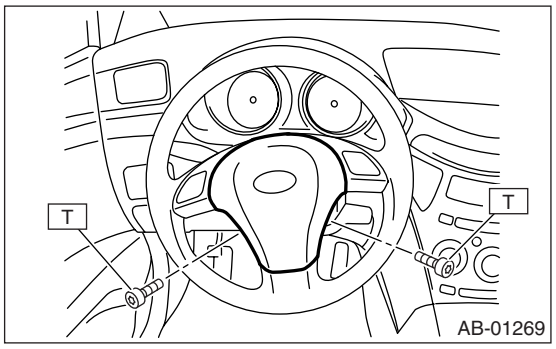
1. General Description

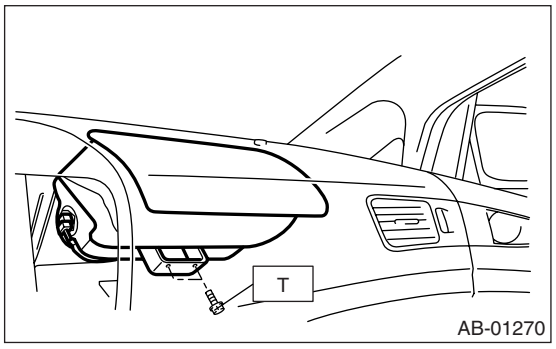
A: COMPONENT

1. DRIVER'S AIRBAG MODULE



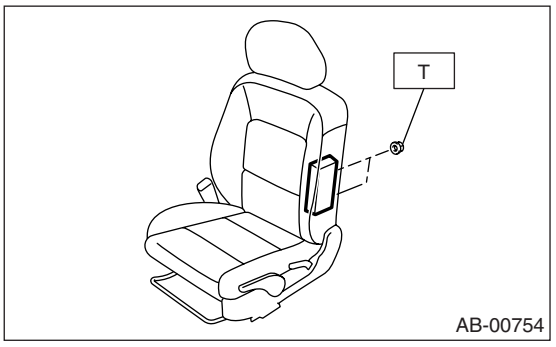
Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

2. PASSENGER'S AIRBAG MODULE



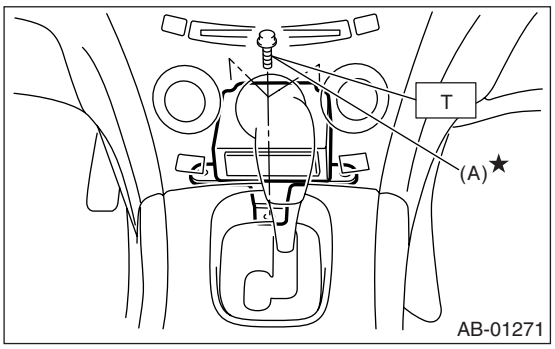
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.5 ft-lb)

3. SIDE AIRBAG MODULE



Tightening torque:
6 N·m (0.61 kgf-m, 4.4 ft-lb)

4. AIRBAG CONTROL MODULE

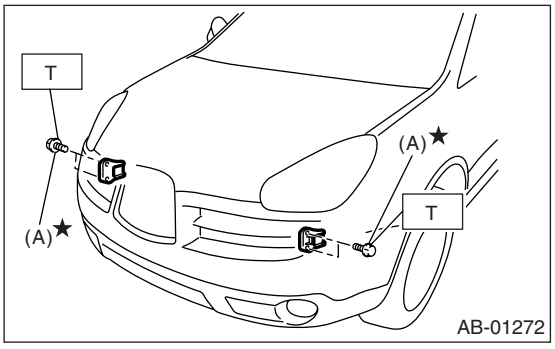


(A) Bolt

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

CAUTION:
Do not reuse mounting bolts and nuts.

5. FRONT SUB SENSOR

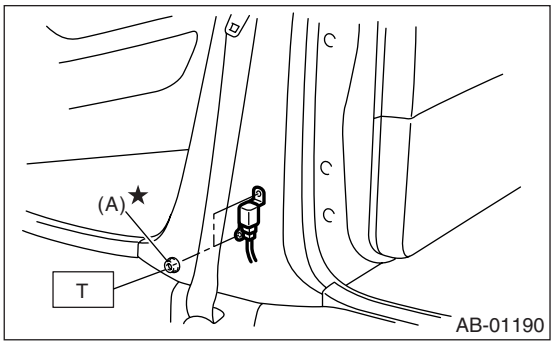


(A) Bolt

Tightening torque:
13 N·m (1.32 kgf-m, 9.6 ft-lb)

CAUTION:
Do not reuse mounting bolts and nuts.

6. SIDE AIRBAG SENSOR

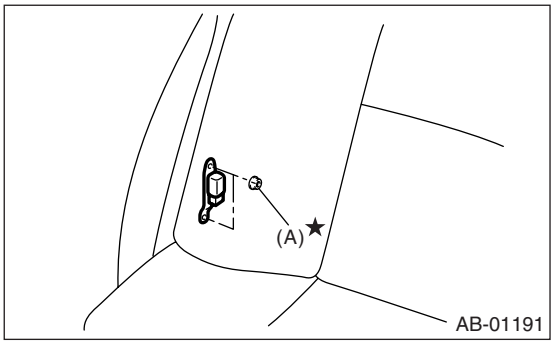


(A) Bolt

Tightening torque:
8 N·m (0.82 kgf-m, 5.9 ft-lb)

CAUTION:
Do not reuse mounting bolts and nuts.

7. CURTAIN AIRBAG SENSOR

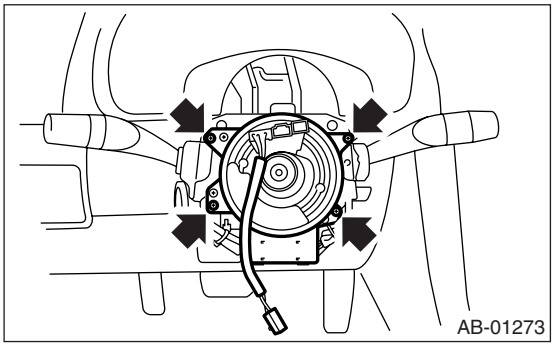


(A) Nut

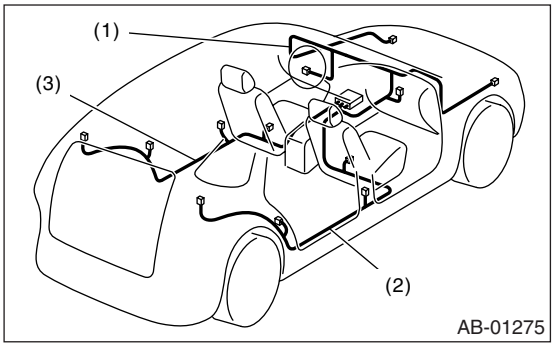
Tightening torque:
8 N·m (0.82 kgf-m, 5.9 ft-lb)

CAUTION:
Do not reuse mounting bolts and nuts.

8. STEERING ROLL CONNECTOR

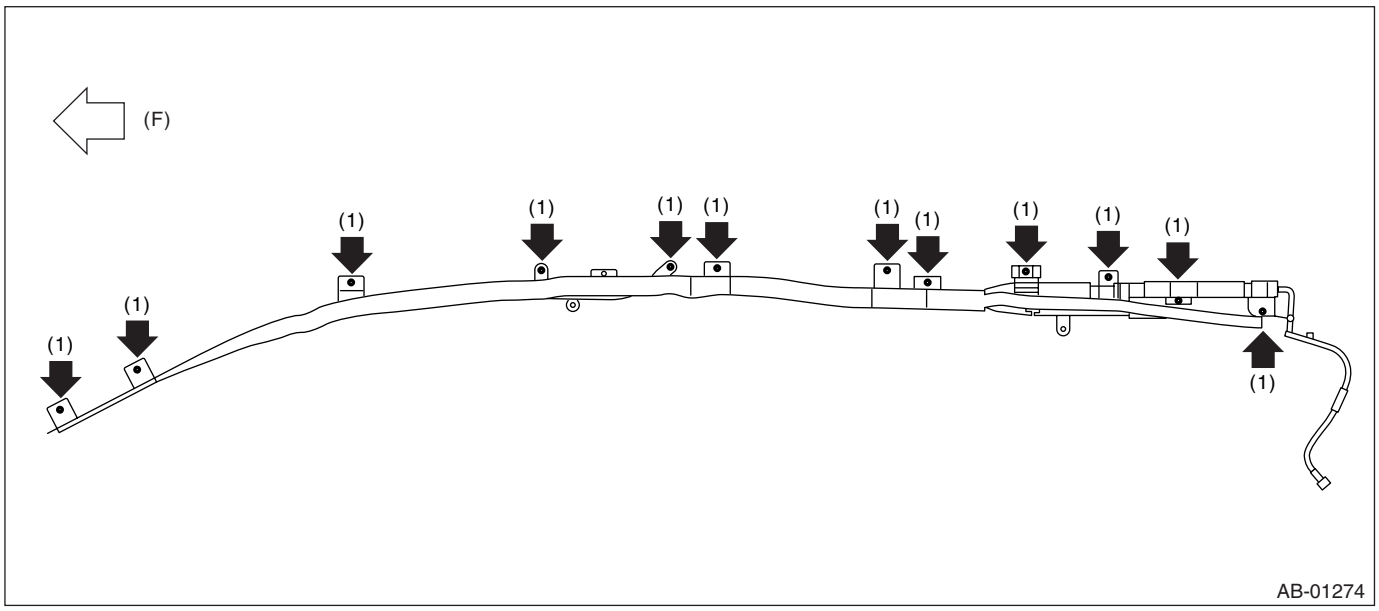


9. AIRBAG HARNESS



(1) Airbag main harness
(2) Airbag rear harness RH
(3) Airbag rear harness LH

10.CURTAIN AIRBAG MODULE

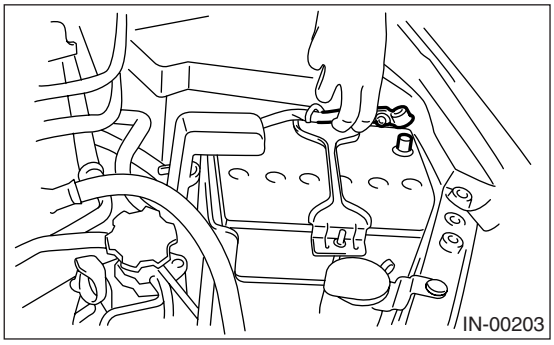


(F) Front side
(1) Bolt

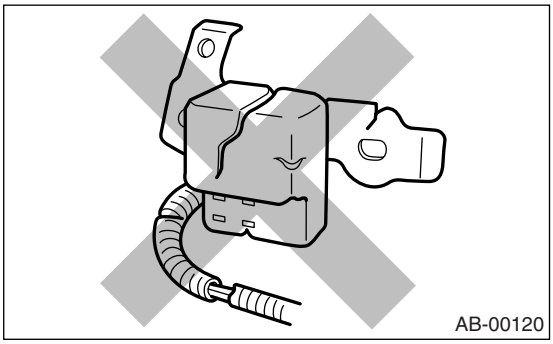
Tightening torque:
7.5 N·m (0.77 kgf-m, 5.5 ft-lb)

B: CAUTION

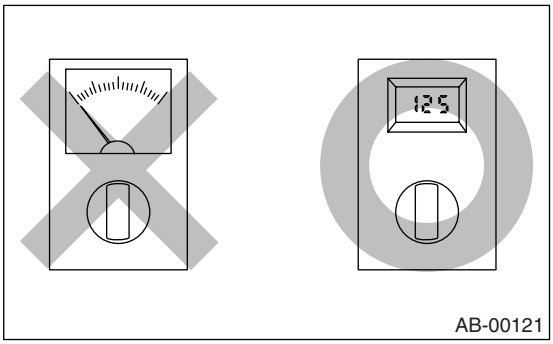
• When servicing a vehicle, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait for more than 20 seconds before starting work.
• The airbag system is fitted with a backup power source. After disconnecting the battery ground cable, the airbag may deploy if you do not wait for more than 20 seconds before starting the service of airbag system.



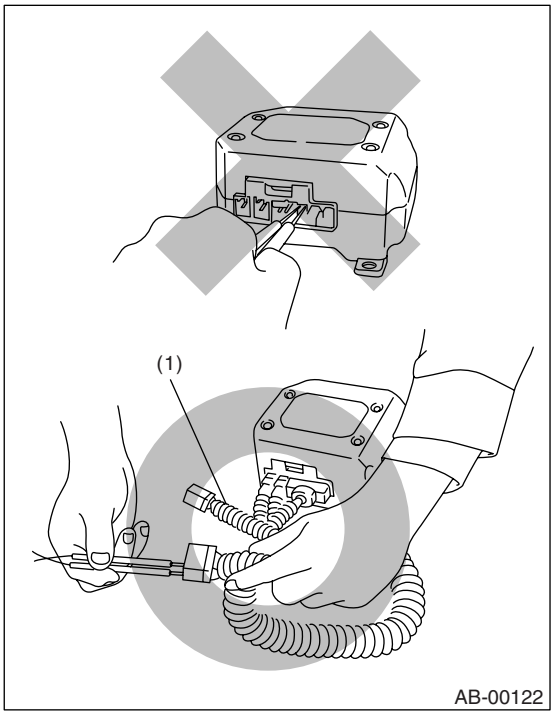
• If the airbag warning light illuminates, repair the vehicle immediately. Otherwise, the airbag or pretensioner may inflate incorrectly, or not inflate in collision.
• If sensors, airbag module, airbag control module, pretensioner or harness is deformed or damaged, replace with new part.



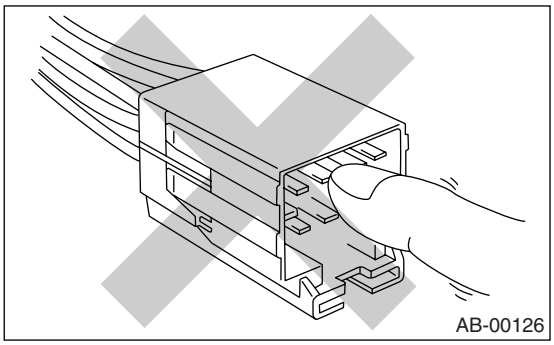
• When checking the airbag system, be sure to use a digital circuit tester. Use of an analog circuit tester may cause the airbag to activate erroneously due to a minimal current inside tester.



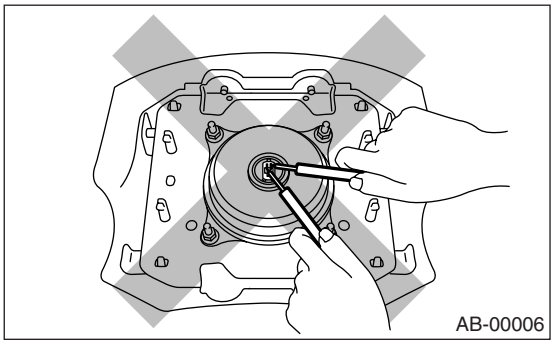
• When checking, use a test harness (1). Damage to connector terminal cause malfunction. Do not directly apply the tester probe to connector terminal of airbag.



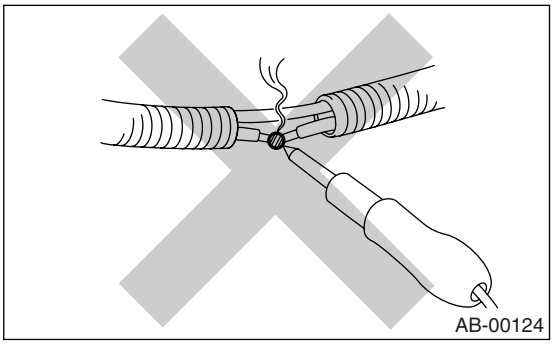
• Do not allow water or oil to come in contact with the connector terminals. Also do not touch the connector terminals.



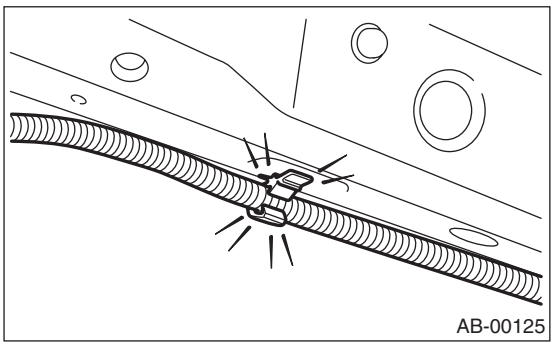
• Do not check continuity of the airbag modules for driver's side, passenger's side and curtain, or the pretensioner.



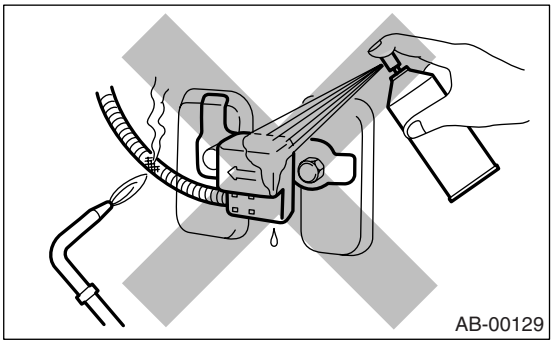
• If damage, open circuit or rust is found on airbag system wire harness, do not use a soldering equipment to repair. Replace the faulty harness with a new genuine part.



• Install the wire harness securely with the specified clips to avoid interference or tangled with other parts.

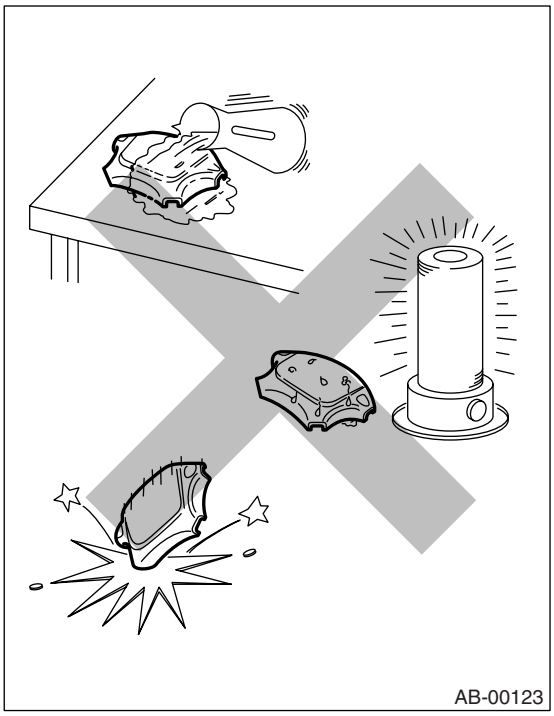


• When painting or performing sheet metal work on the front part of the vehicle, including the front wheel apron, front fender and front side frame, remove the front sub sensors and wire harness of airbag system.
• When painting or performing sheet metal work on the side of the vehicle, including the side sill, center pillar and front and rear doors, remove the side airbag sensors and wire harness of the airbag system.

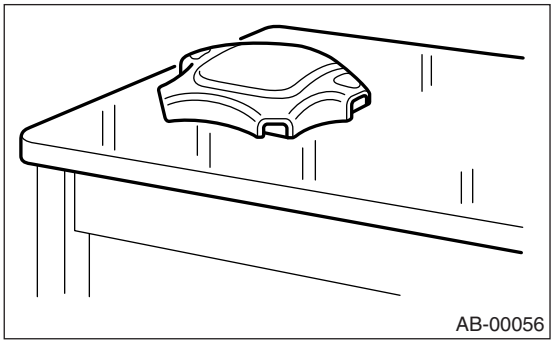


• Do not use the airbag or pretensioner parts from other vehicles. Always replace the defective parts with new parts.
• Never reuse a deployed airbag module and pretensioner.

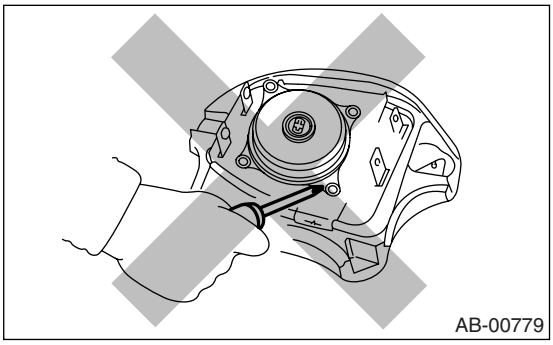
• Do not discard the uninflated airbag or pretensioner.
• When airbag control module, front sub sensor, side airbag sensor and curtain airbag sensor are removed, do not reuse the bolts and nuts of them. Always use new bolts and nuts for them.
• Do not drop each airbag module, airbag control module and each sensor, or store these parts under high temperature over 93°C (199°F), or let water, oil or grease get on them; the internal parts may be damaged or the reliability may be greatly lowered.


AB-00123

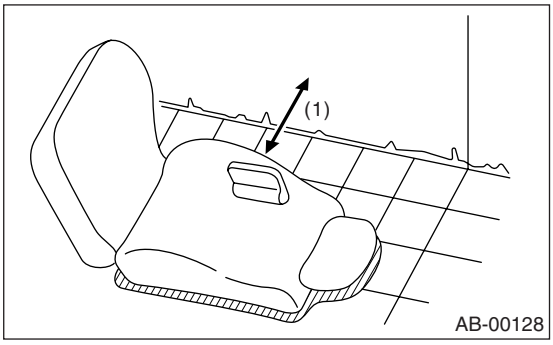
• After removal of each parts for airbag system, keep them with the pad facing upward on a dry, clean and flat surface without heat, light sources, moisture and dust.


AB-00056

• The airbag modules for driver's, passenger's, side or curtain, or the pretensioner must not be disassembled.


AB-00779

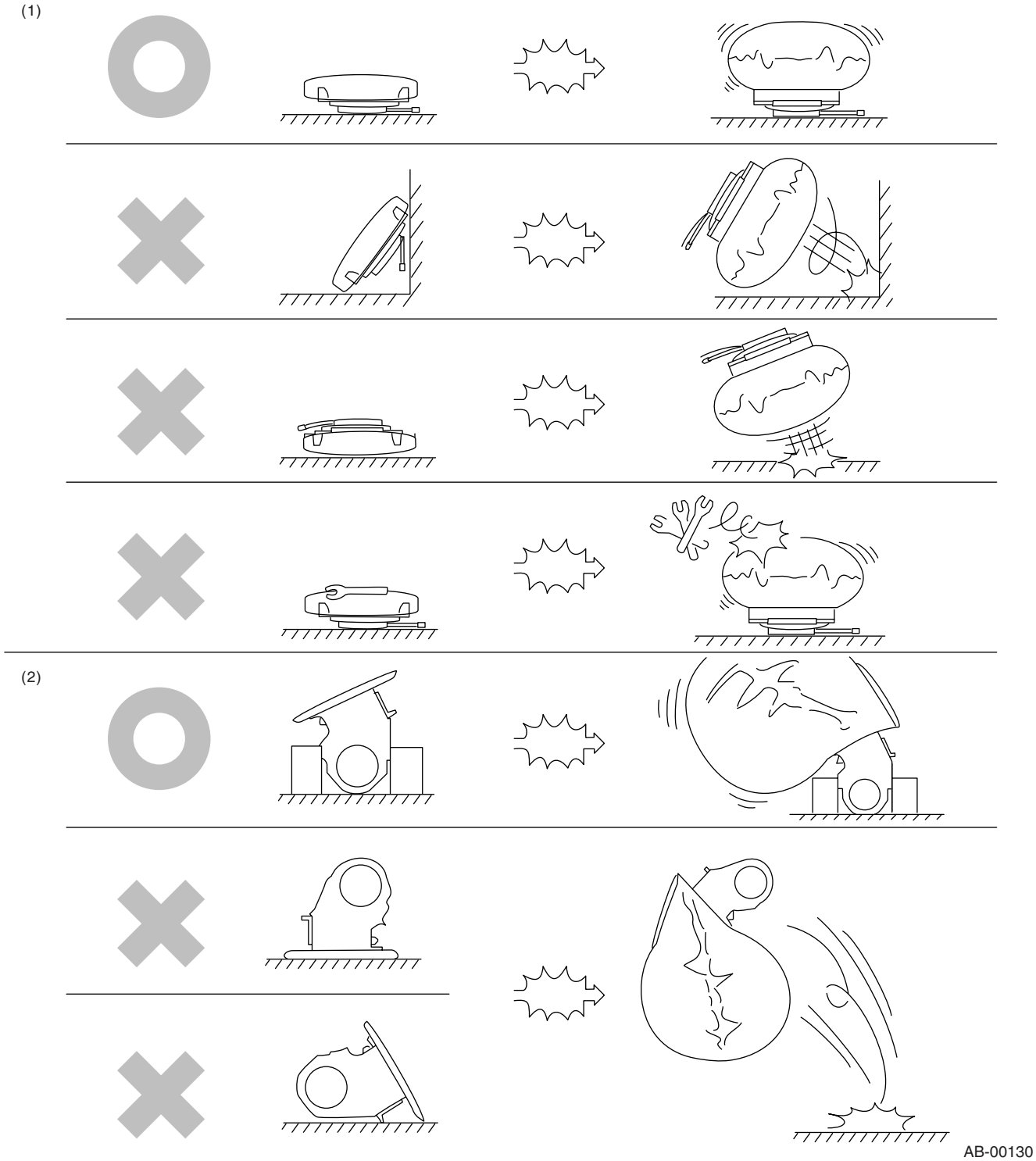
• When performing attachment of the steering wheel and steering roll connector, make sure to perform adjustment of the steering roll connector.
• The removed front seat with airbag module must be kept at least 200 mm (8 in) away from walls and other objects.



AB-00128

(1) 200 mm (8 in) or more

• When storing a removed airbag module, do not place any objects on it or pile them up. If the airbag inflates for some reason when it is placed with its pad side facing downward or under any object, a serious accident may result.



(1) Driver's airbag module (2) Passenger's airbag module

C: PREPARATION TOOL

1. GENERAL TOOL

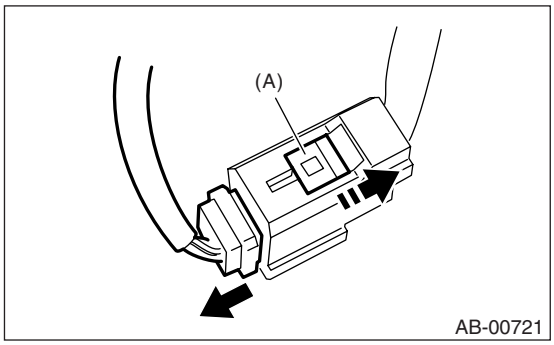
TOOL NAME	REMARKS
TORX® bit T30	Used for removing and installing driver's airbag module.

2. Airbag Connector

A: PROCEDURE

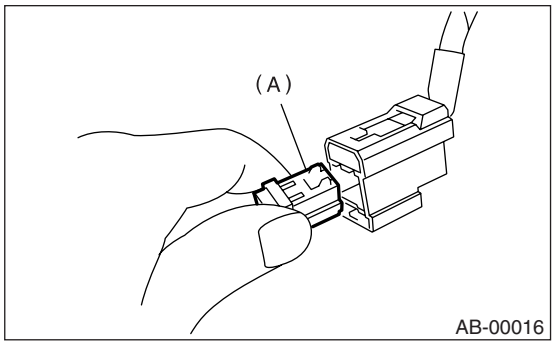
1. POWER SUPPLY, BUCKLE SWITCH

1) How to disconnect:
(1) Move the slide lock (A) in the direction of arrow.
(2) While holding the slide lock (A) in that position, separate the connector.



CAUTION:
When pulling the slide lock or disconnecting connector, be sure to hold the connector, not the harness.

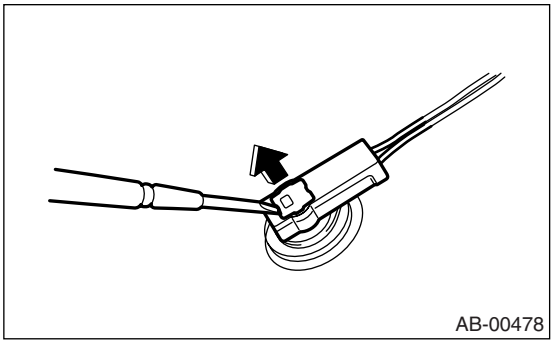
2) How to connect:
Holding the connector (A), and push it in carefully until a clicking sound is heard.



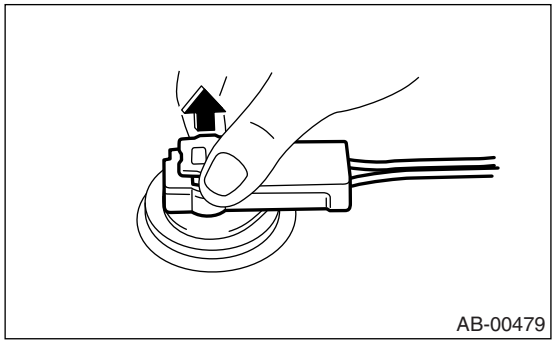
CAUTION:
Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.

2. DRIVER'S AIRBAG MODULE AND PRETENSIONER

1) How to disconnect:
(1) Using a flat tip screwdriver, pry the push lock upward to unlock.

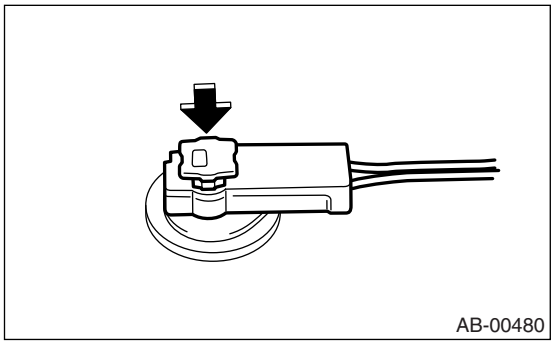


(2) Pull and disconnect the connector from the driver's airbag module assembly or retractor assembly.



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.

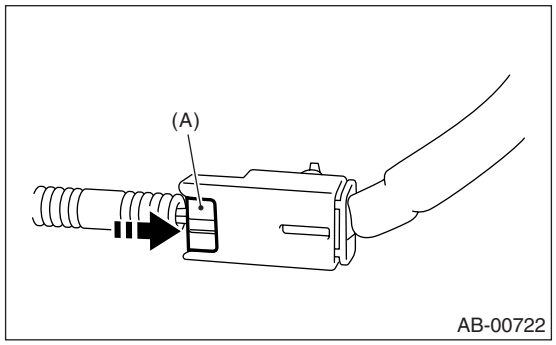
CAUTION:
- **Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.**
- **Be sure to push the push lock in securely.**



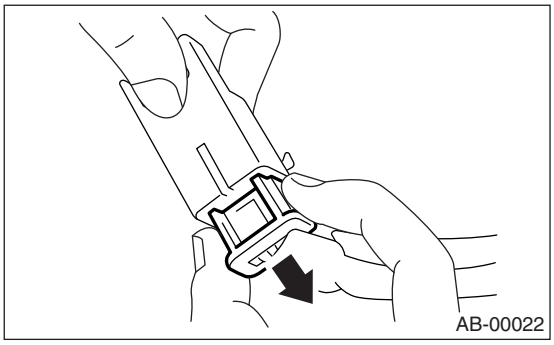
NOTE:
The connector can not be connected when the push lock is in the lock position. To connect the connector, set the push lock to unlock position.

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.



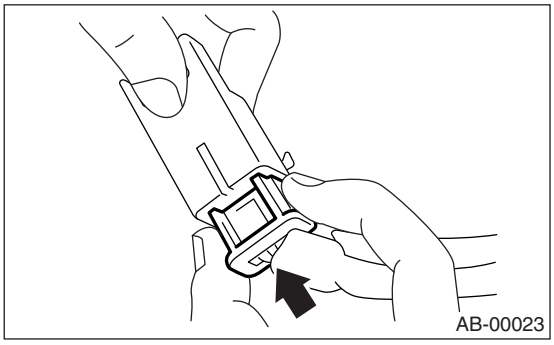
(2) With the slide lock pushed, disconnect the connector.



CAUTION:
When pulling the slide lock or disconnecting connector, be sure to hold the connector, not the harness.

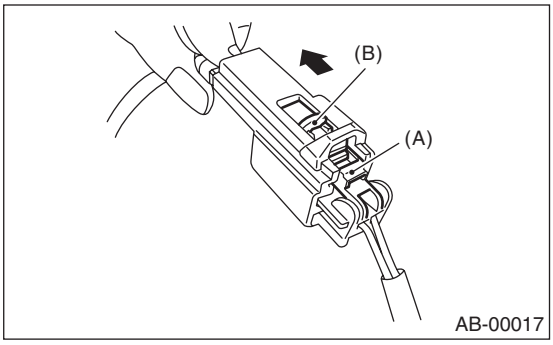
2) How to connect:
Holding the connector, push it in securely until a clicking sound is heard.

CAUTION:
Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.



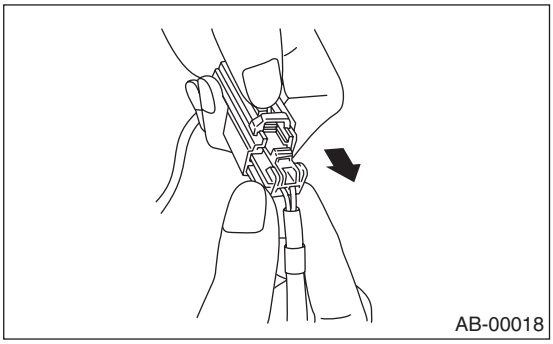
4. SIDE AIRBAG AND CURTAIN AIRBAG

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.



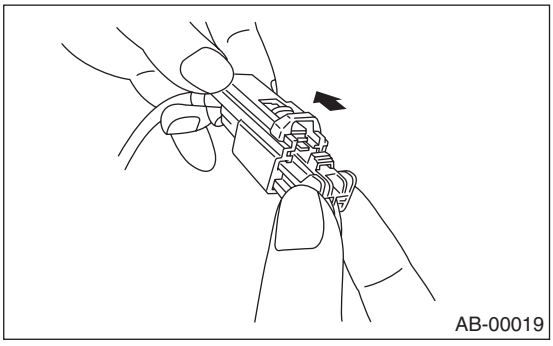
(3) While holding the slide lock in that position, release the lock arm (back to the original position), and disconnect the connector.

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.

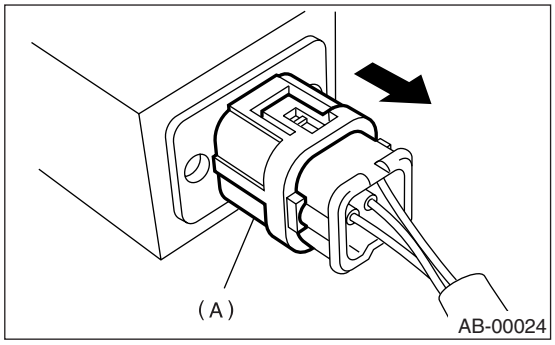
CAUTION:
Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.



5. FRONT SUB SENSOR, SIDE AIRBAG SENSOR, CURTAIN AIRBAG SENSOR AND SEAT POSITION SENSOR

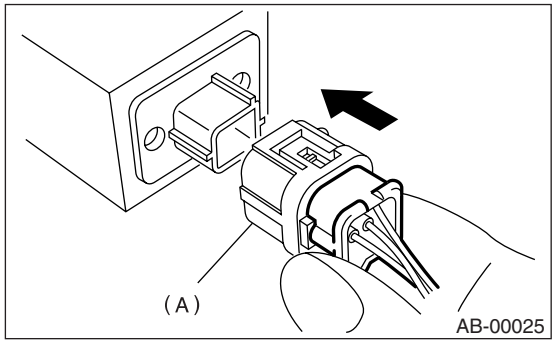
1) How to disconnect:
Holding outer part (A), pull it in the direction of arrow.

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.

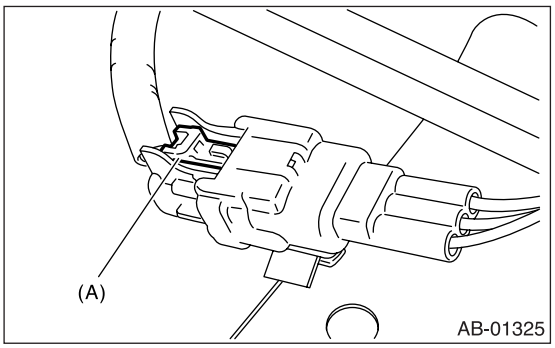
CAUTION:
• Outer side (A) move back, and so do not put your hand on the outer part.
• Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.



6. PASSENGER DETECTION SYSTEM (BETWEEN AIR BAG 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.

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 (L/R)
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)

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, there is a good chance that the shock absorbing part of steering shaft may have 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 frame, backrest, seat rail and headrest for deformation, distortion, crack, and installing condition and play.
4) For passengers seat, replace the seat cushion frame assembly with new one if the seat cushion frame 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)-18, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>
7) Use the Subaru Select Monitor to check whether the drivers seat position sensor and the drivers and the front left/right seat belt buckle switches are operating normally.

B: INSPECTION

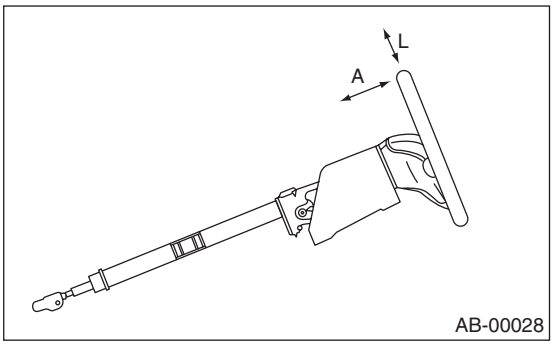
If the vehicle is involved in a collision, even if it is a slight collision, be sure to check the following systems.

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 7 mm (0.28 in)



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

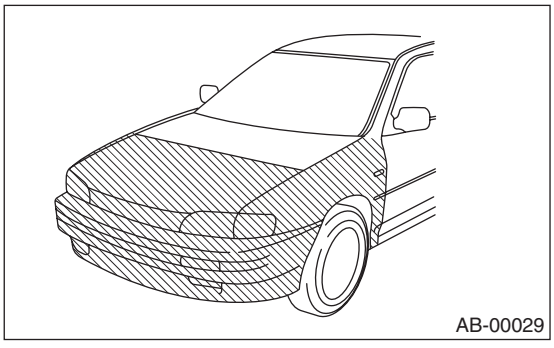
Check for the following, and replace the damaged parts with new parts.
- Airbag cover is scratched or broken.
- Harness and/or connector is cracked, deformed or open. Harness wire is exposed.
- Mounting bracket and securing clip are cracked or deformed.

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.
- Airbag is deployed.
- Side airbag is deployed.
- Curtain airbag is deployed.

6. FRONT SUB SENSOR

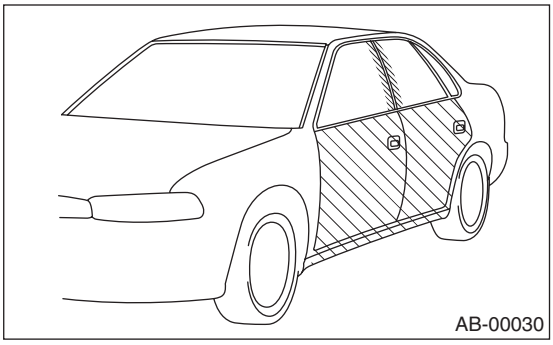
If the section of vehicle as shown in the figure is damaged, check the following items and replace the damaged parts with new parts.



- Front sub sensor is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Airbag is deployed.

7. SIDE AIRBAG SENSOR AND CURTAIN AIRBAG 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 and curtain airbag 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)

8. ROLL CONNECTOR

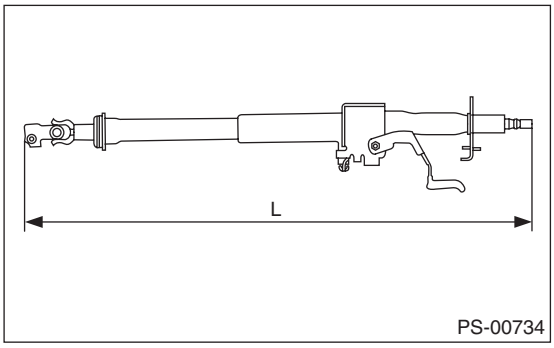
Check for the following, and replace the damaged parts with new parts.
- Combination switch or steering roll connector is cracked or deformed.

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
$917.5^{+1.3}_{-0.3}$ mm ($36.12^{+0.051}_{-0.012}$ 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.

11.PASSENGER'S SEAT

1) Check for the following, and replace the damaged parts with new parts.
• Seat belt buckle body/bracket is scratched, cracked or deformed.
• Backrest frame for crack or deformation
• Headrest for deformation or play
• If the seat cushion cover and seat back cover is scratched or coming loose, replace with a new cover and readjust the system. <Ref. to OD(diag)-18, 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)-18, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>

12.BELT TENSION SENSOR

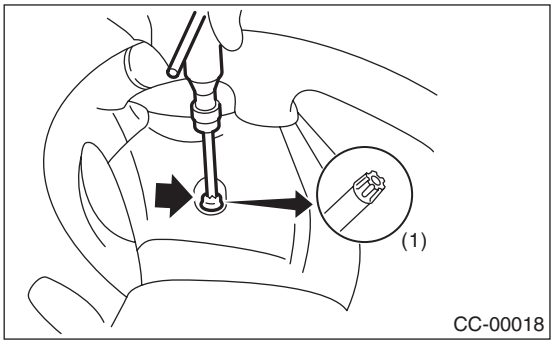
Check for the following, and replace the damaged parts with new parts.
• Belt tension sensor is scratched, cracked, or deformed.
• Harness and/or connector is cracked, deformed or open. Harness wire is exposed.

4. Driver's Airbag Module

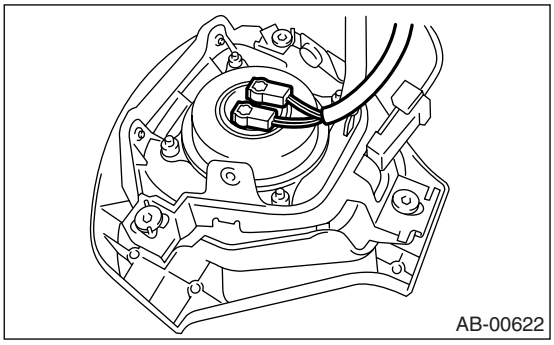
A: REMOVAL

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 more than 5 m (16 ft) 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 20 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-9, PROCEDURE, Airbag Connector.>



7) Refer to "CAUTION" for handling of a removed airbag module. <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.>

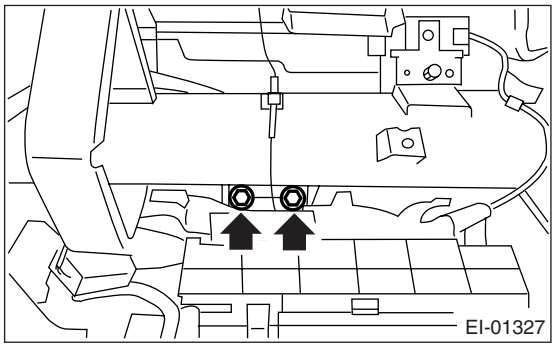
Check for the following, and replace the damaged parts with new parts.
• Airbag module, harness, connector and mounting bracket are damaged. <Ref. to AB-12, DRIVER'S AIRBAG MODULE, INSPECTION, Inspection Locations After a Collision.>

5. Passenger's Airbag Module

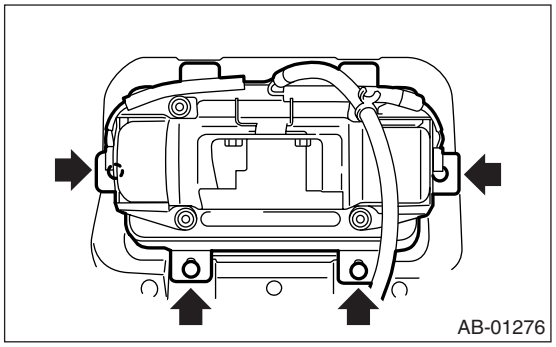
A: REMOVAL

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 20 seconds before starting work.
3) Remove the glove box. <Ref. to EI-37, REMOVAL, Glove Box.>
4) Remove the mounting bolts of the passenger's side air bag module.



5) Remove the instrument panel upper. <Ref. to EI-40, INSTRUMENT PANEL UPPER, REMOVAL, Instrument Panel Assembly.>
6) Remove the screws, and remove the passenger's airbag module.



7) Refer to "CAUTION" for handling of a removed airbag module. <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-13, PASSENGER'S AIRBAG MODULE, INSPECTION, Inspection Locations After a Collision.>

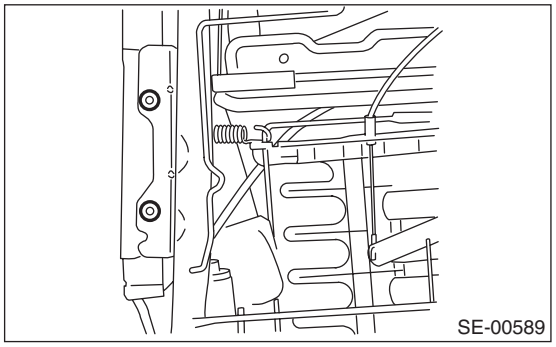
6. Side Airbag Module

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 20 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-7, DISASSEMBLY, Front Seat.>
6) Remove the nuts, and remove the side airbag module assembly from the back rest frame assembly.

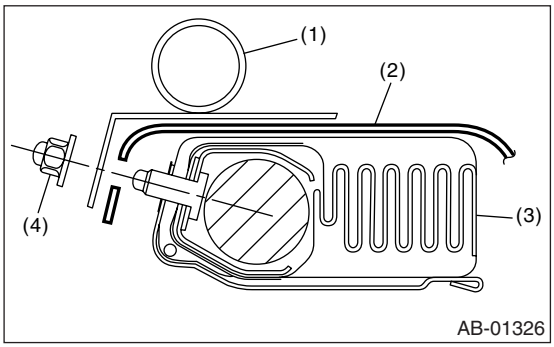


B: INSTALLATION

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)-18, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>**

1) Make sure that there is no foreign matter on side airbag module.
2) Install the side airbag module (A) to backrest frame assembly.

CAUTION:
When attaching the side airbag module assembly, make sure to sandwitch the seat back cover between the seat back side bracket and side airbag module.



(1) Backrest frame ASSY
(2) Backrest cover
(3) Side airbag module ASSY
(4) Hexagon cap nut

Tightening torque:
6.0 N·m (0.61 kgf-m, 4.4 ft-lb)

3) Install the backrest cover. <Ref. to SE-10, ASSEMBLY, Front Seat.>
4) Draw the side airbag harness around the back side of seat cushion assembly.
5) 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.

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-13, 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

2) When damage is found by visual check
- Headrest assembly
- Bushing
- Slide rail OUT (Driver's side)
- Slide rail IN (Driver's side)
- Seat cushion frame assembly (Passenger's side)
- Seat hinge cover
- Seat lifter lever
- Reclining lever
- Side airbag harness and connector on body side

3) With side collision (when side airbag is not deployed)
Check the seat and airbag module visually, and then replace them with new ones if damaged or cracked.
Specially inspect the damage of airbag module body, mounting bracket and harness connector.

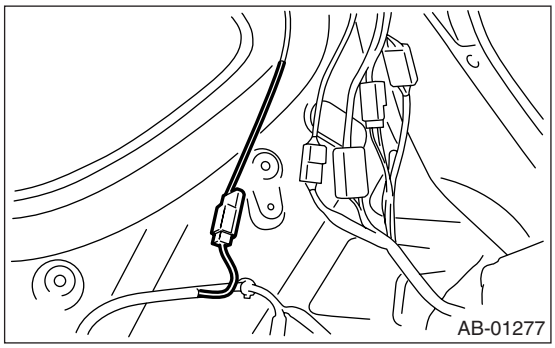
4) Without side collision (dirt and damage of cover)
Replace the corresponding part with a new one.

7. Curtain Airbag Module

A: REMOVAL

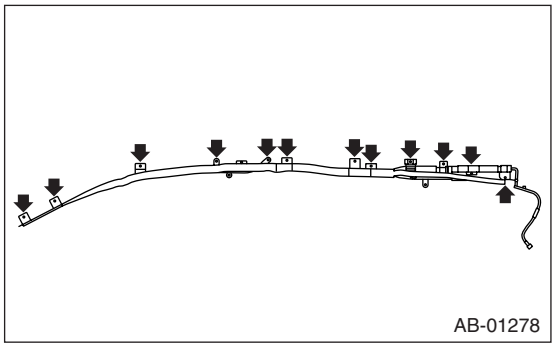
CAUTION:
Refer to "CAUTION" of "General Description" before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the front pillar upper trim and center pillar upper trim. <Ref. to EI-43, FRONT PILLAR UPPER TRIM, REMOVAL, Side Trim.> <Ref. to EI-44, CENTER PILLAR UPPER TRIM, REMOVAL, Side Trim.>
4) Remove the rear quarter trim. <Ref. to EI-45, REMOVAL, Rear Quarter Trim.>
5) Remove the roof trim. <Ref. to EI-50, REMOVAL, Roof Trim.>
6) Disconnect the curtain airbag module connector.

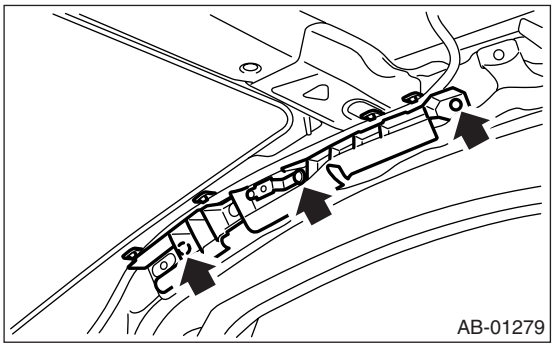

AB-01277

7) Remove the bolts, and then 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.


AB-01278

8) Remove the front piller from front pillar pad.


AB-01279

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 (0.77 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-13, 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 piller pad (blue)
- Center pillar upper trim
- Center piller pad (green)
- Rear quarter upper trim
- Rear quarter piller pad (red)
- Airbag guide

2) When damage is found by visual check
- Assist grip
- Assist grip bracket
- Curtain airbag harness and connector on body side.

3) With side collision (when curtain airbag is not deployed)
Check the roof trim, pillar trim and airbag module visually, and then replace them with new ones if damaged or cracked.
Specially inspect the damage of airbag module body, mounting bracket and harness connector.

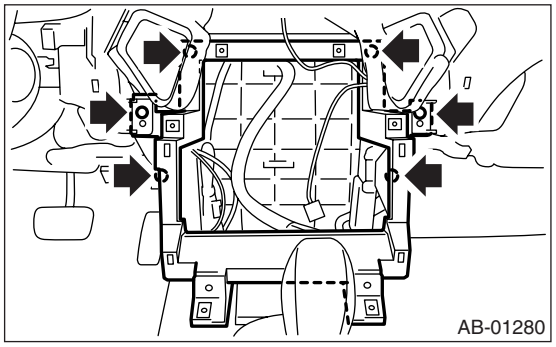
4) Without side collision (dirt and damage of cover)
Replace the corresponding part with a new one.

8. Airbag Control Module

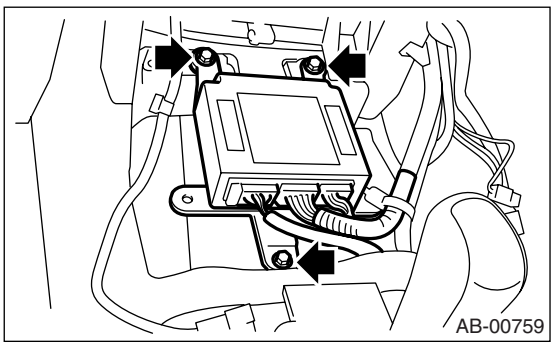
A: REMOVAL

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 one.
• 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 20 seconds before starting work.
3) Remove the center console. <Ref. to EI-39, REMOVAL, Center Console.>
4) Remove the console box. <Ref. to EI-38, REMOVAL, Console Box.>
5) Remove the instrument panel lower cover. <Ref. to EI-36, REMOVAL, Instrument Panel Lower Cover.>
6) Remove the glove box. <Ref. to EI-37, REMOVAL, Glove Box.>
7) Remove the audio unit. <Ref. to ET-14, 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)

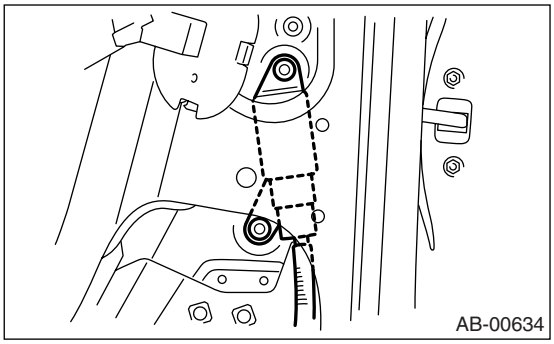
C: INSPECTION

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

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the center pillar lower trim. <Ref. to EI-44, CENTER PILLAR LOWER TRIM, REMOVAL, Side Trim.>
4) Remove the seat belt retractor of the front outer seat belt. <Ref. to SB-10, 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:
8 N·m (0.82 kgf-m, 5.9 ft-lb)

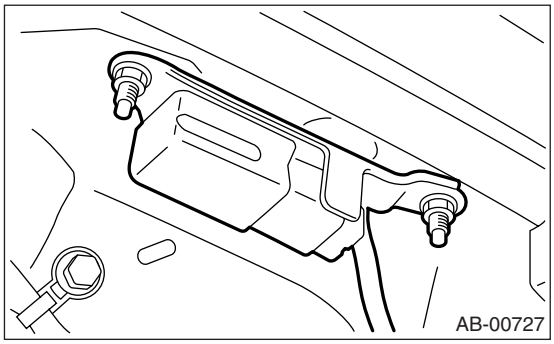
C: INSPECTION

Check for the following, and replace the damaged parts with new parts.
- Mounting bracket or connector of side airbag sensor is damaged.
- Side airbag is deployed.

10.Curtain Airbag Sensor

A: REMOVAL

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the rear quarter lower trim. <Ref. to EI-45, 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:
8 N·m (0.82 kgf-m, 5.9 ft-lb)

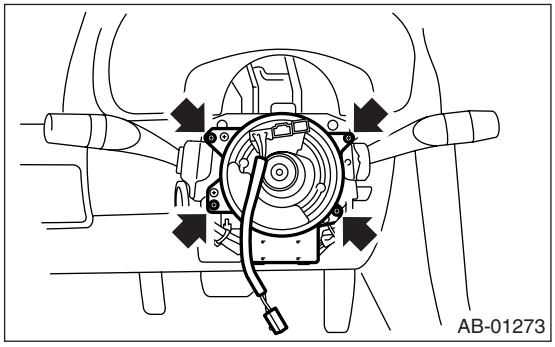
C: INSPECTION

Check for the following, and replace the damaged parts with new parts.
- Mounting bracket or connector of curtain airbag sensor is damaged.
- Curtain airbag is deployed.

11.Roll Connector

A: REMOVAL

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the driver's airbag module. <Ref. to AB-15, 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

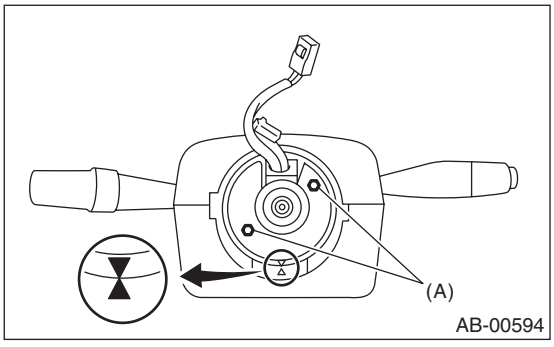
1) Install in the reverse order of removal.
2) Before installing steering wheel, be sure to adjust the direction of roll connector with steering. <Ref. to AB-24, ADJUSTMENT, Roll Connector.>

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

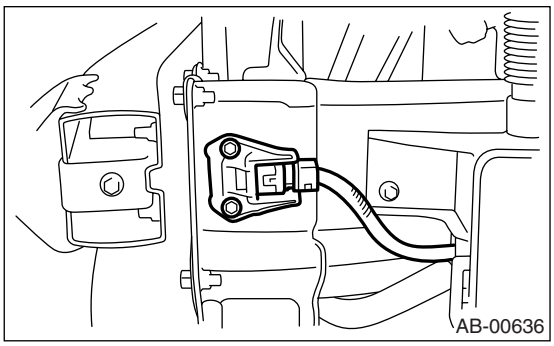
1) Check that front wheels are positioned in straight ahead direction.
2) Turn the roll connector pin (A) clockwise until it stops.
3) Turn the roll connector pins (A) approx. 3.25 turns until "▲" marks are aligned.



12.Front Sub Sensor

A: REMOVAL

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the front bumper face. <Ref. to EI-21, 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, mounting bracket and connector are damaged.
- Airbag is deployed.

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK WARNING LIGHT.** 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	**READ DTC.** 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 the Subaru Select Monitor power switch to ON. 4) Read the DTC. <Ref. to AB(diag)-36, 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 AB(diag)-33, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.> 5) Record all DTCs and freeze frame data.	Is DTC displayed?	Go to step **3**.	<Ref. to AB(diag)-40, Airbag Warning Light Failure.>Go to “Airbag Warning Light Failure”.
3	**PERFORM DIAGNOSIS.** 1) Judge the possible cause from “List of Diagnostic Trouble Code” <Ref. to AB(diag)-45, 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)-38, Clear Memory Mode.> 5) Perform the inspection mode. <Ref. to AB(diag)-37, Inspection Mode.> 6) Read any other DTCs displayed.	Is DTC displayed?	Perform the procedure 1) to 5) in step 3.	Finish the diagnosis.

2. Check List for Interview

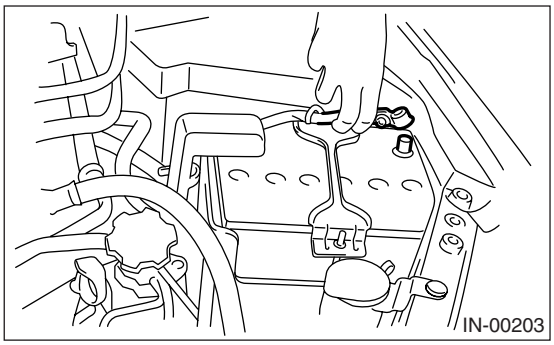
A: CHECK

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	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others:		
Temperature	°C (°F)		
Road condition	❑ Flat road ❑ Uphill ❑ Downhill ❑ Gravel road ❑ Others:		
Vehicle operation	❑ Starting ❑ Idling ❑ Driving ❑ Constant speed ❑ Accelerating ❑ Decelerating ❑ Turning ❑ Others:		
Details of problem			
Airbag warning light operation	❑ Normal (After turning the ignition switch to ON, lit for approximately 6 seconds and goes off.) ❑ Remains ON ❑ Light OFF		
DTC output	❑ OK code ❑ DTC: (Code:)		

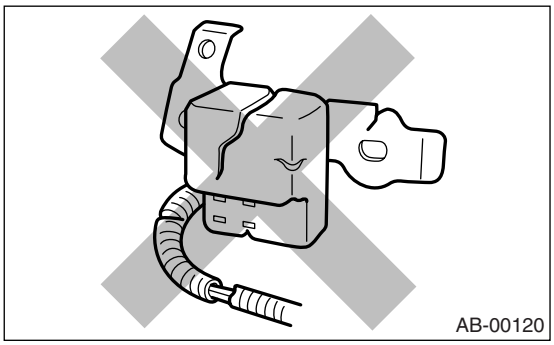
3. General Description

A: CAUTION

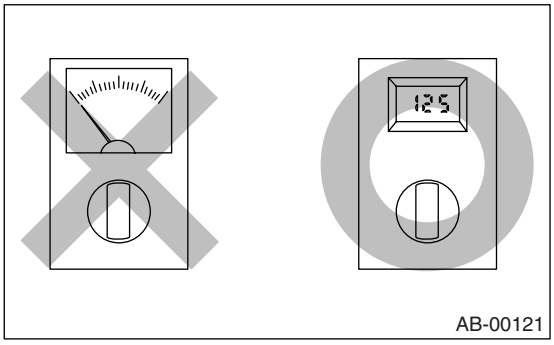
• When servicing a vehicle, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait for more than 20 seconds before starting work.
• The airbag system is fitted with a backup power source. After disconnecting the battery ground cable, the airbag may deploy if you do not wait for more than 20 seconds before starting the service of airbag system.



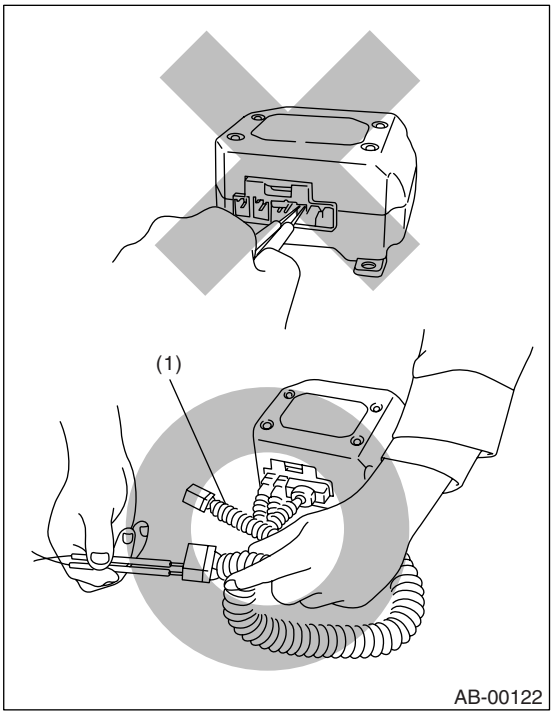
• If sensors, airbag module, airbag control module, pretensioner or harness is deformed or damaged, replace with new part.



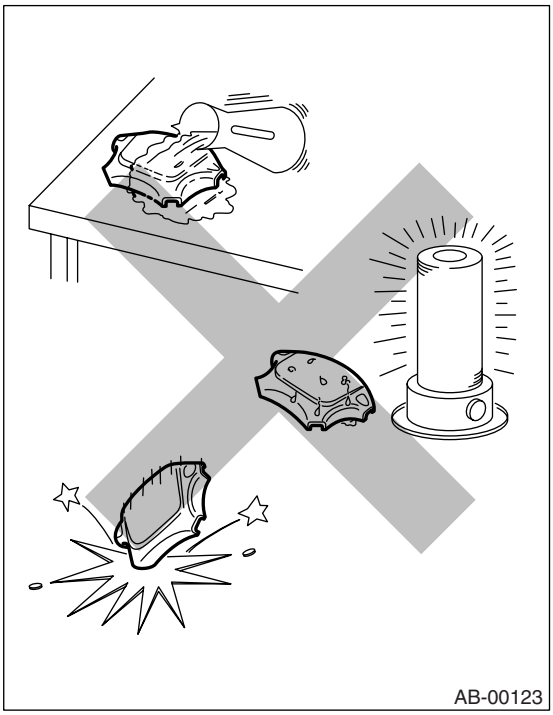
• Do not use the airbag system and pretensioners on other vehicles. When replacing parts, be sure to replace them with new ones.
• When checking the airbag system, be sure to use a digital circuit tester. Use of an analog circuit tester may cause the airbag to activate erroneously due to a minimal current inside tester.



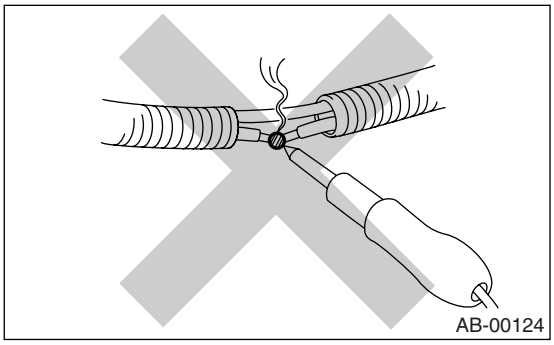
• When checking, use a test harness (1). Damage to connector terminal causes malfunction. Do not directly put the tester probe on airbag connector terminal.



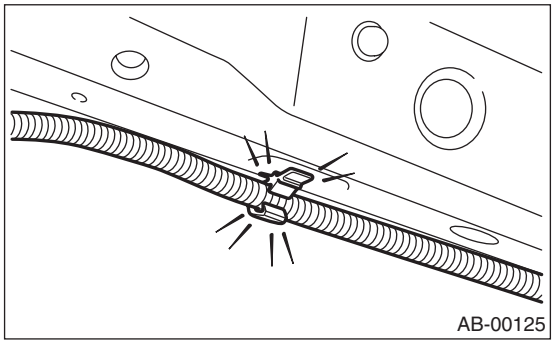
• Do not drop the airbag system parts, or keep them at high temperature over 93°C (199°F), or let water, oil or grease get on them; the internal parts may be damaged and reliability greatly lowered.



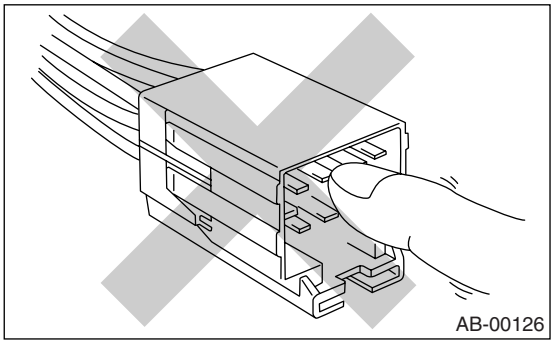
• If damage, open circuit or rust is found on airbag system wire harness, do not use a soldering equipment to repair. Replace the faulty harness with a new genuine part.



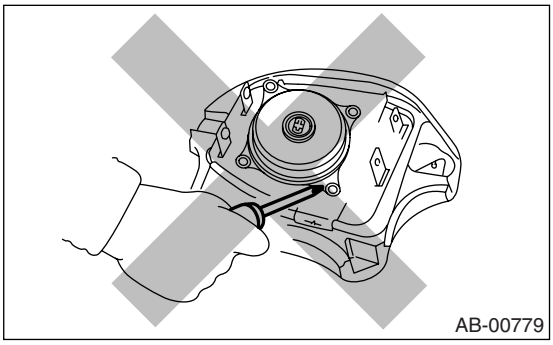
• Install the wire harness securely with the specified clips to avoid interference or tangled with other parts.



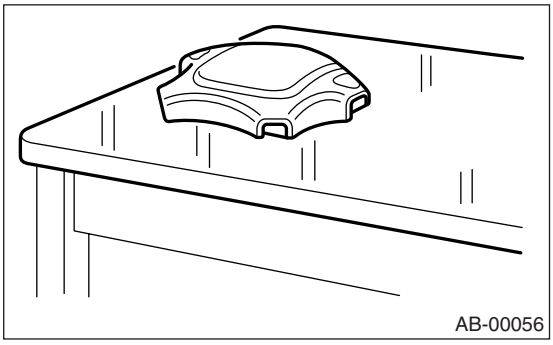
• Do not allow water or oil to come in contact with the connector terminals. Also do not touch the connector terminals.



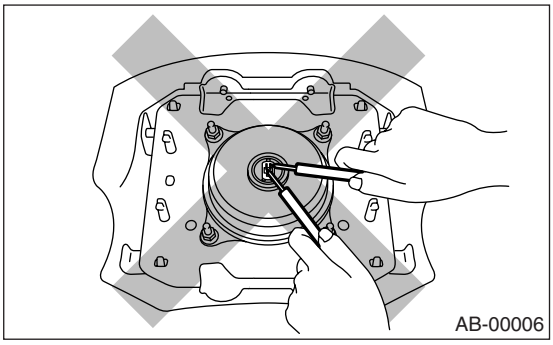
• Either of the airbag modules for driver's, passenger's, side or curtain, or the pretensioner must not be disassembled.



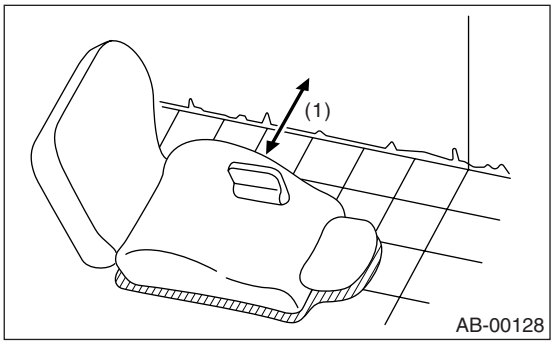
• The airbag module cannot be used again if deployed once.
• After removal, keep the airbag module with the pad side facing upward on a dry, clean and flat surface away from heat, light sources, moisture and dust.



• Do not check continuity of the airbag modules for driver's side, passenger's side and curtain, or the pretensioner.

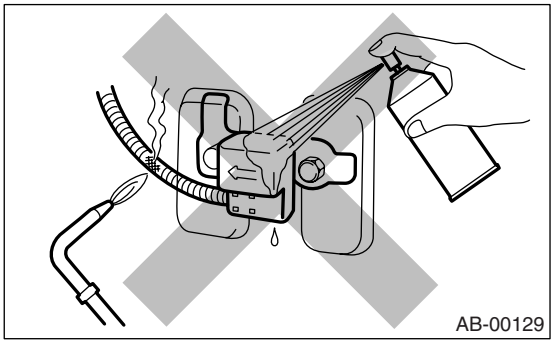


• The removed front seat with airbag module must be kept at least 200 mm (8 in) away from walls and other objects.



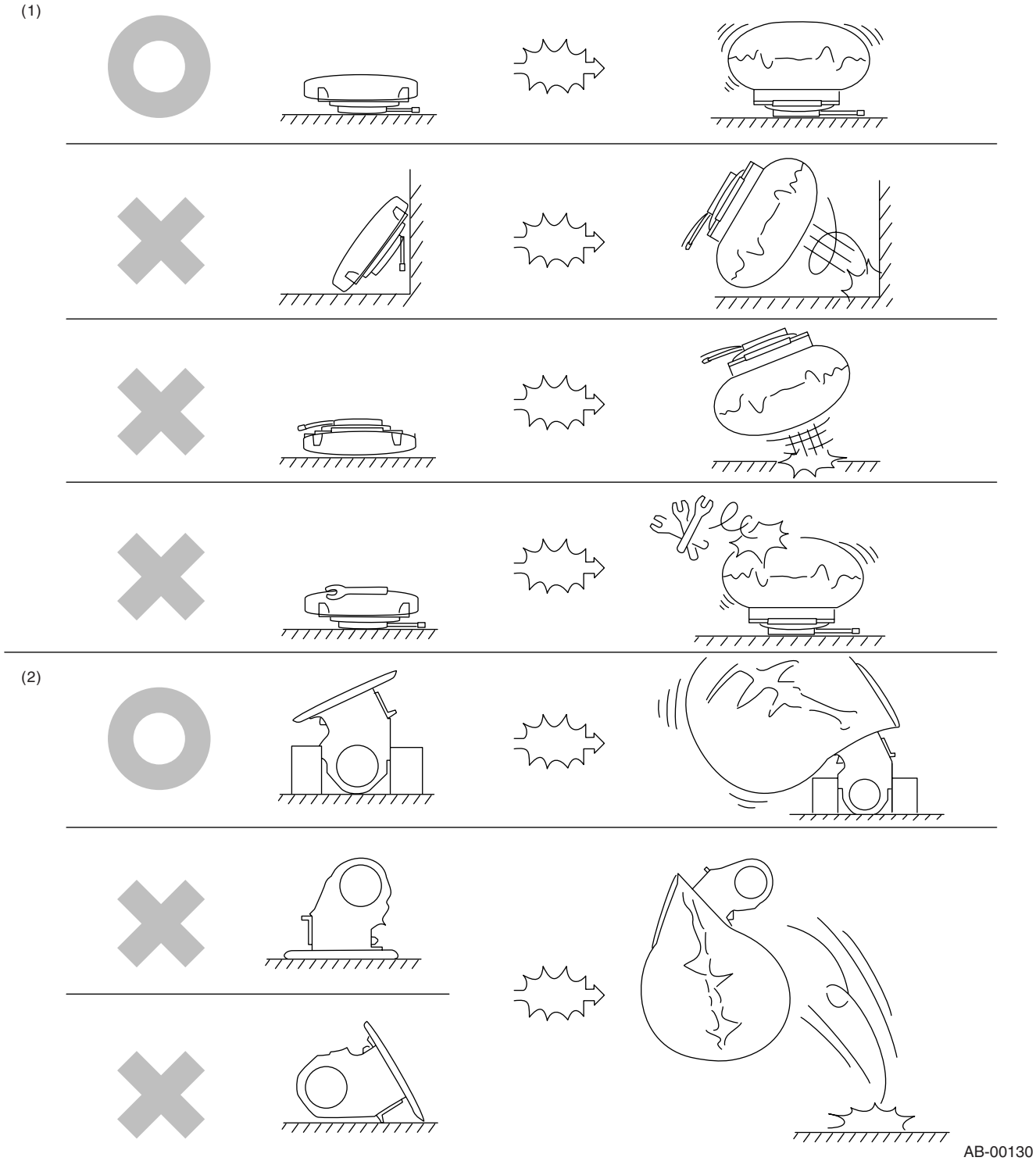
(1) 200 mm (8 in) or more

• When painting or performing sheet metal work on the front part of the vehicle, including the front wheel apron, front fender and front side frame, remove the front sub sensors and wire harness of airbag system.
• When painting or performing sheet metal work on the side of the vehicle, including the side sill, center pillar and front and rear doors, remove the side airbag sensors and wire harness of the airbag system.



• Do not discard undeployed airbag module. They could easily cause a serious accident if accidentally deployed.

• When storing a removed airbag module, do not place any objects on it or pile them up. If the airbag inflates for some reason when it is placed with its pad side facing downward or under any object, a serious accident may result.



(1) Driver's airbag module (2) Passenger's airbag module

B: INSPECTION

Measure the battery voltage and check electrolyte.

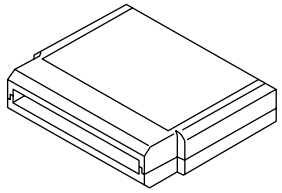
Standard voltage: 12 V

Specific gravity: Above 1.260

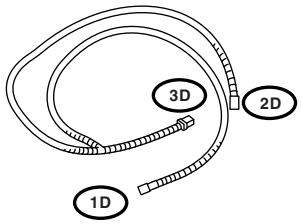
C: PREPARATION TOOL

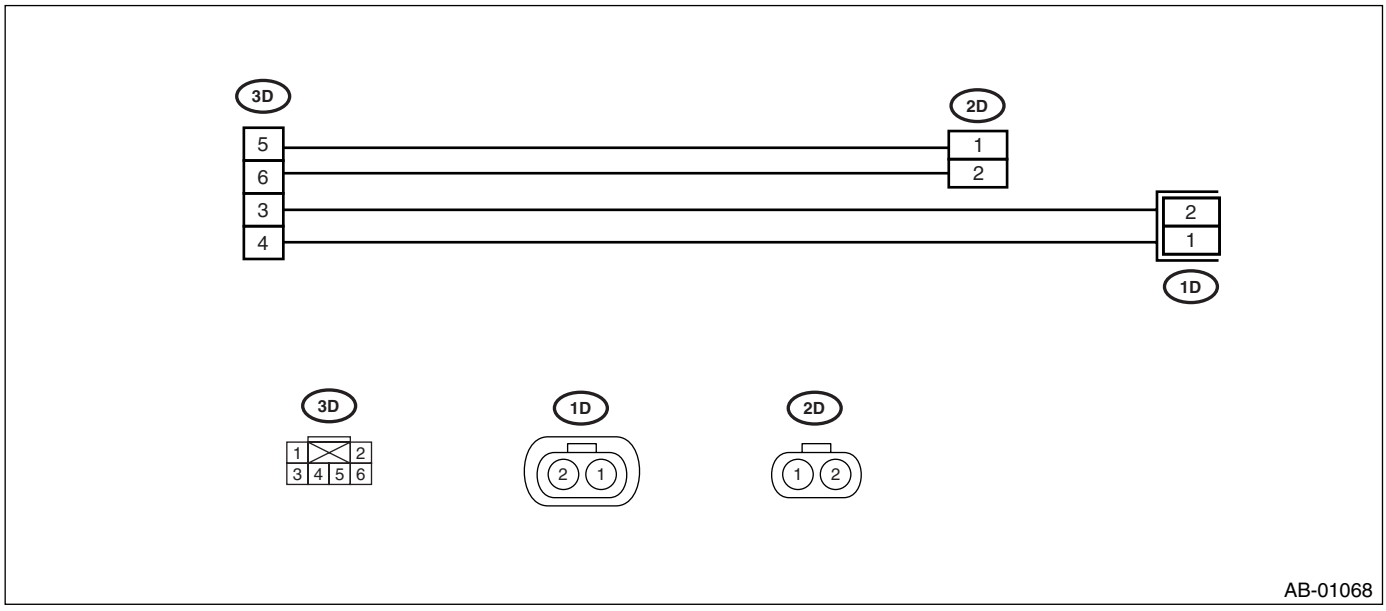
CAUTION:
To measure the voltage and resistance of airbag system component, be sure to use the specified test harness.

1. SPECIAL TOOL

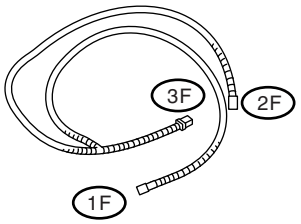
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for the electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for the electrical system.

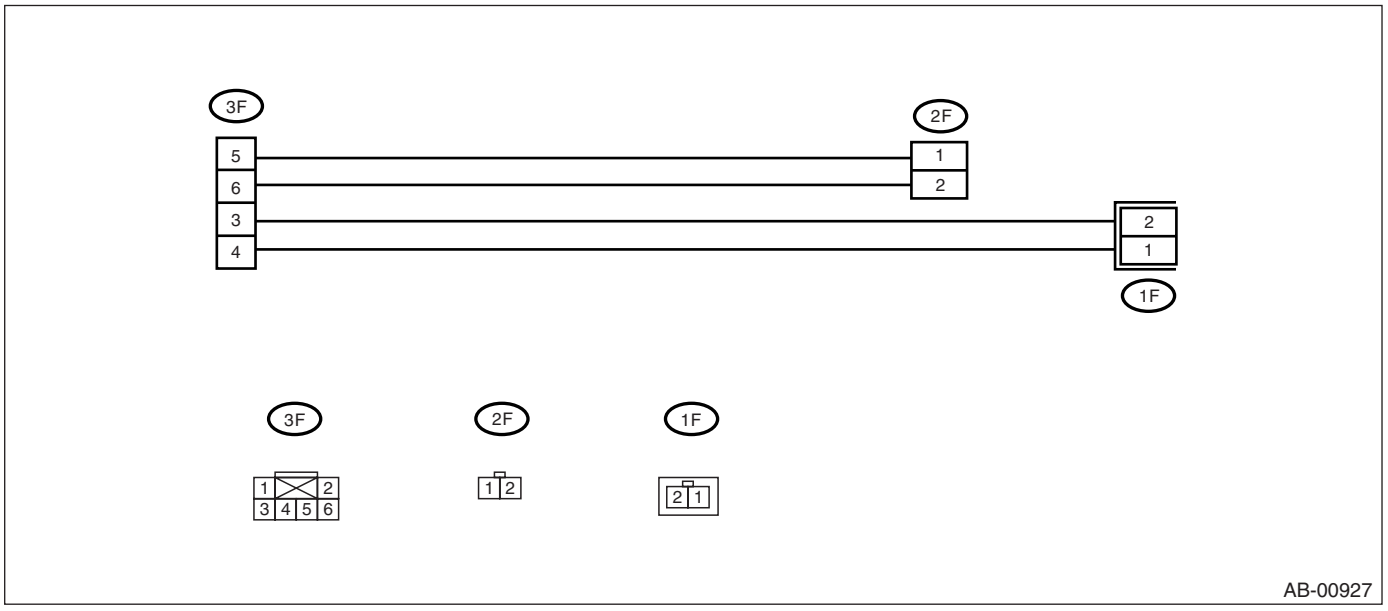
- TEST HARNESS D

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299AG060	98299AG060	TEST HARNESS D	Used when measuring voltage and resistance of the front seat belt buckle switch.

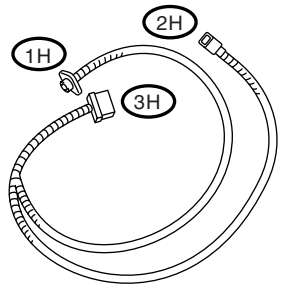


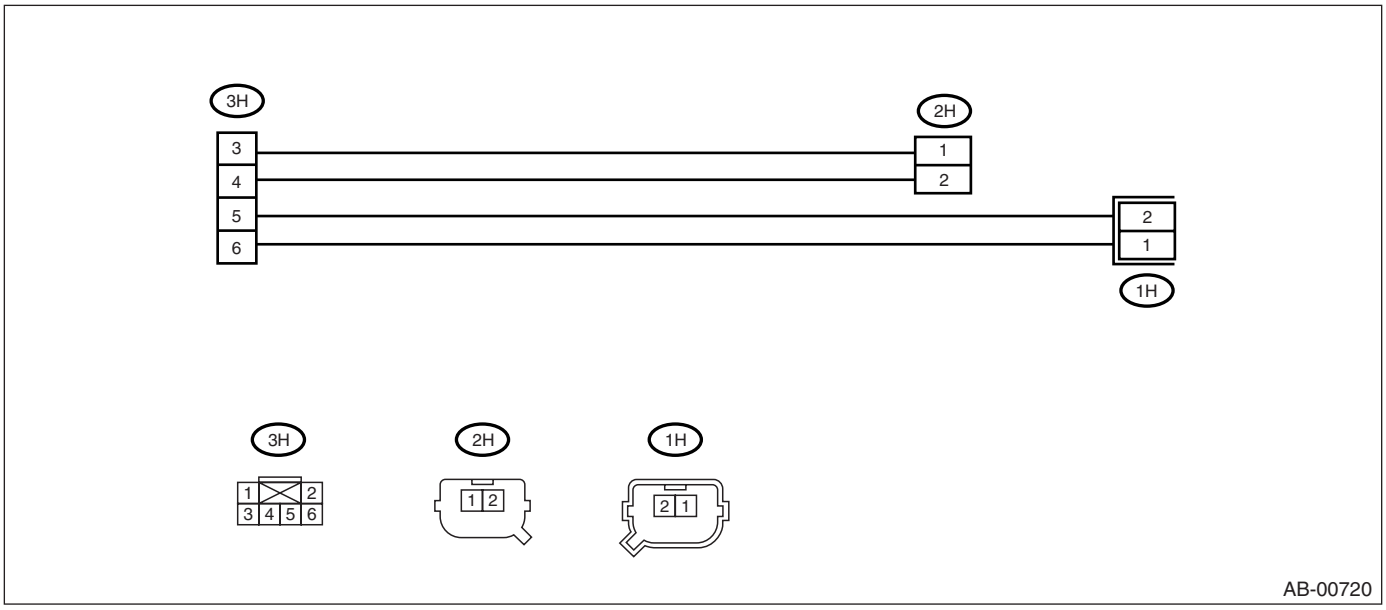
- TEST HARNESS F

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299FC010	98299FC010	TEST HARNESS F	Used when measuring voltage and resistance of airbag module harnesses.



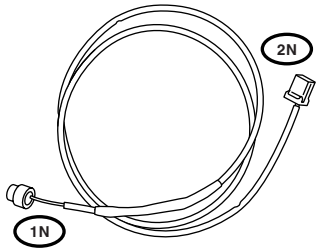
- TEST HARNESS H

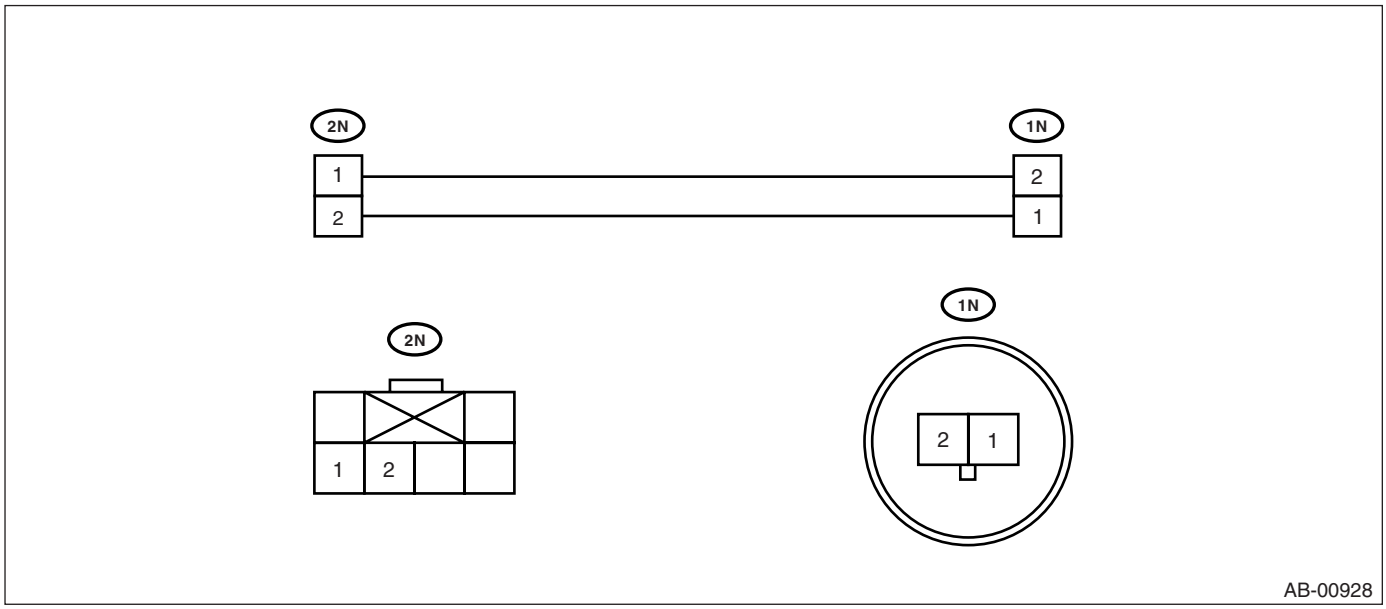
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299FA030	98299FA030	TEST HARNESS H	Used when measuring voltage and resistance of front sub sensor.



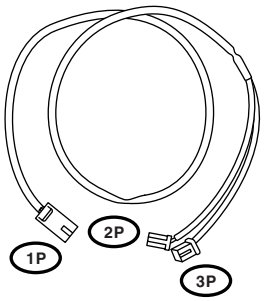
AB-00720

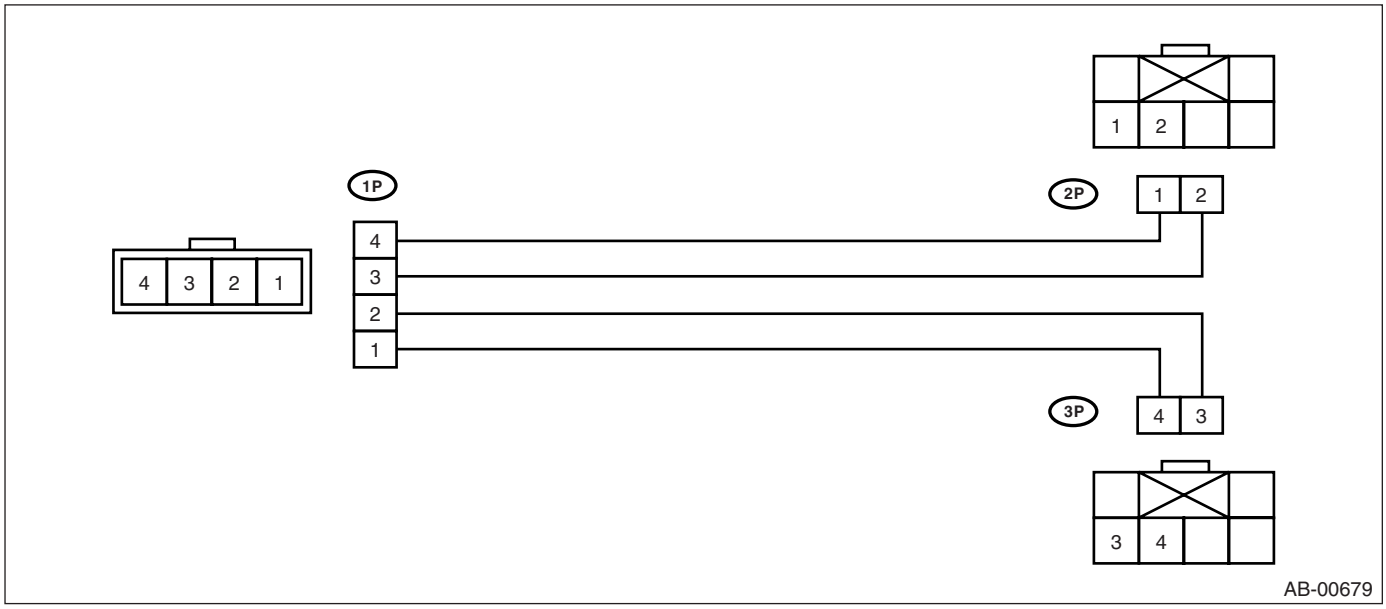
- TEST HARNESS N

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299SA000	98299SA000	TEST HARNESS N	Used when measuring voltage and resistance of driver's airbag module and seat belt pretensioner.

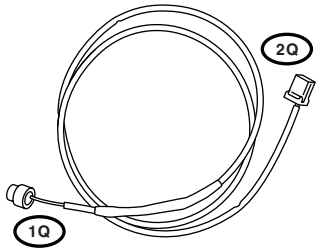


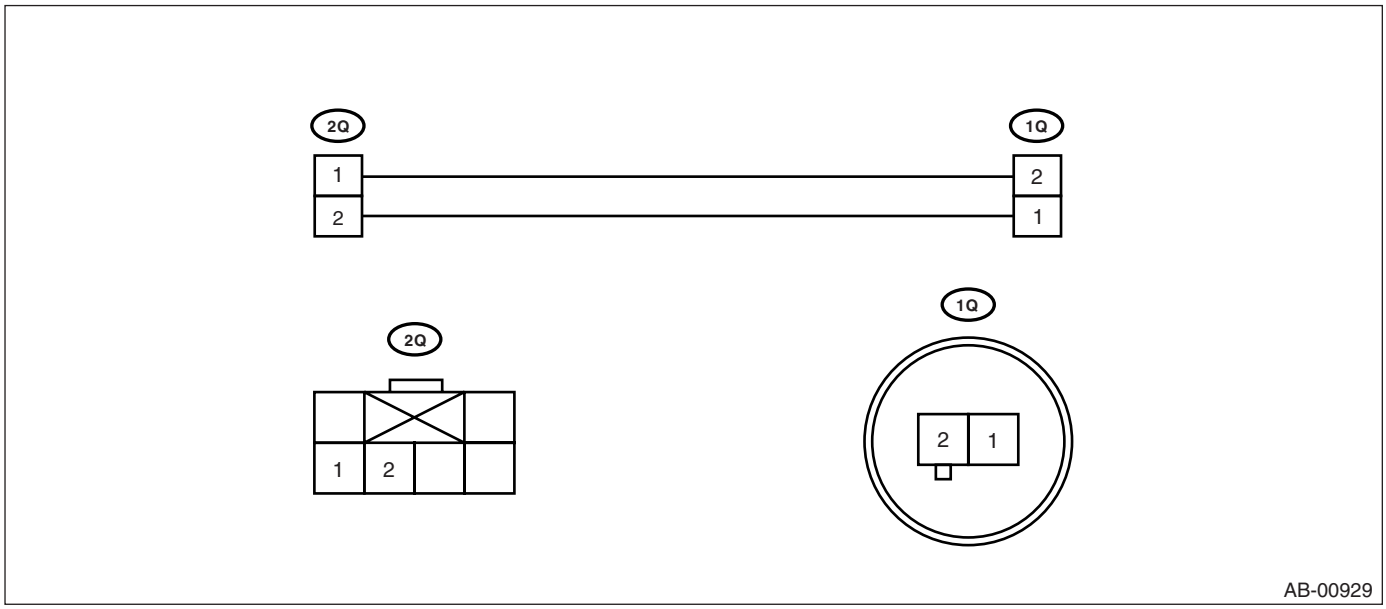
- TEST HARNESS P

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299SA020	98299SA020	TEST HARNESS P	Used when measuring voltage and resistance of driver's airbag module harness and passenger's airbag module harness.



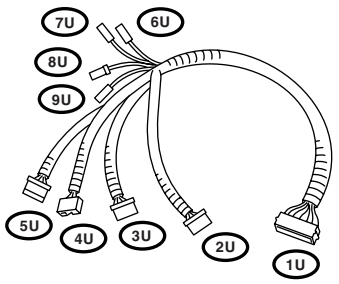
- TEST HARNESS Q

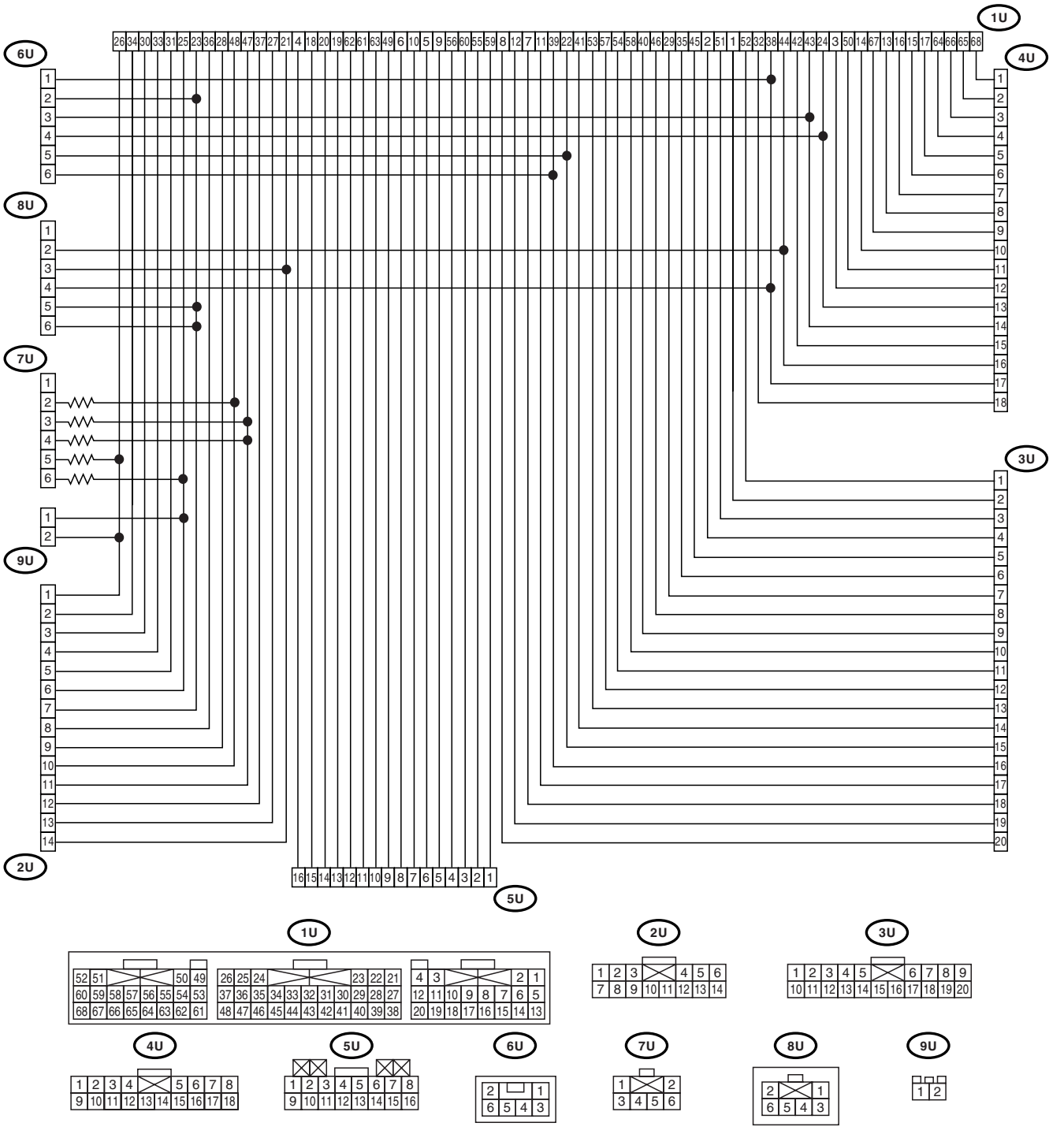
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299SA040	98299SA040	TEST HARNESS Q	Used when measuring voltage and resistance of driver's airbag module.



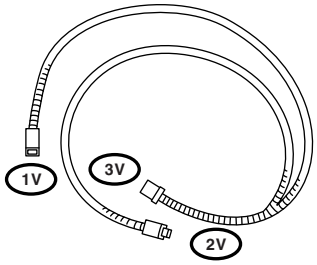
AB-00929

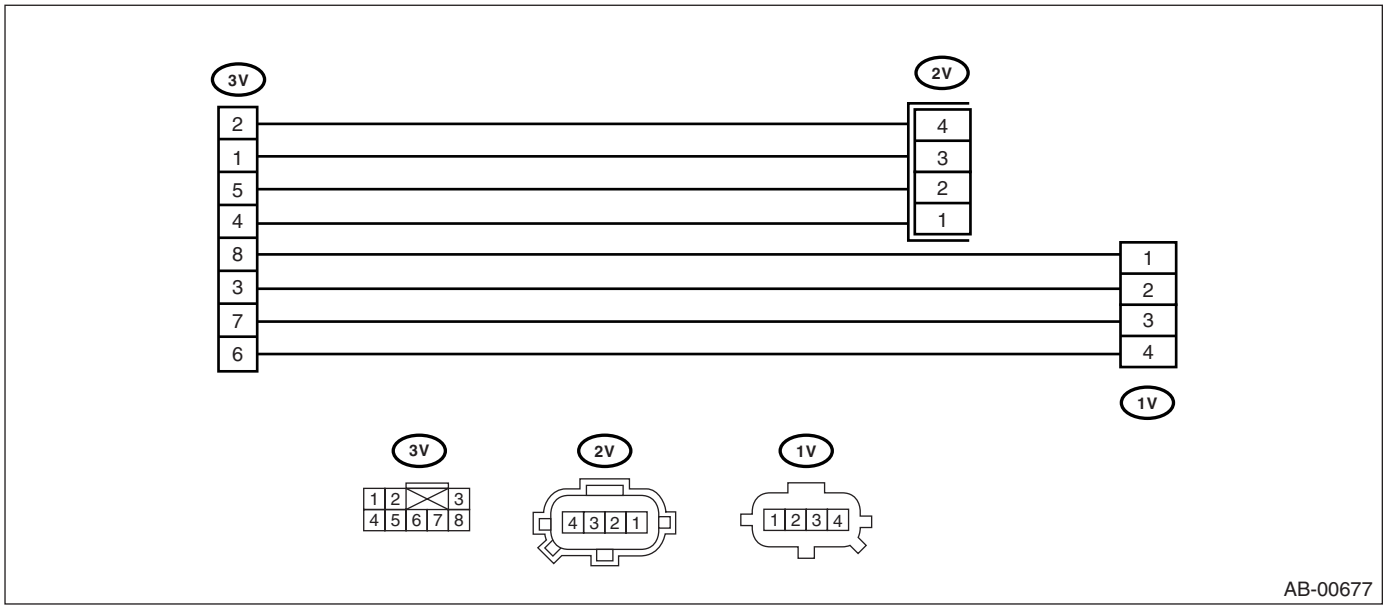
- TEST HARNESS U

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299AG000	98299AG000	TEST HARNESS U	Used when measuring voltage and resistance of airbag control module.

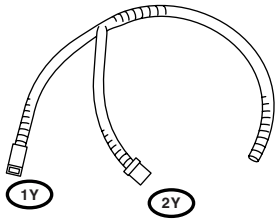

1U
2U
3U
4U
5U
6U
7U
8U
9U
AB-00930

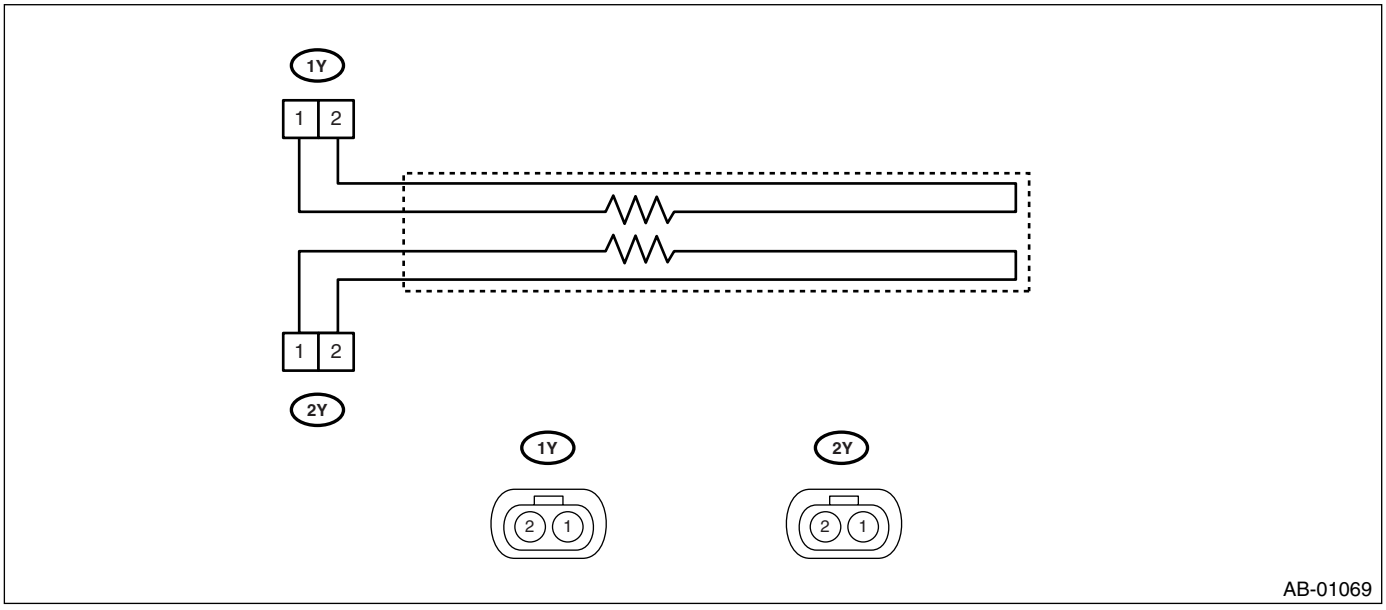
- TEST HARNESS V

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299AG010	98299AG010	TEST HARNESS V	Used when measuring voltage and resistance of side airbag sensor and curtain airbag sensor.



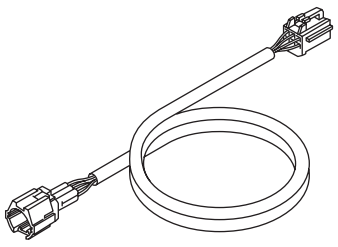
- TEST HARNESS Y

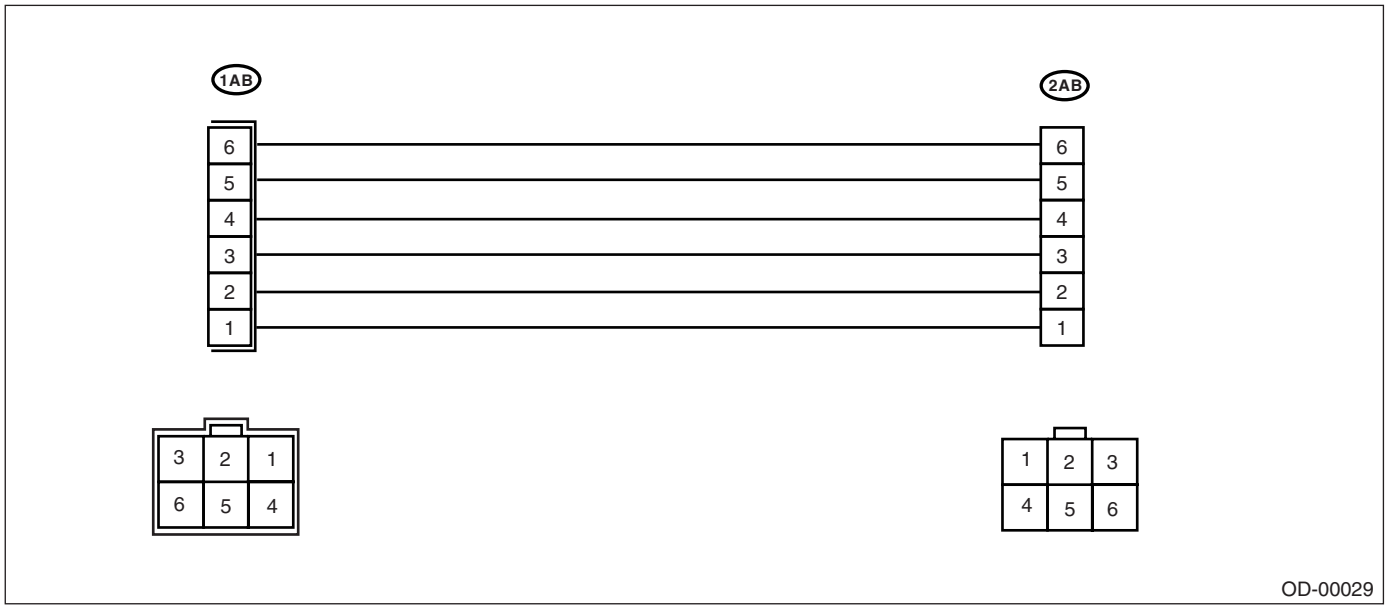
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299AG040	28299AG040	TEST HARNESS Y	Used for diagnosing a failure of the seat belt buckle switch.



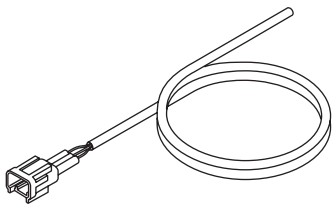
AB-01069

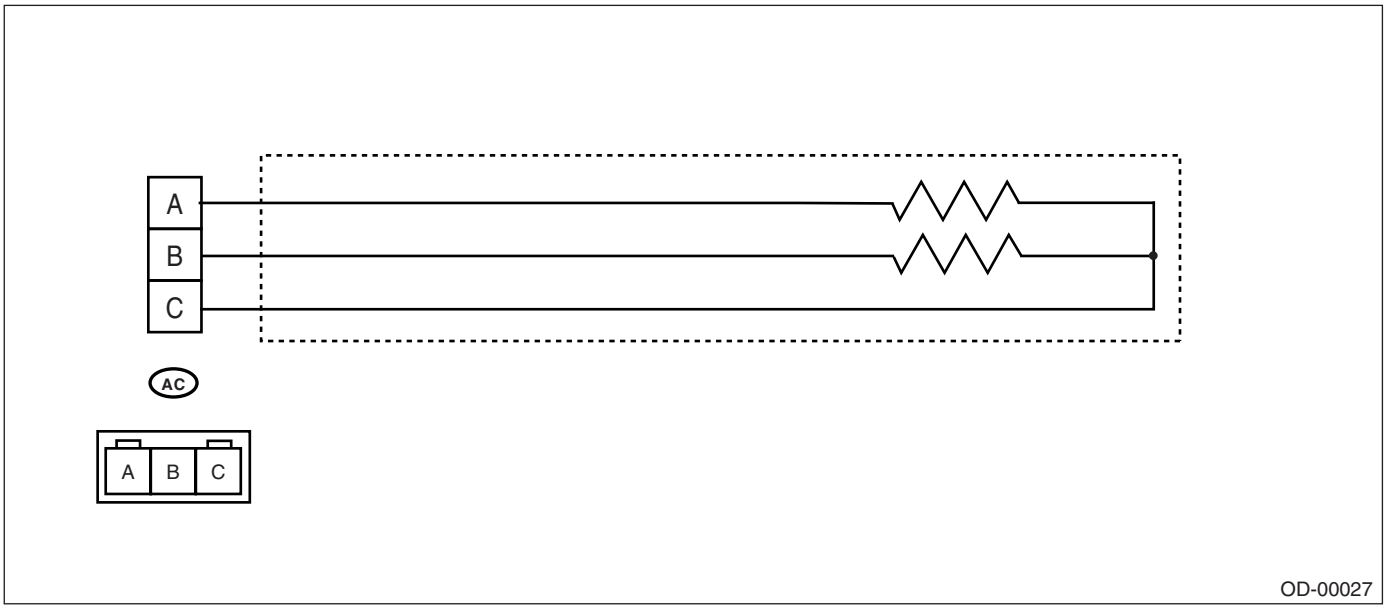
- TEST HARNESS AB

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299XA000	98299XA000	TEST HARNESS AB	Used when measuring voltage and resistance of occupant detection system.

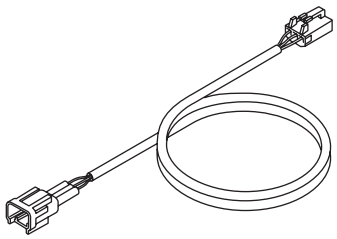


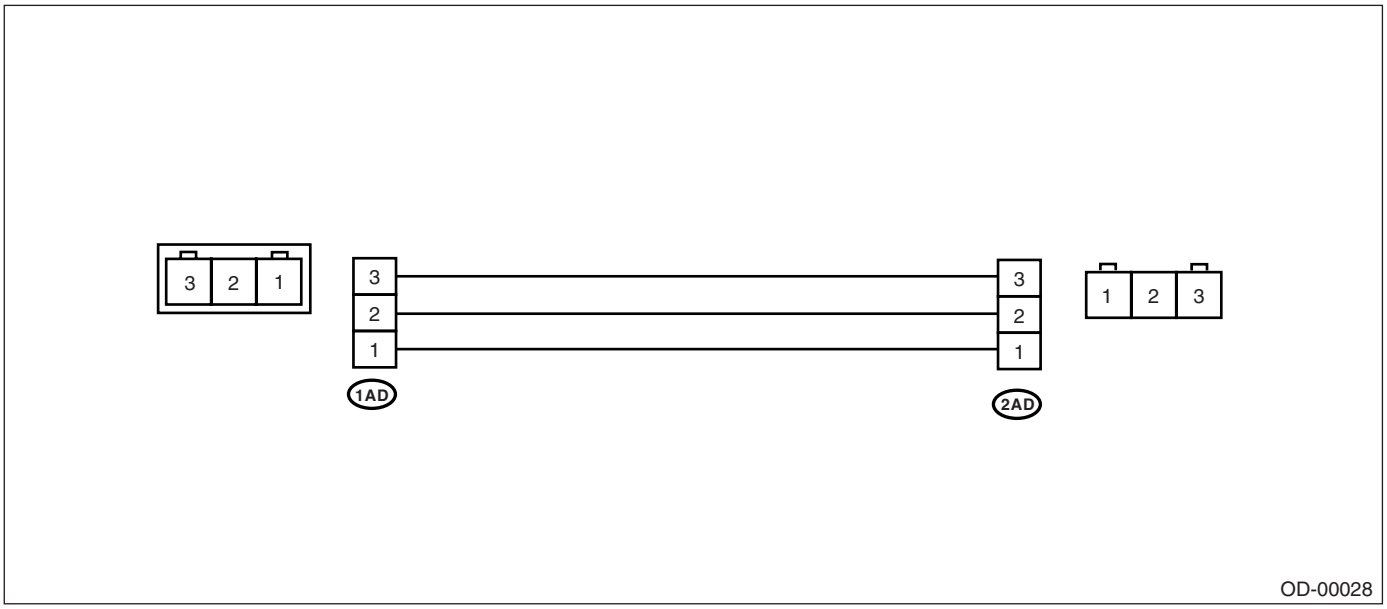
- TEST HARNESS AC

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299XA010	98299XA010	TEST HARNESS AC	Used for diagnosing a failure of the seat belt tension sensor.

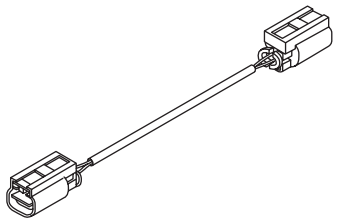


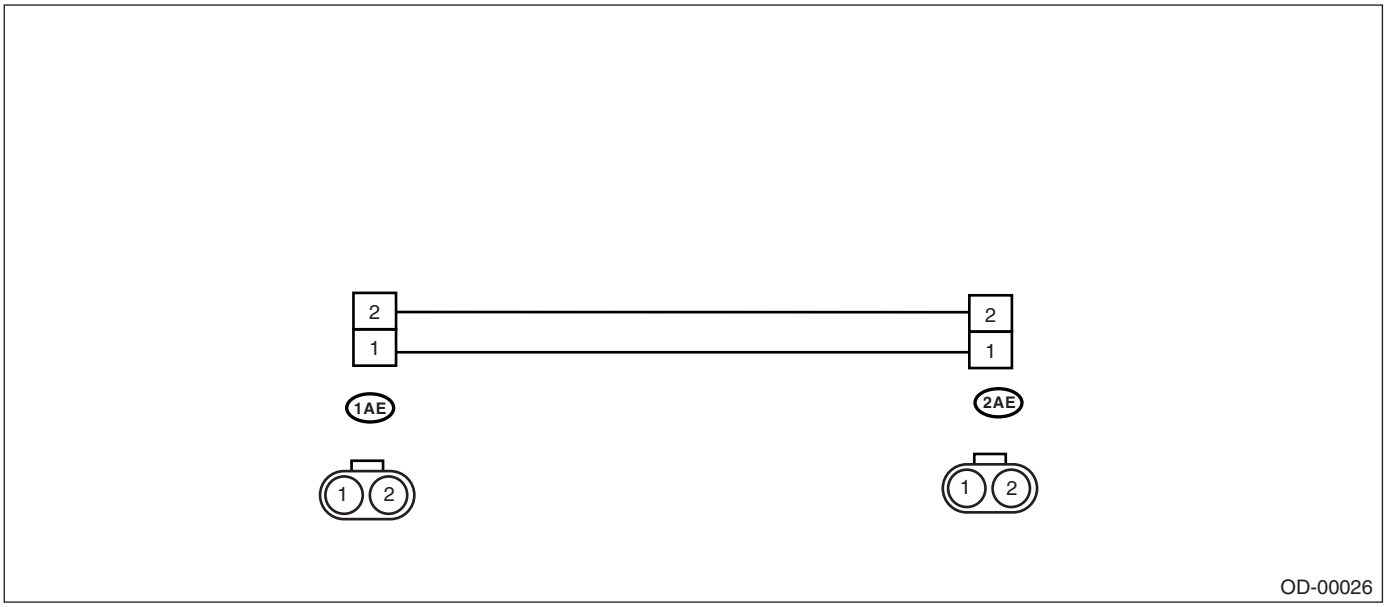
- TEST HARNESS AD

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299XA020	98299XA020	TEST HARNESS AD	Used when measuring voltage and resistance of seat belt tension sensor.

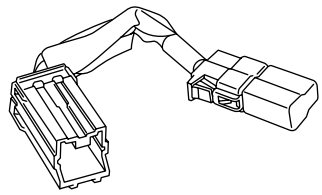


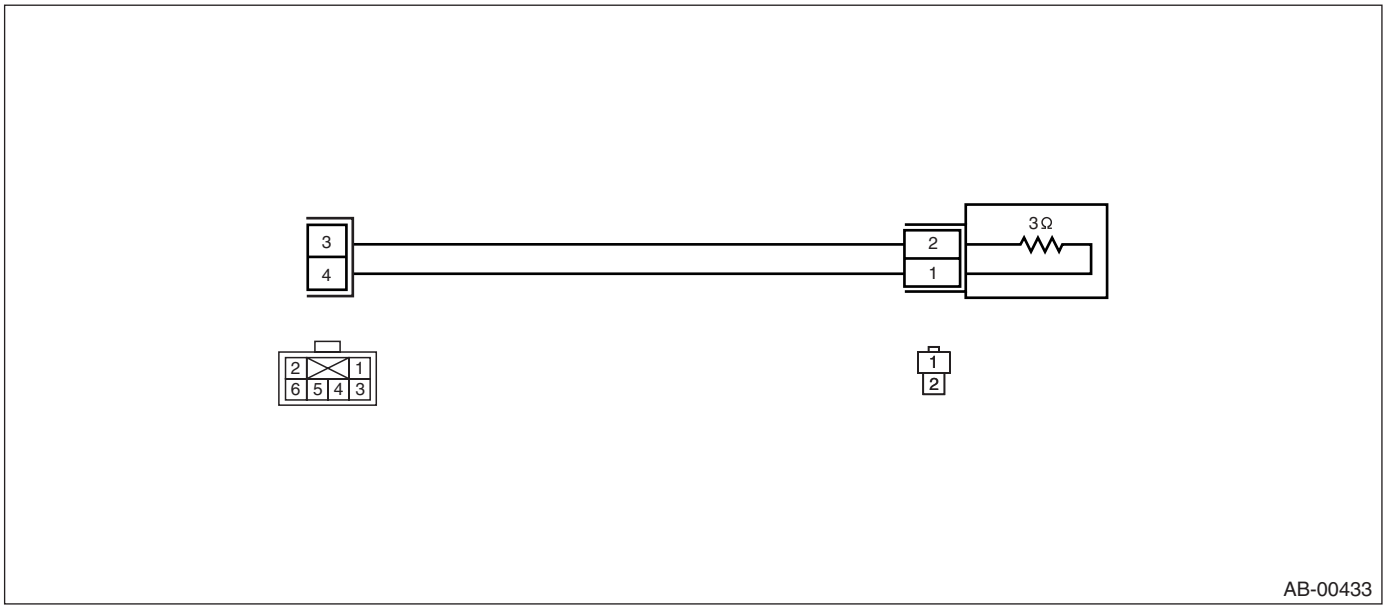
- TEST HARNESS AE

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299XA030	98299XA030	TEST HARNESS AE	• Used for diagnosing a failure of the seat belt buckle switch. • Used together with the test harness Y.



- 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.

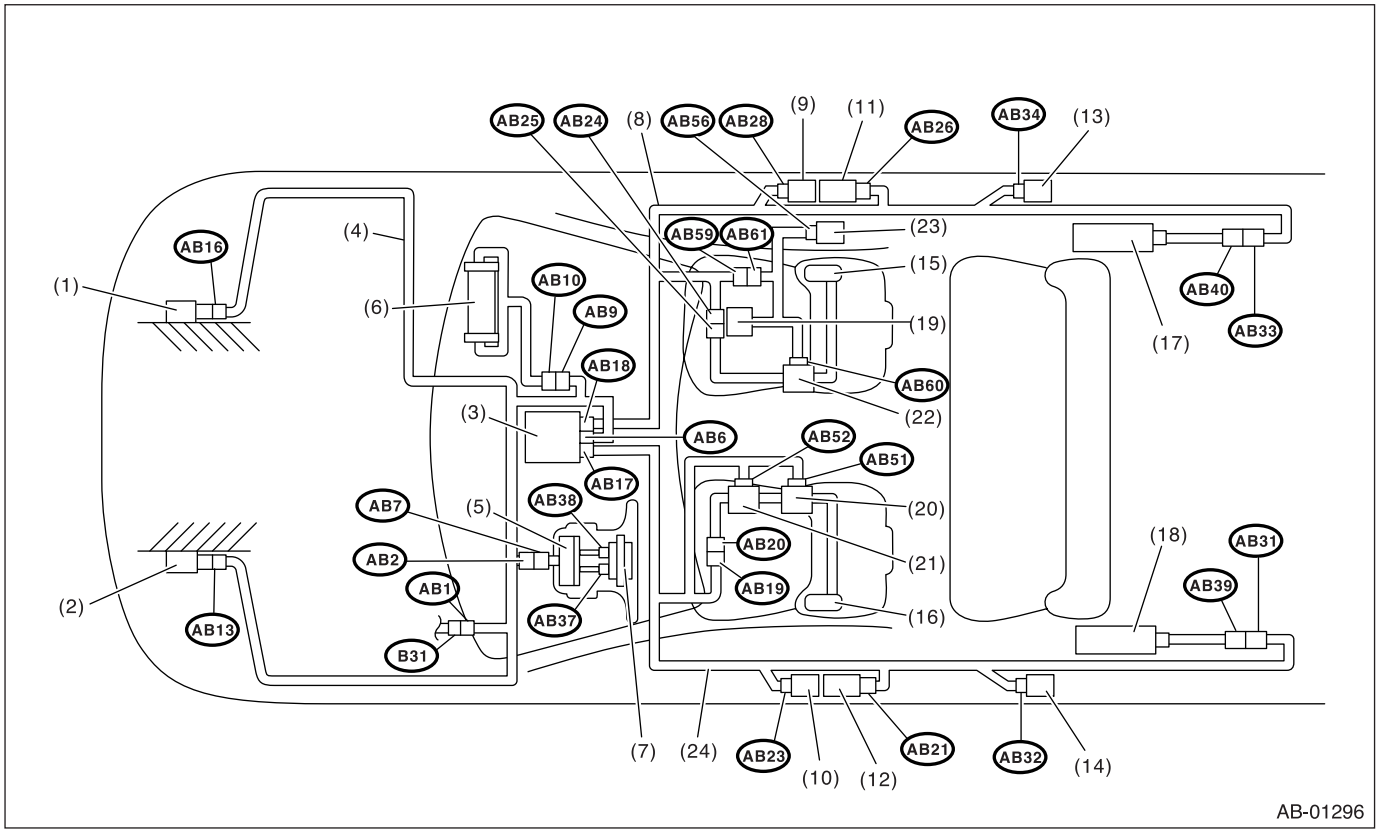


2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring the sensor.

4. Electrical Component Location

A: LOCATION



(1) Front sub sensor (RH)
(2) Front sub sensor (LH)
(3) Airbag control module with built-in safing and electric sensor
(4) Airbag main harness
(5) Roll connector
(6) Passenger's airbag inflator
(7) Driver's airbag inflator
(8) Airbag rear harness (RH)
(9) Side airbag sensor (RH)
(10) Side airbag sensor (LH)
(11) Seat belt pretensioner (RH)
(12) Seat belt pretensioner (LH)
(13) Curtain airbag sensor (RH)
(14) Curtain airbag sensor (LH)
(15) Side airbag inflator (RH)
(16) Side airbag inflator (LH)
(17) Curtain airbag inflator (RH)
(18) Curtain airbag inflator (LH)
(19) Occupant detection control module
(20) Buckle switch (LH)
(21) Seat position sensor (LH)
(22) Buckle switch (RH)
(23) Belt tension sensor
(24) Airbag rear harness LH

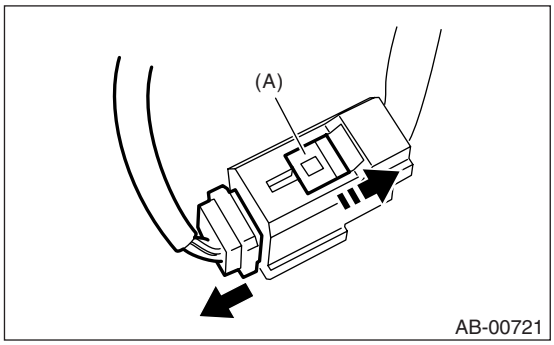
Connector No.	(AB1)	(AB2)	(AB6)	(AB7)	(AB9)	(AB10)	(AB13)	(AB16)	(AB17)	(AB18)	(AB19)	(AB20)
Pin	12	4	28	4	4	4	2	2	20	20	2	2
Connector color	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Male/ Female	Female	Female	Female	Male	Female	Male	Female	Female	Female	Female	Female	Male
Connector No.	(AB21)	(AB23)	(AB24)	(AB25)	(AB26)	(AB28)	(AB31)	(AB32)	(AB33)	(AB34)	(AB37)	(AB38)
Pin	2	4	2	2	2	4	2	4	2	4	2	2
Connector color	Black	Yellow	Yellow	Yellow	Black	Yellow	Yellow	Yellow	Yellow	Yellow	Orange	Black
Male/ Female	Female	Female	Female	Male	Female	Female	Female	Female	Female	Female	Female	Female
Connector No.	(AB39)	(AB40)	(AB51)	(AB52)	(AB56)	(AB59)	(AB60)	(AB61)				
Pin	2	2	2	2	3	6	2	6				
Connector color	Yellow	Yellow	Yellow	Yellow	Brown	Gray	Yellow	Gray				
Male/ Female	Male	Male	Female	Female	Female	Male	Male	Female				

5. Airbag Connector

A: PROCEDURE

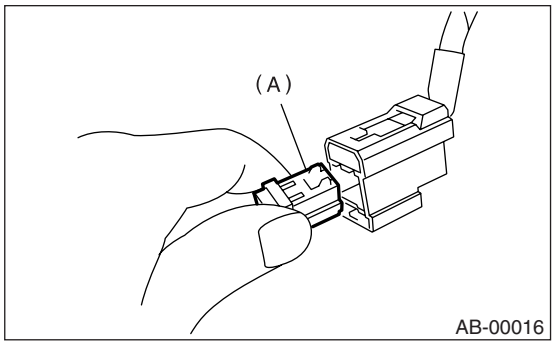
1. BUCKLE SWITCH

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.

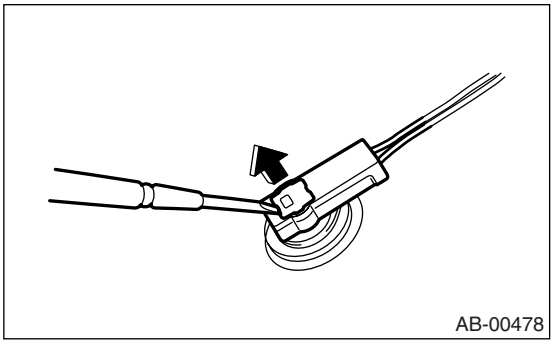
2) How to connect:
Holding the connector (A), and push it in carefully until a clicking sound is heard.



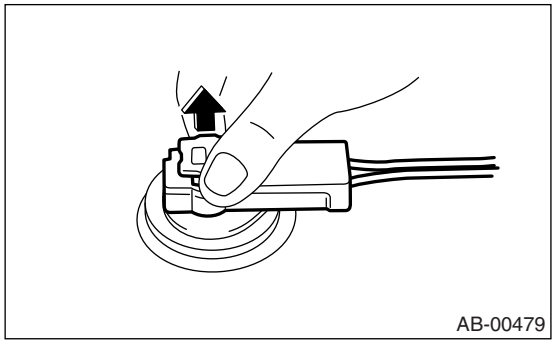
CAUTION:
Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.

2. DRIVER'S AIRBAG MODULE AND PRETENSIONER

1) How to disconnect:
(1) Using a flat tip screwdriver, pry the push lock upward to unlock.

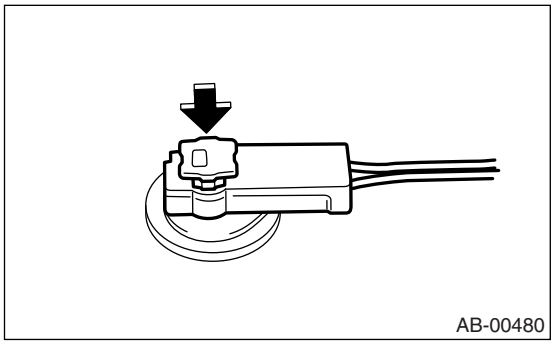


(2) Pull and disconnect the connector from the driver's airbag module assembly or retractor assembly.



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.

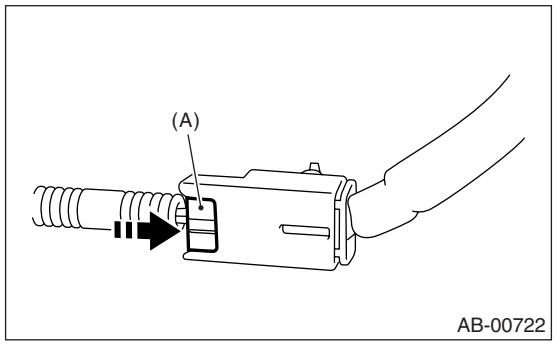
CAUTION:
- **Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.**
- **Be sure to push the push lock in securely.**



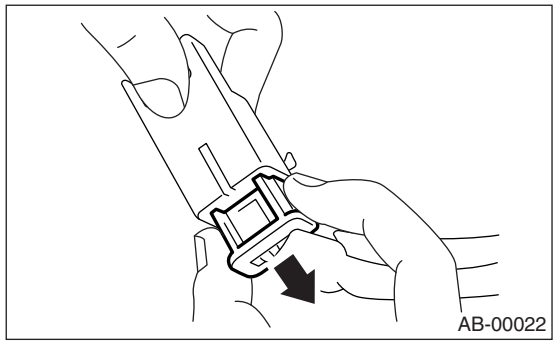
NOTE:
The connector cannot be connected when the push lock is in lock position. To connect the connector, set the push lock to unlock position.

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.



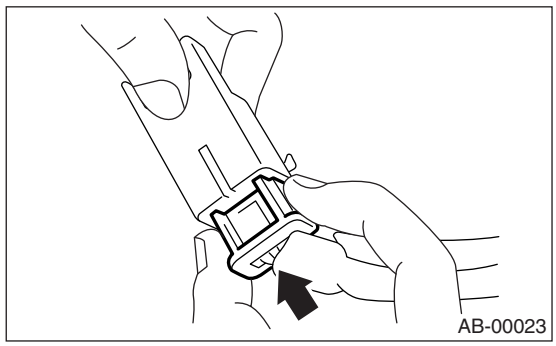
(2) With the slide lock pushed, disconnect the connector.



CAUTION:
When pulling the slide lock or disconnecting connector, be sure to hold the connector, not the harness.

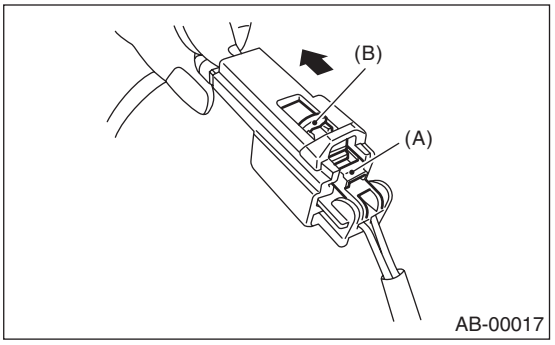
2) How to connect:
Holding the connector, push it in securely until a clicking sound is heard.

CAUTION:
Be sure to insert the connector in until it is locked. Then pull it gently to make sure that it is locked.



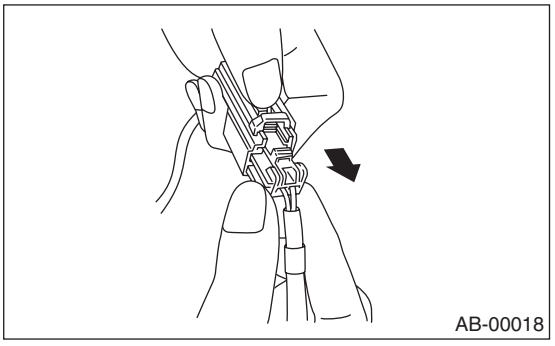
4. SIDE AIRBAG AND CURTAIN AIRBAG

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.

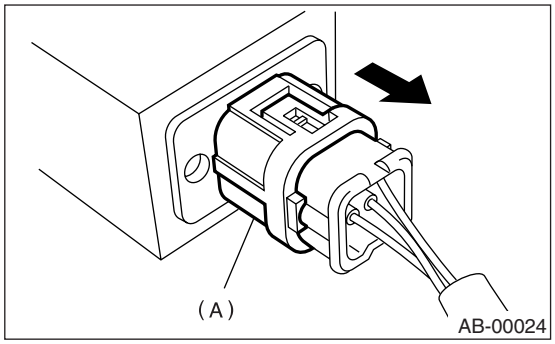
CAUTION:
When pulling the slide lock or disconnecting connector, be sure to hold the connector, not the harness.



5. FRONT SUB SENSOR, SIDE AIRBAG SENSOR, CURTAIN AIRBAG SENSOR AND SEAT POSITION SENSOR LH

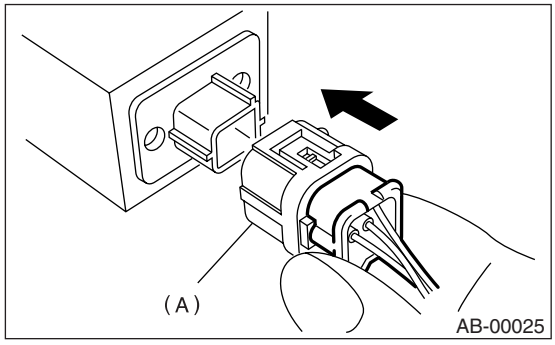
1) How to disconnect:
Holding outer part (A), pull it in the direction of arrow.

CAUTION:
When pulling the slide lock or disconnecting connector, be sure to hold the connector, not the harness.



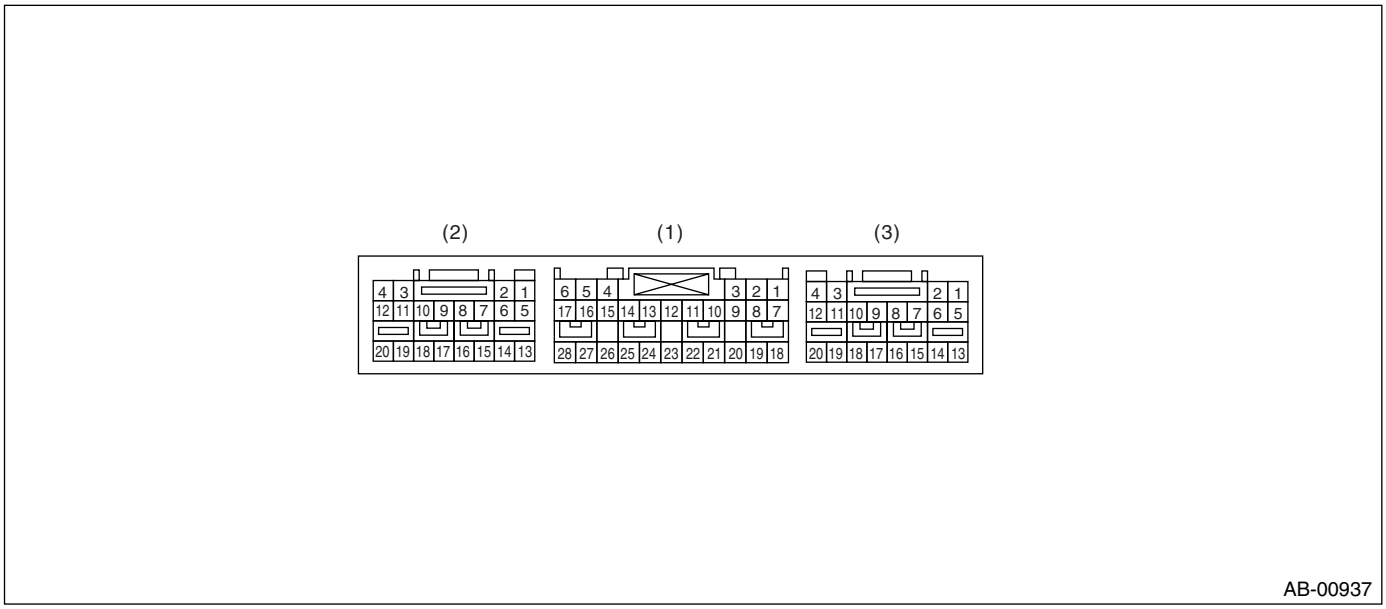
2) How to connect:
Holding the connector, push it in securely until a clicking sound is heard.

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. Airbag Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



- Terminal numbers in airbag control module connector are shown in the figure.
- Airbag warning light illuminates when the connector is removed from airbag control module.

Item		Control module terminal No.
Line end check connector		(1)-2
Diagnosis connector		(1)-19
Data link connector		(1)-12
Combination meter		(1)-3
Battery power supply	Common use fuse	(1)-6
	Dedicated fuse	(1)-5
Passenger's airbag module level one	+	(1)-10
	–	(1)-11
Passenger's airbag module level two	+	(1)-8
	–	(1)-7
Driver's airbag module level one	+	(1)-14
	–	(1)-13
Driver's airbag module level two	+	(1)-16
	–	(1)-17
Front sub sensor LH	Power supply and communication	(1)-15
	GND	(1)-26
Front sub sensor RH	Power supply and communication	(1)-9
	GND	(1)-20
Ground line (GND)		(1)-27
		(1)-28
Passenger's airbag OFF indicator		(1)-1
Passenger's airbag ON indicator		(1)-18
Passenger's seat belt warning light (integrated module)		(1)-24
Seat belt buckle switch LH	+	(2)-19
	–	(2)-2
Seat position sensor LH	+	(2)-3
	–	(2)-4

Item		Control module terminal No.
Seat belt pretensioner LH	+	(2)-6
	–	(2)-5
Side airbag sensor LH	Power supply and communication	(2)-16
	GND	(2)-18
	+	(2)-17
	–	(2)-20
Side airbag module LH	+	(2)-10
	–	(2)-9
Curtain airbag sensor LH	Power supply and communication	(2)-14
	GND	(2)-13
	+	(2)-15
	–	(2)-1
Curtain airbag module LH	+	(2)-11
	–	(2)-12
Seat belt pretensioner RH	+	(3)-11
	–	(3)-12
Side airbag sensor RH	Power supply and communication	(3)-17
	GND	(3)-15
	+	(3)-16
	–	(3)-13
Side airbag module RH	+	(3)-7
	–	(3)-8
Curtain airbag sensor RH	Power supply and communication	(3)-19
	GND	(3)-20
	+	(3)-18
	–	(3)-4
Curtain airbag module RH	+	(3)-6
	–	(3)-5
Occupant detection control module	+	(3)-1
	–	(3)-2

B: WIRING DIAGRAM

Refer to the WI section wiring diagram. <Ref. to WI-68, WIRING DIAGRAM, Airbag System.>

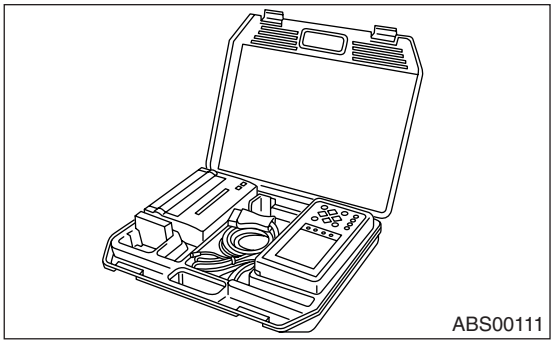
7. Subaru Select Monitor

A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

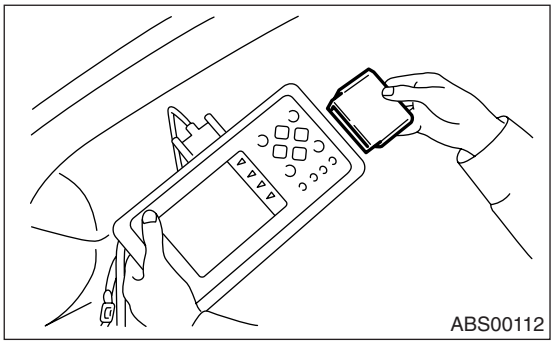
When malfunction of airbag system occurs, the DTC stored in airbag control module will be read out.

1) Prepare the Subaru Select Monitor kit. <Ref. to AB(diag)-8, SPECIAL TOOL, PREPARATION TOOL, General Description.>


ABS00111

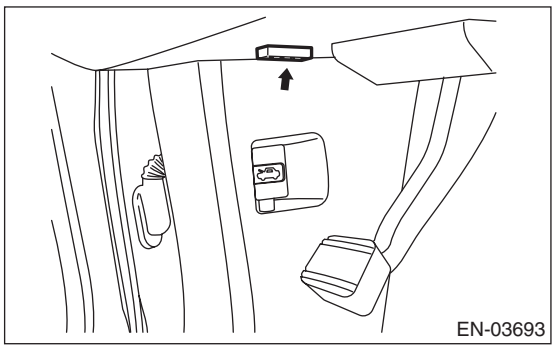
2) Connect the diagnosis cable to Subaru Select Monitor.

3) Insert the cartridge to Subaru Select Monitor. <Ref. to AB(diag)-8, SPECIAL TOOL, PREPARATION TOOL, General Description.>


ABS00112

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

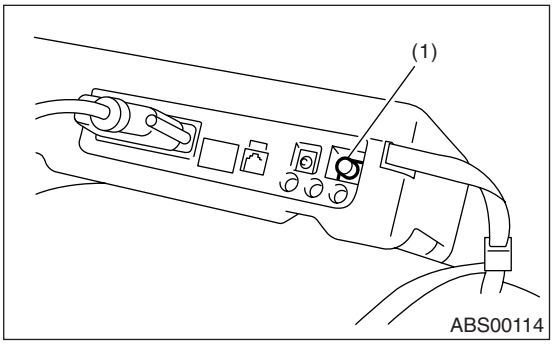
(1) Data link connector (1) is located in the lower portion of instrument panel (on the driver's side).


EN-03693

(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON.



ABS00114

(1) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.

7) On the «System Selection Menu» display screen, select the {Airbag System} and press the [YES] key.

8) {Press the [YES] key after the {**MY AIRBAG SYSTEM} is displayed.

9) On the «Airbag System» screen, select the {DTC Display}, and then press the [YES] key.

NOTE:

- For details concerning operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".
- For details concerning DTCs, refer to List of Diagnostic Trouble Code (DTC). <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>

2. DISPLAY OF STATUS INFORMATION

Check the operating condition of each sensor in the event of malfunction in seat belt buckle switch and seat position sensor, or when the seat belt buckle switch and seat position sensor has been replaced.
1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Airbag System} and press the [YES] key.
3) On the «Airbag System» display screen, select the {Status Data} and press the [YES] key.
The following table is for support data.

Item	Display contents
Seat position sensor LH	Front position *1/Rear position *2 /Other *3/Initial Setting *3 /— *5
Seat position sensor RH	— *5
Seat belt buckle switch LH	Belted *6/Unbelted *7 /Other *8/Initial Setting *4 /— *9
Seat belt buckle switch RH	Belted *6/Unbelted *7 /Other *8/Initial Setting *4 /— *9
Passenger's airbag control status	ON *10/OFF *11 /Initial Setting *4

*1: The seat position is forward.
*2: The seat position is rearward.
*3: Displayed when data other than before and behind the seat, such as the breakdown etc, is input.
*4: Displayed when it is initial.
*5: Seat position sensor not supported
*6. Seat belt fastened
*7. Seat belt not fastened
*8: Displayed when data other than belt fastened or not fastened, such as breakdowns is input.
*9: Seat belt buckle switch not supported
*10: Passenger's seat air bag operating state
*11: Passenger's seat air bag non-operating state

NOTE:
For details concerning operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".

3. CLEAR MEMORY MODE

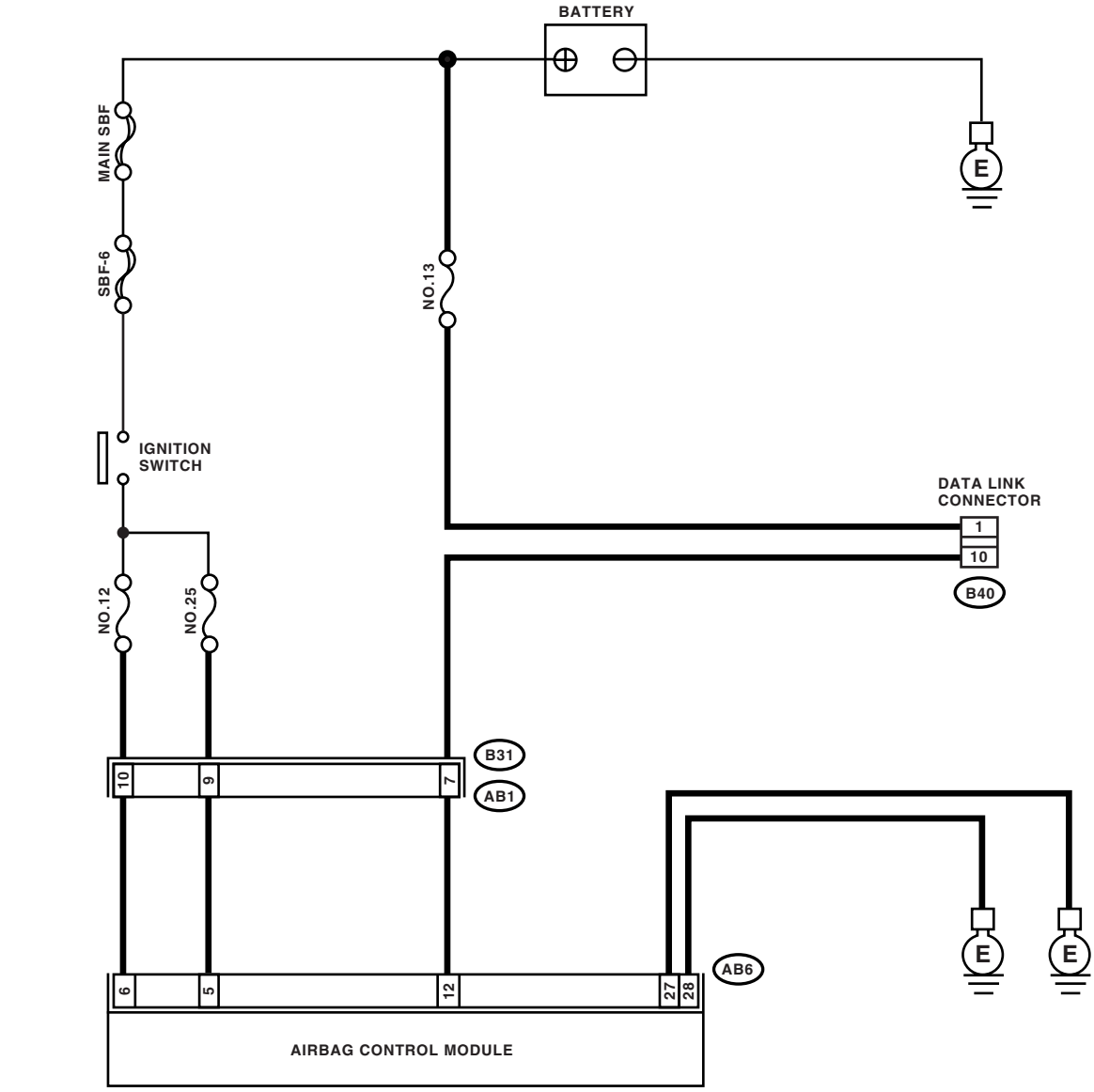
Clear the DTC stored in the airbag control module after repairing airbag system. (After the breakdown is recovered, the breakdown code for completed recoveries are read out when the next breakdown occurs if the memory clear work is not performed.)
1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Airbag System} and press the [YES] key.
3) On the {Airbag System} menu screen, select the {Clear Memory} and press the [YES] key.
4) When the "Clear Memory?" is shown on the screen, press the [YES] key.
5) When "Done" is displayed, turn the Subaru Select Monitor to OFF.

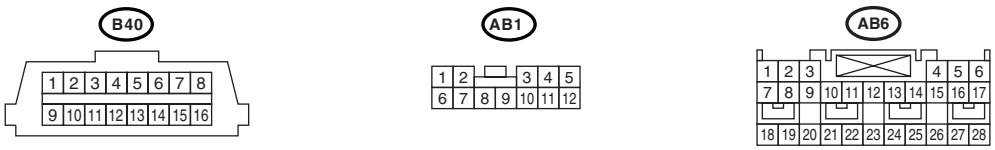
NOTE:
For details concerning operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".

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.
WIRING DIAGRAM:





AB-01299

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is the ignition switch ON?	Go to step **2**.	Turn the ignition switch to ON, and select the airbag mode using the Subaru Select Monitor.
2	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage more than 11 V?	Go to step **3**.	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4**.
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other system can be executed normally.	Are the system name and model year displayed on Subaru Select Monitor?	Go to step **9**.	Go to step **5**.
5	**CHECK AIRBAG CONTROL MODULE CONNECTOR.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Is the connector of the air bag control module (AB6) securely connected?	Is the connector of the air bag control module securely connected?	Go to step **6**.	Connect the connector of the airbag control module.
6	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to OFF. 2) Disconnect the airbag control module connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Are the system name and model year displayed on Subaru Select Monitor?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **7**.
7	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the airbag control module, ABSCM&H/U, ECM and TCM. 3) Measure the resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair the harness and connector between each control module and data link connector. (Replace the harness without repairing the airbag harness.)
8	**CHECK THE OUTPUT SIGNAL TO THE AIRBAG CONTROL MODULE.** 1) Turn the ignition switch to ON in the status of step 7. 2) Measure the voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **9**.	Repair the harness and connector between each control module and data link connector. (Replace the harness without repairing the airbag harness.)

	Step	Check	Yes	No
9	**CHECK THE HARNESS BETWEEN THE AIRBAG CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB6) from airbag control module. 3) Connect the connector (1U) in the test harness U to connector (AB6). 4) Measure the resistance between connector (4U) in the test harness U and the data link connector. ***Connector & terminal*** ***(4U) No. 18 — (B40) No. 10:***	Is the resistance less than 10 Ω?	Go to step **10**.	Repair the harness between the airbag control module and the data link connector. Or replace the airbag main harness with the bulkhead harness.
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. 2) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 1 — Chassis ground:*** ***(2U) No. 6 — Chassis ground:***	Is the voltage more than 10 V?	Go to step **11**.	Repair the harness between the airbag control module and the battery. Or replace the airbag main harness with the bulkhead harness.
11	**CHECK BETWEEN THE AIRBAG CONTROL MODULE AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 10 — Chassis ground:*** ***(2U) No. 11 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **12**.	Repair the harness between the airbag control module and the chassis ground. Or replace the airbag main harness with the bulkhead harness.
12	**CHECK POOR CONTACT OF CONNECTOR.**	Is there poor contact in the control module power supply, ground circuit and data link connector?	Repair the connector. (Replace the harness without repairing the airbag system connector.)	Replace the only airbag control module. <Ref. to AB-21, REMOVAL, Airbag Control Module.>

2. WITHOUT DTC

DETECTING CONDITION:

- Defective combination meter
- Open circuit of harness

TROUBLE SYMPTOM:

- Airbag warning light remains on.
- “NO TROUBLE CODE” will be displayed on the Subaru Select Monitor.

For detailed operation procedure, refer to “Airbag Warning Light Failure”. <Ref. to AB(diag)-40, Airbag Warning Light Failure.>

NOTE:

- For detailed operation procedure, refer to “Airbag Warning Light Failure”. <Ref. to AB(diag)-40, Airbag Warning Light Failure.>
- When the airbag warning light is OFF and “NO TROUBLE CODE” is displayed on Subaru Select Monitor, the system is in normal condition.

8. Read Diagnostic Trouble Code (DTC)

A: OPERATION

For details about reading of DTCs, refer to “Subaru Select Monitor”. <Ref. to AB(diag)-31, Subaru Select Monitor.>

9. Inspection Mode

A: PROCEDURE

Recreate the circumstance by referring to the conditions described in the checklist.

10.Clear Memory Mode

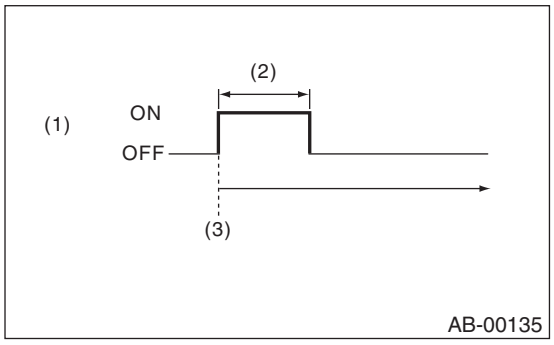
A: OPERATION

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)-31, 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

12.Airbag Warning Light Failure

A: AIRBAG WARNING LIGHT REMAINS ON

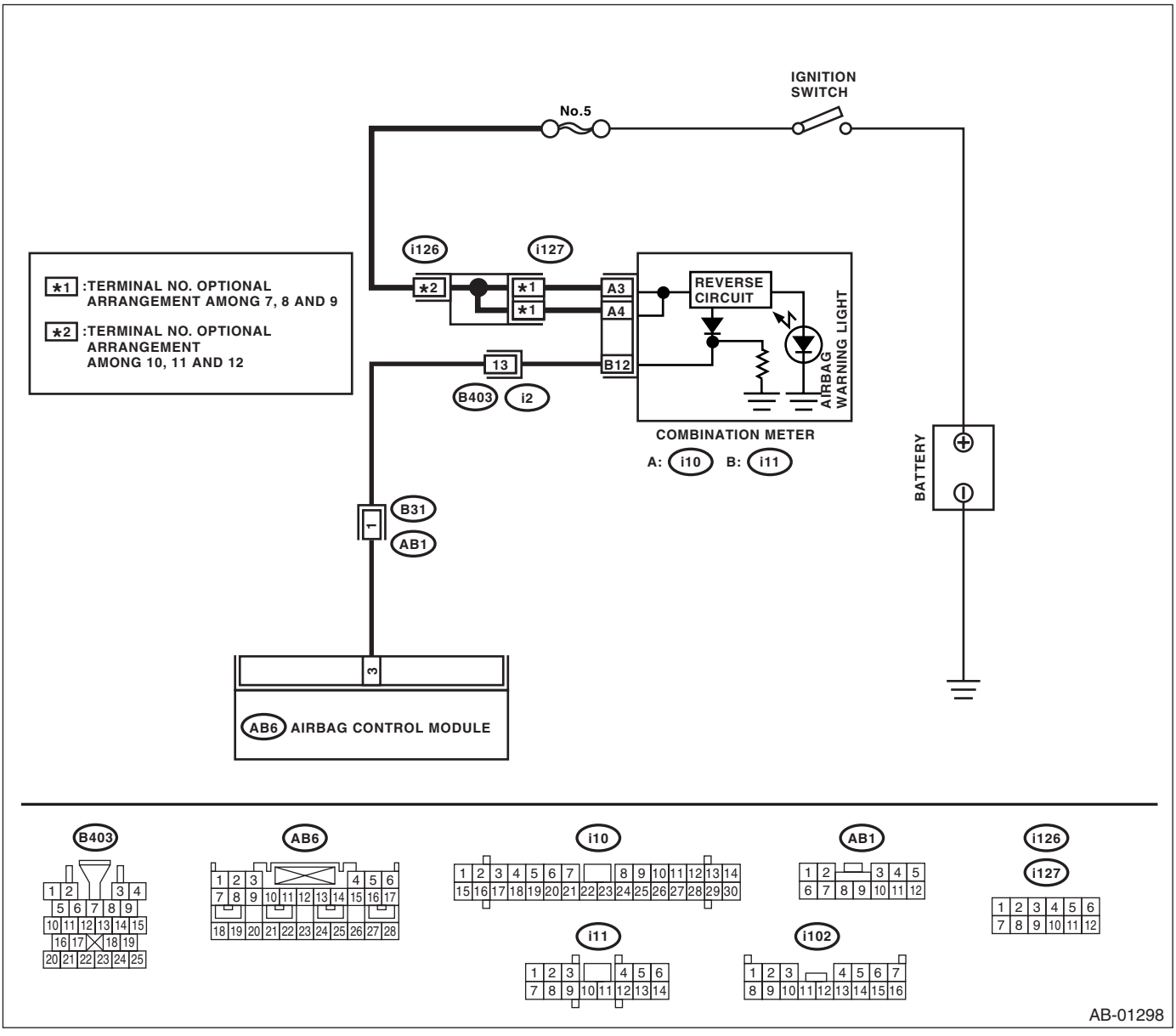
DETECTING CONDITION:

- 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.
- Connection of (AB6) to airbag control module is improper.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to AB(diag)-31, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK POOR CONTACT.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Confirm that there is solid connection between the airbag control module and connector (AB6).	Is there poor contact in connector (AB6)?	If the poor contact of the connector is not fixed, replace the airbag main harness with body harness or replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **3**.
3	**CHECK AIRBAG MAIN HARNESS.** 1) Remove the instrument panel lower cover and disconnect the connectors (AB7) and (AB2). 2) Remove the console side cover lower on the passenger's side and disconnect the connectors (AB10) and (AB9). 3) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. 4) Connect the battery ground terminal and turn the ignition switch to ON. 5) Connect the connectors (7U) and (8U) in the test harness U. NOTE: After the fault has been cleared, disconnect the connectors (7U) and (8U).	Does the airbag warning light go off?	Go to step **4**.	Go to step **5**.
4	**CHECK GROUND CIRCUIT.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB6) from airbag control module. 3) Connect the connector (1U) in the test harness U to body harness connector (AB6). 4) Measure the resistance between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 10 — Chassis ground:*** ***(2U) No. 11 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Repair the chassis ground circuit.
5	**CHECK AIRBAG MAIN HARNESS AND BULKHEAD HARNESS.** 1) Disconnect the connectors (7U) and (8U). 2) Remove the combination meter. 3) Measure the resistance between connector (i11) and connector (2U) in the test harness U. ***Connector & terminal*** ***(2U) No. 7 — (i11) No. 12:***	Is the resistance less than 10 Ω?	Check the combination meter.	Go to step **6**.

	Step	Check	Yes	No
6	**CHECK POOR CONTACT OF CONNECTORS (AB1) AND (B31).** 1) Turn the ignition switch to OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Confirm that there is firm contact between connectors (AB1) and (B31).	Is there poor contact between connectors (AB1) and (B31)?	Repair the bulkhead harness or replace the airbag main harness with body harness.	Go to step **7**.
7	**CHECK AIRBAG MAIN HARNESS.** Check the airbag main harness for defect.	Is there any defect in the airbag main harness?	Replace the airbag main harness with bulkhead harness.	Repair the bulkhead harness.

B: AIRBAG WARNING LIGHT REMAINS OFF

DETECTING CONDITION:

- Fuse No. 5 (in fuse box) is brown out.
- Body harness circuit is open.
- Airbag warning light is faulty.
- Airbag main harness is faulty.
- Airbag control module is faulty.

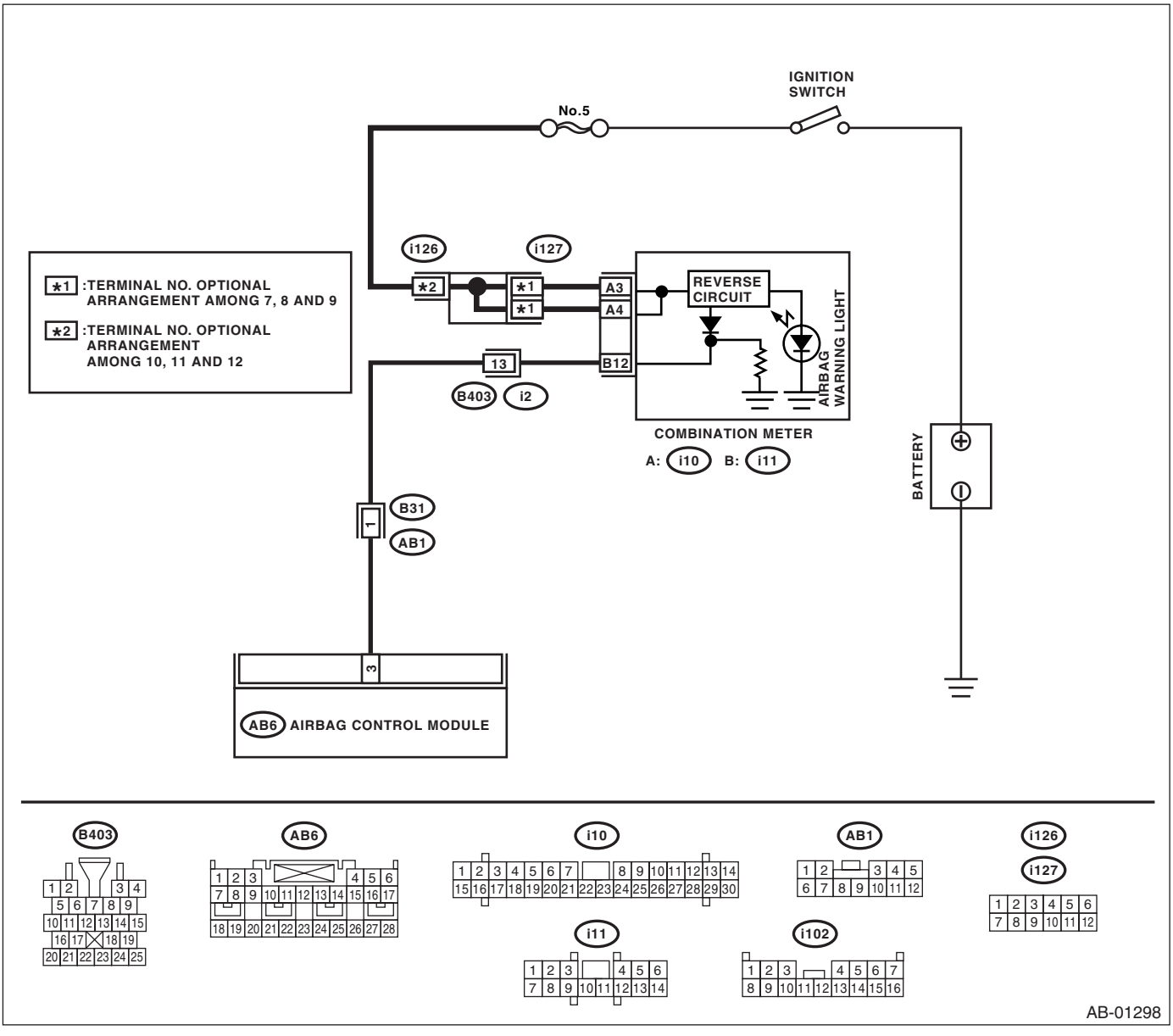
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



Airbag Warning Light Failure

	Step	Check	Yes	No
1	**CHECK COMBINATION METER.** Turn the ignition switch to ON, and confirm that warning light of combination meter is turned on.	Do warning lights except for airbag turn on?	Go to step **2**.	Check the combination meter.
2	**CHECK DTC.** Read the DTC. <Ref. to AB(diag)-31, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK FUSE NO. 5 (IN MAIN FUSE BOX).** Remove the fuse No. 5 and perform visual inspection.	Is the fuse No. 5 (in main fuse box) blown out?	Replace the fuse No. 5. If the fuse No. 5 is blown out again, go to step 4.	Go to step **4**.
4	**CHECK AIRBAG WARNING LIGHT CIRCUIT (IN COMBINATION METER).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB1) from (B31). 3) Connect the battery ground terminal and turn the ignition switch to ON.	Does airbag warning light turn on?	Go to step **5**.	Check the combination meter.
5	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Connect the connector (AB1) to (B31). 3) Disconnect the connector (AB6) from airbag control module. 4) Connect the battery ground terminal and turn the ignition switch to ON.	Does airbag warning light turn on?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Replace the airbag main harness with bulkhead harness.

13.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Display	Content of diagnosis	Reference target
11	Driver's Airbag failure	• 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. • Airbag control module is faulty. • Driver's airbag module is faulty.	<Ref. to AB(diag)-49, DTC 11 DRIVER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
12	Passenger's Airbag failure	• 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. • Airbag control module is faulty. • Passenger's airbag module is faulty.	<Ref. to AB(diag)-53, DTC 12 PASSENGER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
15	Driver's Airbag failure	• 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. • Airbag control module is faulty. • Driver's airbag module is faulty.	<Ref. to AB(diag)-56, DTC 15 DRIVER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
16	Passenger's Airbag failure	• Airbag main harness circuit (Passenger's side) is shorted to power supply. • Airbag module harness circuit (Passenger's side) is shorted to power supply. • Airbag control module is faulty. • Passenger's airbag module is faulty.	<Ref. to AB(diag)-59, DTC 16 PASSENGER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
21	Airbag ECU failure	Airbag control module is faulty.	<Ref. to AB(diag)-61, DTC 21 AIRBAG ECU 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)-62, DTC 22 FRONT AIRBAG FIRING OUTPUT, Diagnostic Chart with Trouble Code.>
23	Connector to Airbag ECU failure	Connection of (AB6), (AB17) and (AB18) to airbag control module is improper.	<Ref. to AB(diag)-63, DTC 23 CONNECTOR TO AIRBAG ECU FAILURE, Diagnostic Chart with Trouble Code.>
24	IG1 open	• Airbag control module is faulty. • Airbag main harness circuit is open. • Fuse No. 12 (in joint box) is blown. • Airbag rear harness circuit is open.	<Ref. to AB(diag)-64, DTC 24 IG1 OPEN, Diagnostic Chart with Trouble Code.>
25	IG2 open	• Airbag control module is faulty. • Airbag main harness circuit is open. • Fuse No. 25 (in joint box) is blown. • Airbag rear harness circuit is open.	<Ref. to AB(diag)-66, DTC 25 IG2 OPEN, Diagnostic Chart with Trouble Code.>
26	Passenger's Airbag indicator failure	• Passenger's airbag indicator is faulty. • Airbag control module is faulty. • Airbag main harness circuit is open, shorted or shorted to ground. • Body harness circuit is open.	<Ref. to AB(diag)-68, DTC 26 PASSENGER'S AIRBAG INDICATOR FAILURE, Diagnostic Chart with Trouble Code.>
27	ODS Communication error	• Occupant detection control module communication is faulty. • Airbag rear harness circuit is open, shorted, shorted to ground or shorted to power supply. • Occupant detection harness is faulty. • Airbag control module is faulty. • Occupant detection system is faulty.	<Ref. to AB(diag)-70, DTC 27 ODS COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

DTC	Display	Content of diagnosis	Reference target
29	ODS failure	• Occupant detection sensor is faulty. • Occupant detection control module is faulty. • Occupant detection harness is faulty. • Fuse No. 25 (in joint box) is blown.	Refer to “Occupant Detection System” for details on DTC 29. <Ref. to OD(diag)-29, 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)-26, DTC 2A OCCUPANT DETECTION CALIBRATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2B	ODS System Wrong error	• Wrong airbag control module was installed. • Wrong occupant detection system was installed. • Occupant detection system is faulty.	Refer to “Occupant Detection System” for details on DTC 2B. <Ref. to OD(diag)-26, DTC 2B ODS ERRONEOUS PARTS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2C	Belt Tension Sensor failure	• Passenger’s seat belt tension sensor is faulty. • Occupant detection system is faulty. • Airbag rear harness circuit is open, shorted, shorted to ground or shorted to power supply. • Occupant detection harness is faulty.	Refer to “Occupant Detection System” for details on DTC 2C. <Ref. to OD(diag)-27, DTC 2C BELT TENSION SENSOR FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Front Sub Sensor RH failure	• Front sub sensor harness (RH) circuit is open or shorted. • Front sub sensor (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-72, DTC 31 FRONT SUB SENSOR RH FAILURE, Diagnostic Chart with Trouble Code.>
32	Front Sub Sensor LH failure	• Front sub sensor harness (LH) circuit is open or shorted. • Front sub sensor (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-74, DTC 32 FRONT SUB SENSOR LH FAILURE, Diagnostic Chart with Trouble Code.>
33	Front Sub Sensor RH failure	Front sub sensor (RH) is faulty.	<Ref. to AB(diag)-76, DTC 33 FRONT SUB SENSOR RH FAILURE, Diagnostic Chart with Trouble Code.>
34	Front Sub Sensor LH failure	Front sub sensor (RH) is faulty.	<Ref. to AB(diag)-76, DTC 34 FRONT SUB SENSOR LH FAILURE, Diagnostic Chart with Trouble Code.>
36	Seat Position Sensor LH failure	• Driver's seat position sensor is faulty. • Airbag control module is faulty. • Airbag rear harness LH circuit is open, shorted or shorted to ground.	<Ref. to AB(diag)-77, DTC 36 SEAT POSITION SENSOR LH FAILURE, Diagnostic Chart with Trouble Code.>
37	Buckle Switch RH failure	• Passenger's seat buckle switch circuit is open, shorted or shorted to ground. • Occupant detection system is faulty. • Occupant detection harness is faulty.	Refer to “Occupant Detection System” for details on DTC 37. <Ref. to OD(diag)-30, DTC 37 BUCKLE SWITCH RH FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
38	Buckle Switch LH failure	• Driver's seat buckle switch circuit is open, shorted or shorted to ground. • Airbag rear harness LH circuit is open, shorted or shorted to ground. • Airbag control module is faulty.	<Ref. to AB(diag)-79, DTC 38 BUCKLE SWITCH LH FAILURE, Diagnostic Chart with Trouble Code.>
39	Seatbelt Warning failure	• Airbag control module is faulty. • Body integrated module is faulty. • Harness circuits between body integrated module and air bag control module are open, shorted or shorted to ground.	<Ref. to AB(diag)-81, DTC 39 SEATBELT WARNING FAILURE, Diagnostic Chart with Trouble Code.>
41	Side Airbag RH failure	• Side airbag harness (RH) circuit is faulty. • Side airbag module (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-83, DTC 41 SIDE AIRBAG RH FAILURE, Diagnostic Chart with Trouble Code.>

DTC	Display	Content of diagnosis	Reference target
42	Side Airbag LH failure	• Side airbag harness (LH) circuit is faulty. • Side airbag module (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-86, DTC 42 SIDE AIRBAG LH FAILURE, Diagnostic Chart with Trouble Code.>
45	Side Airbag RH failure	• Side airbag harness (RH) is shorted to power supply. • Airbag control module is faulty.	<Ref. to AB(diag)-89, DTC 45 SIDE AIRBAG RH FAILURE, Diagnostic Chart with Trouble Code.>
46	Side Airbag LH failure	• Side airbag harness (LH) is shorted to power supply. • Airbag control module is faulty.	<Ref. to AB(diag)-91, DTC 46 SIDE AIRBAG LH FAILURE, Diagnostic Chart with Trouble Code.>
51	Side Airbag Sensor RH failure	• Side airbag sensor (RH) is faulty. • Side airbag harness (RH) circuit is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-93, DTC 51 SIDE AIRBAG SENSOR RH FAILURE, Diagnostic Chart with Trouble Code.>
52	Side Airbag Sensor LH failure	• Side airbag sensor (LH) is faulty. • Side airbag harness (LH) circuit is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-95, DTC 52 SIDE AIRBAG SENSOR LH FAILURE, Diagnostic Chart with Trouble Code.>
53	Side Airbag Sensor RH failure	Side airbag sensor (RH) is faulty.	<Ref. to AB(diag)-97, 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)-97, DTC 54 SIDE AIRBAG SENSOR LH FAILURE, Diagnostic Chart with Trouble Code.>
55	Side Curtain Airbag Firing output	• Side airbag module is deployed. • Curtain airbag module is deployed.	<Ref. to AB(diag)-97, DTC 55 SIDE CURTAIN AIRBAG FIRING OUTPUT, Diagnostic Chart with Trouble Code.>
56	Curtain Airbag Sensor RH failure	• Curtain airbag sensor (RH) is faulty. • Curtain airbag harness (RH) circuit is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-98, DTC 56 CURTAIN AIRBAG SENSOR RH FAILURE, Diagnostic Chart with Trouble Code.>
57	Curtain Airbag Sensor LH failure	• Curtain airbag sensor (LH) is faulty. • Curtain airbag harness (LH) circuit is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-101, DTC 57 CURTAIN AIRBAG SENSOR LH FAILURE, Diagnostic Chart with Trouble Code.>
58	Curtain Airbag Sensor RH failure	Curtain airbag sensor (RH) is faulty.	<Ref. to AB(diag)-103, 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)-103, DTC 59 CURTAIN AIRBAG SENSOR LH FAILURE, Diagnostic Chart with Trouble Code.>
61	Belt Pretensioner RH failure	• Seat belt pretensioner (RH) circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Pretensioner is faulty. • Pretensioner harness is faulty.	<Ref. to AB(diag)-104, DTC 61 BELT PRETENSIONER RH FAILURE, Diagnostic Chart with Trouble Code.>
62	Belt Pretensioner LH failure	• Seat belt pretensioner (LH) circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Pretensioner is faulty. • Pretensioner harness is faulty.	<Ref. to AB(diag)-107, DTC 62 BELT PRETENSIONER LH FAILURE, Diagnostic Chart with Trouble Code.>
65	Belt Pretensioner RH failure	• Seat belt pretensioner (RH) circuit is shorted to power supply. • Pretensioner is faulty. • Pretensioner harness is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-110, DTC 65 BELT PRETENSIONER RH FAILURE, Diagnostic Chart with Trouble Code.>
66	Belt Pretensioner LH failure	• Seat belt pretensioner (LH) circuit is shorted to power supply. • Pretensioner is faulty. • Pretensioner harness is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-112, DTC 66 BELT PRETENSIONER LH FAILURE, Diagnostic Chart with Trouble Code.>

DTC	Display	Content of diagnosis	Reference target
71	Driver's Airbag failure	• 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. • Airbag control module is faulty. • Driver's airbag module is faulty.	<Ref. to AB(diag)-114, DTC 71 DRIVER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
72	Passenger's Airbag failure	• 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. • Airbag control module is faulty. • Passenger's airbag module is faulty.	<Ref. to AB(diag)-117, DTC 72 PASSENGER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
75	Driver's Airbag failure	• 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. • Airbag control module is faulty. • Driver's airbag module is faulty.	<Ref. to AB(diag)-120, DTC 75 DRIVER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
76	Passenger's Airbag failure	• Airbag main harness circuit (Passenger's side) is shorted to power supply. • Airbag module harness circuit (Passenger's side) is shorted to power supply. • Airbag control module is faulty. • Passenger's airbag module is faulty.	<Ref. to AB(diag)-123, DTC 76 PASSENGER'S AIRBAG FAILURE, Diagnostic Chart with Trouble Code.>
91	Curtain Airbag Module RH failure	• Curtain airbag harness (RH) circuit is faulty. • Curtain airbag module (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-125, DTC 91 CURTAIN AIRBAG MODULE RH FAILURE, Diagnostic Chart with Trouble Code.>
92	Curtain Airbag Module LH failure	• Curtain airbag harness (LH) circuit is faulty. • Curtain airbag module (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-128, DTC 92 CURTAIN AIRBAG MODULE LH FAILURE, Diagnostic Chart with Trouble Code.>
95	Curtain Airbag Module RH failure	• Curtain airbag harness (RH) is shorted to power supply. • Curtain airbag module (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-131, DTC 95 CURTAIN AIRBAG MODULE RH FAILURE, Diagnostic Chart with Trouble Code.>
96	Curtain Airbag Module LH failure	• Curtain airbag harness (LH) is shorted to power supply. • Curtain airbag module (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-133, DTC 96 CURTAIN AIRBAG MODULE LH FAILURE, Diagnostic Chart with Trouble Code.>

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:

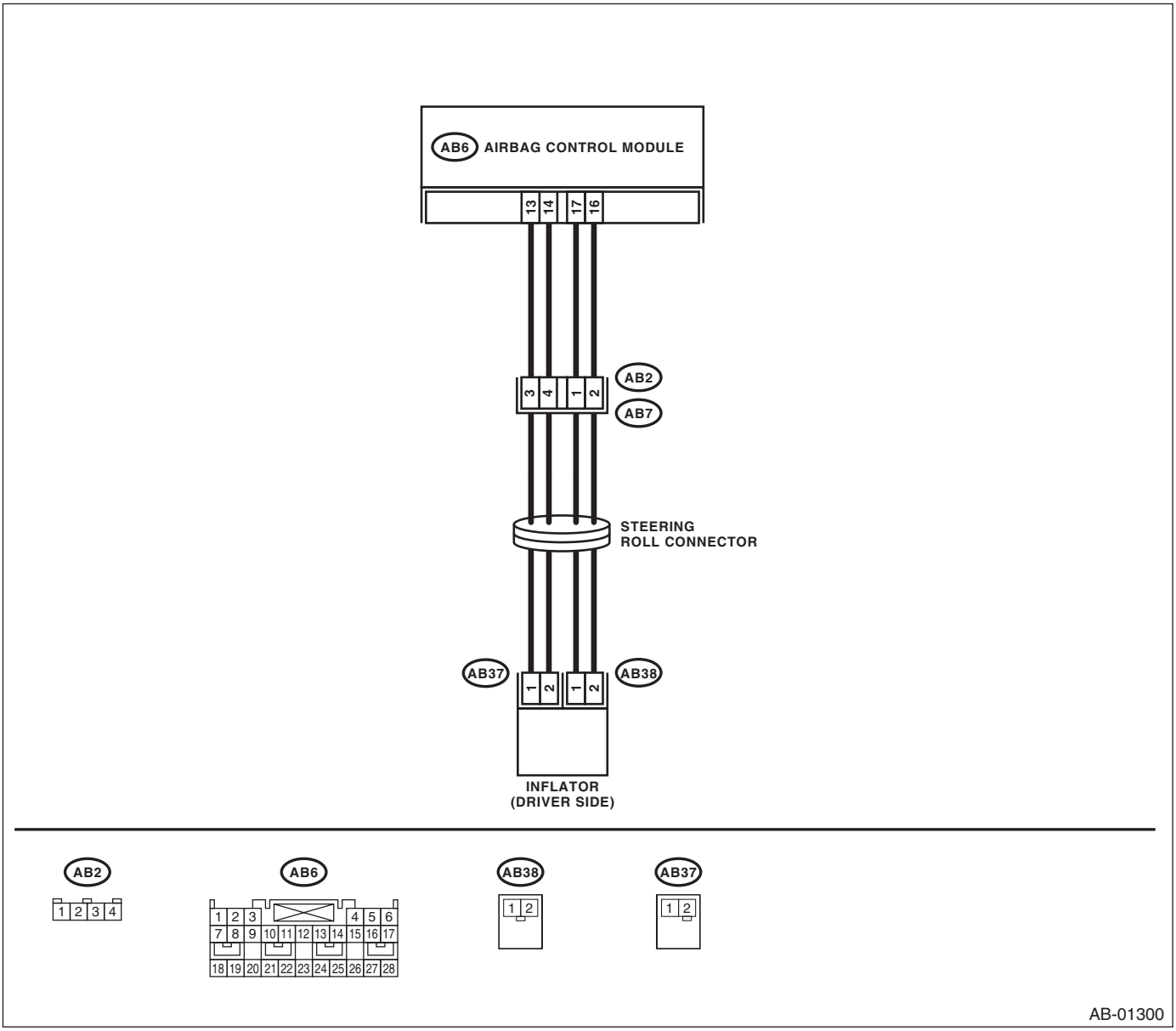
• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver’s and passenger’s seats for safety reasons.

NOTE:
Prior to starting work, prepare two airbag resistors (98299PA040).

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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**.

	Step	Check	Yes	No
2	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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) of test harness Q. 7) 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 driver's airbag module. <Ref. to AB-15, Driver's Airbag Module.>	Go to step **3**.
3	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 6 seconds and go off?	Replace the roll connector. <Ref. to AB-24, Roll Connector.>	Go to step **4**.
4	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the console side cover lower on the passenger's side and disconnect the connectors (AB10) and (AB9). 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. 5) Measure the resistance between connector (2U) in the test harness U and connectors (2P) and (3P) in the test harness P. ***Connector & terminal*** ***(2U) No. 2 — (2P) No. 1:*** ***(2U) No. 4 — (2P) No. 2:*** ***(2U) No. 8 — (3P) No. 3:*** ***(2U) No. 12 — (3P) No. 4:***	Is the resistance less than 10 Ω?	Go to step **5**.	Replace the airbag main harness with body harness.

	Step	Check	Yes	No
5	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** Measure the resistance between connector (2U) terminals in the test harness U. ***Connector & terminal*** ***(2U) No. 2 — (2U) No. 4:*** ***(2U) No. 4 — Chassis ground:*** ***(2U) No. 2 — Chassis ground:*** ***(2U) No. 8 — (2U) No. 12:*** ***(2U) No. 8 — Chassis ground:*** ***(2U) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace the airbag main harness with body harness.
6	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **7**.
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

B: DTC 12 PASSENGER'S AIRBAG FAILURE

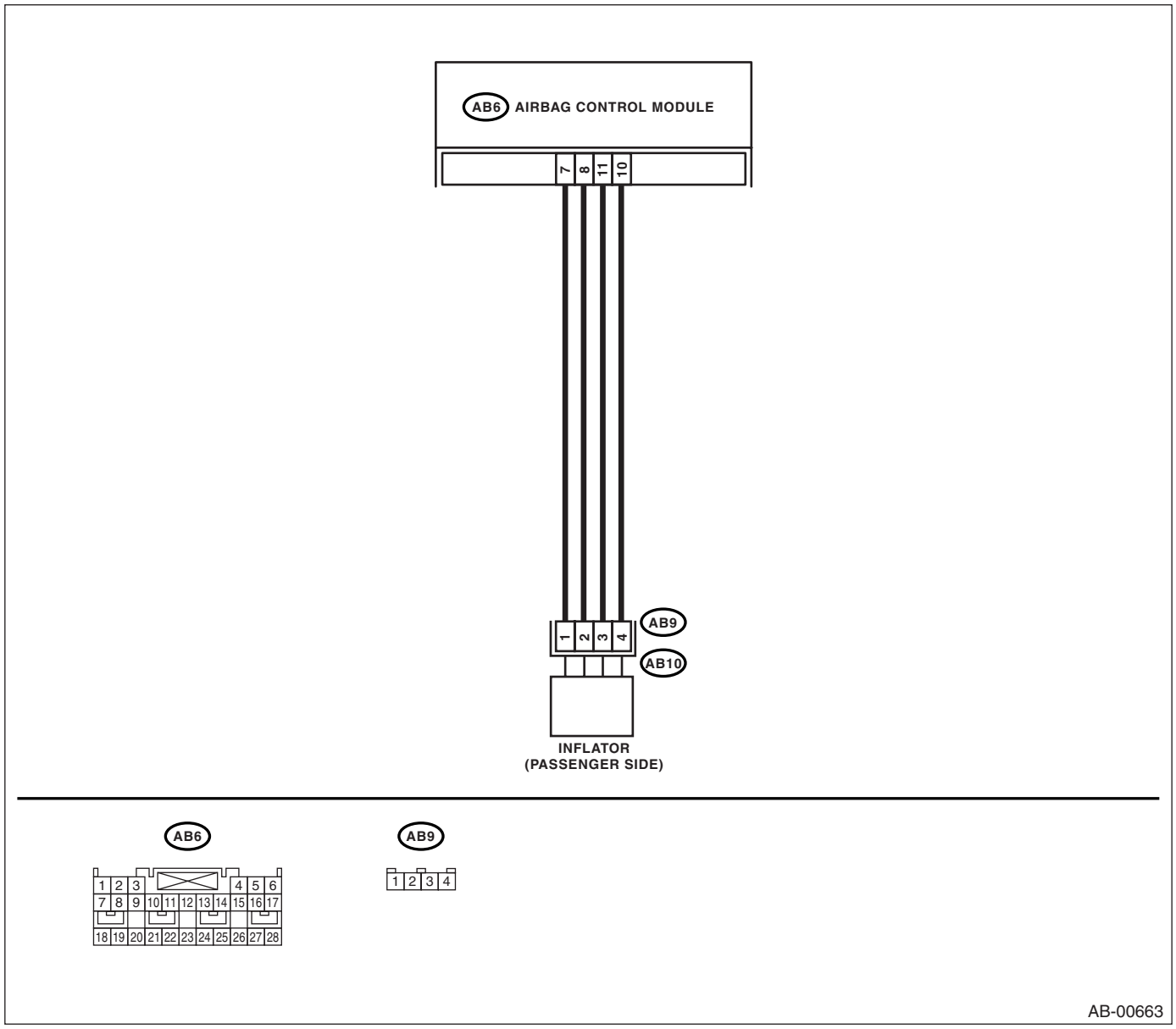
DTC DETECTING CONDITION:

- 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 diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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.	Go to step **2**.
2	**CHECK PASSENGER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the console side cover lower on the passenger's side. 3) Disconnect the connector (AB10) from (AB9). 4) Connect the connector (1P) in the test harness P to connector (AB9). 5) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P. 6) 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 passenger's airbag module. <Ref. to AB-16, Passenger's Airbag Module.>	Go to step **3**.
3	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. 5) Measure the resistance between connector (2U) in the test harness U and connectors (2P) and (3P) in the test harness P. ***Connector & terminal*** ***(2U) No. 3 — (2P) No. 1:*** ***(2U) No. 5 — (2P) No. 2:*** ***(2U) No. 9 — (3P) No. 3:*** ***(2U) No. 13 — (3P) No. 4:***	Is the resistance less than 10 Ω?	Go to step **4**.	Replace the airbag main harness with body harness.
4	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** Measure the resistance between connectors (2U) in the test harness U, and between connector (2U) and chassis ground. ***Connector & terminal*** ***(2U) No. 3 — (2U) No. 5:*** ***(2U) No. 3 — Chassis ground:*** ***(2U) No. 5 — Chassis ground:*** ***(2U) No. 9 — (2U) No. 13:*** ***(2U) No. 9 — Chassis ground:*** ***(2U) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace the airbag main harness with body harness.

	Step	Check	Yes	No
5	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **6**.
6	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

C: DTC 15 DRIVER'S AIRBAG FAILURE

DTC DETECTING CONDITION:

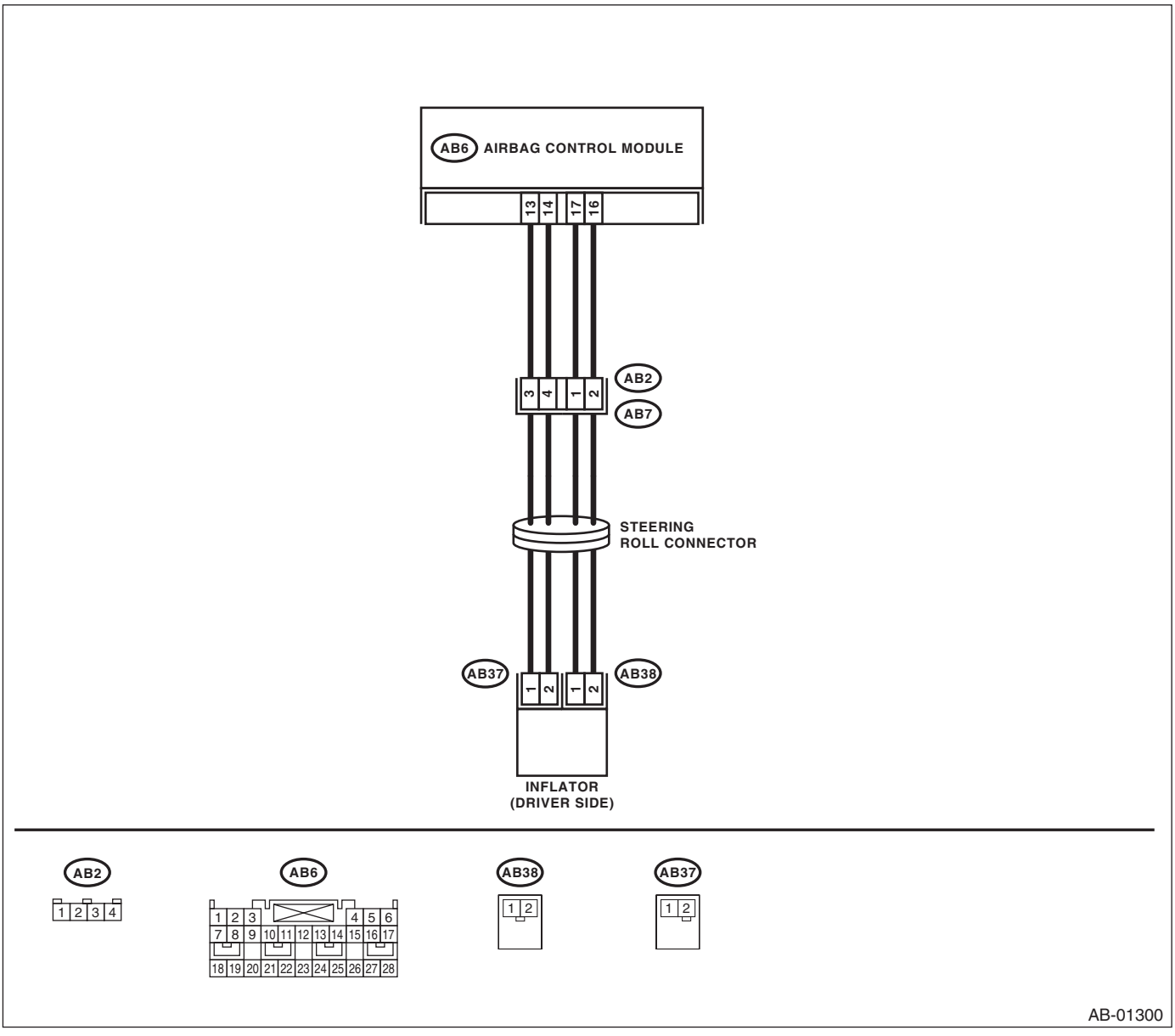
- Airbag main harness circuit (Driver's side) is shorted to power supply.
- Airbag module harness circuit (Driver's side) is shorted to power supply.
- Roll connector is shorted to power supply.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

NOTE:
Prior to starting work, prepare two airbag resistors (98299PA040).

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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**.
2	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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) of test harness Q. 7) 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 driver's airbag module. <Ref. to AB-15, Driver's Airbag Module.>	Go to step **3**.
3	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 6 seconds and go off?	Replace the roll connector. <Ref. to AB-24, Roll Connector.>	Go to step **4**.
4	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the console side cover lower on the passenger's side and disconnect the connectors (AB10) and (AB9). 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. 5) Connect the battery ground terminal and turn the ignition switch to ON. (Engine OFF) 6) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 4 (+) — Chassis ground (–):*** ***(2U) No. 2 (+) — Chassis ground (–):*** ***(2U) No. 8 (+) — Chassis ground (–):*** ***(2U) No. 12 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **5**.	Replace the airbag main harness with body harness.

	Step	Check	Yes	No
5	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **6**.
6	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

D: DTC 16 PASSENGER'S AIRBAG FAILURE

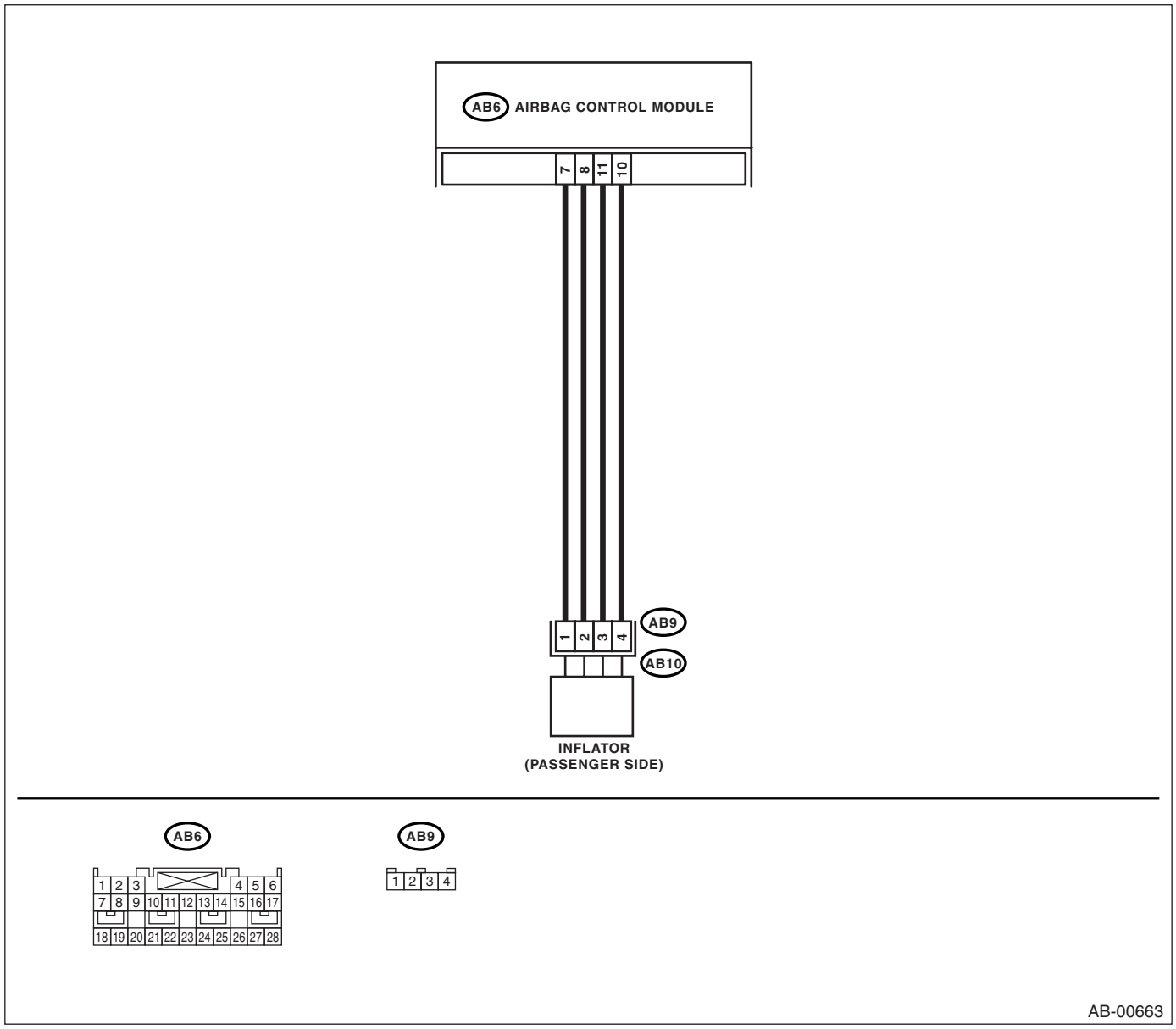
DTC DETECTING CONDITION:

- 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 diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



Diagnostic Chart with Trouble Code

	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 with chassis harness.	Go to step **2**.
2	**CHECK PASSENGER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the console side cover lower on the passenger's side. 3) Disconnect the connector (AB10) from (AB9). 4) Connect the connector (1P) in the test harness P to connector (AB9). 5) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P. 6) 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 passenger's airbag module. <Ref. to AB-16, Passenger's Airbag Module.>	Go to step **3**.
3	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. 5) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 3 (+) — Chassis ground (–):*** ***(2U) No. 5 (+) — Chassis ground (–):*** ***(2U) No. 9 (+) — Chassis ground (–):*** ***(2U) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Replace the airbag main harness with body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

E: DTC 21 AIRBAG ECU FAILURE

DTC DETECTING CONDITION:

Airbag control module is faulty.

CAUTION:

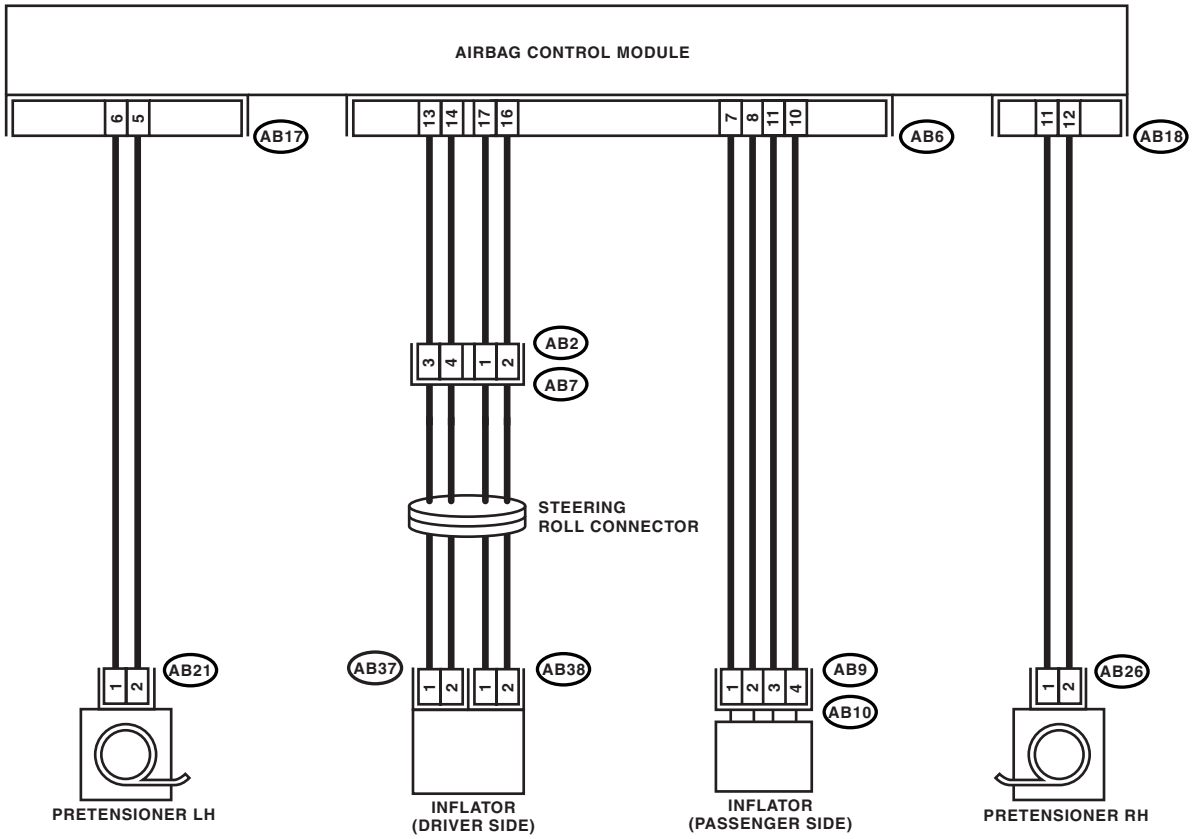
• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

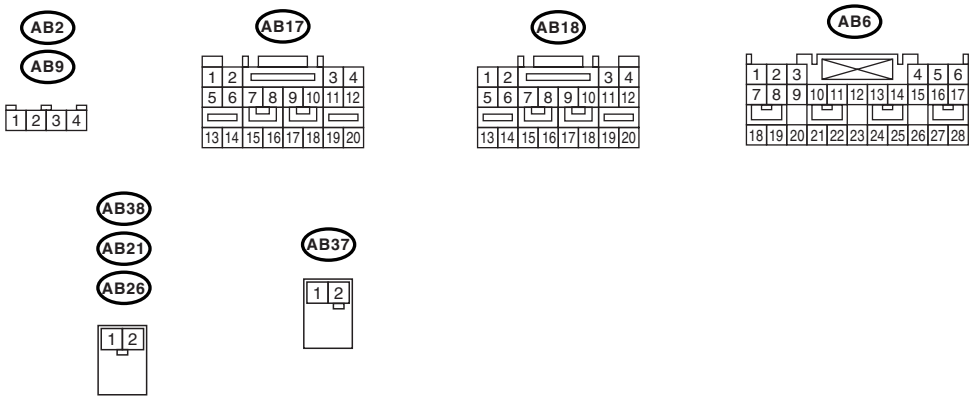
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

	Step	Check	Yes	No
1	**CHECK IF DTC 21 IS INDICATED.** Read the DTC. <Ref. to AB(diag)-31, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC 21 indicated for airbag warning light?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Perform the clear memory mode. <Ref. to AB(diag)-32, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

F: DTC 22 FRONT AIRBAG FIRING OUTPUT

WIRING DIAGRAM:





AB-00922

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-21, Airbag Control Module.>
- Driver's airbag module<Ref. to AB-15, Driver's Airbag Module.>
- Passenger's airbag module<Ref. to AB-16, Passenger's Airbag Module.>
- Front sub sensor of both sides<Ref. to AB-25, Front Sub Sensor.>
- Front seat belt outer with pretensioner of both sides. <Ref. to SB-10, 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.>

G: DTC 23 CONNECTOR TO AIRBAG ECU FAILURE

DTC DETECTING CONDITION:
Connection of (AB6), (AB17) and (AB18) to airbag control module is improper.

CAUTION:
Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

	Step	Check	Yes	No
1	**CHECK POOR CONTACTS OF CONNECTORS (AB6), (AB17) AND (AB18).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connectors (AB6), (AB17) and (AB18) from airbag control module.	Is there rust or damage on the harness connector and the control module connector?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.> Replace the body harness with the airbag main harness or replace the body harness with the side airbag harness.	Go to step **2**.
2	**CHECK POOR CONTACTS OF CONNECTORS (AB6), (AB17) AND (AB18).** 1) Reconnect the connector securely. 2) Connect the battery ground terminal and turn the ignition switch to ON.	Does the airbag warning light illuminate for 6 seconds and go off?	Go to step **3**.	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>
3	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **4**.
4	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

H: DTC 24 IG1 OPEN

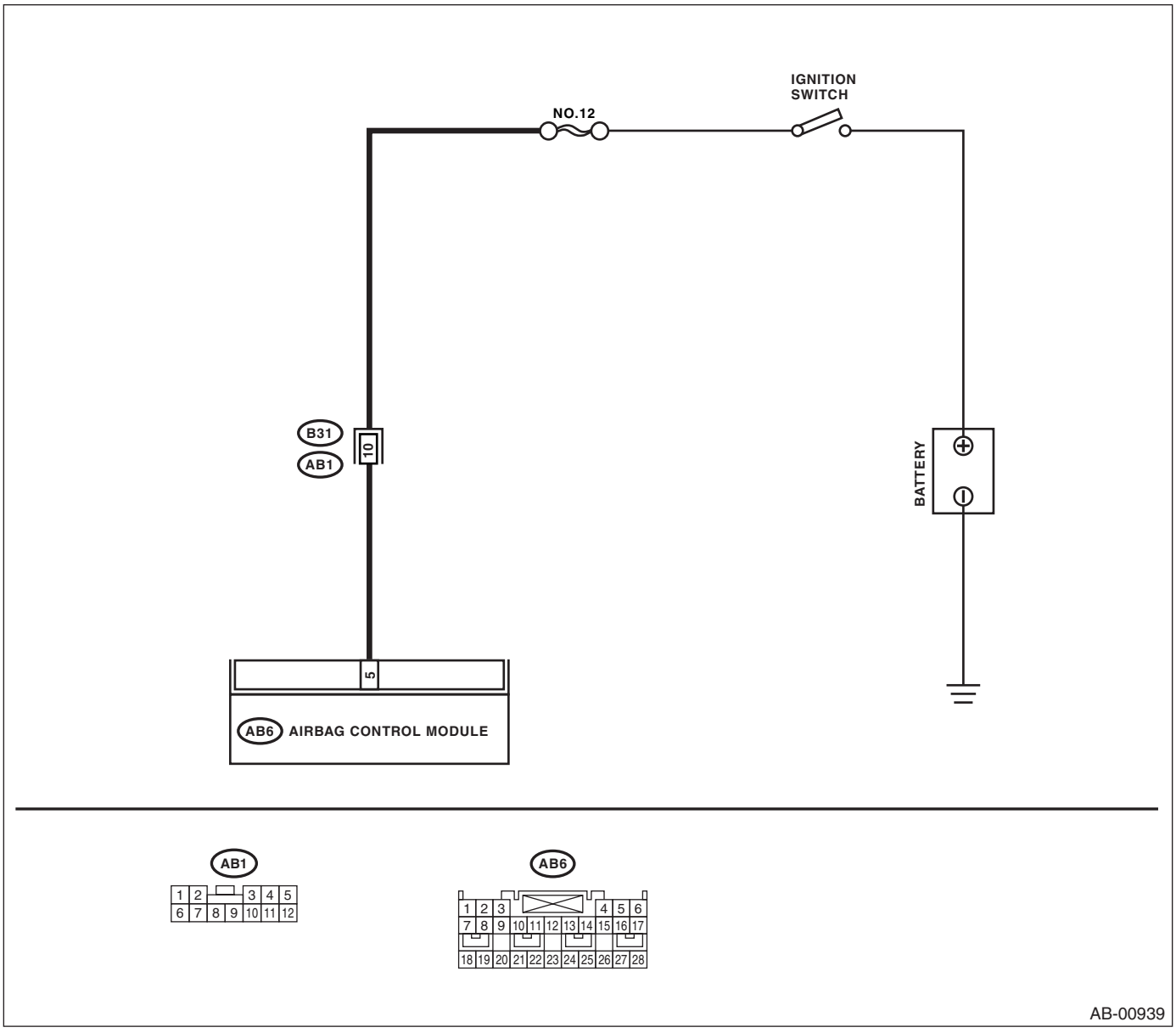
DTC DETECTING CONDITION:

- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No. 12 (in joint box) is blown.
- Body harness circuit is open.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK AIRBAG CONTROL MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB6) from airbag control module. 3) Connect the connector (1U) in the test harness U to connector (AB6). 4) Connect the battery ground terminal and turn the ignition switch to ON. 5) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **2**.
2	**CHECK FUSE NO. 12 (IN JOINT BOX).** 1) Confirm that the ignition switch is turned to OFF. 2) Remove the fuse No. 12 (in joint box) and perform visual inspection.	Is the fuse No. 12 blown out?	Replace the fuse No. 12. If fuse No. 25 is blown out again, repair the body harness. Replace the airbag main harness with body harness.	Go to step **3**.
3	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **4**.
4	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

I: DTC 25 IG2 OPEN

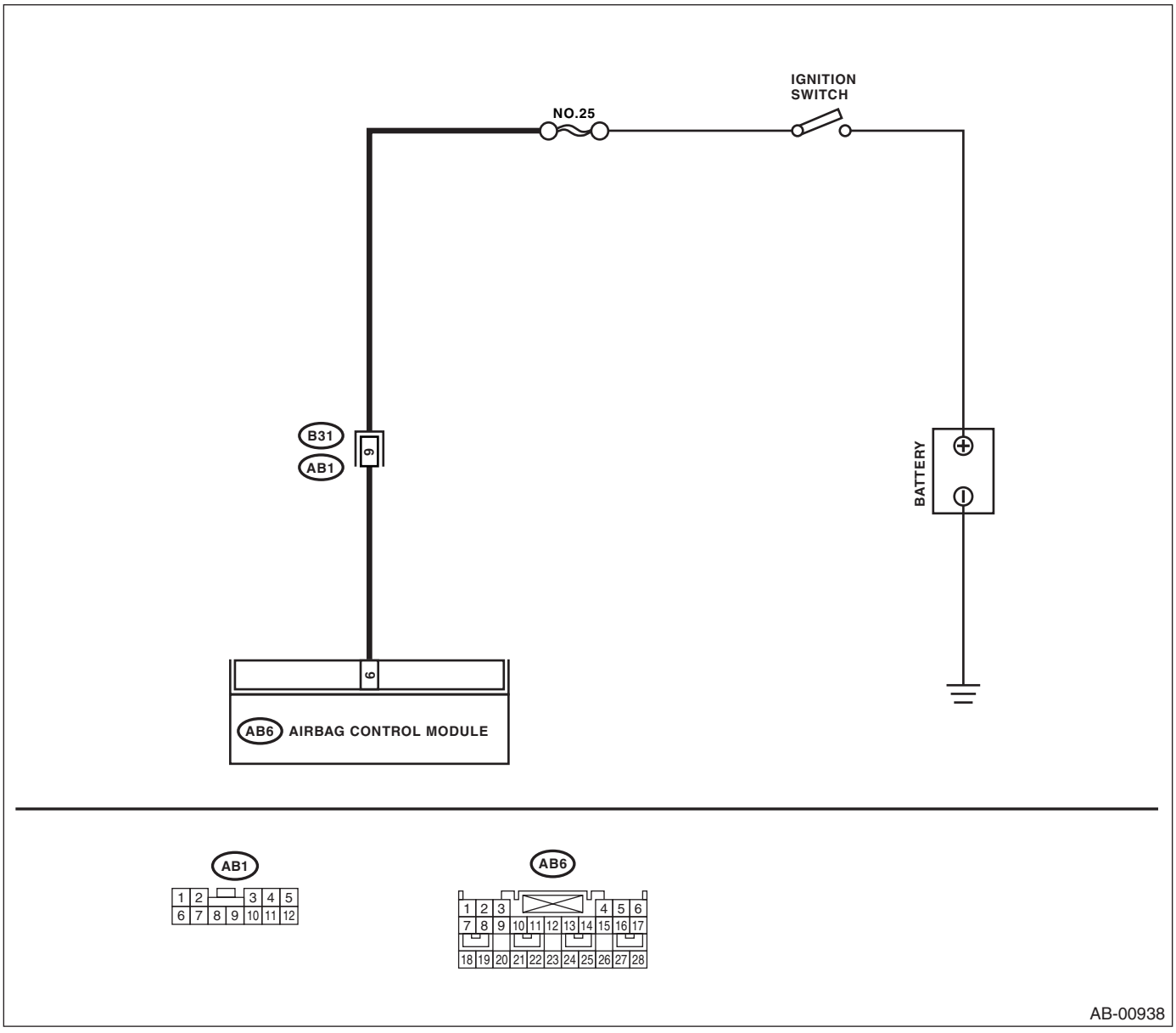
DTC DETECTING CONDITION:

- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No. 25 (in joint box) is blown.
- Body harness circuit is open.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK AIRBAG CONTROL MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB6) from airbag control module. 3) Connect the connector (1U) in the test harness U to connector (AB6). 4) Connect the battery ground terminal and turn the ignition switch to ON. 5) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **2**.
2	**CHECK FUSE NO. 25 (IN JOINT BOX).** 1) Confirm that the ignition switch is turned to OFF. 2) Remove the fuse No. 25 (in joint box) and perform visual inspection.	Is the fuse No. 25 blown out?	Replace the fuse No. 25. If fuse No. 12 is blown out again, repair the body harness. Or replace the airbag main harness with body harness.	Go to step **3**.
3	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **4**.
4	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

J: DTC 26 PASSENGER'S AIRBAG INDICATOR FAILURE

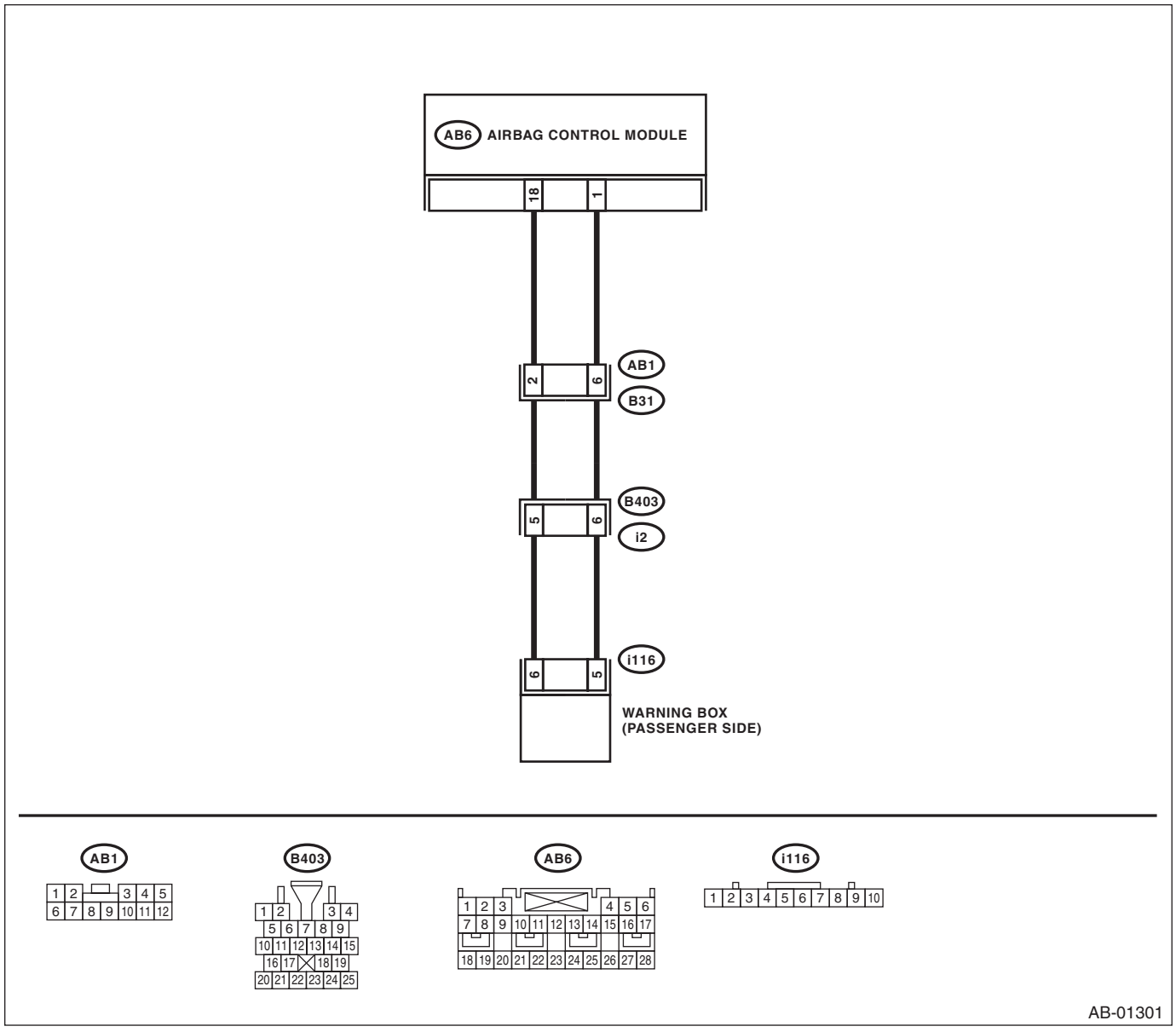
DTC DETECTING CONDITION:

- Passenger's seat airbag indicator is faulty.
- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Body harness circuit is open.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag harness, disconnect the each airbag module connector, and seat belt pretensioner for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Confirm that the connector that is between the airbag control module and the passenger's side warning box is securely connected.	Is there poor contact in any connector?	Replace the airbag harness connector.	Go to step **2**.
2	**CHECK AIRBAG MAIN HARNESS.** 1) Disconnect the connector (AB6) 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.	Is the passenger's seat airbag indicator lit?	Go to step **3**.	Go to step **4**.
3	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch to OFF. 2) Remove the passenger's side warning box and disconnect the connector (i116). 3) Connect the connector (1U) in the test harness U to connector (AB6). 4) Measure the resistance between connectors (2U) and (4U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 14 — (4U) No. 17:*** ***(2U) No. 14 — Chassis ground:*** ***(4U) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the passenger's side warning box. <Ref. to AC-46, REMOVAL, Air Vent Grille.>	Repair the bulkhead harness. Or replace the airbag main harness with body harness.
4	**CHECK THE AIRBAG HARNESS.** 1) Connect the connectors (7U) and (8U) in the test harness U. 2) Connect the battery ground terminal and turn the ignition switch to ON.	Is the passenger's seat airbag indicator lit?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK THE AIRBAG HARNESS.** 1) Turn the ignition switch to OFF. 2) Connect the connector (1U) in the test harness U to connector (AB6). 3) Measure the resistance between connectors (2U) and (4U) in the test harness U and the connector (i116). ***Connector & terminal*** ***(2U) No. 14 — (i116) No. 5:*** ***(4U) No. 17 — (i116) No. 6:***	Is the resistance less than 10 Ω?	Go to step **6**.	Repair the bulkhead harness. Or replace the airbag main harness with body harness.
6	**CHECK BODY HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between connector (i116) and chassis ground. ***Connector & terminal*** ***(i116) No. 3 — Chassis ground:***	Is the voltage more than 10 V?	Replace the passenger's side warning box. <Ref. to AC-46, REMOVAL, Air Vent Grille.>	Repair the power supply line to the passenger's side warning box.

K: DTC 27 ODS COMMUNICATION ERROR

DTC DETECTING CONDITION:

- Occupant detection control module communication 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.

	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 RH or the occupant detection harness (seat harness).	Go to step **2**.
2	**CHECK THE AIRBAG HARNESS.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB18) from airbag control module. 3) Disconnect the connectors (AB59) and (AB61) under the passenger's seat. 4) Connect the connector (1U) in the test harness U to connector (AB18). 5) Connect the connector (1AB) in the test harness AB to the connector (AB61). 6) Measure the resistance between connector (3U) in the test harness U and connector (2AB) in the test harness AB. ***Connector & terminal*** ***(3U) No. 2 — (2AB) No. 1:*** ***(3U) No. 4 — (2AB) No. 2:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the airbag rear harness RH with body harness.
3	**CHECK THE AIRBAG HARNESS.** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 2 — Chassis ground:*** ***(3U) No. 2 — (3U) No.4:***	Is the resistance less than 10 Ω?	Go to step **4**.	Replace the airbag rear harness RH with the body harness.
4	**CHECK THE AIRBAG HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between connector (2AB) in the test harness AB and chassis ground. ***Connector & terminal*** ***(2AB) No. 3 — chassis ground:***	Is the voltage more than 9 V?	Go to step **5**.	Check the battery voltage and fuse. If there is no faulty, replace the airbag rear harness RH with body harness.

	Step	Check	Yes	No
5	**CHECK THE AIRBAG HARNESS.** Measure the voltage between connector (2AB) in the test harness AB and chassis ground. ***Connector & terminal*** ***(2AB) No. 1 — chassis ground:***	Is the voltage more than 9 V?	Replace the airbag rear harness RH with body harness.	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.

L: DTC 29 ODS FAILURE

NOTE:
Refer to “Occupant Detection System” for details on DTC 29. <Ref. to OD(diag)-29, DTC 29 ODS FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

M: DTC 2A OCCUPANT DETECTION CALIBRATION FAILURE

NOTE:
Refer to “Occupant Detection System” for details on DTC 2A. <Ref. to OD(diag)-26, DTC 2A OCCUPANT DETECTION CALIBRATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

N: DTC 2B ODS ERRONEOUS PARTS

NOTE:
Refer to “Occupant Detection System” for details on DTC 2B. <Ref. to OD(diag)-26, DTC 2B ODS ERRONEOUS PARTS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

O: DTC 2C BELT TENSION SENSOR FAILURE

NOTE:
Refer to “Occupant Detection System” for details on DTC 2C. <Ref. to OD(diag)-27, DTC 2C BELT TENSION SENSOR FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

P: DTC 31 FRONT SUB SENSOR RH FAILURE

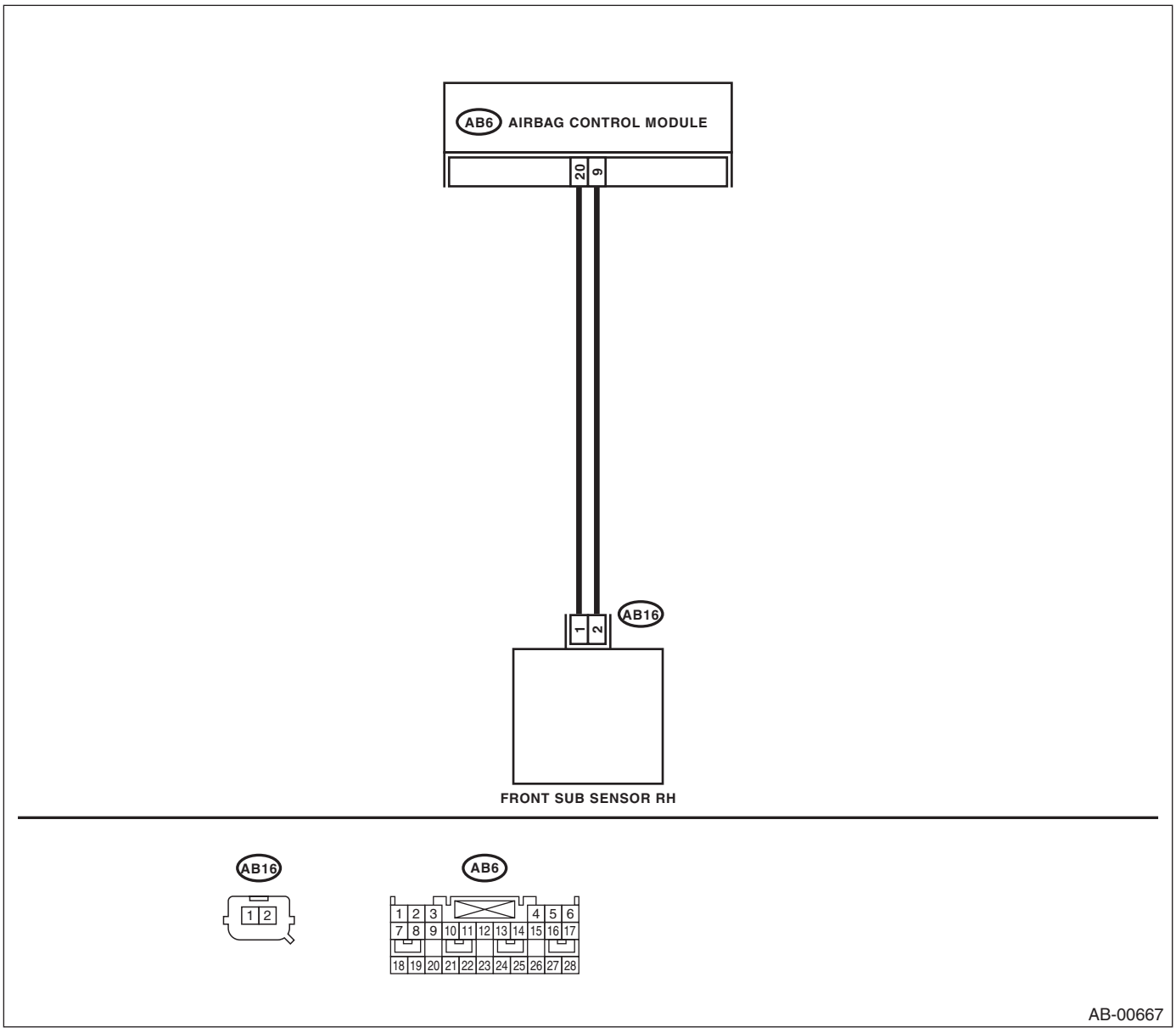
DTC DETECTING CONDITION:

- Front sub sensor harness (RH) circuit is shorted.
- Front sub sensor harness (RH) circuit is open.
- Front sub sensor (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** Check for poor contact of the connectors between the airbag control module and the front sub sensor RH.	Is there poor contact?	Repair the connector.	Go to step **2**.
2	**CHECK AIRBAG MAIN HARNESS (FRONT SUB SENSOR HARNESS RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the instrument panel lower cover and disconnect the connectors (AB7) and (AB2). 3) Remove the console side cover lower on the passenger's side and disconnect the connectors (AB10) and (AB9). 4) Disconnect the connector (AB6) from airbag control module. 5) Connect the connector (1U) in the test harness U to connector (AB6). 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 (3U) in the test harness U and connector (3H) in the test harness H. ***Connector & terminal*** ***(3U) No. 7 — (3H) No. 5:*** ***(3U) No. 9 — (3H) No. 6:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the airbag main harness with body harness.
3	**CHECK AIRBAG MAIN HARNESS (FRONT SUB SENSOR HARNESS RH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 7 — Chassis ground:*** ***(3U) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front sub sensor (RH). <Ref. to AB-25, Front Sub Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-21, Airbag Control Module.>	Go to step **4**.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

Q: DTC 32 FRONT SUB SENSOR LH FAILURE

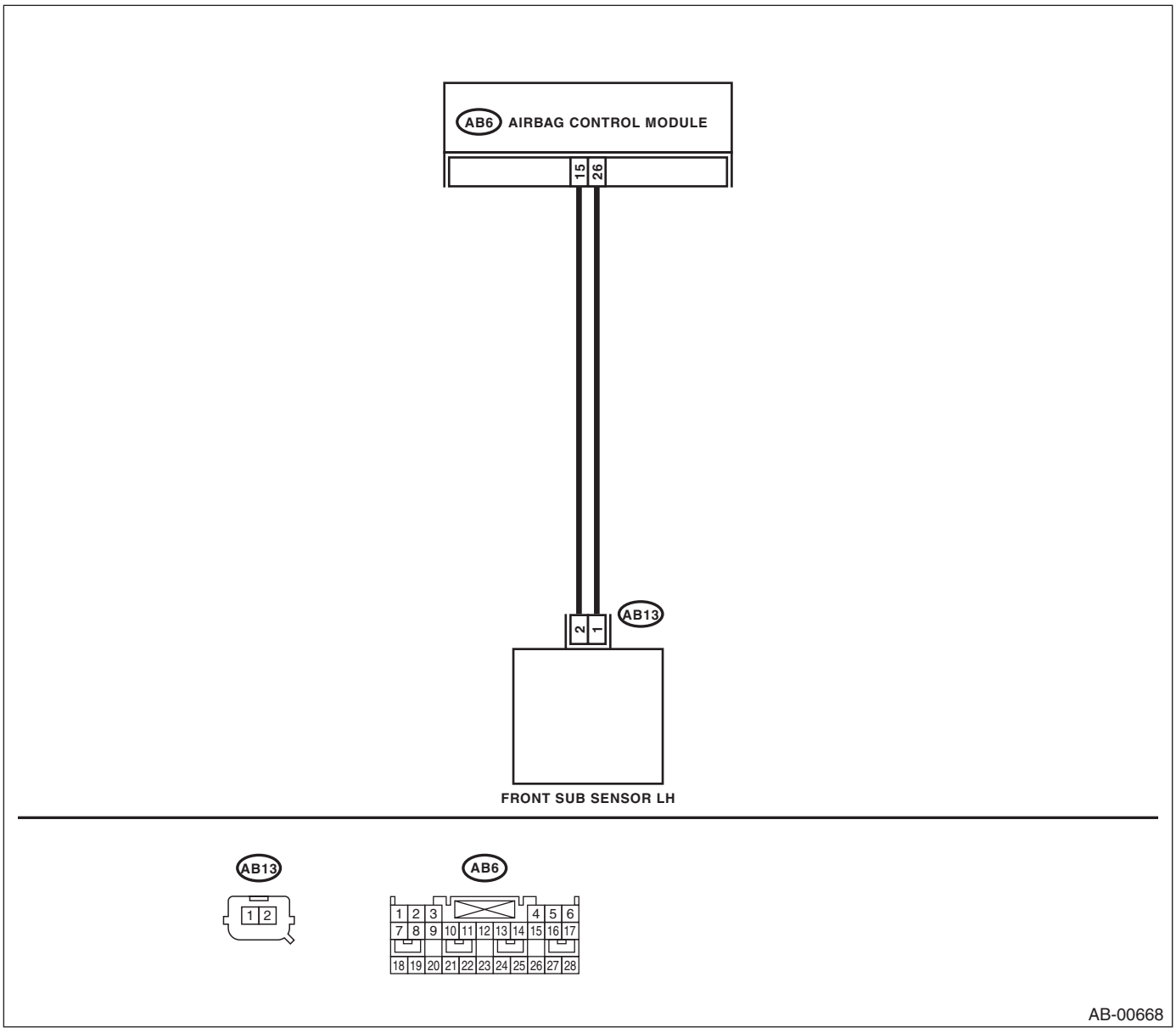
DTC DETECTING CONDITION:

- Front sub sensor harness (LH) circuit is shorted.
- Front sub sensor harness (LH) circuit is open.
- Front sub sensor (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** Check for poor contact of the connectors between the airbag control module and the front sub sensor LH.	Is there poor contact?	Replace the airbag main harness with body harness.	Go to step **2**.
2	**CHECK AIRBAG MAIN HARNESS (FRONT SUB SENSOR HARNESS LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the instrument panel lower cover and disconnect the connectors (AB7) and (AB2). 3) Remove the console side cover lower on the passenger's side and disconnect the connectors (AB10) and (AB9). 4) Disconnect the connector (AB6) from airbag control module. 5) Connect the connector (1U) in the test harness U to connector (AB6). 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 (3U) in the test harness U and connector (3H) in the test harness H. ***Connector & terminal*** ***(3U) No. 6 — (3H) No. 5:*** ***(3U) No. 8 — (3H) No. 6:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the airbag main harness with body harness.
3	**CHECK AIRBAG MAIN HARNESS (FRONT SUB SENSOR HARNESS LH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 6 — Chassis ground:*** ***(3U) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front sub sensor (LH). <Ref. to AB-25, Front Sub Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-21, Airbag Control Module.>	Go to step **4**.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

R: 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.>

S: 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.>

T: DTC 36 SEAT POSITION SENSOR LH FAILURE

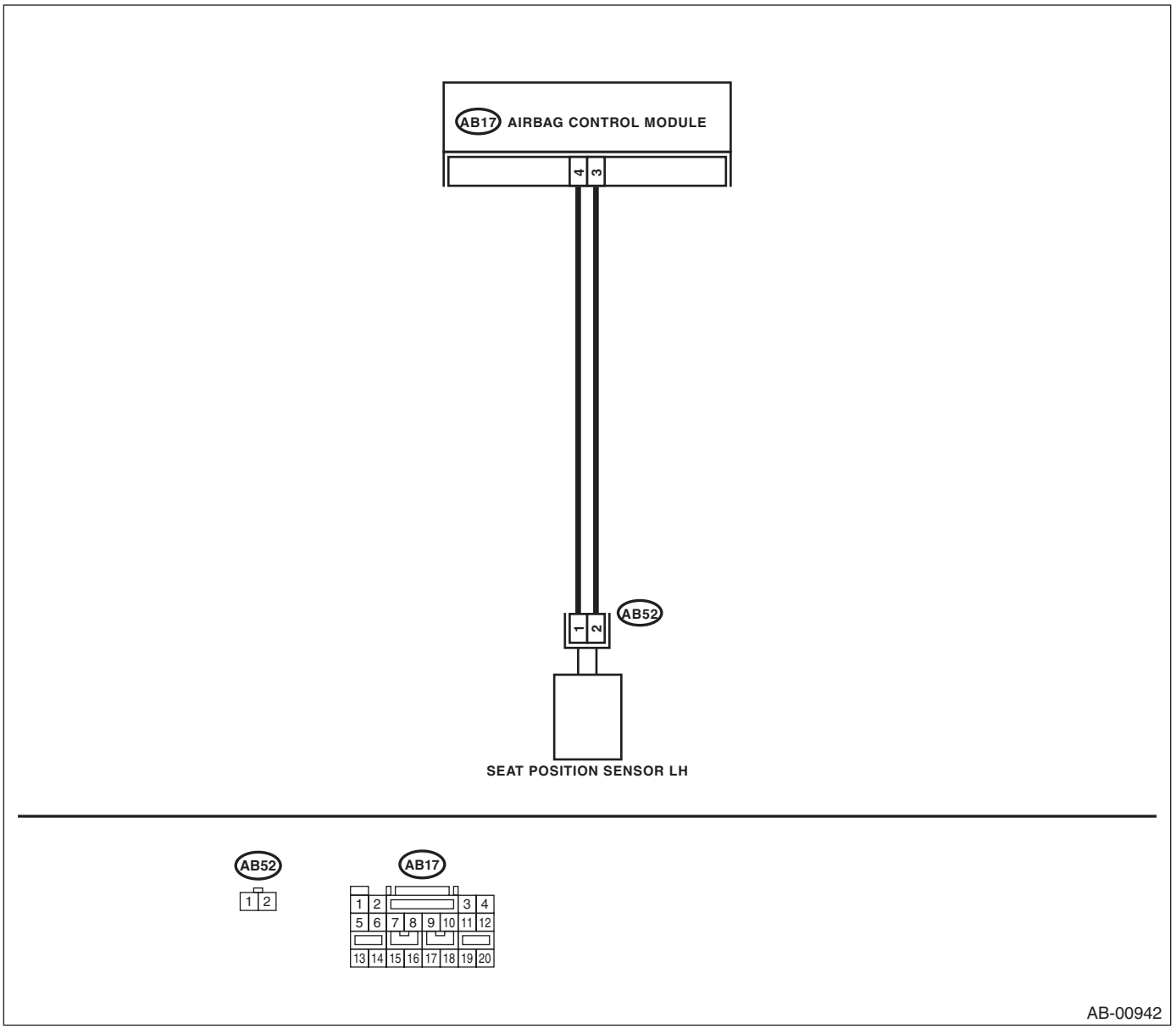
DTC DETECTING CONDITION:

- Driver's seat position sensor is faulty.
- Airbag control module is faulty.
- Airbag rear harness LH circuit is open, shorted or shorted to ground.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag harness, disconnect the each airbag module connector, and seat belt pretensioner for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK THE SEAT POSITION SENSOR (LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB52) from the seat position sensor (LH). 3) Connect the connector (2Y) in the test harness Y to connector (AB52). 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 seat position sensor (LH) with the driver's seat slide rail assembly. <Ref. to SE-7, Front Seat.>	Go to step **2**.
2	**CHECK AIRBAG REAR HARNESS LH (SEAT POSITION SENSOR HARNESS LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB23) from side airbag module (LH). 3) Disconnect the connector (AB31) from curtain airbag module (LH). 4) Disconnect the connector (AB21) from seat belt pretensioner (LH). 5) Disconnect the connector (AB17) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Disconnect the seat position sensor (LH), and then connect the connector (1H) in the test harness H to connector (AB52). 8) Measure the resistance between connector (3U) in the test harness U and connector (3H) in the test harness H. ***Connector & terminal*** ***(3U) No. 1 — (3H) No. 6:*** ***(3U) No. 3 — (3H) No. 5:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the airbag rear harness LH with the body harness.
3	**CHECK AIRBAG REAR HARNESS LH.** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 1 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the airbag rear harness LH with the body harness.	Replace the airbag control module.

U: DTC 37 BUCKLE SWITCH RH FAILURE

NOTE:
Refer to “Occupant Detection System” for details on DTC 37. <Ref. to OD(diag)-30, DTC 37 BUCKLE SWITCH RH FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

V: DTC 38 BUCKLE SWITCH LH FAILURE

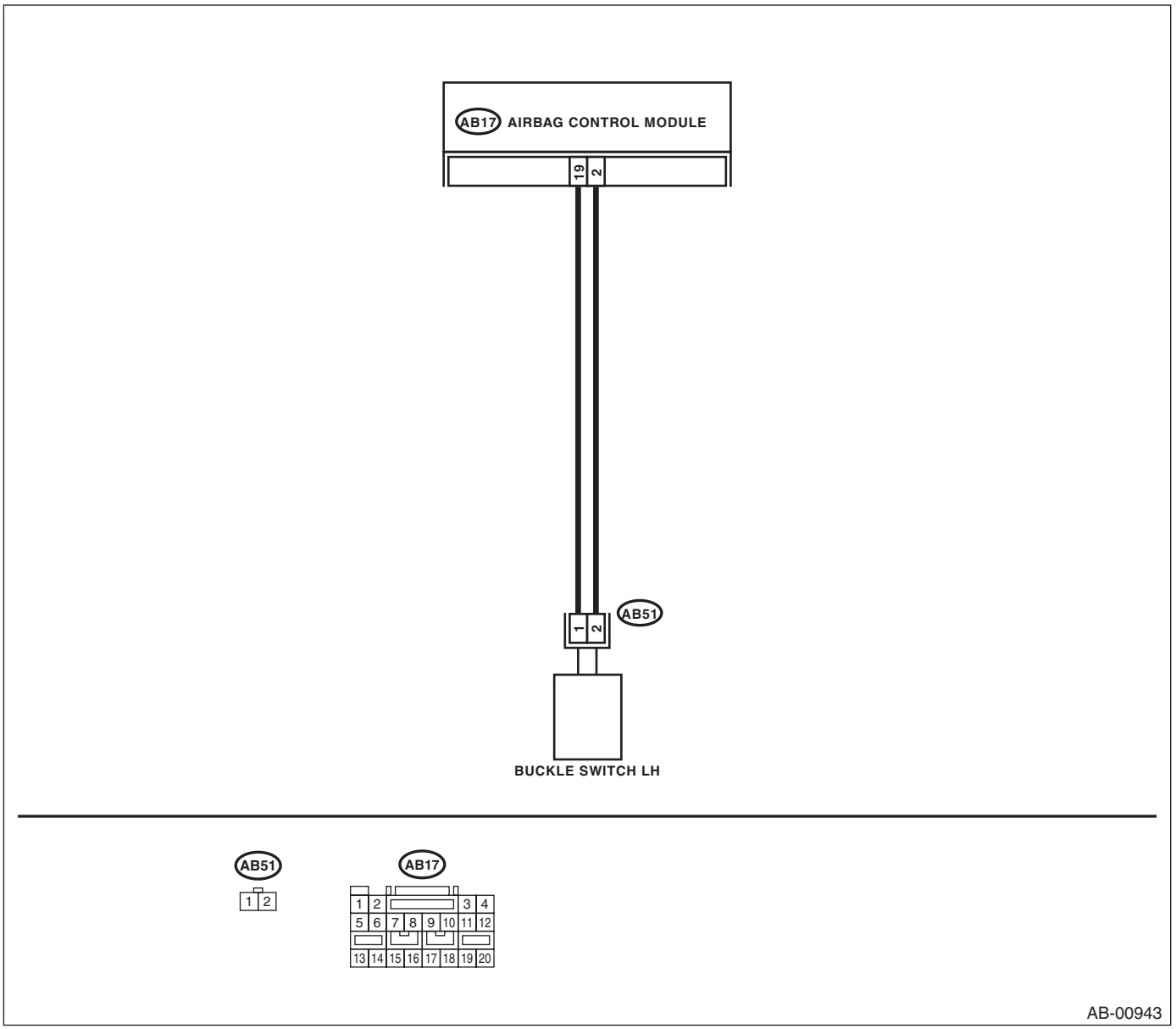
DTC DETECTING CONDITION:

- Driver's seat buckle switch circuit is open, shorted or shorted to ground.
- Airbag rear harness LH circuit is open, shorted or shorted to ground.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag harness, disconnect the each airbag module connector, and seat belt pretensioner for safety reasons.

WIRING DIAGRAM:



Diagnostic Chart with Trouble Code

	Step	Check	Yes	No
1	**CHECK SEAT BELT BUCKLE SWITCH (LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB51) from the buckle switch (LH). 3) Connect the connector (1Y) in the test harness Y to connector (AB51). 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 seat belt buckle switch (LH). <Ref. to SB-10, Front Seat Belt.>	Go to step **2**.
2	**CHECK AIRBAG REAR HARNESS LH (BUCKLE SWITCH HARNESS LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB23) from side airbag module (LH). 3) Disconnect the connector (AB31) from curtain airbag module (LH). 4) Disconnect the connector (AB21) from seat belt pretensioner (LH). 5) Disconnect the connector (AB17) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Disconnect the seat belt buckle switch (LH), and then connect the connector (1D) in the test harness D to connector (AB51). 8) Measure the resistance between connectors (4U) and (5U) in the test harness U and connector (3D) in the test harness D. ***Connector & terminal*** ***(4U) No. 11 — (3D) No. 3:*** ***(4U) No. 9 — (3D) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the airbag rear harness LH with the body harness.
3	**CHECK AIRBAG REAR HARNESS LH.** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(4U) No. 9 — (4U) No. 11:*** ***(4U) No. 9 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the airbag rear harness LH with the body harness.	Replace the airbag control module.

W: DTC 39 SEATBELT WARNING FAILURE

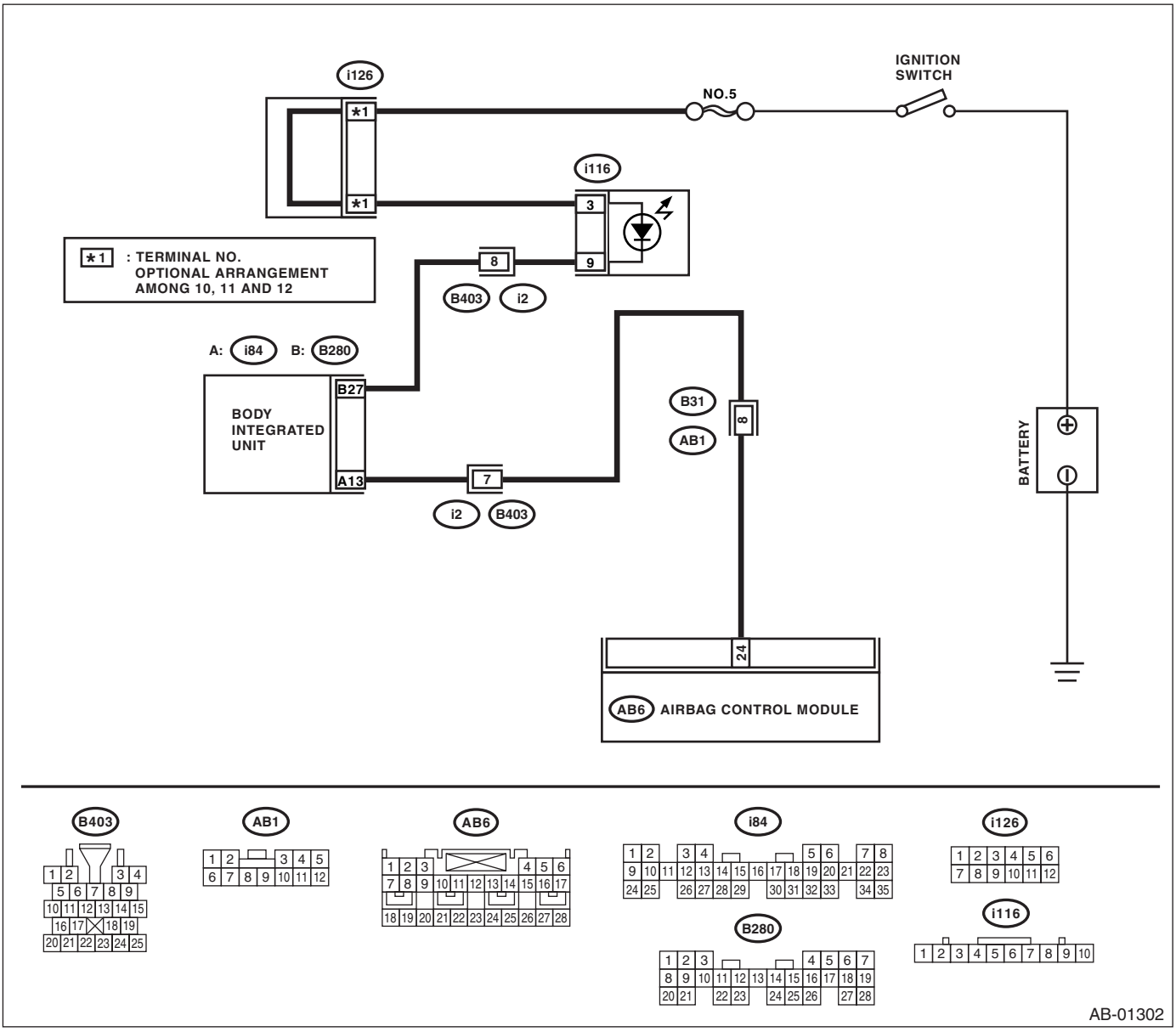
DTC DETECTING CONDITION:

- Passenger's seat belt warning system is faulty.
- Airbag control module is faulty.
- Body integrated module is faulty.
- Airbag rear harness RH circuit is open, shorted or shorted to ground.
- Harness circuits between body integrated module and air bag control module are open, shorted or shorted to ground.

CAUTION:

- **Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.**
- **After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.**
- **When inspecting the airbag harness, disconnect the each airbag module connector, and seat belt pretensioner for safety reasons.**

WIRING DIAGRAM:



Diagnostic Chart with Trouble Code

	Step	Check	Yes	No
1	**CHECK THE AIRBAG HARNESS.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB6) 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**.
2	**CHECK THE AIRBAG HARNESS.** 1) Turn the ignition switch to OFF. 2) Connect the connector (1U) in the test harness U to connector (AB6). 3) Measure the resistance between connector (4U) in the test harness U and chassis ground. ***Connector & terminal*** ***(4U) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the body integrated module.	Repair the bulkhead harness. Or replace the airbag main harness with body harness.
3	**CHECK THE AIRBAG HARNESS.** 1) With the condition of step 2, connect the connectors (7U) and (8U) in the test harness U. 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-21, Airbag Control Module.>	Go to step **4**.
4	**CHECK THE AIRBAG HARNESS.** 1) With the condition of step 3, disconnect the connectors (7U) and (8U) in the test harness U. 2) Measure the resistance between connector (4U) in the test harness U and the connector (i84). ***Connector & terminal*** ***(4U) No. 16 — (84) No. 13:***	Is the resistance less than 10 Ω?	Replace the body integrated module.	Repair the bulkhead harness. Or replace the airbag main harness with body harness.

X: DTC 41 SIDE AIRBAG RH FAILURE

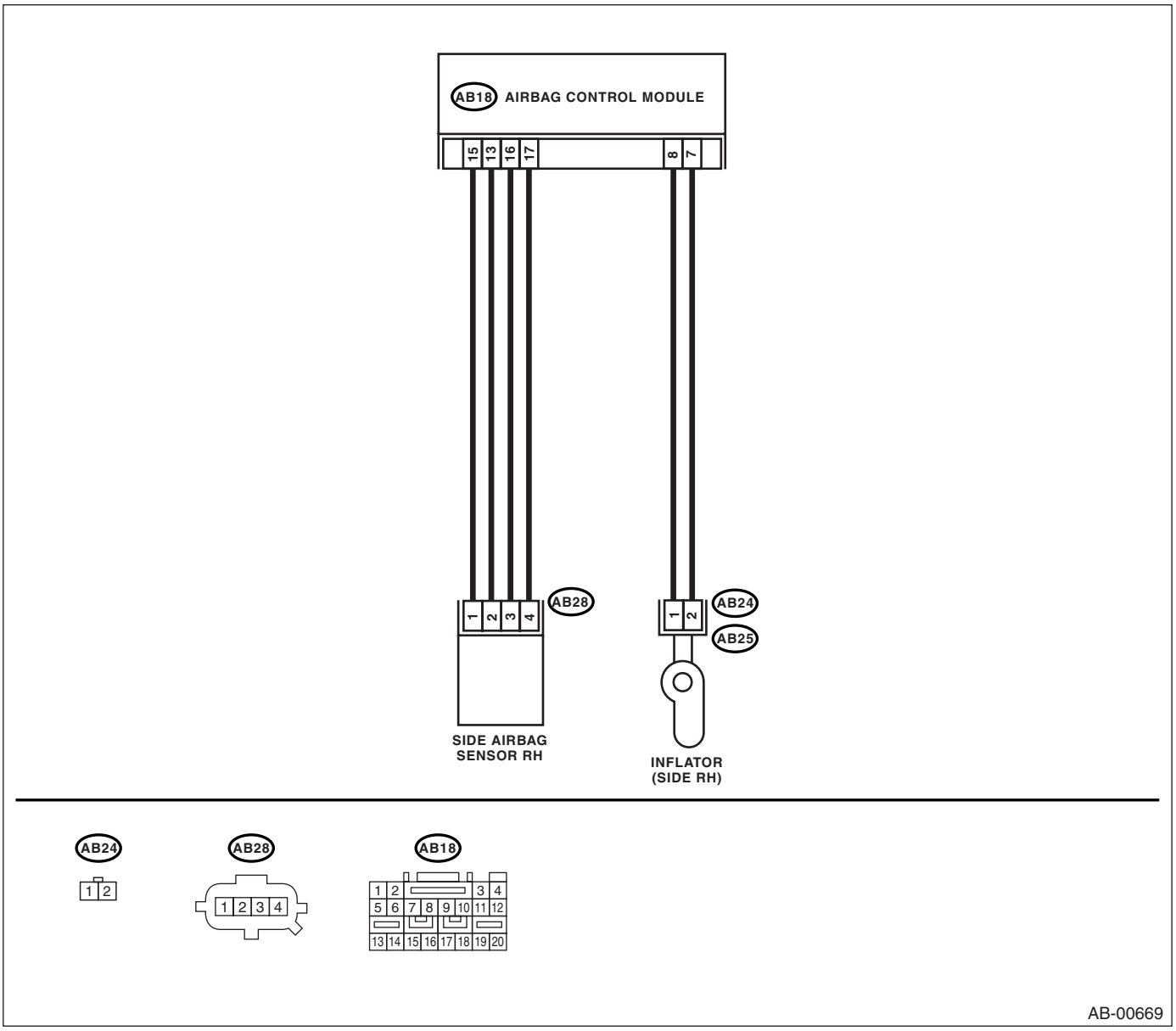
DTC DETECTING CONDITION:

- Side airbag harness (RH) is faulty.
- Side airbag module (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors of driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



Diagnostic Chart with Trouble Code

	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 RH with body harness.	Go to step **2**.
2	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB25) from (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 6 seconds and go off?	Replace the side airbag module (RH). <Ref. to SE-7, Front Seat.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS RH (SIDE AIRBAG MODULE HARNESS RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 connector (AB18) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Measure the resistance between connector (3U) in the test harness U and connector (3F) in the test harness F. ***Connector & terminal*** ***(3U) No. 20 — (3F) No. 4:*** ***(3U) No. 18 — (3F) No. 3:***	Is the resistance less than 10 Ω?	Go to step **4**.	Replace the airbag rear harness RH with body harness.
4	**CHECK AIRBAG REAR HARNESS RH (SIDE AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (3U) terminals in the test harness U. ***Connector & terminal*** ***(3U) No. 20 — (3U) No. 18:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace the airbag rear harness RH with body harness.
5	**CHECK AIRBAG REAR HARNESS RH (SIDE AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 20 — Chassis ground:*** ***(3U) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace the airbag rear harness RH with body harness.

	Step	Check	Yes	No
6	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **7**.
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

Y: DTC 42 SIDE AIRBAG LH FAILURE

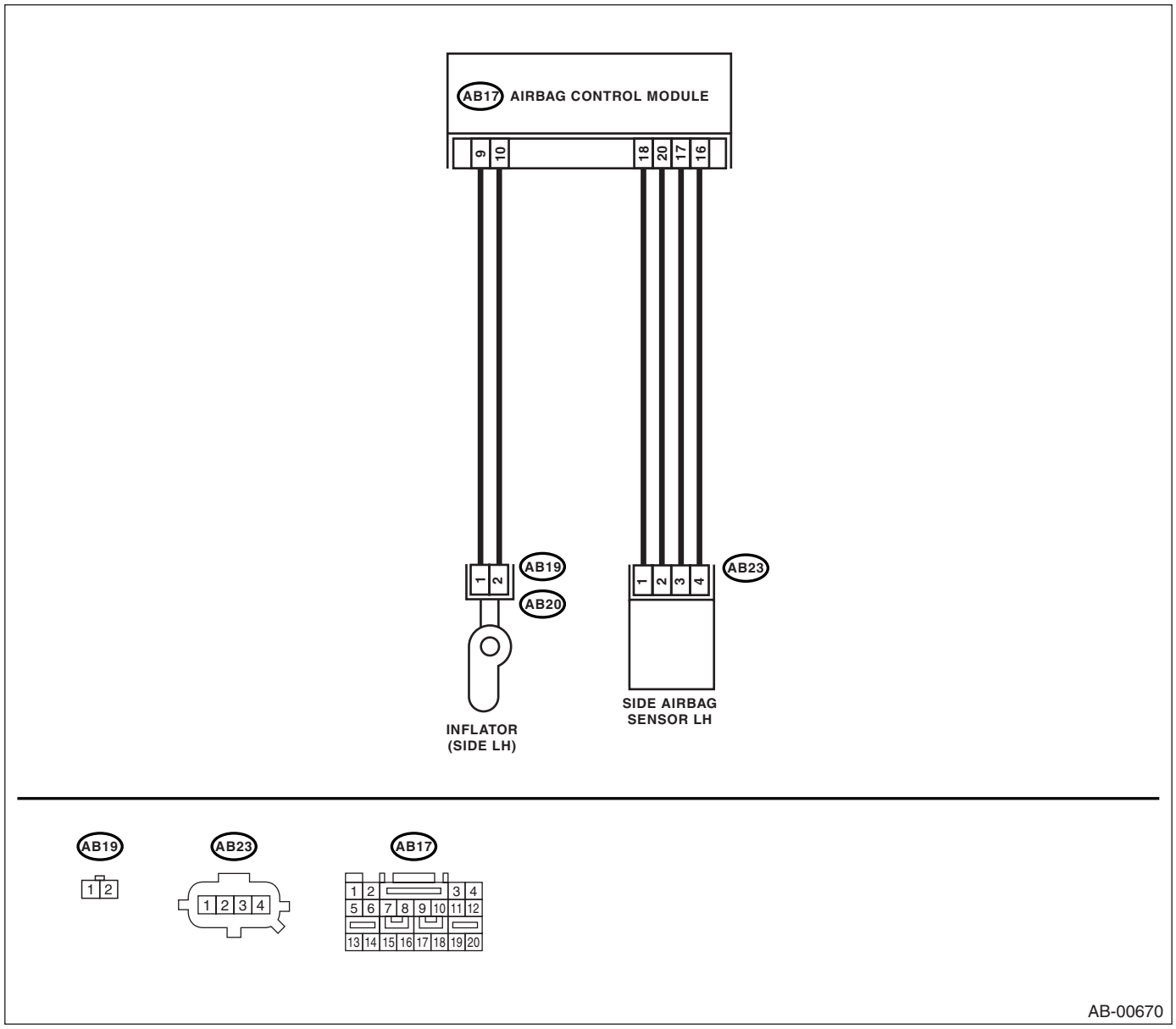
DTC DETECTING CONDITION:

- Side airbag harness (LH) is faulty.
- Side airbag module (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors of driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 LH with the body harness.	Go to step **2**.
2	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB20) from (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 6 seconds and go off?	Replace the side airbag module (LH). <Ref. to SE-7, Front Seat.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS LH (SIDE AIRBAG MODULE HARNESS LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 connector (AB17) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Measure the resistance between connector (3U) in the test harness U and connector (3F) in the test harness F. ***Connector & terminal*** ***(3U) No. 12 — (3F) No. 4:*** ***(3U) No. 10 — (3F) No. 3:***	Is the resistance less than 10 Ω?	Go to step **4**.	Replace the airbag rear harness LH with the body harness.
4	**CHECK AIRBAG REAR HARNESS LH (SIDE AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (3U) terminals in the test harness U. ***Connector & terminal*** ***(3U) No. 12 — (3U) No. 10:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace the airbag rear harness LH with the body harness.
5	**CHECK AIRBAG REAR HARNESS LH (SIDE AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 12 — Chassis ground:*** ***(3U) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace the airbag rear harness LH with the body harness.

Step		Check	Yes	No
6	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **7**.
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

Z: DTC 45 SIDE AIRBAG RH FAILURE

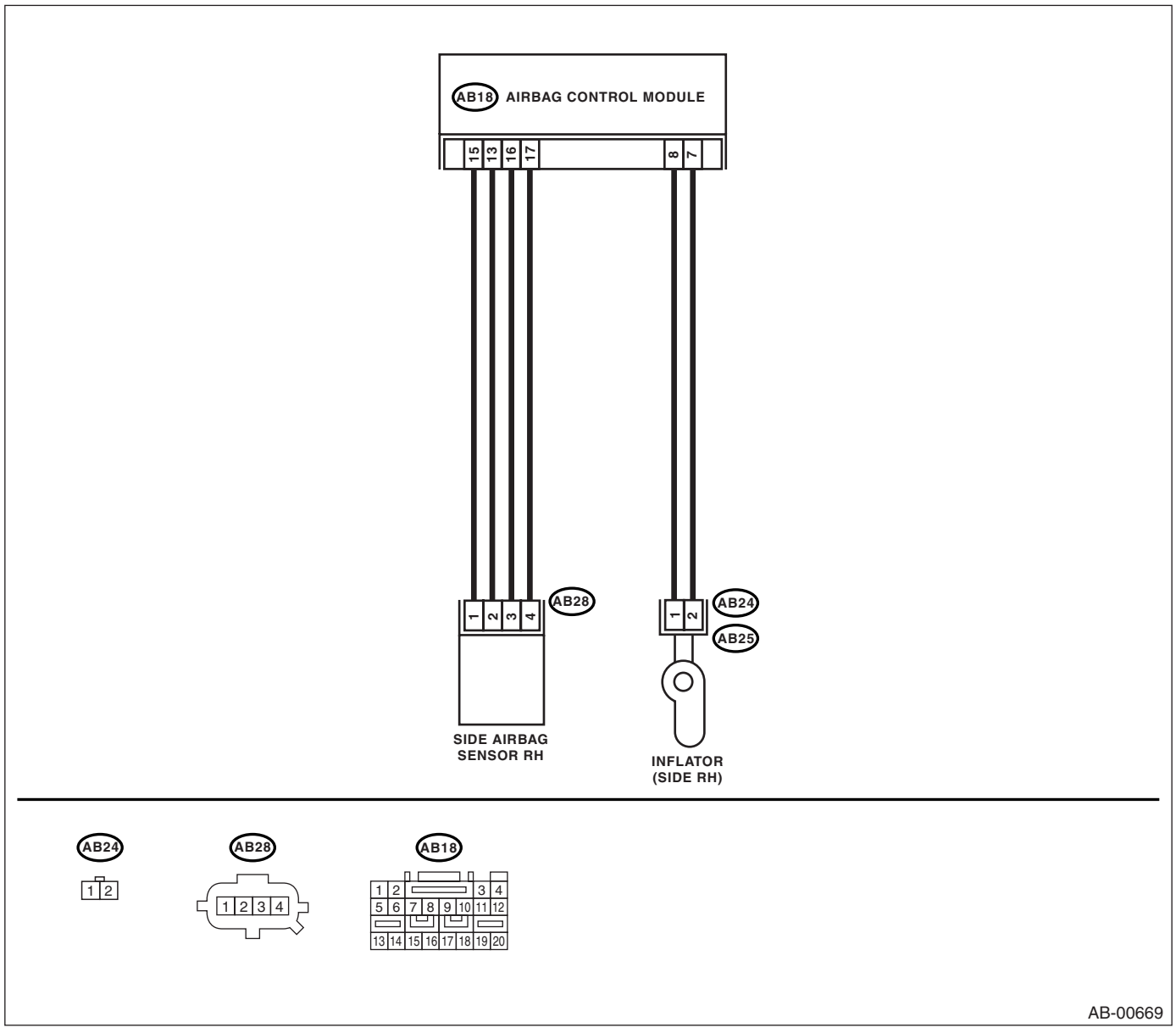
DTC DETECTING CONDITION:

- Side airbag harness (RH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors of driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 RH with body harness.	Go to step **2**.
2	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB25) from (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 6 seconds and go off?	Replace the side airbag module (RH). <Ref. to SE-7, Front Seat.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS RH (SIDE AIRBAG MODULE HARNESS RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 connector (AB18) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 20 (+) — Chassis ground (–):*** ***(3U) No. 18 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Replace the airbag rear harness RH with body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AA:DTC 46 SIDE AIRBAG LH FAILURE

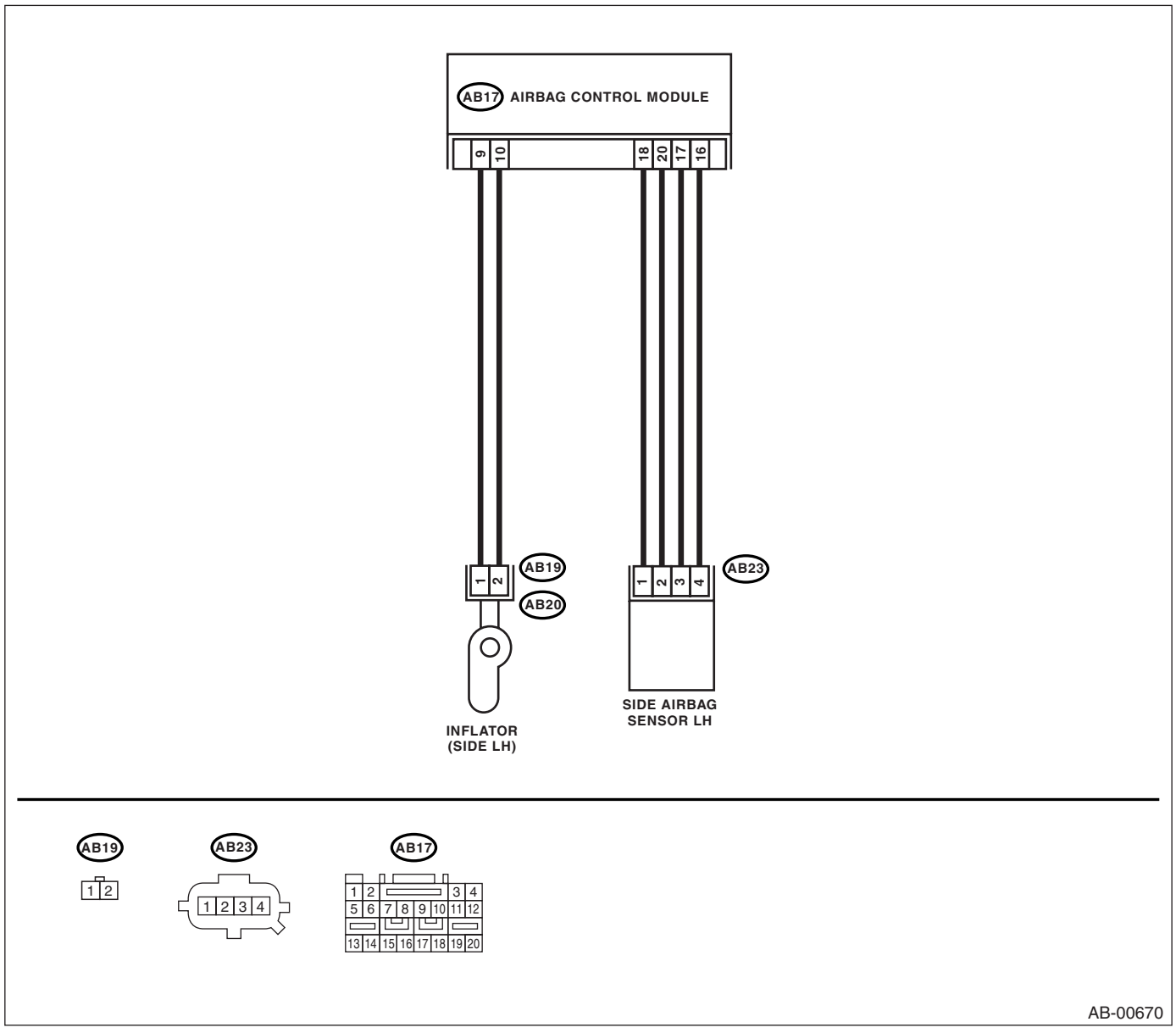
DTC DETECTING CONDITION:

- Side airbag harness (LH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors of driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



Diagnostic Chart with Trouble Code

	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 LH with the body harness.	Go to step **2**.
2	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB20) from (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 6 seconds and go off?	Replace the side airbag module (LH). <Ref. to SE-7, Front Seat.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS LH (SIDE AIRBAG MODULE HARNESS LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 connector (AB17) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 12 (+) — Chassis ground (–):*** ***(3U) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Replace the airbag rear harness LH with the body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AB:DTC 51 SIDE AIRBAG SENSOR RH FAILURE

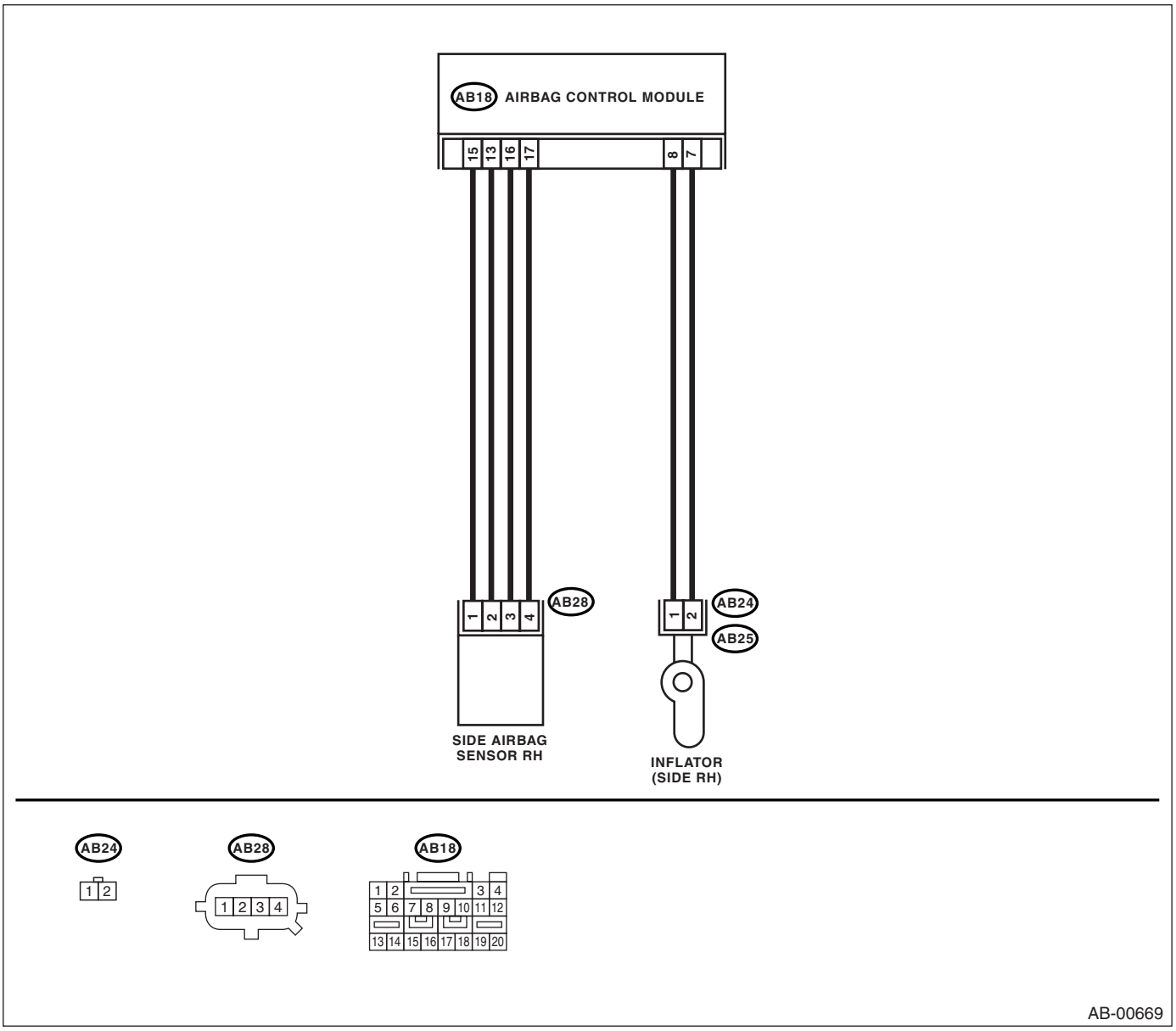
DTC DETECTING CONDITION:

- Side airbag sensor (RH) is faulty.
- Side airbag harness (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors of driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 RH with body harness.	Go to step **2**.
2	**CHECK AIRBAG REAR HARNESS RH (SIDE AIRBAG SENSOR HARNESS RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). 3) Disconnect the connector (AB33) from curtain airbag module (RH). 4) Disconnect the connector (AB25) from (AB24). 5) Disconnect the connector (AB18) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Disconnect the connector (AB28) from side airbag sensor (RH), and connect the connector (2V) in test harness V to connector (AB28). 8) Measure the resistance between connector (4U) in the test harness U and connector (3V) in the test harness V. ***Connector & terminal*** ***(4U) No. 5 — (3V) No. 2:*** ***(4U) No. 7 — (3V) No. 1:*** ***(4U) No. 8 — (3V) No. 5:*** ***(4U) No. 6 — (3V) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the airbag rear harness RH with body harness.
3	**CHECK AIRBAG REAR HARNESS RH (SIDE AIRBAG SENSOR HARNESS RH).** Measure the resistance between connector (4U) in the test harness U and chassis ground. ***Connector & terminal*** ***(4U) No. 5 — Chassis ground:*** ***(4U) No. 7 — Chassis ground:*** ***(4U) No. 8 — Chassis ground:*** ***(4U) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace the airbag rear harness RH with body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the side airbag sensor (RH). <Ref. to AB-22, Side Airbag Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AC:DTC 52 SIDE AIRBAG SENSOR LH FAILURE

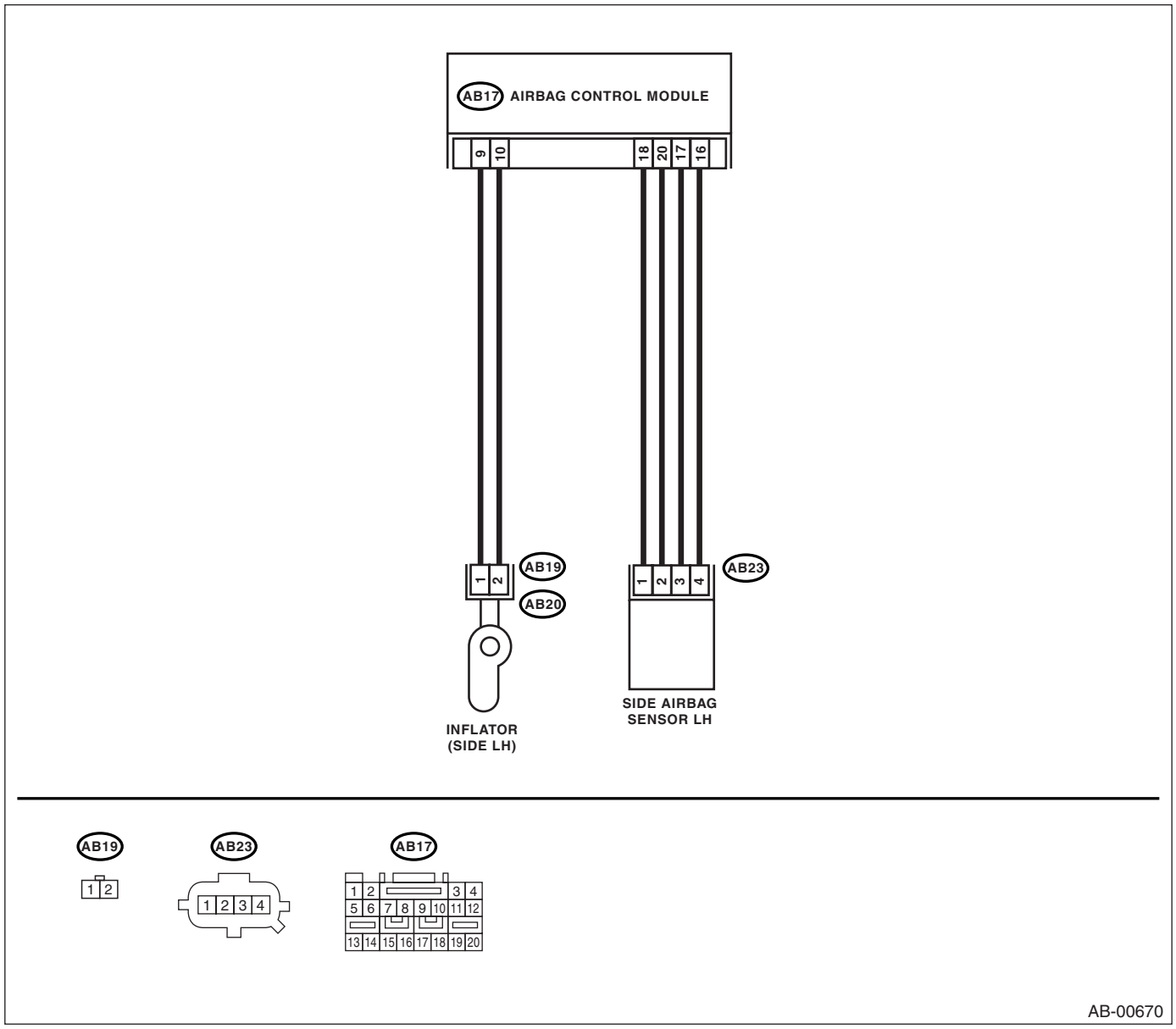
DTC DETECTING CONDITION:

- Side airbag sensor (LH) is faulty.
- Side airbag harness (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors of driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 LH with the body harness.	Go to step **2**.
2	**CHECK AIRBAG REAR HARNESS LH (SIDE AIRBAG SENSOR HARNESS LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). 3) Disconnect the connector (AB31) from curtain airbag module (LH). 4) Disconnect the connector (AB20) from (AB19). 5) Disconnect the connector (AB17) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Disconnect the connector (AB23) from side airbag sensor (LH), and connect the connector (2V) in test harness V to connector (AB23). 8) Measure the resistance between connector (4U) in the test harness U and connector (3V) in the test harness V. ***Connector & terminal*** ***(4U) No. 3 — (3V) No. 4:*** ***(4U) No. 1 — (3V) No. 5:*** ***(4U) No. 2 — (3V) No. 1:*** ***(4U) No. 4 — (3V) No. 2:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the airbag rear harness LH with the body harness.
3	**CHECK AIRBAG REAR HARNESS LH (SIDE AIRBAG SENSOR HARNESS LH).** Measure the resistance between connector (4U) in the test harness U and chassis ground. ***Connector & terminal*** ***(4U) No. 3 — Chassis ground:*** ***(4U) No. 1 — Chassis ground:*** ***(4U) No. 2 — Chassis ground:*** ***(4U) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace the airbag rear harness LH with the body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the side airbag sensor (LH). <Ref. to AB-22, Side Airbag Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AD: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-22, Side Airbag Sensor.>

AE: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-22, Side Airbag Sensor.>

AF: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-21, 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-22, Side Airbag Sensor.>
- Curtain airbag module (Operating side) <Ref. to AB-19, Curtain Airbag Module.>
- Curtain airbag sensor (Operating side) <Ref. to AB-23, Curtain Airbag Sensor.>
- Front outer seat belt with pretensioner (operating side) <Ref. to SB-10, Front Seat Belt.>

AG:DTC 56 CURTAIN AIRBAG SENSOR RH FAILURE

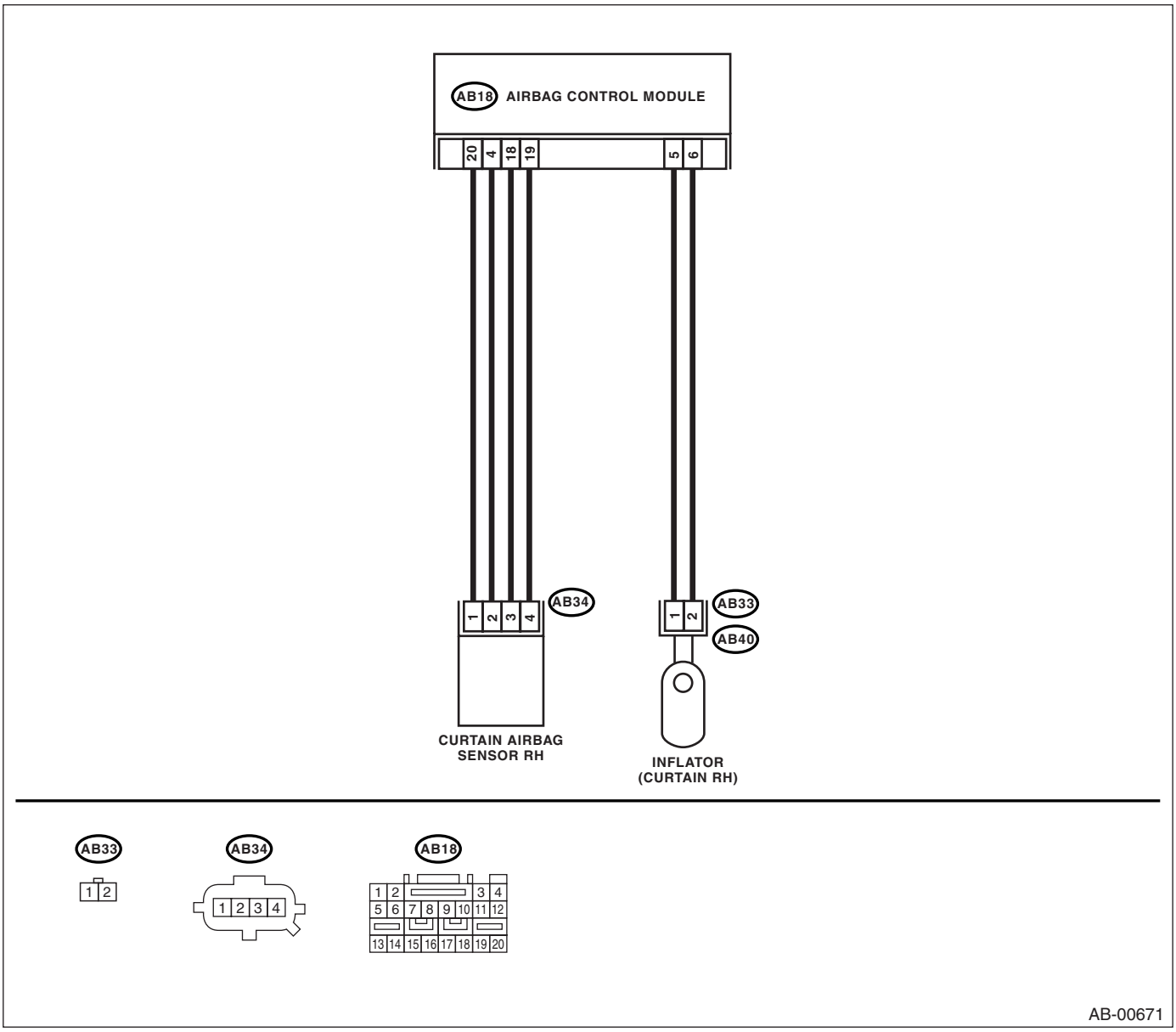
DTC DETECTING CONDITION:

- Curtain airbag sensor (RH) is faulty.
- Curtain airbag harness (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors of driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 with body harness.	Go to step **2**.
2	**CHECK AIRBAG REAR HARNESS RH (CURTAIN AIRBAG SENSOR HARNESS RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). 3) Disconnect the connector (AB24) from side airbag module (RH). 4) Disconnect the connector (AB33) from (AB40). 5) Disconnect the connector (AB18) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Disconnect the connector (AB34) from curtain airbag sensor (RH), and connect the connector (2V) in test harness V to connector (AB34). 8) Measure the resistance between connector (5U) in the test harness U and connector (3V) in the test harness V. ***Connector & terminal*** ***(5U) No. 14 — (3V) No. 4:*** ***(5U) No. 16 — (3V) No. 5:*** ***(5U) No. 15 — (3V) No. 1:*** ***(5U) No. 13 — (3V) No. 2:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the airbag rear harness RH with body harness.
3	**CHECK AIRBAG REAR HARNESS RH (CURTAIN AIRBAG SENSOR HARNESS RH).** Measure the resistance between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 14 — Chassis ground:*** ***(5U) No. 16 — Chassis ground:*** ***(5U) No. 15 — Chassis ground:*** ***(5U) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace the airbag rear harness RH with body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the curtain airbag sensor (RH). <Ref. to AB-23, Curtain Airbag Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.

Step		Check	Yes	No
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AH:DTC 57 CURTAIN AIRBAG SENSOR LH FAILURE

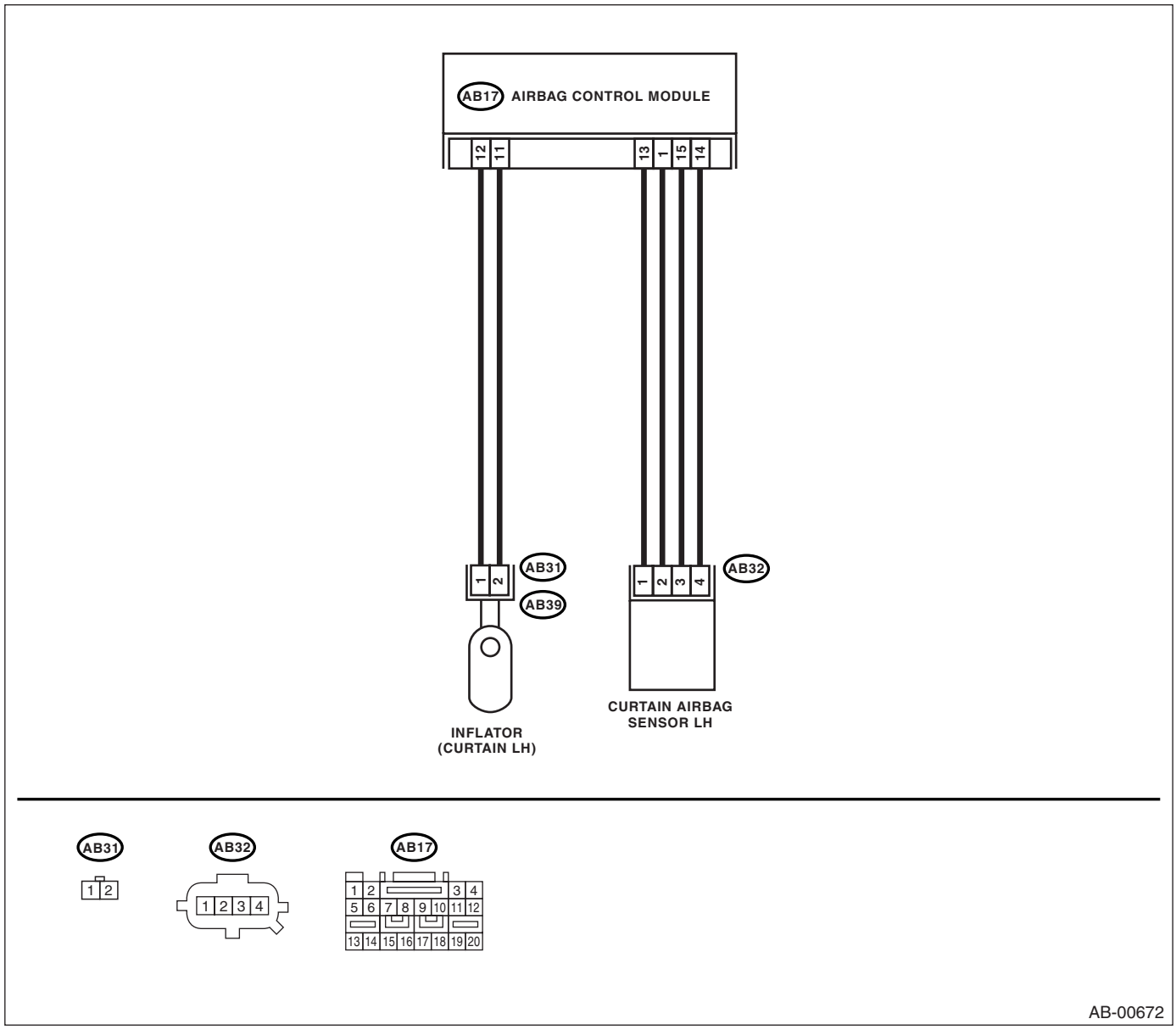
DTC DETECTING CONDITION:

- Curtain airbag sensor (LH) is faulty.
- Curtain airbag harness (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors of driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 with body harness.	Go to step **2**.
2	**CHECK AIRBAG REAR HARNESS LH (CURTAIN AIRBAG SENSOR HARNESS LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). 3) Disconnect the connector (AB19) from side airbag module (LH). 4) Disconnect the connector (AB31) from (AB39). 5) Disconnect the connector (AB17) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Disconnect the connector (AB32) from curtain airbag sensor (LH), and connect the connector (2V) in test harness V to connector (AB32). 8) Measure the resistance between connector (5U) in the test harness U and connector (3V) in the test harness V. ***Connector & terminal*** ***(5U) No. 11 — (3V) No. 4:*** ***(5U) No. 9 — (3V) No. 5:*** ***(5U) No. 10 — (3V) No. 1:*** ***(5U) No. 12 — (3V) No. 2:***	Is the resistance less than 10 Ω?	Go to step **3**.	Replace the airbag rear harness LH with the body harness.
3	**CHECK AIRBAG REAR HARNESS LH (CURTAIN AIRBAG SENSOR HARNESS LH).** Measure the resistance between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 11 — Chassis ground:*** ***(5U) No. 9 — Chassis ground:*** ***(5U) No. 10 — Chassis ground:*** ***(5U) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace the airbag rear harness LH with the body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the curtain airbag sensor (LH). <Ref. to AB-23, Curtain Airbag Sensor.> Replace the airbag control module if not operating normally even after replacing the sensor. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.

Step		Check	Yes	No
5	CHECK ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AI: 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-23, Curtain Airbag Sensor.>

AJ: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-23, Curtain Airbag Sensor.>

AK:DTC 61 BELT PRETENSIONER RH FAILURE

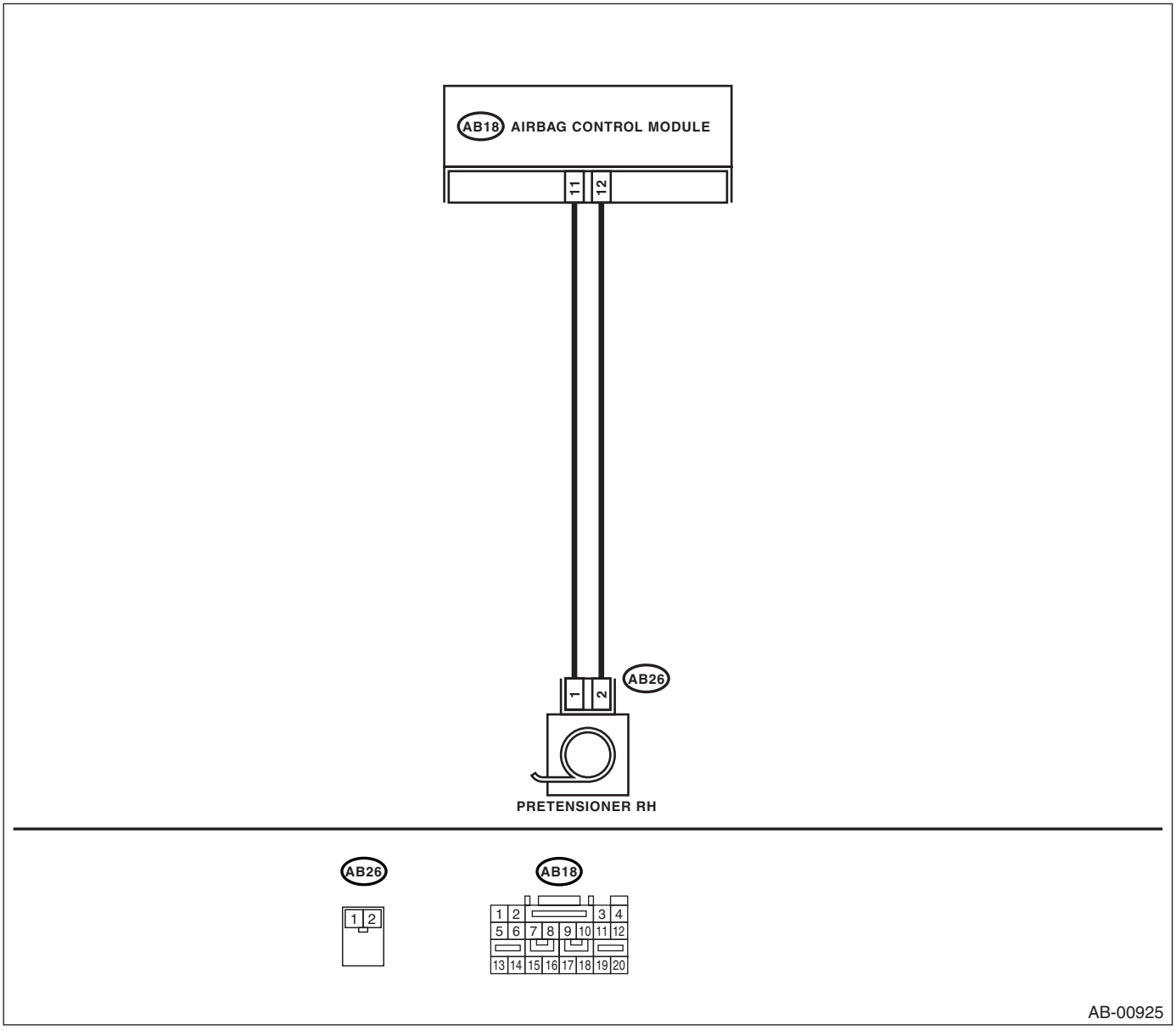
DTC DETECTING CONDITION:

- 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 diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 RH with body harness.	Go to step **2**.
2	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 6 seconds and go off?	Replace the seat belt pretensioner (RH). <Ref. to SB-10, Front Seat Belt.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS RH (PRETENSIONER HARNESS RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connector (AB24) from side airbag module (RH). 4) Disconnect the connector (AB33) from curtain airbag module (RH). 5) Disconnect the connectors (AB17) and (AB18) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Measure the resistance between connector (3U) in the test harness U and connector (2N) in the test harness N. ***Connector & terminal*** ***(3U) No. 17 — (2N) No. 2:*** ***(3U) No. 19 — (2N) No. 1:***	Is the resistance less than 10 Ω?	Go to step **4**.	Replace the airbag rear harness RH with body harness.
4	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS RH).** Measure the resistance between connector (3U) terminals in the test harness U. ***Connector & terminal*** ***(3U) No. 19 — (3U) No. 17:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace the airbag rear harness RH with body harness.
5	**CHECK AIRBAG REAR HARNESS RH (PRETENSIONER HARNESS RH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 17 — Chassis ground:*** ***(3U) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace the airbag rear harness RH with body harness.

	Step	Check	Yes	No
6	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **7**.
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AL:DTC 62 BELT PRETENSIONER LH FAILURE

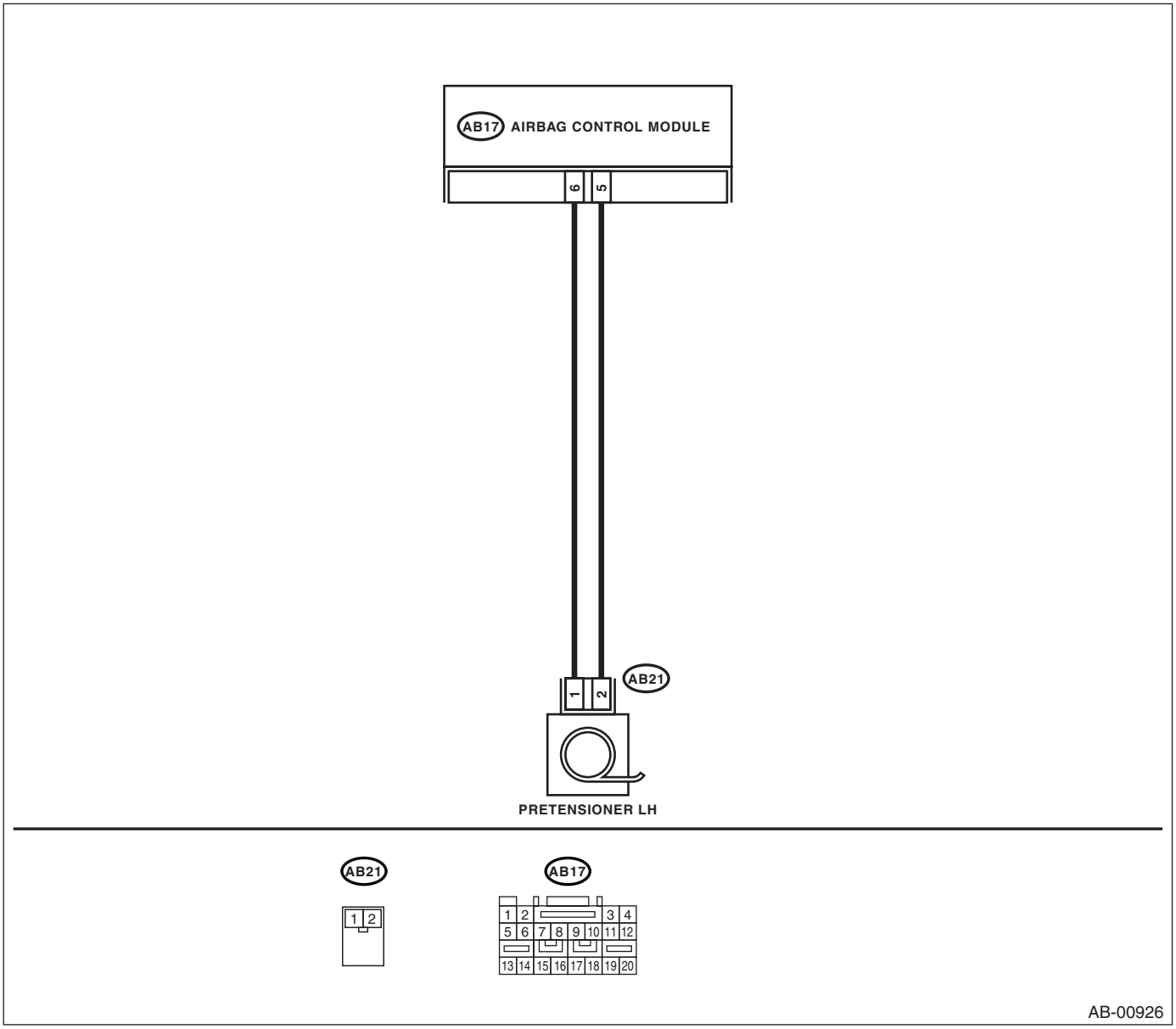
DTC DETECTING CONDITION:

- 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 diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 LH with the body harness.	Go to step **2**.
2	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 6 seconds and go off?	Replace the seat belt pretensioner (LH). <Ref. to SB-10, Front Seat Belt.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS LH (PRETENSIONER HARNESS LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connector (AB19) from side airbag module (LH). 4) Disconnect the connector (AB31) from curtain airbag module (LH). 5) Disconnect the connectors (AB17) and (AB18) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Measure the resistance between connector (3U) in the test harness U and connector (2N) in the test harness N. ***Connector & terminal*** ***(3U) No. 13 — (2N) No. 1:*** ***(3U) No. 11 — (2N) No. 2:***	Is the resistance less than 10 Ω?	Go to step **4**.	Replace the airbag rear harness LH with the body harness.
4	**CHECK AIRBAG REAR HARNESS LH (PRETENSIONER HARNESS LH).** Measure the resistance between connector (3U) terminals in the test harness U. ***Connector & terminal*** ***(3U) No. 11 — (3U) No. 13:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace the airbag rear harness LH with the body harness.
5	**CHECK AIRBAG REAR HARNESS LH (PRETENSIONER HARNESS LH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 11 — Chassis ground:*** ***(3U) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace the airbag rear harness LH with the body harness.

	Step	Check	Yes	No
6	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **7**.
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AM:DTC 65 BELT PRETENSIONER RH FAILURE

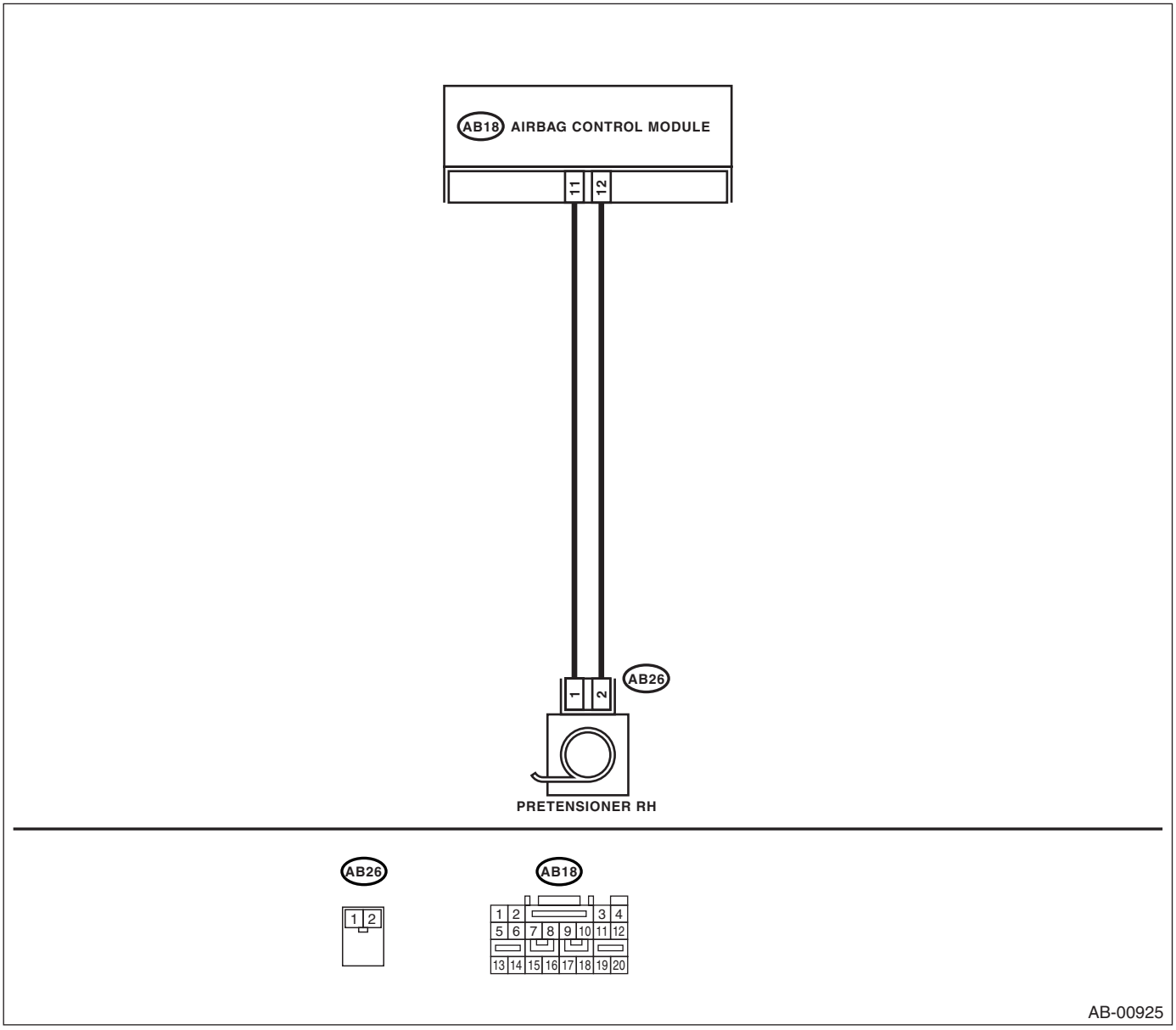
DTC DETECTING CONDITION:

- Seat belt pretensioner (RH) circuit is shorted to power supply.
- Pretensioner is faulty.
- Pretensioner harness is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 RH with body harness.	Go to step **2**.
2	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 6 seconds and go off?	Replace the seat belt pretensioner (RH). <Ref. to SB-10, Front Seat Belt.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS RH (PRETENSIONER HARNESS RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connector (AB24) from side airbag module (RH). 4) Disconnect the connector (AB33) from curtain airbag module (RH). 5) Disconnect the connectors (AB17) and (AB18) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 17 (+) — Chassis ground (–):*** ***(3U) No. 19 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Replace the airbag rear harness RH with body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AN:DTC 66 BELT PRETENSIONER LH FAILURE

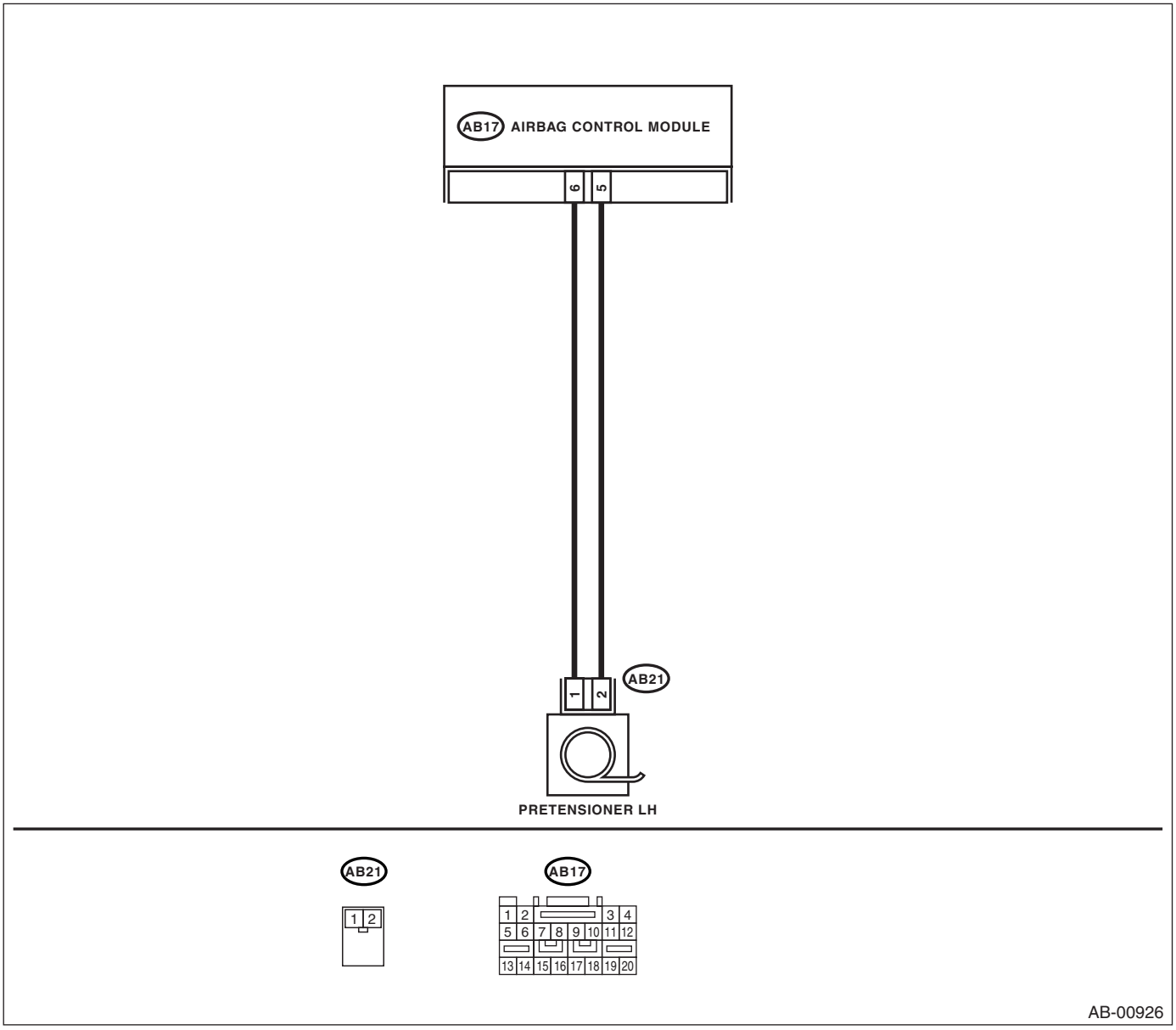
DTC DETECTING CONDITION:

- Seat belt pretensioner (LH) circuit is shorted to power supply.
- Pretensioner is faulty.
- Pretensioner harness is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 LH with the body harness.	Go to step **2**.
2	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 6 seconds and go off?	Replace the seat belt pretensioner (LH). <Ref. to SB-10, Front Seat Belt.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS LH (PRETENSIONER HARNESS LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connector (AB19) from side airbag module (LH). 4) Disconnect the connector (AB31) from curtain airbag module (LH). 5) Disconnect the connectors (AB17) and (AB18) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 11 (+) — Chassis ground (–):*** ***(3U) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Replace the airbag rear harness LH with the body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AO: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:

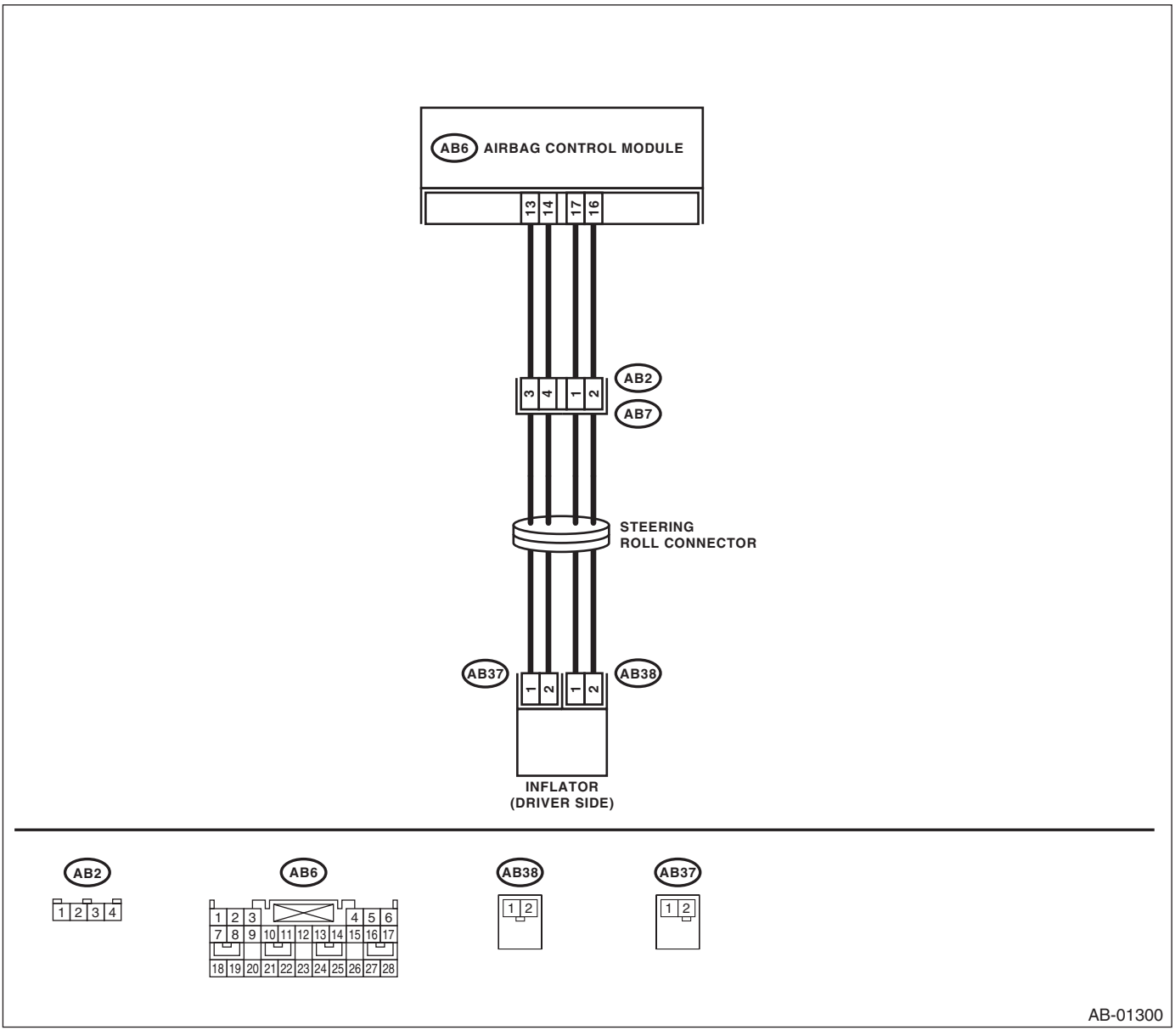
• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

NOTE:
Prior to starting work, prepare two airbag resistors (98299PA040).

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 with body harness.	Go to step **2**.
2	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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) of test harness Q. 7) 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 driver's airbag module. <Ref. to AB-15, Driver's Airbag Module.>	Go to step **3**.
3	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 6 seconds and go off?	Replace the roll connector. <Ref. to AB-24, Roll Connector.>	Go to step **4**.
4	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the console side cover lower on the passenger's side and disconnect the connectors (AB10) and (AB9). 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. 5) Measure the resistance between connector (2U) in the test harness U and connectors (2P) and (3P) in the test harness P. ***Connector & terminal*** ***(2U) No. 2 — (2P) No. 1:*** ***(2U) No. 4 — (2P) No. 2:*** ***(2U) No. 8 — (3P) No. 3:*** ***(2U) No. 12 — (3P) No. 4:***	Is the resistance less than 10 Ω?	Go to step **5**.	Replace the airbag main harness with body harness.

	Step	Check	Yes	No
5	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** Measure the resistance between connectors (2U) in the test harness U, and between connector (2U) and chassis ground. ***Connector & terminal*** ***(2U) No. 2 — (2U) No. 4:*** ***(2U) No. 4 — Chassis ground:*** ***(2U) No. 2 — Chassis ground:*** ***(2U) No. 8 — (2U) No. 12:*** ***(2U) No. 8 — Chassis ground:*** ***(2U) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace the airbag main harness with body harness.
6	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **7**.
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AP:DTC 72 PASSENGER'S AIRBAG FAILURE

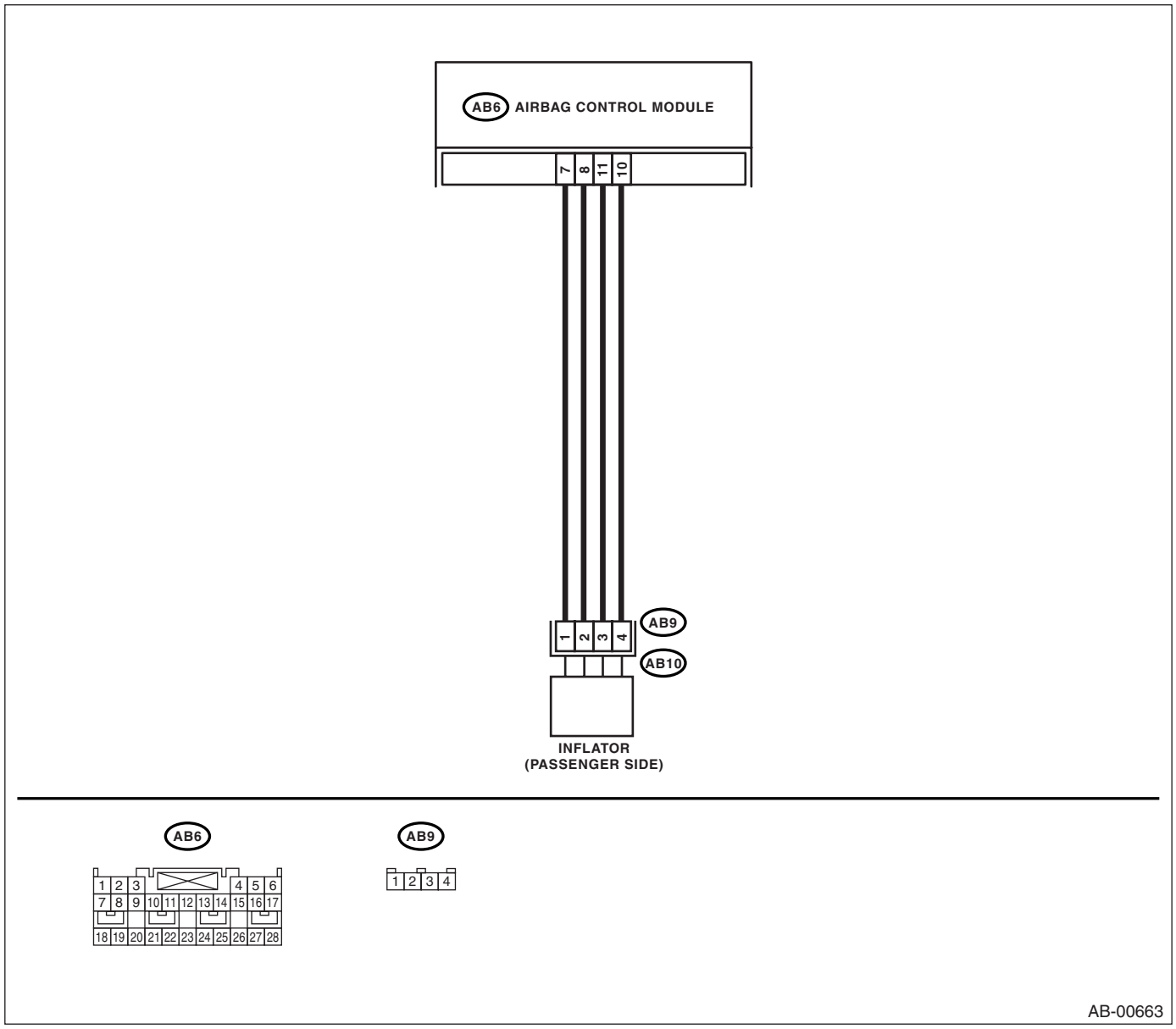
DTC DETECTING CONDITION:

- 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 diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 main harness with body harness.	Go to step **2**.
2	**CHECK PASSENGER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the console side cover lower on the passenger's side. 3) Disconnect the connector (AB10) from (AB9). 4) Connect the connector (1P) in the test harness P to connector (AB9). 5) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P. 6) 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 passenger's airbag module. <Ref. to AB-16, Passenger's Airbag Module.>	Go to step **3**.
3	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. 5) Measure the resistance between connector (2U) in the test harness U and connectors (2P) and (3P) in the test harness P. ***Connector & terminal*** ***(2U) No. 3 — (2P) No. 1:*** ***(2U) No. 5 — (2P) No. 2:*** ***(2U) No. 9 — (3P) No. 3:*** ***(2U) No. 13 — (3P) No. 4:***	Is the resistance less than 10 Ω?	Go to step **4**.	Replace the airbag main harness with body harness.
4	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** Measure the resistance between connectors (2U) in the test harness U, and between connector (2U) and chassis ground. ***Connector & terminal*** ***(2U) No. 3 — (2U) No. 5:*** ***(2U) No. 3 — Chassis ground:*** ***(2U) No. 5 — Chassis ground:*** ***(2U) No. 9 — (2U) No. 13:*** ***(2U) No. 9 — Chassis ground:*** ***(2U) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace the airbag main harness with body harness.

	Step	Check	Yes	No
5	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **6**.
6	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AQ:DTC 75 DRIVER'S AIRBAG FAILURE

DTC DETECTING CONDITION:

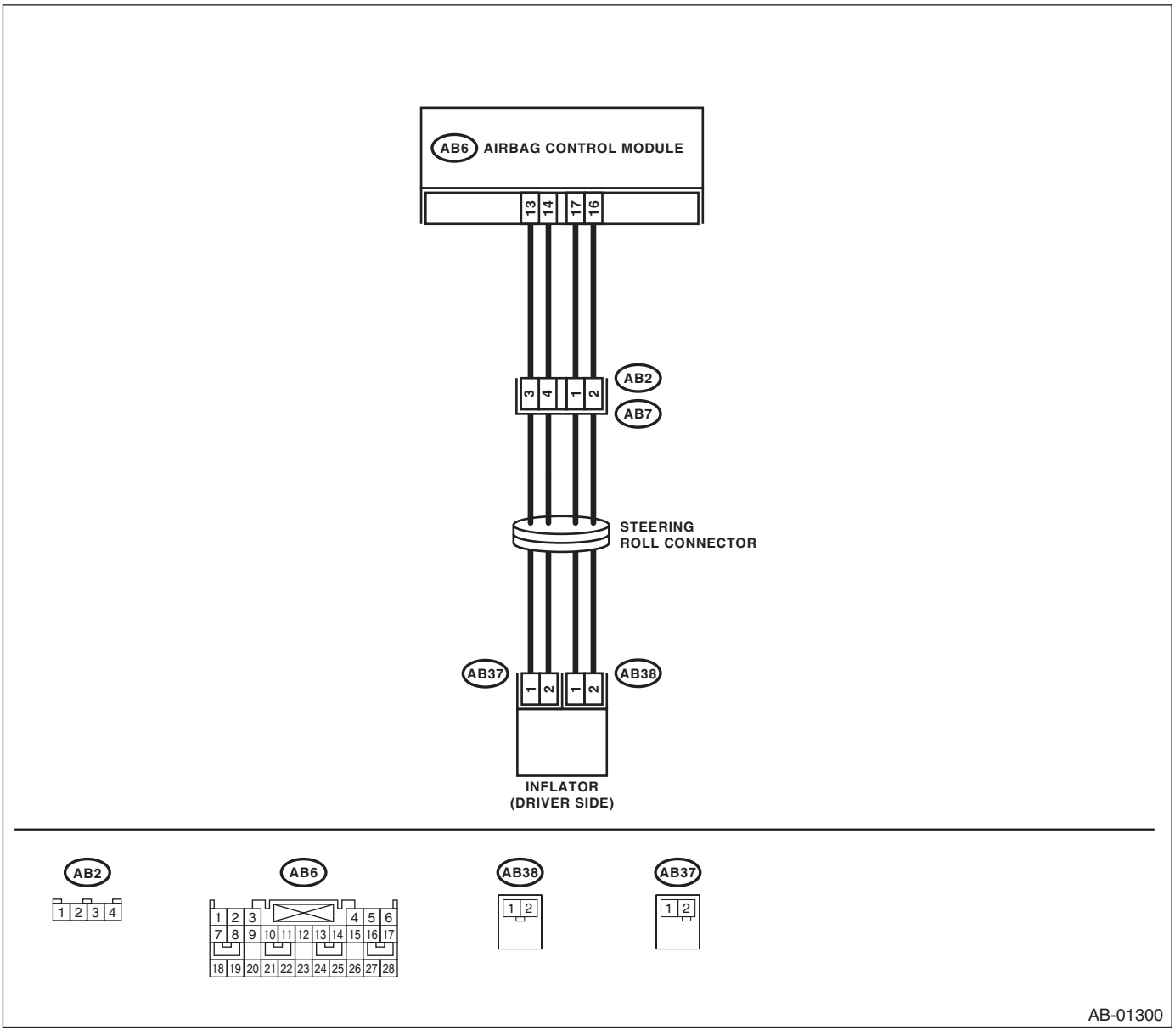
- Airbag main harness circuit (Driver's side) is shorted to power supply.
- Airbag module harness circuit (Driver's side) is shorted to power supply.
- Roll connector is shorted to power supply.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

NOTE:
Prior to starting work, prepare two airbag resistors (98299PA040).

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 with body harness.	Go to step **2**.
2	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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) of test harness Q. 7) 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 driver's airbag module. <Ref. to AB-15, Driver's Airbag Module.>	Go to step **3**.
3	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 6 seconds and go off?	Replace the roll connector. <Ref. to AB-24, Roll Connector.>	Go to step **4**.
4	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connectors (2P) and (3P) of test harness P. 3) Remove the console side cover lower on the passenger's side and disconnect the connectors (AB10) and (AB9). 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. 5) Connect the battery ground terminal and turn the ignition switch to ON. (Engine OFF) 6) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 4 (+) — Chassis ground (–):*** ***(2U) No. 2 (+) — Chassis ground (–):*** ***(2U) No. 8 (+) — Chassis ground (–):*** ***(2U) No. 12 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **5**.	Replace the airbag main harness with body harness.

	Step	Check	Yes	No
5	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **6**.
6	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AR:DTC 76 PASSENGER'S AIRBAG FAILURE

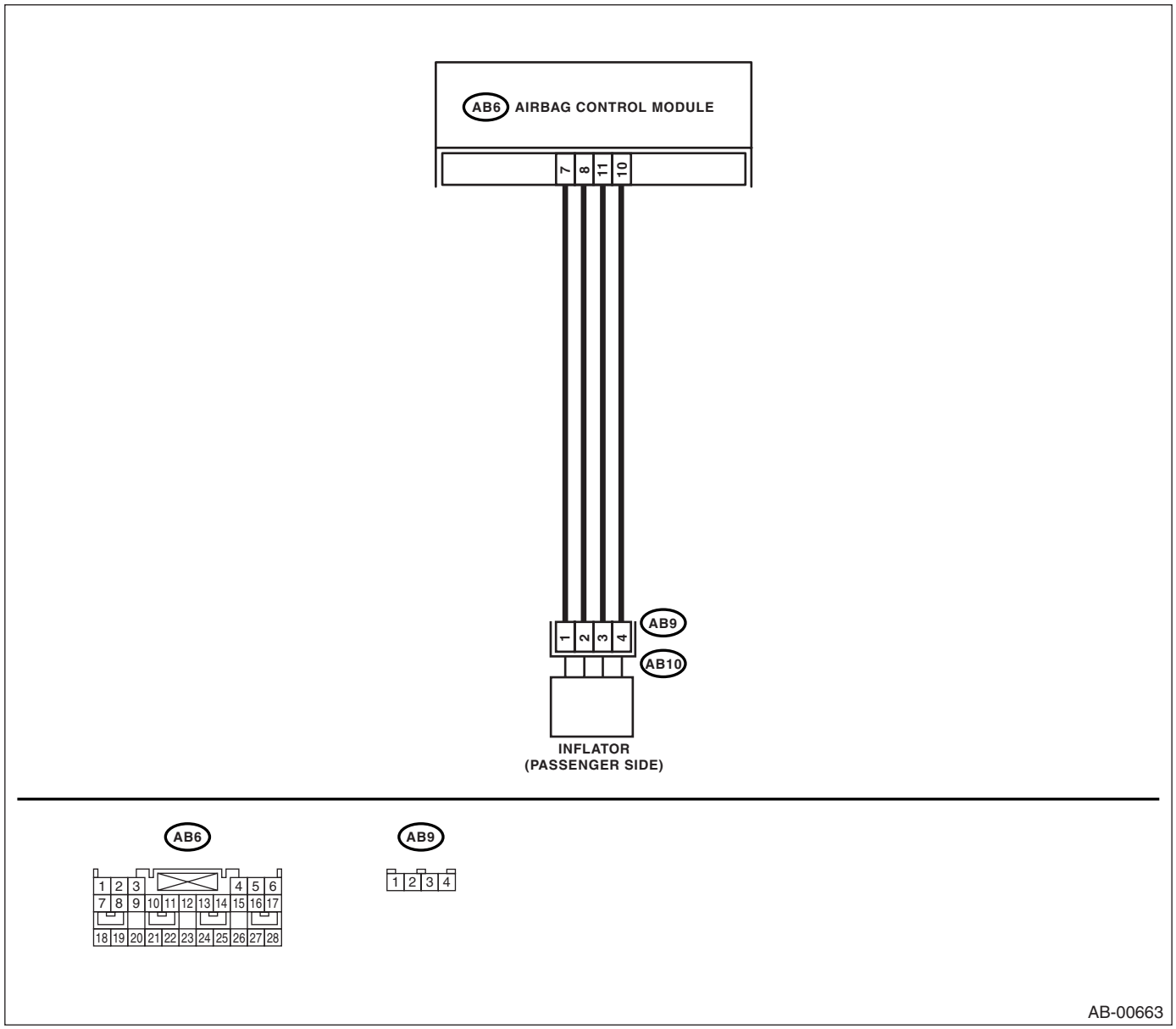
DTC DETECTING CONDITION:

- 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 diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors and seat belt pretensioners of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



Diagnostic Chart with Trouble Code

	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 main harness with body harness.	Go to step **2**.
2	**CHECK PASSENGER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the console side cover lower on the passenger's side. 3) Disconnect the connector (AB10) from (AB9). 4) Connect the connector (1P) in the test harness P to connector (AB9). 5) Connect the airbag resistor to the connectors (2P) and (3P) of test harness P. 6) 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 passenger's airbag module. <Ref. to AB-16, Passenger's Airbag Module.>	Go to step **3**.
3	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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 connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. 5) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 3 (+) — Chassis ground (–):*** ***(2U) No. 5 (+) — Chassis ground (–):*** ***(2U) No. 9 (+) — Chassis ground (–):*** ***(2U) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Replace the airbag main harness with body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AS: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.

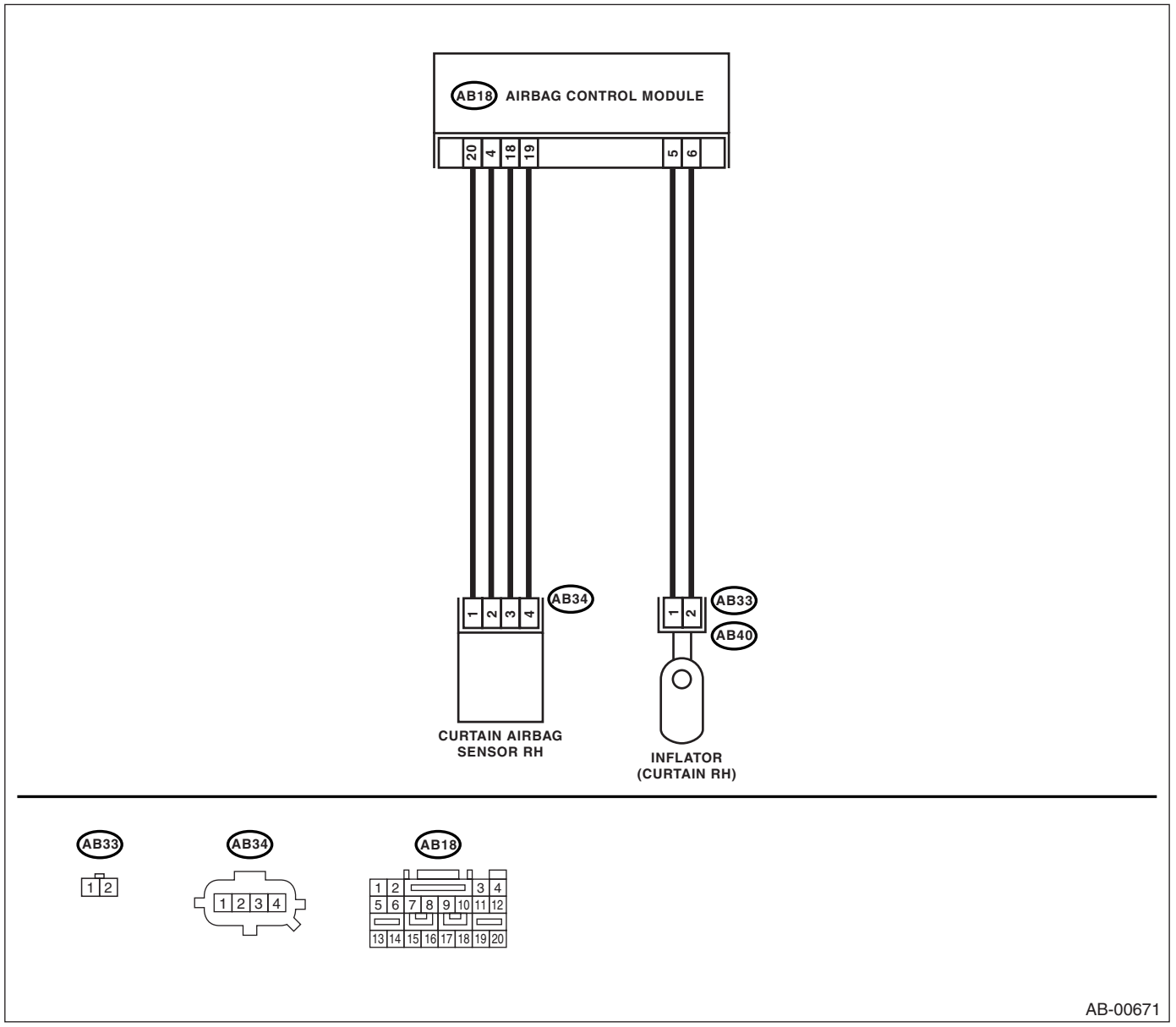
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 with body harness.	Go to step **2**.
2	**CHECK CURTAIN AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB33) from (AB40), and connect the connector (1F) in test harness F to connector (AB33). 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 6 seconds and go off?	Replace the curtain airbag module (RH). <Ref. to AB-19, Curtain Airbag Module.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS RH (CURTAIN AIRBAG MODULE HARNESS RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). 3) Disconnect the connector (AB24) from side airbag module (RH). 4) Disconnect the airbag resistor from test harness F. 5) Disconnect the connector (AB18) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Measure the resistance between connector (5U) in the test harness U and connector (3F) in the test harness F. ***Connector & terminal*** ***(5U) No. 6 — (3F) No. 4:*** ***(5U) No. 8 — (3F) No. 3:***	Is the resistance less than 10 Ω?	Go to step **4**.	Replace the airbag rear harness RH with body harness.
4	**CHECK AIRBAG REAR HARNESS RH (CURTAIN AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (5U) terminals in the test harness U. ***Connector & terminal*** ***(5U) No. 6 — (5U) No. 8:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace the airbag rear harness RH with body harness.
5	**CHECK AIRBAG REAR HARNESS RH (CURTAIN AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 6 — Chassis ground:*** ***(5U) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace the airbag rear harness RH with body harness.

	Step	Check	Yes	No
6	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **7**.
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AT:DTC 92 CURTAIN AIRBAG MODULE LH FAILURE

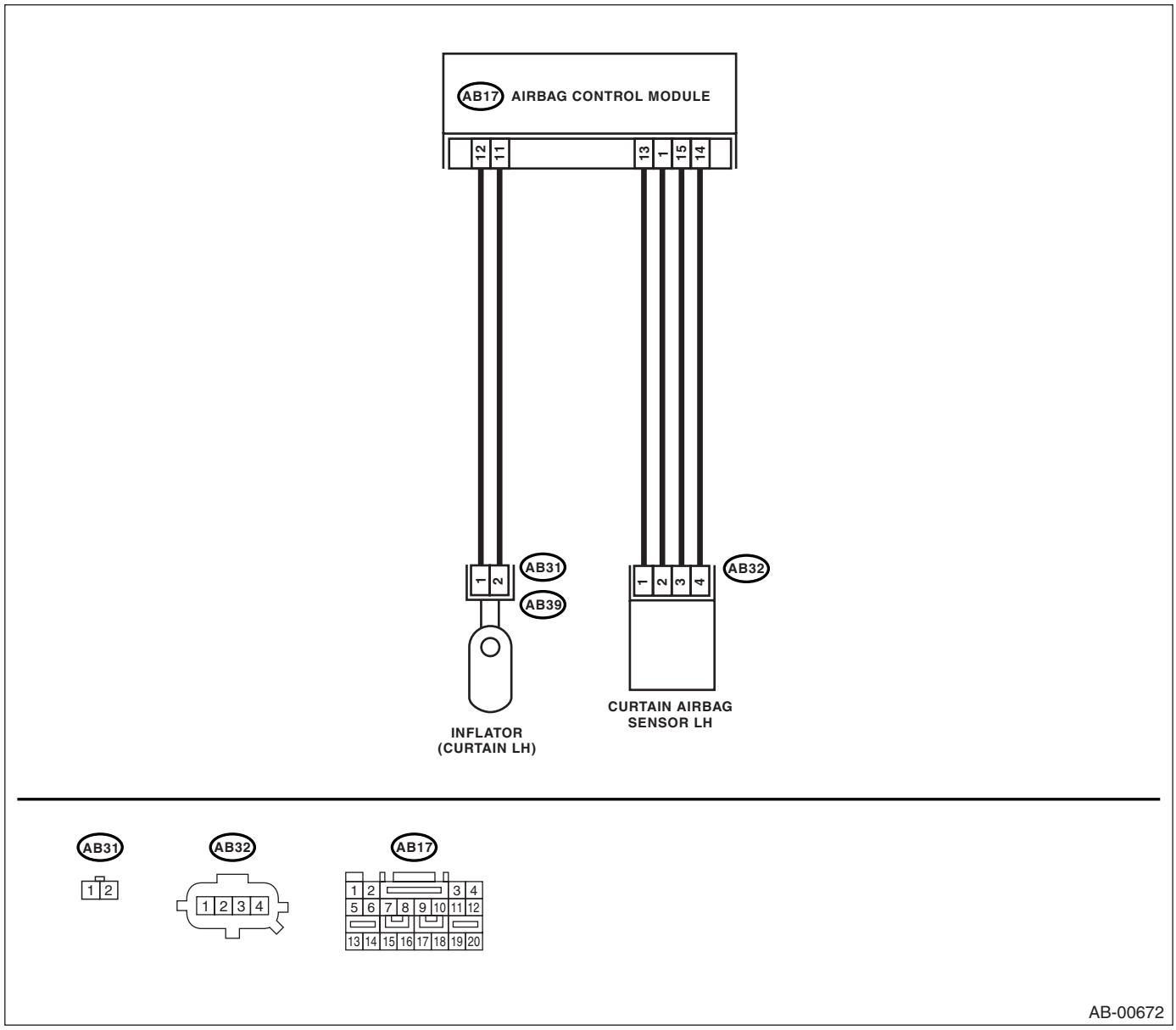
DTC DETECTING CONDITION:

- Curtain airbag harness (LH) is faulty.
- Curtain airbag module (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors of driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 LH with the body harness.	Go to step **2**.
2	**CHECK CURTAIN AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB31) from (AB39), and connect the connector (1F) in test harness F to connector (AB31). 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 6 seconds and go off?	Replace the curtain airbag module (LH). <Ref. to AB-19, Curtain Airbag Module.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS LH (CURTAIN AIRBAG MODULE HARNESS LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). 3) Disconnect the connector (AB19) from side airbag module (LH). 4) Disconnect the airbag resistor from test harness F. 5) Disconnect the connector (AB17) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Measure the resistance between connector (5U) in the test harness U and connector (3F) in the test harness F. ***Connector & terminal*** ***(5U) No. 1 — (3F) No. 3:*** ***(5U) No. 3 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **4**.	Replace the airbag rear harness LH with the body harness.
4	**CHECK AIRBAG REAR HARNESS LH (CURTAIN AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (5U) terminals in the test harness U. ***Connector & terminal*** ***(5U) No. 1 — (5U) No. 3:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace the airbag rear harness LH with the body harness.
5	**CHECK AIRBAG REAR HARNESS LH (CURTAIN AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 1 — Chassis ground:*** ***(5U) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace the airbag rear harness LH with the body harness.

Step		Check	Yes	No
6	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **7**.
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AU:DTC 95 CURTAIN AIRBAG MODULE RH FAILURE

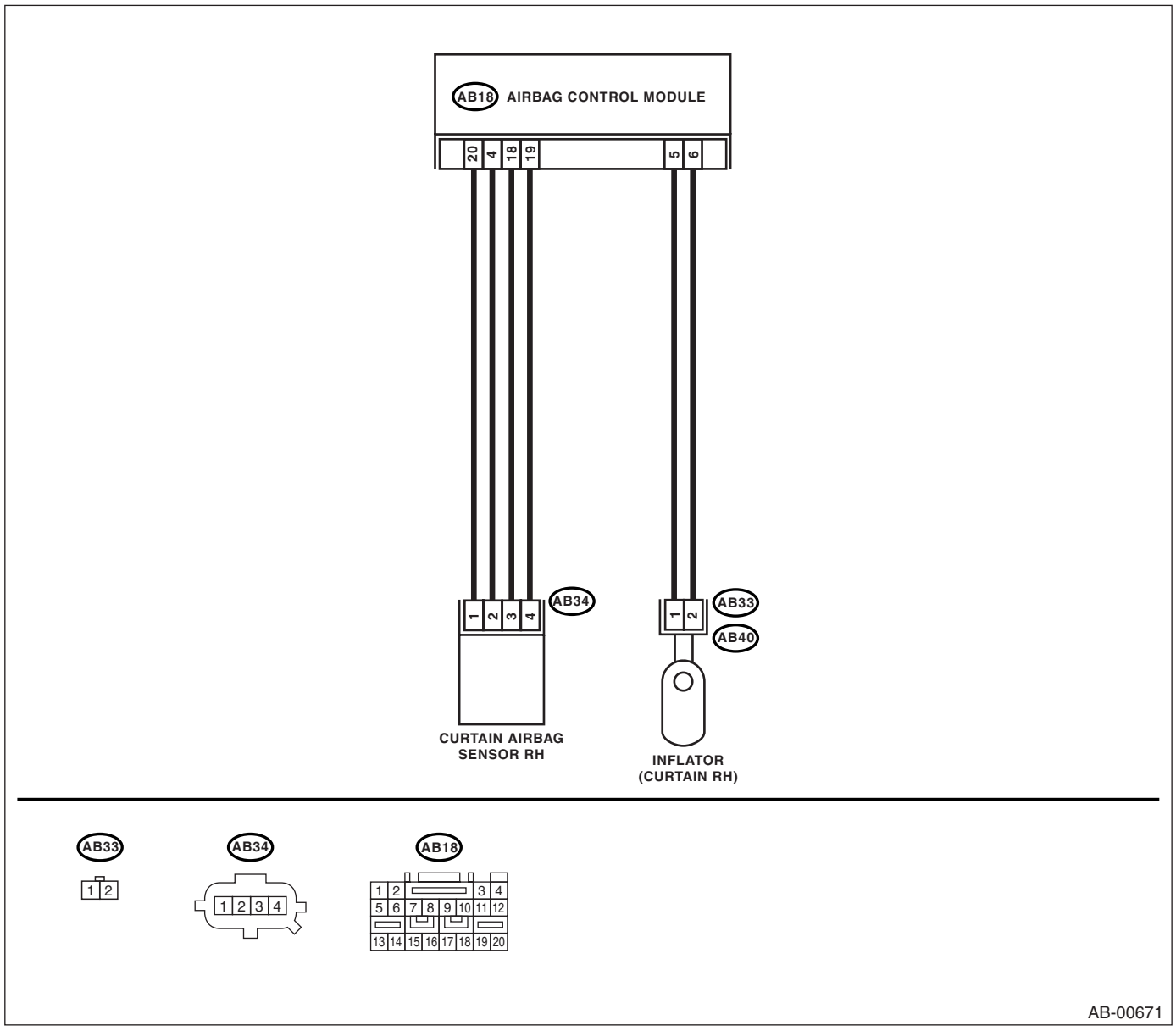
DTC DETECTING CONDITION:

- Curtain airbag harness (RH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors of driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 RH with body harness.	Go to step **2**.
2	**CHECK CURTAIN AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB33) from (AB40), and connect the connector (1F) in test harness F to connector (AB33). 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 6 seconds and go off?	Replace the curtain airbag module (RH). <Ref. to AB-19, Curtain Airbag Module.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS RH (CURTAIN AIRBAG MODULE HARNESS RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). 3) Disconnect the connector (AB24) from side airbag module (RH). 4) Disconnect the airbag resistor from test harness F. 5) Disconnect the connector (AB18) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 6 (+) — Chassis ground (–):*** ***(5U) No. 8 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Replace the airbag rear harness RH with body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

AV:DTC 96 CURTAIN AIRBAG MODULE LH FAILURE

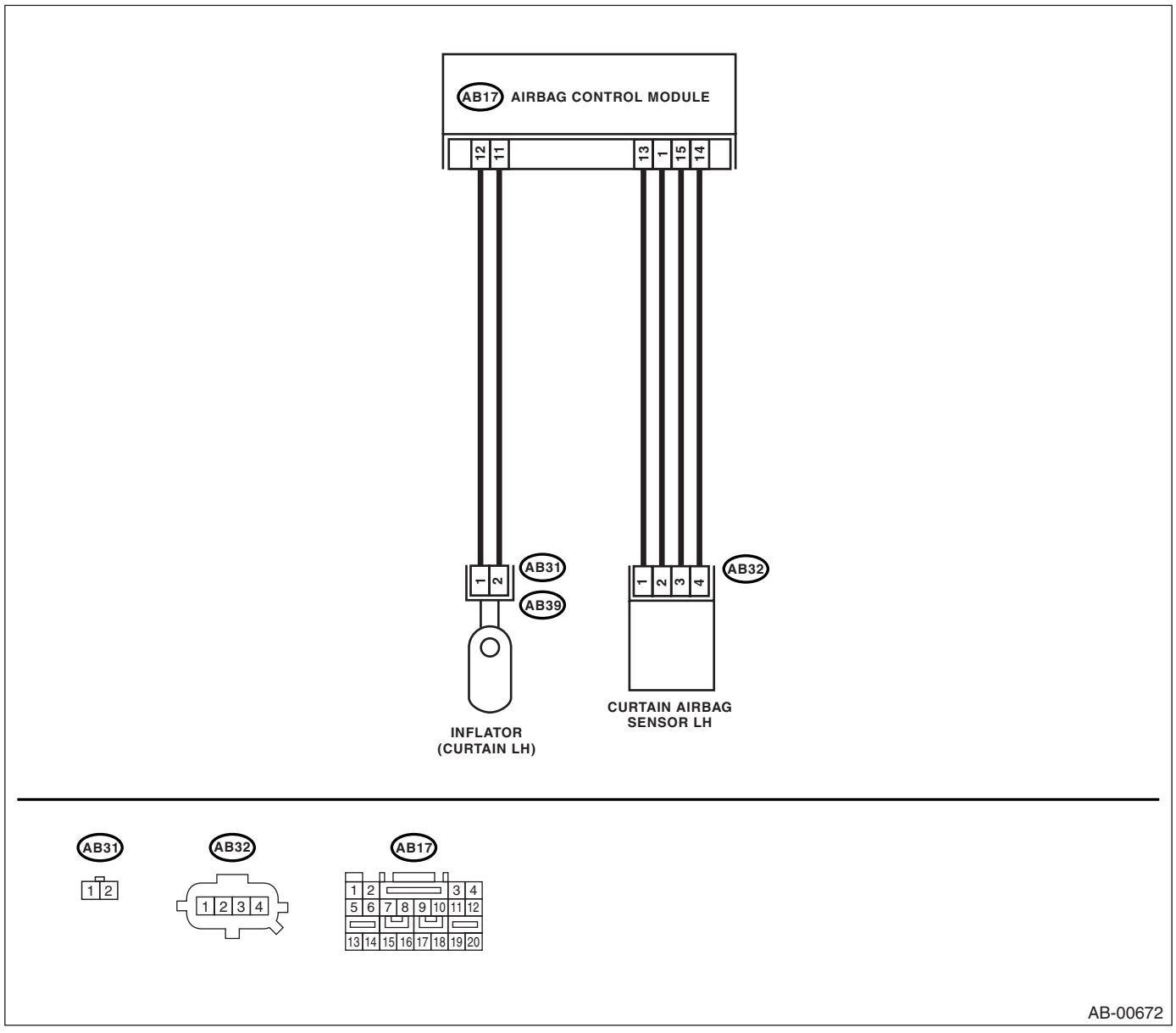
DTC DETECTING CONDITION:

- Curtain airbag harness (LH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• After replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connectors of driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** 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 LH with the body harness.	Go to step **2**.
2	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB31) from (AB39), and connect the connector (1F) in test harness F to connector (AB31). 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 6 seconds and go off?	Replace the curtain airbag module (LH). <Ref. to AB-19, Curtain Airbag Module.>	Go to step **3**.
3	**CHECK AIRBAG REAR HARNESS LH (CURTAIN AIRBAG MODULE HARNESS LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). 3) Disconnect the connector (AB19) from side airbag module (LH). 4) Disconnect the airbag resistor from test harness F. 5) Disconnect the connector (AB17) from airbag control module. 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Connect the battery ground terminal and turn the ignition switch to ON. 8) Measure the voltage between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 1 (+) — Chassis ground (–):*** ***(5U) No. 3 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Replace the airbag rear harness LH with the body harness.
4	**CHECK AIRBAG CONTROL MODULE.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the airbag control module. <Ref. to AB-21, Airbag Control Module.>	Go to step **5**.
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to AB(diag)-45, List of Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

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

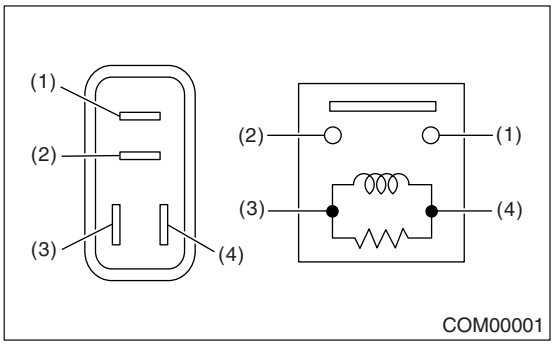
1. HORN

<Ref. to WI-123, 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.

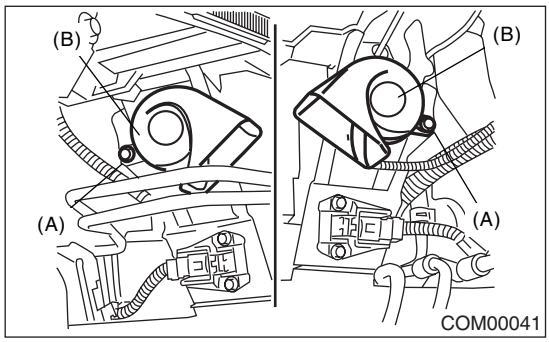


Current	Terminal No.	Standard
Yes	1 and 2	Less than 1 Ω
No		1 MΩ or more

3. Horn

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the left and right headlight assemblies. <Ref. to LI-11, REMOVAL, Headlight Assembly.>
3) Remove the horn bracket mounting bolt (A).
4) Disconnect the harness connector and remove the horn assembly (B).

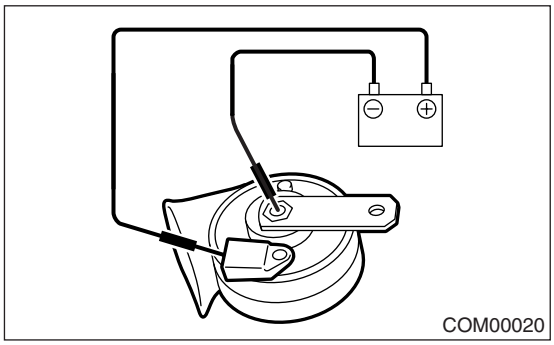


B: INSTALLATION

Install in the reverse order of removal.

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.

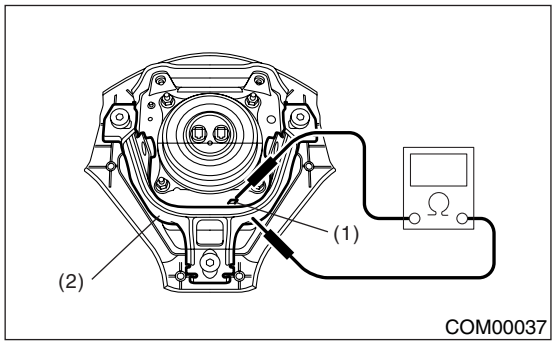
1) Disconnect the ground cable from battery.
2) Remove the driver's airbag module. <Ref. to AB-15, REMOVAL, Driver's Airbag Module.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the resistance between horn switch terminal and airbag module bracket.

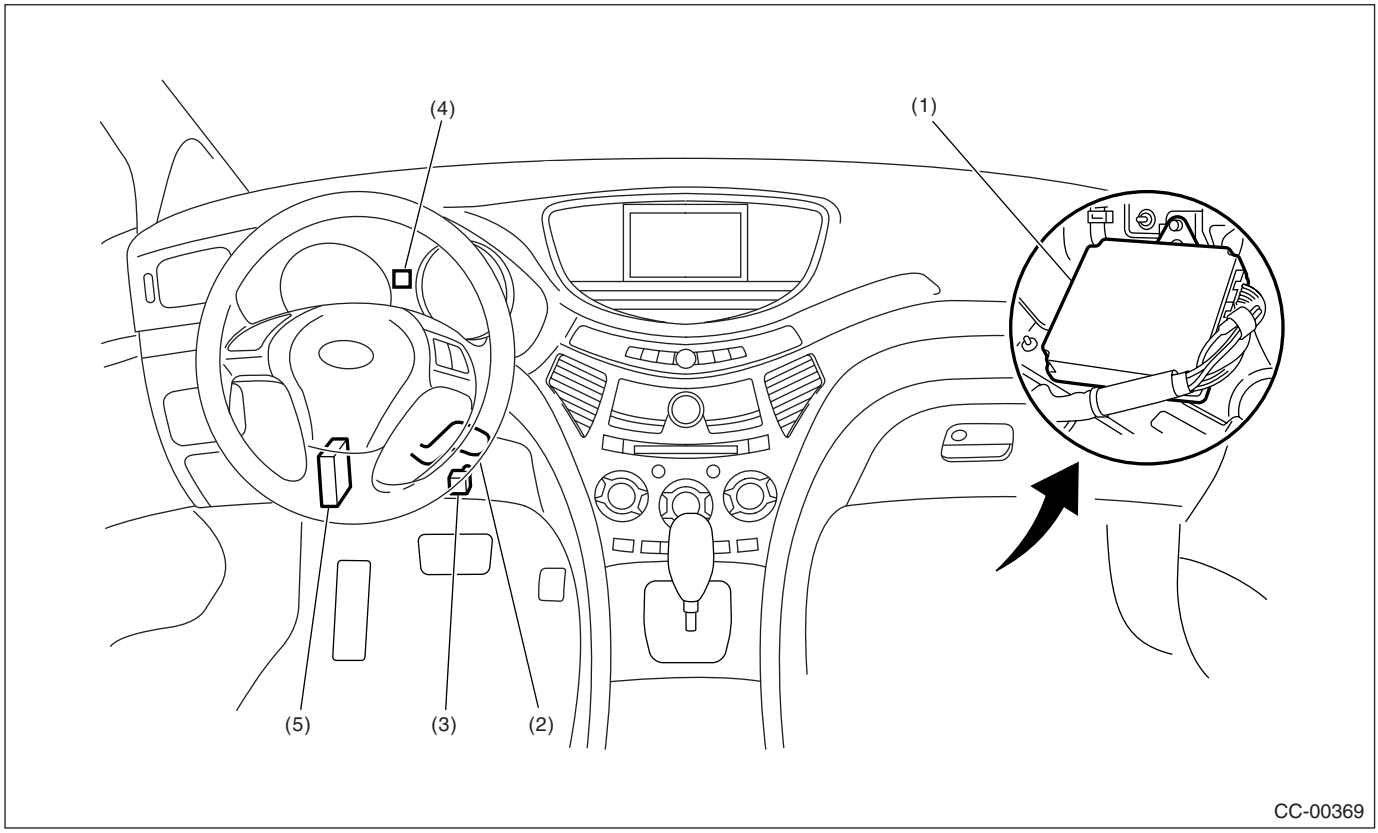


(1) Airbag module bracket
(2) Horn switch terminal

Switch position	Terminal No.	Resistance
When horn switch is pushed.	Horn switch terminal and airbag module bracket	Less than 1 Ω
When horn switch is not pushed.		1 MΩ or more

1. General Description

A: COMPONENT



(1) Engine control module (ECM)
(2) Cruise control command switch
(3) Stop light and brake switch
(4) Cruise indicator light and cruise set indicator light
(5) Transmission control module (TCM)

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 Unit

A: NOTE

The control of cruise control system is carried out in Engine control module (ECM).

B: REMOVAL

<Ref. to FU(H6DO)-32, REMOVAL, Engine Control Module (ECM).>

C: INSTALLATION

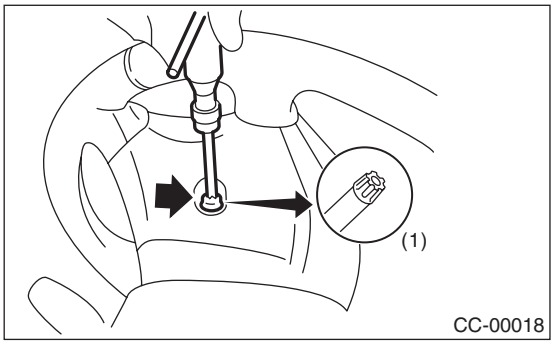
<Ref. to FU(H6DO)-32, INSTALLATION, Engine Control Module (ECM).>

3. Cruise Control Command Switch

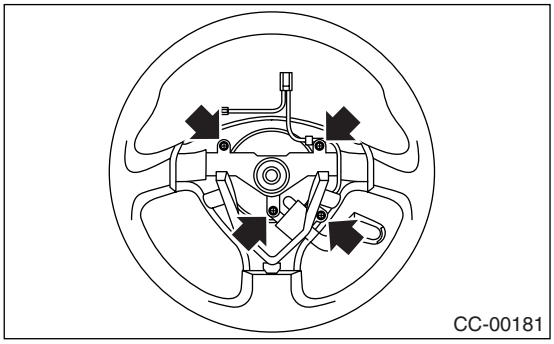
A: REMOVAL

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.>

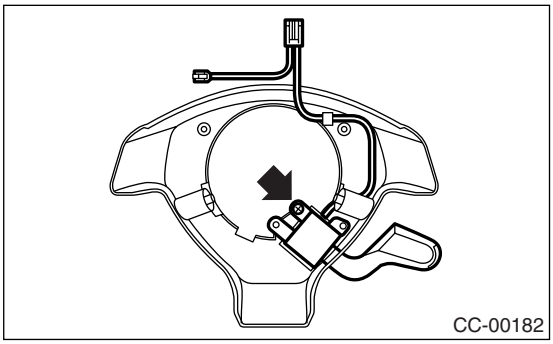
1) Set the front wheels in straight ahead position.
2) Turn the ignition switch to OFF.
3) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
4) Using TORX® BIT T30 (1), loosen two TORX® bolts which secure the driver's airbag module.



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.

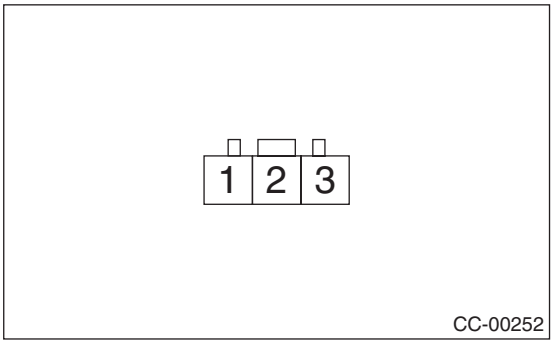


B: INSTALLATION

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 kΩ
CANCEL	ON	2 and 3	Less than 1 Ω
SET/COAST	ON	2 and 3	Approximately 250 Ω
RESUME/ ACCEL	ON	2 and 3	Approximately 1500 Ω
MAIN	OFF	1 and 2	1 MΩ or more
	ON	1 and 2	Less than 1 Ω

If NG, replace the cruise control command switch.

4. Stop Light and Brake Switch

A: REMOVAL

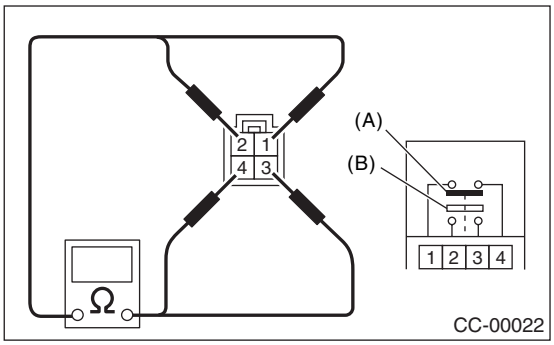
1) Disconnect the ground cable from battery.
2) Disconnect the connector from the stop light & brake switch, and then remove the switch. <Ref. to BR-37, REMOVAL, Stop Light Switch.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the resistance of brake switch (A) and stop light switch (B).



Switch	Pedal	Terminal No.	Standard
Brake	Released	1 and 4	Less than 1 Ω
	Depressed	1 and 4	1 MΩ or more
Stop light	Released	2 and 3	1 MΩ or more
	Depressed	2 and 3	Less than 1 Ω

If NG, replace the stop light & brake switch.

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK MALFUNCTION INDICATOR LIGHT.** 1) Start the engine. 2) Make sure the malfunction indicator light illuminates.	Does the malfunction indicator light illuminate?	Go to step **5**.	Go to step **2**.
2	**CHECK CRUISE INDICATOR LIGHT.** Make sure the cruise indicator light blinks.	Does the cruise indicator light blink?	Go to step **5**.	Go to step **3**.
3	**CHECK CRUISE CONTROL MAIN SWITCH OPERATION.** 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(ETC)(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
4	**CHECK CRUISE CONTROL SET OPERATION.** Check the cruise control setting operation.	Can the cruise control be set while driving at more than 40 km/h (25 MPH)?	Go to step **6**.	Go to step **5**.
5	**PERFORM CRUISE CONTROL CANCEL CONDITIONS DIAGNOSIS.** Perform the cruise control cancel conditions diagnosis. <Ref. to CC(ETC)(diag)-7, CRUISE CONTROL CANCEL CONDITIONS DIAGNOSIS, OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Go to “List of Diagnostic Trouble Code (DTC)”. <Ref. to CC(ETC)(diag)-11, List of Diagnostic Trouble Code (DTC).>	Go to phenomenon 2. <Ref. to CC(ETC)(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
6	**CHECK CRUISE SET INDICATOR LIGHT.** Make sure the cruise set indicator light illuminates.	Does the cruise set indicator light illuminate?	Go to step **7**.	Go to phenomenon 3. <Ref. to CC(ETC)(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
7	**CHECK VEHICLE SPEED IS HELD WITHIN SET SPEED.** Make sure the vehicle speed is held within set speed.	Is the vehicle speed kept within setting speed ±3 km/h (±2 MPH)? (Make sure that on a level road.)	Go to step **8**.	Go to phenomenon 4. <Ref. to CC(ETC)(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
8	**CHECK RESUME/ACCEL OPERATION.** 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 **9**.	Go to phenomenon 5. <Ref. to CC(ETC)(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>

	Step	Check	Yes	No
9	**CHECK SET/COAST OPERATION.** Check the SET/COAST switch operation.	Does the vehicle speed decrease after SET/COAST switch has been pressed?	Go to step **10**.	Go to phenomenon 6. <Ref. to CC(ETC)(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
10	**CHECK CANCEL OPERATION.** Check the CANCEL switch operation.	Is the cruise control released after CANCEL switch has been pressed?	Go to step **11**.	Go to phenomenon 7. <Ref. to CC(ETC)(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
11	**CHECK CRUISE CONTROL RELEASE OPERATION.** Check the cruise control release operation.	Is the cruise control released after brake pedal has been depressed?	Go to step **12**.	Go to phenomenon 8. <Ref. to CC(ETC)(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
12	**CHECK CRUISE CONTROL RELEASE OPERATION.** 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(ETC)(diag)-9, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>

2. General Description

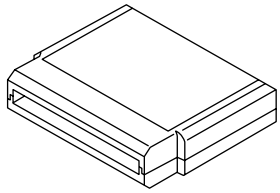
A: CAUTION

Airbag system wiring harness is routed near the cruise control command switch.

CAUTION:
• All airbag system wiring harnesses and connectors are colored yellow. Do not use electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the cruise control command switch.

B: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.

C: INSPECTION

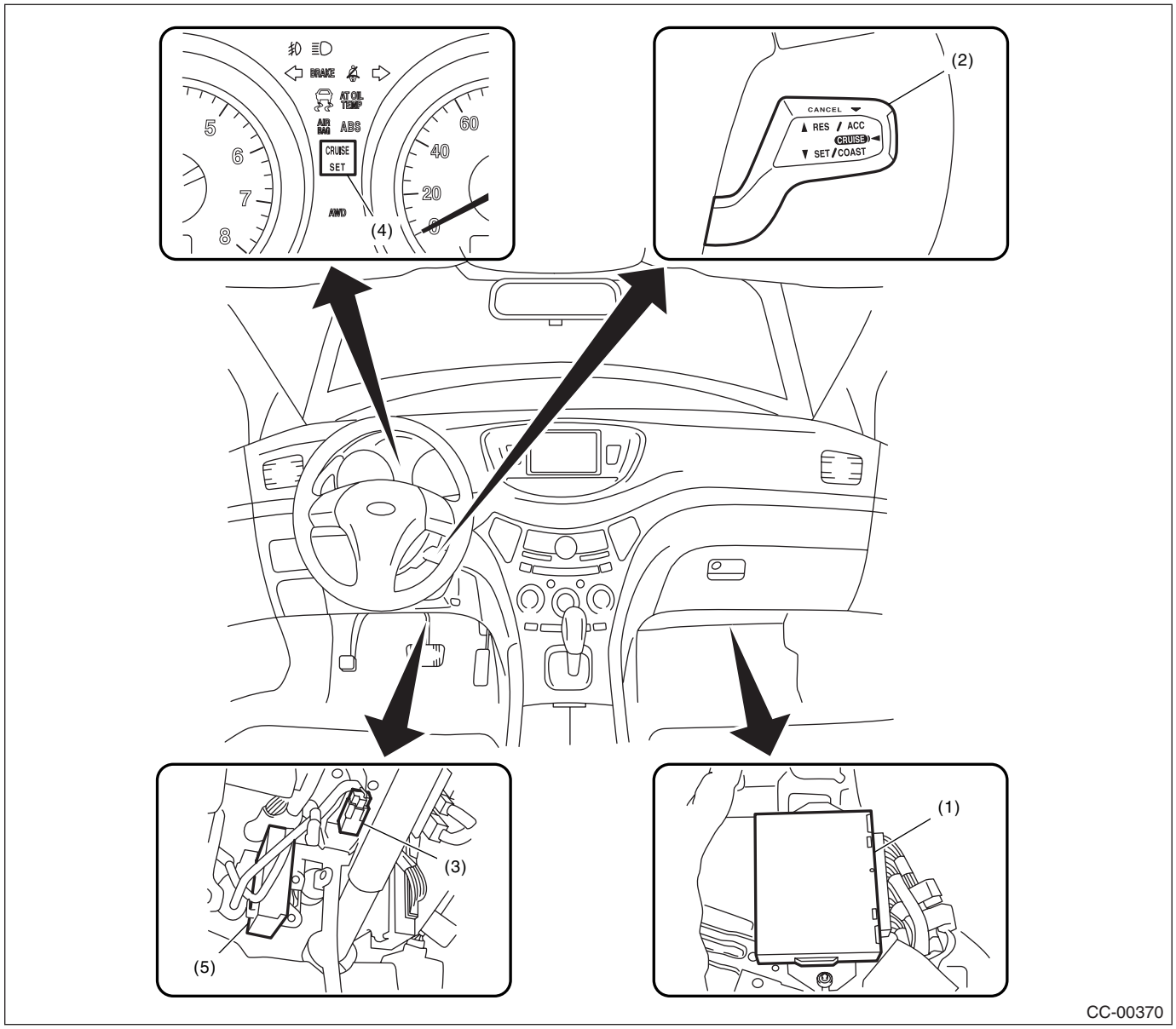
Measure the battery voltage and specific gravity of electrolyte.

Standard voltage:
12 V or more

Specific gravity:
1.260 or more

3. Electrical Component Location

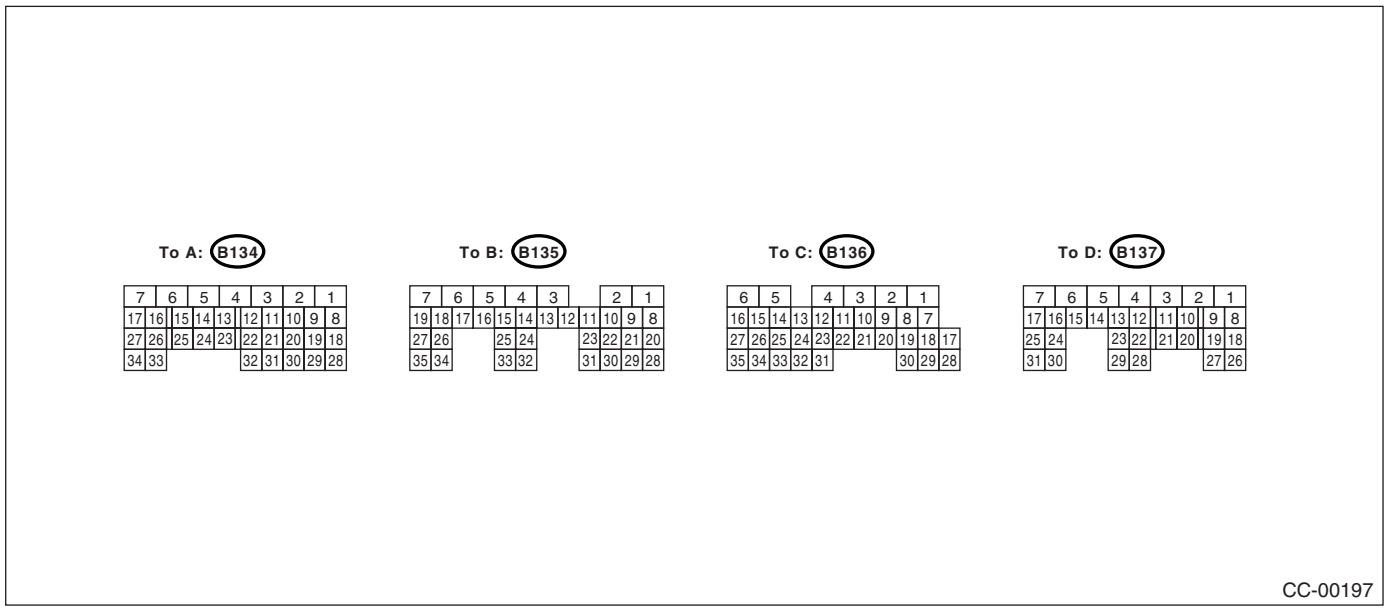
A: LOCATION



(1) Engine control module (ECM)
(2) Cruise control command switch
(3) Stop and brake switch
(4) Cruise indicator light and cruise set indicator light
(5) Transmission control module (TCM)

4. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



Description		Terminal No.	Measurement Condition and I/O Signal (Idling with ignition ON: Except cruise set light)
Main power supply	VB (CONTROL 1) VB (CONTROL 2)	A7 B2	• Battery voltage is present when the main power is turned ON. • “0 V” is present when the main power is turned OFF.
Command switch		B24	• “0 V” is detected when the command switch is in CANCEL position. • “Approx. 1 V” is present when the command switch is in SET/COAST position. • “Approx. 3 V” is detected when the command switch is in RESUME/ACCEL position. • “Approx. 4 V” is detected when the command switch is released.
Brake switch 1 (Brake switch)		B20	• Battery voltage is present when the brake pedal is released. • “0 V” is present when brake pedal is depressed.
Brake switch 2 (Stop light switch)		B28	• Battery voltage is present when brake pedal is depressed. • “0 V” is present when the brake pedal is released.
Main switch		B12	• “0 V” is present while the main switch is pressed or turned on. • Battery voltage is present when the main switch is turned OFF.
Ground	GND (CONTROL 1) GND (CONTROL 2)	A5 D7	—
Ignition switch		B19	• Battery voltage is present when the ignition switch is turned ON. • “0 V” is present when the ignition switch is turned OFF.
Neutral signal		C31	• Battery voltage is present when shift lever is in other than “P” or “N” position. • “0 V” is detected when the shift lever is in “P” or “N” position.

B: WIRING DIAGRAM

<Ref. to WI-75, WIRING DIAGRAM, Cruise Control System.>

5. Subaru Select Monitor

A: OPERATION

1. GENERAL DESCRIPTION

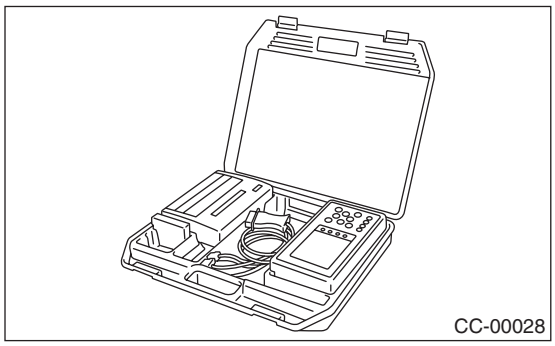
The on-board diagnosis function of the cruise control system uses Subaru Select Monitor.
The on-board diagnosis function operates in two categories, which are used depending on the type of problems;
1) Cruise Control Cancel Conditions Diagnosis:
(1) This category of diagnosis requires actual vehicle 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 condition (Code No.) which occurred during driving. When there are multiple cancel conditions (Code No.), they are shown on the Subaru Select Monitor.

CAUTION:
• The cruise control memory stores not only the cruise "cancel" which occurred (although "cancel" operation is not entered by the driver), but also the "cancel" condition input by the driver.
• The content of memory is cleared when ignition switch or cruise control main switch is turned OFF.

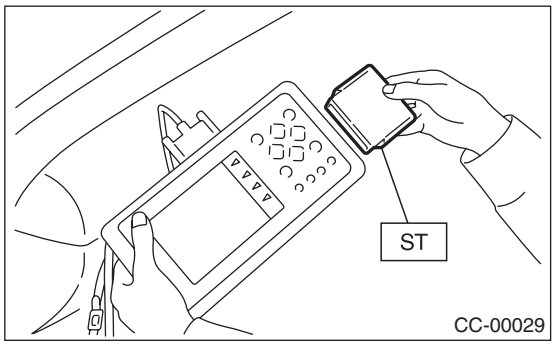
2) Real-time Diagnosis:
Real-time diagnosis function is used to determine whether or not the input signal system is in good order, according to signal emitted from switches, sensors, etc.
(1) Vehicle cannot be driven at cruise speed when the problem occurs in the cruise control system or relevant circuits.
(2) Monitor the signal conditions from switches and sensors.

2. CRUISE CONTROL CANCEL CONDITIONS DIAGNOSIS

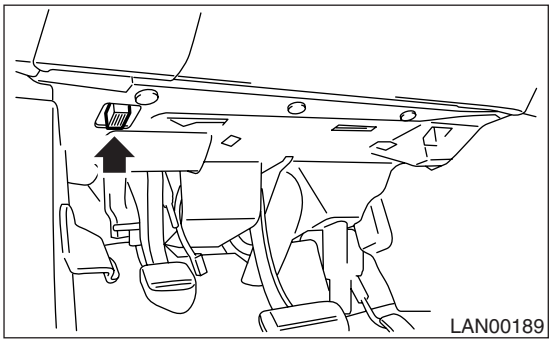
1) Prepare the Subaru Select Monitor kit.



2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to CC(ETC)(diag)-4, SPECIAL TOOL, PREPARATION TOOL, General Description.>

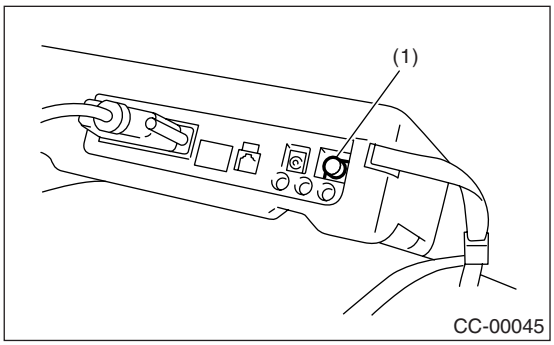


4) Connect the Subaru Select Monitor to data link connector.
(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.
5) Start the engine and turn the cruise control main switch to ON.

6) Turn the Subaru Select Monitor switch to ON.



(1) Power switch

7) On the «Main Menu», select the {2. Each System Check} and press the [YES] key.
On the system selection display screen, select the {Engine} and press the [YES] key. Press the [YES] key after the information of engine type is displayed.
8) Drive vehicle at least 40 km/h (25 MPH) and set the cruise control.
9) When the cruise speed is canceled by itself (without any cancel operations), DTC will be displayed on the screen after selecting the {Check Cancel Code} and pressing the [YES] key on the engine malfunction diagnosis screen.

CAUTION:
• When performing diagnosis, observe the legal speed limit on the road.
• DTC will be also displayed when cruise control is cancelled by driver. Do not confuse them.
• Get an assistant in the vehicle for help of diagnosis while driving.

NOTE:
DTC will be cleared by turning ignition switch or cruise control main 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) Turn the Subaru Select Monitor switch to ON.
4) On the «Main Menu», select the {2. Each System Check} and press the [YES] key.
5) On the «System Selection» display screen, select the {Engine} and press the [YES] key.
6) Press the [YES] key after the information of engine type is displayed.
7) On the «Cruise Control Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
8) Make sure that normal display is shown when operated as follows:
• Depress and release the brake pedal. (Stop light switch and brake switch turn 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.
• Depress or release the clutch pedal.
• Place the shift lever in any position other than neutral.

NOTE:
• For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• Refer to “List of Diagnostic Trouble Code (DTC)” for DTC. <Ref. to CC(ETC)(diag)-11, List of Diagnostic Trouble Code (DTC).>

6. Diagnostics with Phenomenon

A: DIAGNOSTIC PROCEDURE WITH PHENOMENON

Phenomenon		Checking item	Reference
1	Cruise control main switch is not turned to ON. (Cruise indicator light does not illuminate.)	(1) Check the cruise indicator light.	<Ref. to CC(ETC)(diag)-10, CHECK CRUISE INDICATOR LIGHT AND CRUISE SET INDICATOR LIGHT., Diagnostics with Phenomenon.>
		(2) Check the cruise control command switch.	<Ref. to CC(ETC)(diag)-13, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2	Cruise control cannot be set.	(1) Check the cruise control command switch.	<Ref. to CC(ETC)(diag)-13, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(2) Check stop light switch and brake switch.	<Ref. to CC(ETC)(diag)-15, DTC 12 AND 25 STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(3) Check the neutral position switch.	<Ref. to CC(ETC)(diag)-17, DTC 14 NEUTRAL POSITION SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(4) Check vehicle speed sensor.	<Ref. to CC(ETC)(diag)-20, DTC 22 AND 32 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
3	Cruise set indicator light does not illuminate.	Check the cruise set indicator light.	<Ref. to CC(ETC)(diag)-10, CHECK CRUISE INDICATOR LIGHT AND CRUISE SET INDICATOR LIGHT., Diagnostics with Phenomenon.>
4	Vehicle speed is not held within set speed ±3 km/h (±2 MPH).	Check the vehicle speed sensor.	<Ref. to CC(ETC)(diag)-20, DTC 22 AND 32 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
5	Vehicle speed does not increase or does not return to set speed after RESUME/ACCEL switch has been pressed.	Check the RESUME/ACCEL switch.	<Ref. to CC(ETC)(diag)-13, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
6	Vehicle speed does not decrease after SET/COAST switch has been pressed.	Check the SET/COAST switch.	<Ref. to CC(ETC)(diag)-13, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
7	Cruise control is not released after CANCEL switch has been pressed.	Check the CANCEL switch.	<Ref. to CC(ETC)(diag)-13, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
8	Cruise control is not released after brake pedal has been depressed.	Check the stop light switch and brake switch.	<Ref. to CC(ETC)(diag)-15, DTC 12 AND 25 STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
9	Cruise control is not released after shifting to the neutral position.	Check the neutral position switch.	<Ref. to CC(ETC)(diag)-17, DTC 14 NEUTRAL POSITION SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

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.

	Step	Check	Yes	No
1	**CHECK CRUISE INDICATOR LIGHT AND CRUISE SET INDICATOR LIGHT.** 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 & cruise set indicator light illuminate?	Go to step **2**.	Replace the meter case assembly. <Ref. to IDI-11, Combination Meter.>
2	**CHECK LAN COMMUNICATION CIRCUIT ERROR DISPLAY** 1) Complete self-diagnosis, and turn the ignition switch to ON again. 2) Check if the communication error is displayed on the odo/trip meter in combination meter.	Is the error code “Er xx” displayed on odo/trip meter?	Check the LAN communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

7. List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Contents of diagnosis	Reference
11	Main switch	Main switch of cruise control command switch is turned to OFF, and then the cruise control is released.	This DTC is displayed without operating the main switch. <Ref. to CC(ETC)(diag)-13, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
12	Stop and brake switch	Stop light switch or brake switch is turned to ON, and then the cruise control is released.	This DTC is displayed without depressing the brake pedal. <Ref. to CC(ETC)(diag)-15, DTC 12 AND 25 STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
14	Neutral switch	Neutral position switch is turned to ON, and then the cruise control is released.	This DTC is displayed without shifting to neutral position. <Ref. to CC(ETC)(diag)-17, DTC 14 NEUTRAL POSITION SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
15	Cancel switch	Cancel switch is turned to ON, and then the cruise control is released.	This DTC is displayed without operating the cancel switch. <Ref. to CC(ETC)(diag)-13, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
16	Ignition switch	Ignition switch is turned to OFF, and then the cruise control is released.	This DTC is displayed without operating the ignition switch. <Ref. to CC(ETC)(diag)-19, DTC 16 IGNITION SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
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 DTC is displayed without operating the main switch. <Ref. to CC(ETC)(diag)-13, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	Vehicle speed variation malfunction	Malfunction of vehicle speed signal variation is detected.	<Ref. to CC(ETC)(diag)-20, DTC 22 AND 32 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	Engine related sensor malfunction	Malfunction related to engine is detected.	<Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>
24	Cruise control related switch malfunction	Command switch malfunction is detected. (While the switch is pressed ON for an abnormally long time (approximately two minutes), open circuit is detected.)	This DTC is displayed with normal operation. <Ref. to CC(ETC)(diag)-13, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
25	Brake switch input circuit malfunction	Malfunction of brake switch input circuit in ECM is detected.	<Ref. to CC(ETC)(diag)-15, DTC 12 AND 25 STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	Engine speed signal	• Abnormal increase of engine speed is detected. • Gear is placed in Neutral, 1st or Reverse position.	Cruise in more than 2nd shift position.

DTC	Item	Contents of diagnosis	Reference
32	Out of vehicle speed of cruise control operation	• Controlled vehicle speed decreased under the limit during cruising. • Set operation was performed at vehicle speed unavailable for setting. • Resume operation was performed without memorized vehicle speed.	This DTC is displayed, though the vehicle speed is increased to the speed available for cruise set and set operation was performed again. <Ref. to CC(ETC)(diag)-20, DTC 22 AND 32 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	WAIT is prohibited after operating accelerator pedal.	Controlled vehicle speed increased above the limit during cruising.	This DTC is displayed when driving at higher speed than appropriate cruise control speed. In this case, lower the vehicle speed to the speed available for cruise set, and perform cruise set operation again.
34	Prohibited when accelerator pedal position large is continued.	The vehicle has been driven at higher speed than set vehicle speed for an abnormally long time (approximately 10 minutes) during cruise driving.	This DTC 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, release the cruise set.
35	Prohibited when vehicle speed feedback unavailable.	Set vehicle speed cannot be kept because of some reasons (steep uphill, parking brake, abnormal decrease of engine output, etc.) during cruise driving.	This DTC is displayed when driving condition is not suitable for cruise control. Perform cruise set operation again after clearing the possible cause.
41	VDC/TCS operation	Vehicle dynamics control (VDC) or TCS is operated during cruise driving or cruise setting.	This DTC is displayed when driving condition is not suitable for cruise control. Perform cruise set operation again after clearing the possible cause.
43	ABS/VDC malfunction	Vehicle dynamics control (VDC) system malfunction is detected during cruise driving or cruise setting.	<Ref. to VDC(diag)-2, Basic Diagnostic Procedure.>
44	Body integrated unit malfunction	Body integrated unit system malfunction is detected during cruise driving or cruise setting.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
45	Meter Failure	Combination meter malfunction is detected during cruise driving or cruise setting.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

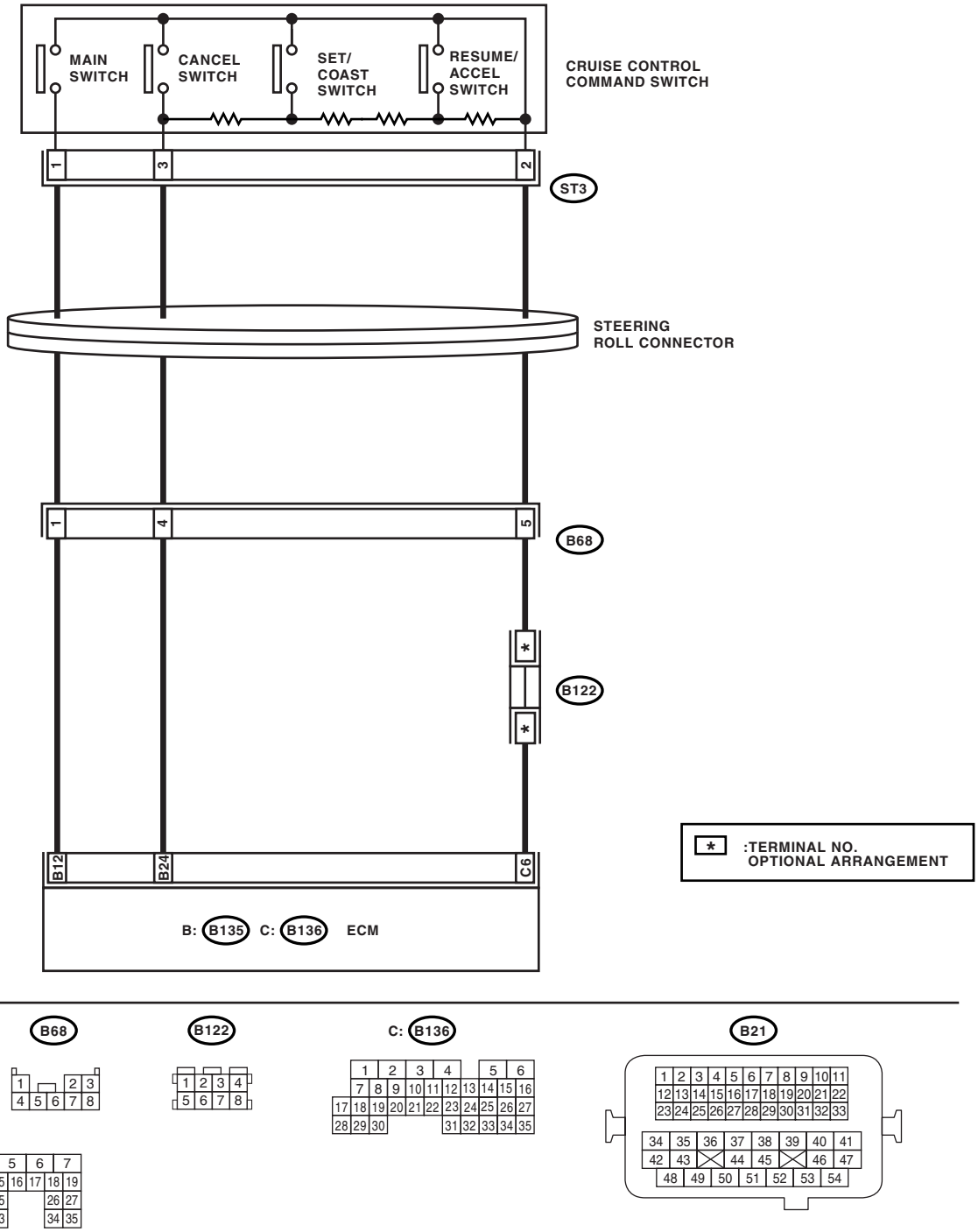
8. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH

TROUBLE SYMPTOM:

- Cruise control cannot be set. (Cancelled immediately.)
- Cruise control cannot be released.

WIRING DIAGRAM:



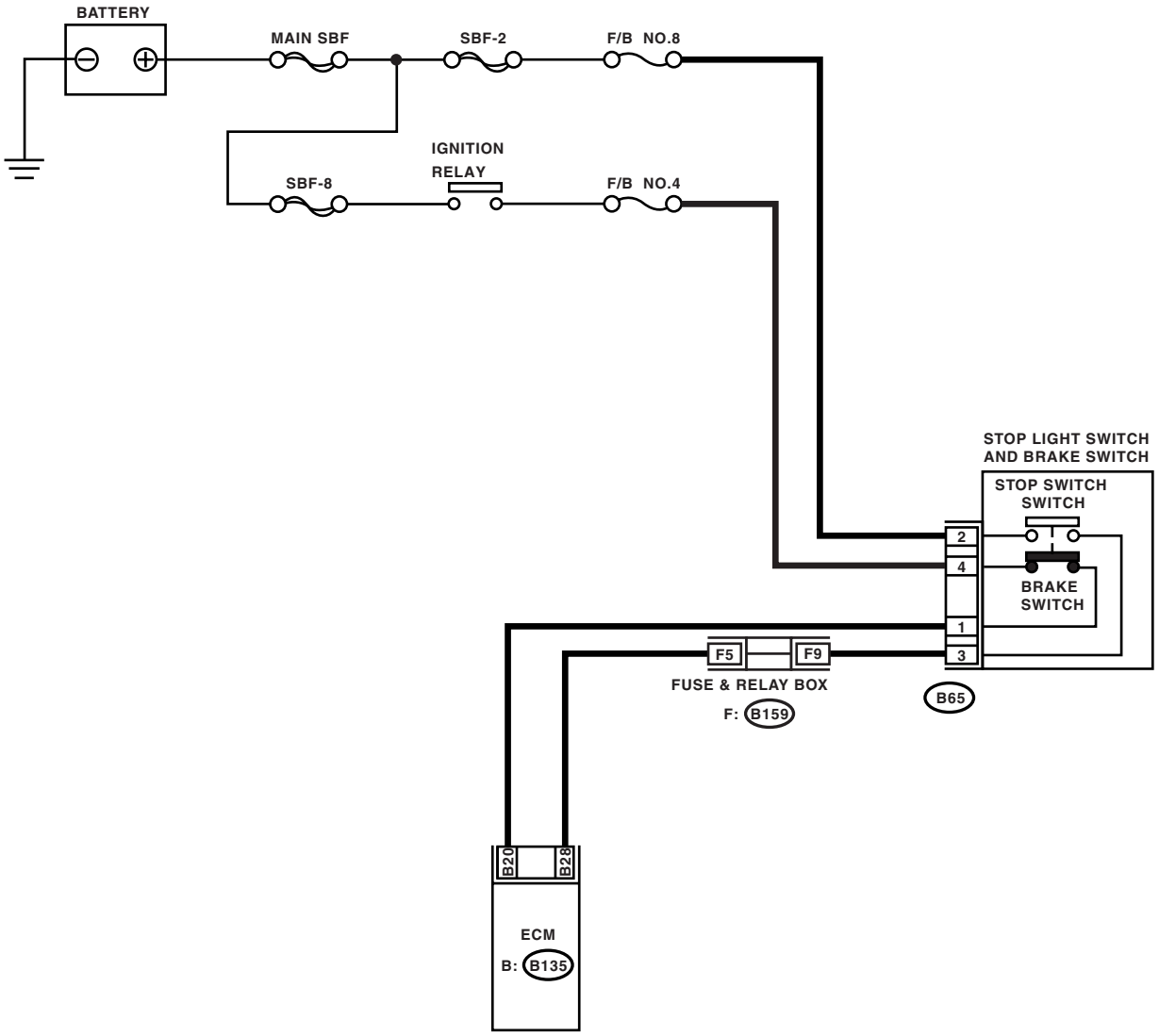
	Step	Check	Yes	No
1	**CHECK CRUISE CONTROL COMMAND SWITCH CIRCUIT.** 1) Remove the driver's airbag module. <Ref. to AB-15, REMOVAL, Driver's Airbag Module.> 2) Disconnect the harness connector of cruise control command switch. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(ST3) No. 1 (+) — Chassis ground (–):*** ***(ST3) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 5 V?	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.
2	**CHECK CRUISE CONTROL COMMAND SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Remove the cruise control command switch. <Ref. to CC-5, REMOVAL, Cruise Control Command Switch.> 3) Measure the resistance between harness connector terminal and chassis ground. ***Connector terminal*** ***(ST3) No. 2 — Chassis ground:***	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.
3	**Check Cruise Control Command Switch** Measure the resistance between switch terminals when the cruise control command switch is not being pressed. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance approx. 4 kΩ?	Go to step **4**.	Replace the cruise control command switch. <Ref. to CC-5, Cruise Control Command Switch.>
4	**CHECK CANCEL SWITCH.** 1) Turn the ignition switch to OFF. 2) Remove the cruise control command switch. <Ref. to CC-5, REMOVAL, Cruise Control Command Switch.> 3) Measure the resistance between switch terminals when the CANCEL switch is pressed. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance approx. less than 1 Ω when the CANCEL switch is pressed?	Go to step **5**.	Replace the cruise control command switch. <Ref. to CC-5, Cruise Control Command Switch.>
5	**CHECK SET/COAST SWITCH.** Measure the resistance between switch terminals when the SET/COAST switch is pressed. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance approx. 250 Ω when SET/COAST switch is pressed?	Go to step **6**.	Replace the cruise control command switch. <Ref. to CC-5, Cruise Control Command Switch.>
6	**CHECK RESUME/ACCEL SWITCH CIRCUIT.** Measure the resistance between switch terminals when the RESUME/ACCEL switch is pressed. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance approx. 1,500 Ω when RESUME/ACCEL switch is pressed?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Replace the cruise control command switch. <Ref. to CC-5, Cruise Control Command Switch.>

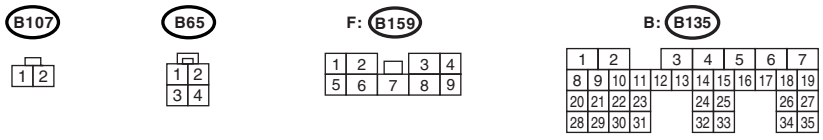
B: DTC 12 AND 25 STOP LIGHT SWITCH AND BRAKE SWITCH

TROUBLE SYMPTOM:

- Cruise control cannot be set.
- Cruise control cannot be released.

WIRING DIAGRAM:





CC-00372

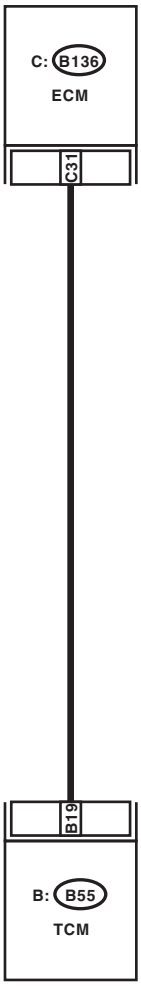
	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the stop light switch and brake switch harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B65) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	• Check fuse No. 8 (in fuse & relay box). • Check for open or short in the harness between stop light/brake switch and fuse & relay box.
2	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B65) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	• Check fuse No. 4 (in fuse & relay box). • Check for open or short in the harness between stop light/brake switch and fuse & relay box.
3	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** 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 and brake switch harness connector terminal. ***Connector & terminal*** ***(B135) No. 28 — (B65) No. 3:*** ***(B135) No. 20 — (B65) No. 1:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair the harness.
4	**Check Stop Light Switch and Brake Switch** Remove and check the stop light switch and brake switch. <Ref. to CC-6, Stop Light and Brake Switch.>	Are the stop light switch and brake switch OK?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Replace the stop light switch and brake switch.

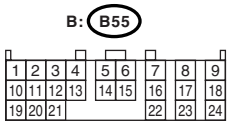
C: DTC 14 NEUTRAL POSITION SWITCH

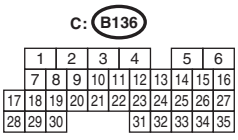
TROUBLE SYMPTOM:

Cruise control cannot be set.

WIRING DIAGRAM:







CC-00373

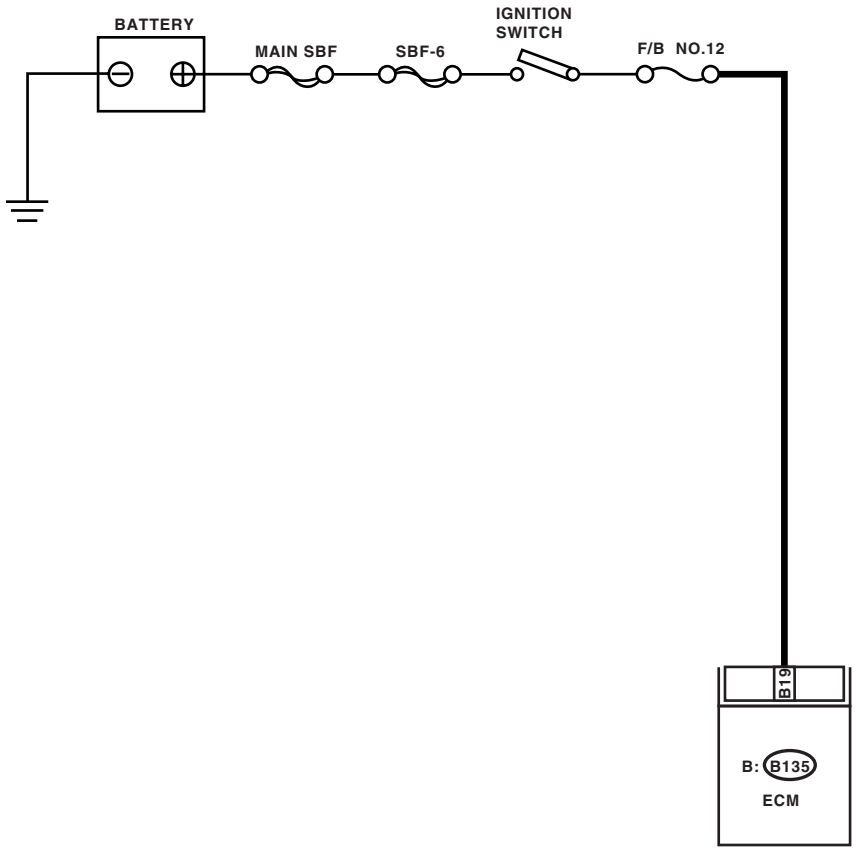
	Step	Check	Yes	No
1	**CHECK NEUTRAL POSITION SWITCH.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch and Subaru Select Monitor switch to ON. 3) Select {Engine} from the main menu. 4) Then, select {Current Data Display & Save}. 5) Check the neutral position switch signal by shifting the select lever to "P" or "N" range.	Is Subaru Select Monitor ON when select lever is shifted into "P" or "N" range? Is Subaru Select Monitor OFF when select lever is shifted to a range other than the "P" or "N" range?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Go to step **2**.
2	**CHECK TCM OUTPUT VOLTAGE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM harness connector terminal and chassis ground. ***Connector & terminal*** ***(B55) No. 19 (+) — Chassis ground (–):***	Is voltage more than 10 V when select lever is shifted to a range other than "P" or "N" range? Is voltage less than 1 V when select lever is shifted into "P" or "N" range?	Go to step **3**.	Check the TCM. <Ref. to 5AT(diag)-2, Basic Diagnostic Procedure.>
3	**CHECK HARNESS BETWEEN TCM AND ECM.** 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. ***Connector & terminal*** ***(B136) No. 31 — (B55) No. 19:***	Is the resistance less than 10 Ω?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Repair the wiring harness.

D: DTC 16 IGNITION SWITCH

TROUBLE SYMPTOM:

Cruise control cannot be set.

WIRING DIAGRAM:



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

CC-00374

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH CIRCUIT** 1) Turn the ignition switch to OFF. 2) Disconnect the ECM harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Check poor contact of ECM connector.	• Check fuse No. 12 (in fuse & relay box). • Check the harness for open or short circuit between ignition switch and ECM.

E: DTC 22 AND 32 VEHICLE SPEED SENSOR

DIAGNOSIS:

Open or short circuit in vehicle speed sensor system.

TROUBLE SYMPTOM:

Cruise control cannot be set. (Cancelled immediately.)

	Step	Check	Yes	No
1	**CHECK ABS WARNING LIGHT.** 1) Turn the ignition switch to ON. 2) After the initial operation of combination meter is completed, check if the 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	**CHECK LAN COMMUNICATION CIRCUIT ERROR DISPLAY** Check if the communication error is displayed on the odo/trip meter in combination meter.	Is the error code «Er xx» displayed on odo/trip meter?	Check the LAN communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

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-109, WIRING DIAGRAM, Audio System.>

B: INSPECTION

Symptom	Repair order
No power coming in. (No display and no sound from speakers)	1. Check the fuse and power supply for audio. 2. Check the audio ground. 3. Remove the audio and repair them.
A specific speaker does not operate.	1. Check the speaker. 2. Check the output circuit between audio and speaker.
Audio generates noise with engine is running.	1. Check the audio ground. 2. Check the generator. 3. Check the ignition coil. 4. Remove the audio and repair them.
Volume is low in AM and FM modes or interference noise occurs.	1. Check the antenna. 2. Check the antenna amplifier. 3. Check the noise suppressor. 4. Check the audio ground. 5. Remove the audio and repair them.

3. Front Accessory Power Supply Socket System

A: WIRING DIAGRAM

<Ref. to WI-121, WIRING DIAGRAM, Front Accessory Power Supply Socket System.>

4. Rear Accessory Power Supply Socket System

A: WIRING DIAGRAM

<Ref. to WI-122, WIRING DIAGRAM, Rear Accessory Power Supply Socket System.>

5. Navigation System

A: WIRING DIAGRAM

<Ref. to WI-112, 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 there are no problems in the inspections of 1 and 2 above, use "<Ref. to WI-112, WIRING DIAGRAM, Navigation System.>" of the navigation device to perform inspection.

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 THE PARKING SIGNAL

NOTE:
The side brake signal is normally "OFF", so operating it will produce no change.

9. 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 VDC CM, clear the memory.

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.

6. Multi Function Display (MFD) System

A: WIRING DIAGRAM

<Ref. to WI-116, WIRING DIAGRAM, Multi-function Display (MFD) System.>

B: INSPECTION

Symptom	Repair order
No power coming in. (Light does not illuminate.)	1. Check the fuse and power supply for the display. 2. Check the ground circuit of the display. 3. Remove the display to repair.
A specific light does not operate.	1. Check the display. 2. Check the output circuit between unit and display.

1. MFD ERROR DISPLAY AND FAULT CONTENT

Display contents		Fault cause
CHECK_DISK		• During playback, it was not possible to read data from the CD due to scratches on the CD, etc. • Disc inserted upside-down, cannot detect disc. • Bacause of a focus error, cannot read the disc. • An error occurred in the decoder section • A problem occurred in the internal circuit during playback, such as high temperature, etc.
MECHA_ERROR		• During disc loading, a problem occurred in the traverse drive. • Operation became impossible during disc change, loading, or eject.
NO_FILE		• After completing read of the disc, the number of files was 0 • A disc with no data was inserted
ERROR_**	01	• Disc is dirty, or is upside down. • Nothing is recorded. • Is not an audio disc. • There are scratches on the disk. • A disc that cannot be played back was used.
	02	
	03	A mechanical error/operational error of some sort occurred.
	04	

NOTE:
When the above errors are displayed, check the disc, and if no problems can be found, repair or replace the unit.

7. Rear Entertainment System

A: WIRING DIAGRAM

<Ref. to WI-119, WIRING DIAGRAM, Rear Entertainment System.>

B: INSPECTION

1. CHECK THE DVD-ROM.

Insert a region code 1 DVD-ROM, and check that the display shows images from the DVD when playing back the media.

NOTE:
Region code 1 is a code for North American DVD-ROM discs. DVD-ROMs of different region codes will not be played back.

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.

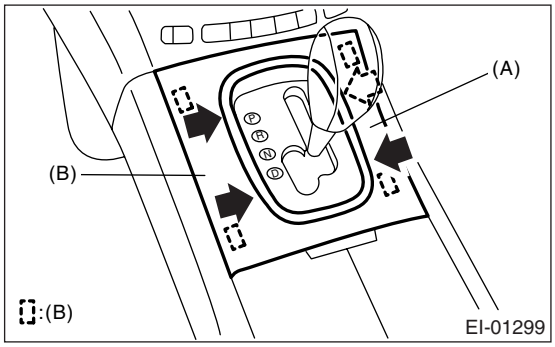
2. ERROR DISPLAY AND CONTENT

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.

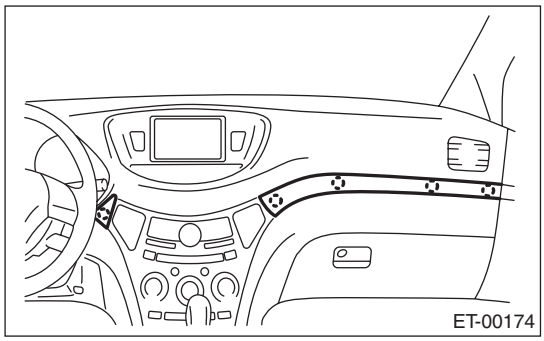
8. Control Panel

A: REMOVAL

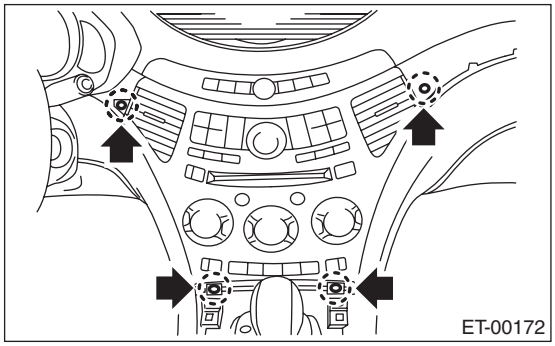
1) Disconnect the ground cable from battery.
2) Remove the ring indicator (A) and console front panel (B).



3) Remove the instrument ornament inner panels on passengers and drivers side.



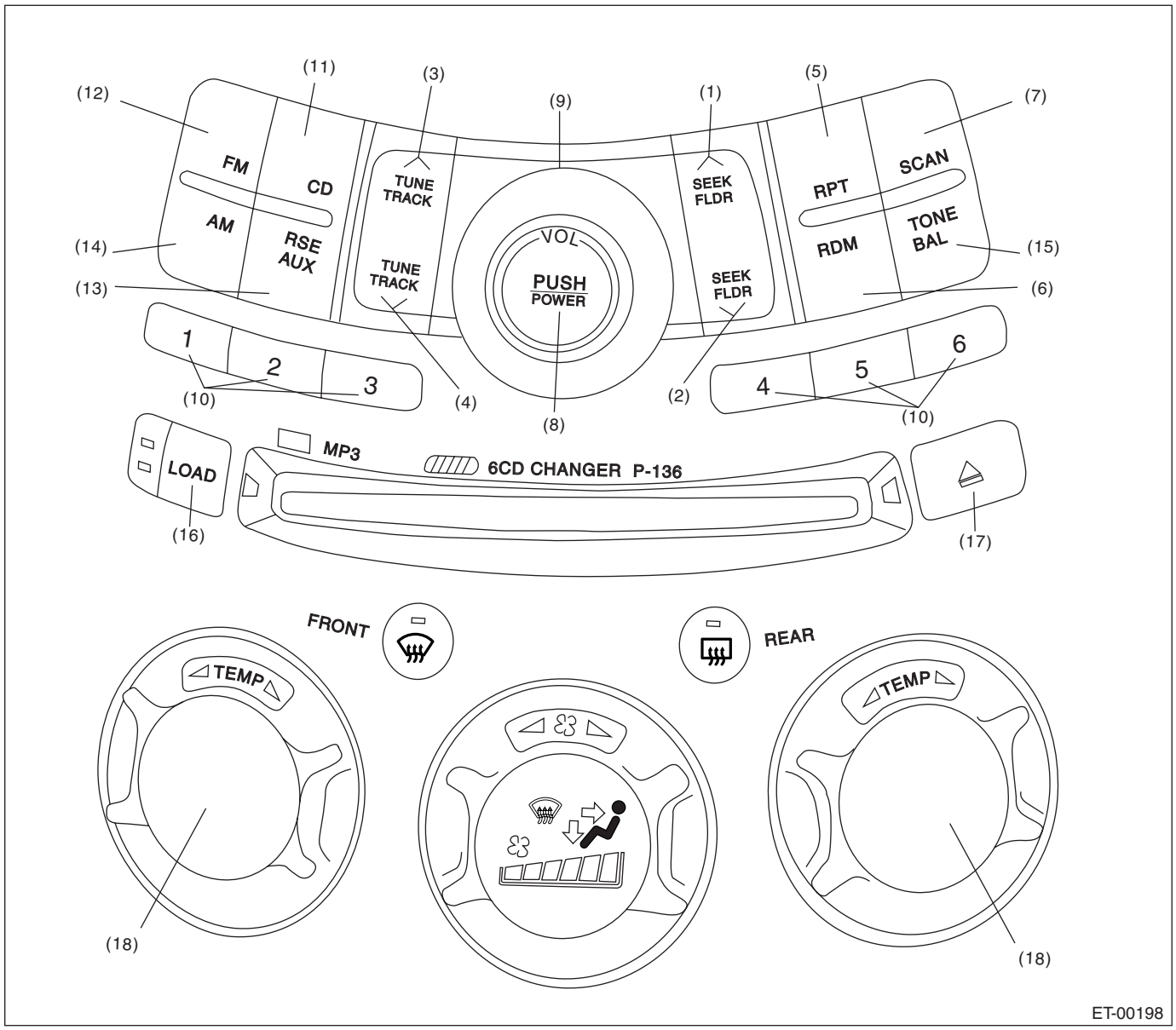
4) Remove the screws, and remove the control panel.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION



(1) SEEK UP switch
(2) SEEK DOWN switch
(3) TUNE TRACK UP switch
(4) TUNE TRACK DOWN switch
(5) RPT switch
(6) RDM switch
(7) SCAN switch
(8) PUSH/POWER switch
(9) VOLUME
(10) Presets 1 — 6
(11) CD switch
(12) FM switch
(13) RSE AUX switch
(14) AM switch
(15) TONE/BAL switch
(16) LOAD switch
(17) EJECT 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(12), AM(14), CD(11), RSE AUX(13) switches. Pressing these switches will disengage the self diagnosis mode.

1. SELF DIAGNOSIS OF THE CONTROL PANEL AND AUDIO

	Step	Check	Yes	No
1	**SETTING THE SELF-DIAGNOSIS MODE BY OPERATING THE CONTROL PANEL.** 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**.
2	**CHECK BUZZER**	Did the buzzer sound when going into the diagnosis mode?	Go to step **6**.	Check the connection of the harness connector, and if there are no problems found, repair or replace the audio unit and control panel. <Ref. to ET-14, REMOVAL, Audio.> <Ref. to AC-31, REMOVAL, Control Panel.>
3	**COMMUNICATION STATUS CHECK** 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 **4**.	Go to step **5**.
4	**COMMUNICATION STATUS CHECK**	Was the display in step 3 on the left side TEMP display section?	<Ref. to ET-14, REMOVAL, Audio.>	<Ref. to AC-31, REMOVAL, Control Panel.>
5	**CHECK SWITCH.** 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-13, SWITCH CHECK LIST, INSPECTION, Control Panel.>	<Ref. to ET-14, REMOVAL, Audio.>	<Ref. to AC-31, REMOVAL, Control Panel.>
6	**INSPECTION OF MALFUCTION DISPLAY** 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 **3**.	Go to step **7**.
7	**INSPECTION OF MALFUCTION DISPLAY**	Did the buzzer sound when going into the self diagnosis mode?	<Ref. to ET-14, REMOVAL, Audio.>	<Ref. to ET-14, REMOVAL, Audio.> <Ref. to AC-31, REMOVAL, Control Panel.>

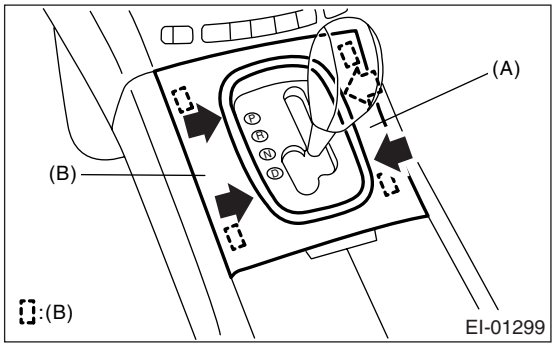
2. SWITCH CHECK LIST

Switch	TEMP display LH	TEMP display RH	Switch	TEMP display LH	TEMP display RH
TUNE/TRACK ⋀	TR	UP	TONE/BAL	TO	-
TUNE/TRACK ⋁	TR	DW	1 (Preset)	P1	-
SEEK/FLDR ⋀	SK	UP	2 (Preset)	P2	-
SEEK/FLDR ⋁	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

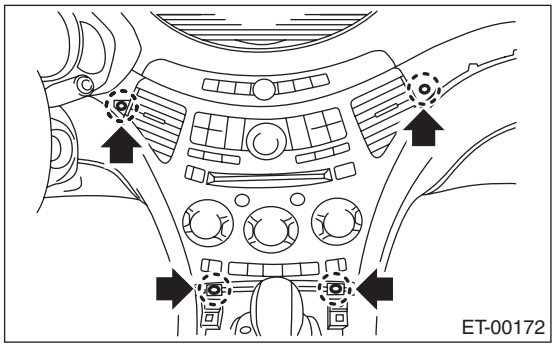
9. Audio

A: REMOVAL

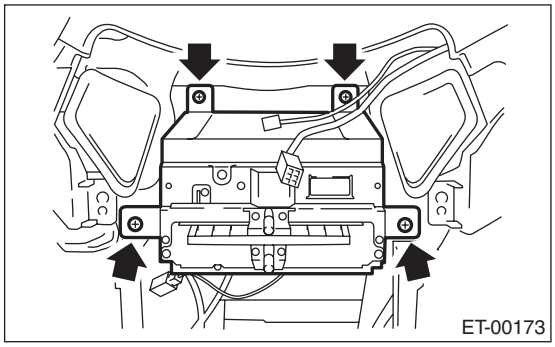
1) Disconnect the ground cable from battery.
2) Remove the ring indicator (A) and console front panel (B).



3) Remove the screws, and pull out the front control panel.



4) Disconnect the harness connectors and remove the front control panel.
5) Remove the screws, and partially pull the audio out from center console.



6) Disconnect the harness connector and antenna feeder cord, and then remove the audio.

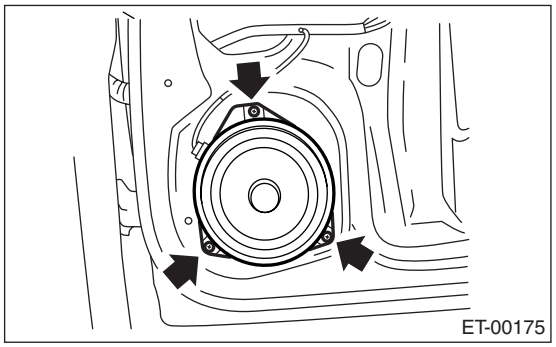
B: INSTALLATION

Install in the reverse order of removal.

10.Front Speaker

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-35, REMOVAL, Door Trim.>
3) Remove the front speaker mounting screws.



4) Disconnect the harness connector and remove the front speaker.

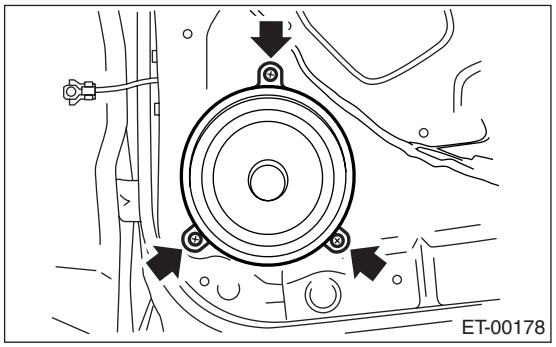
B: INSTALLATION

Install in the reverse order of removal.

12.Rear Speaker

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear door trim. <Ref. to EI-35, REMOVAL, Door Trim.>
3) Remove the rear speaker mounting screws.



4) Disconnect the harness connector and remove the rear speaker.

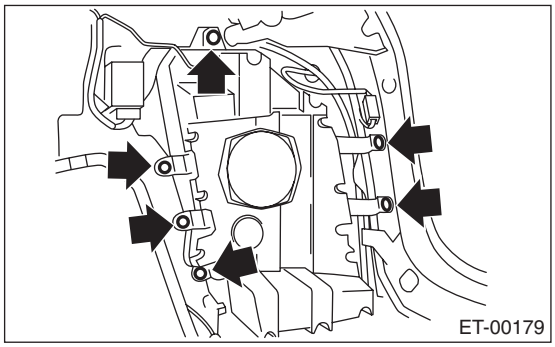
B: INSTALLATION

Install in the reverse order of removal.

13.Woofer

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the quarter trim. <Ref. to EI-45, REMOVAL, Rear Quarter Trim.>
3) Remove the woofer bracket mounting screws.



4) Disconnect the harness connector and detach the woofers.

B: INSTALLATION

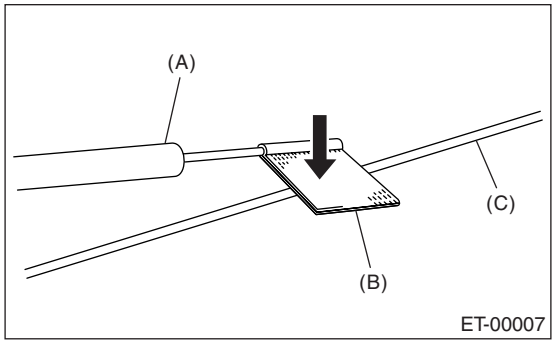
Install in the reverse order of removal.

14.Antenna

A: INSPECTION

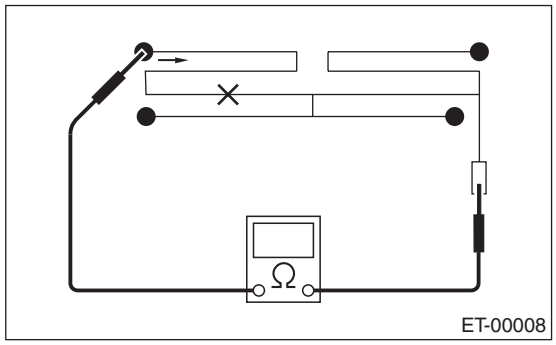
Measure the resistance between the antenna terminal and each antenna wire.
If an antenna wire is OK, resistance will be less than 1 Ω. If an antenna wire is broken, resistance will be more than 1 MΩ.

NOTE:
When checking the continuity, wind a piece of aluminum foil around the tip of tester probe and press foil against the antenna wire with your finger.



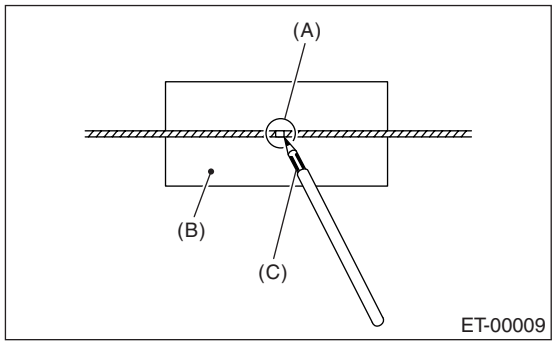
(A) Tester probe
(B) Aluminum foil
(C) Antenna wire

To locate the broken point, move the probe along antenna wire.



B: REPAIR

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 (DUPONT No. 4817) on the broken portion with a drawing pen.



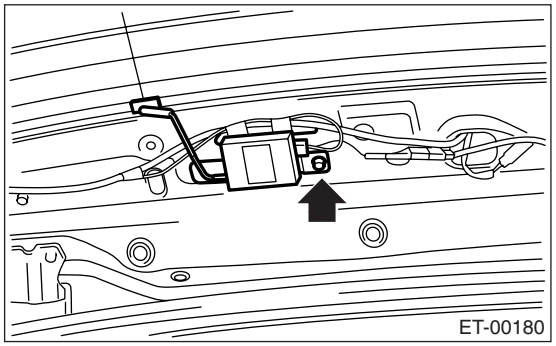
(A) Broken portion
(B) Masking film
(C) Conductive silver composition

4) Dry out the deposited portion.
5) After repair has been completed, measure the resistance in repaired wire.

15.Antenna Amplifier

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear gate trim. <Ref. to EI-51, REMOVAL, Rear Gate Trim.>
3) Disconnect the harness connectors and terminals.
4) Remove the screws and detach the antenna amplifier.

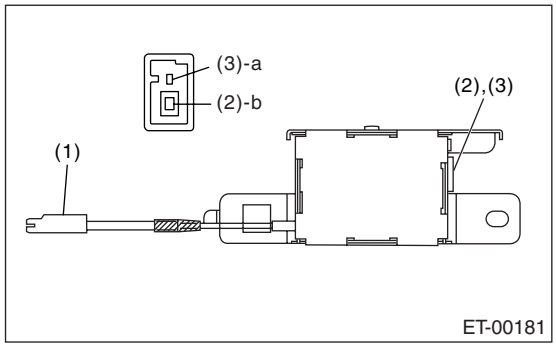


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the resistance of antenna amplifier.

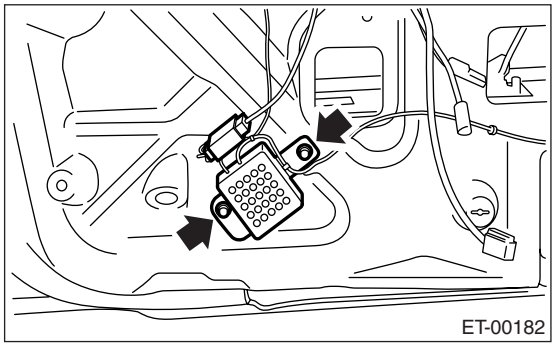


Terminal No.	Standard
(1) and amplifier body	10 kΩ or more
(2)-b and Amplifier body	10 kΩ or more
(3)-a and Amplifier body	10 kΩ or more

16.Noise Surpressor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear gate trim. <Ref. to EI-51, REMOVAL, Rear Gate Trim.>
3) Disconnect harness connector from noise suppressor.
4) Remove the screws and detach the noise suppressor.



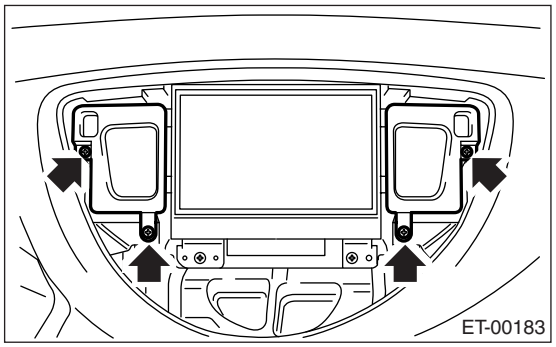
B: INSTALLATION

Install in the reverse order of removal.

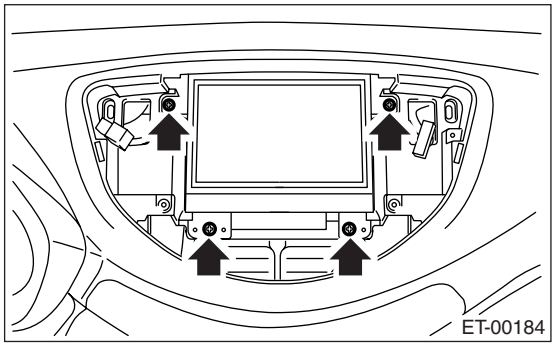
17.Navigation Display

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the upper grille. <Ref. to AC-46, REMOVAL, Air Vent Grille.>
3) Remove the warning box.



4) Remove the screws and then remove the navigation display.



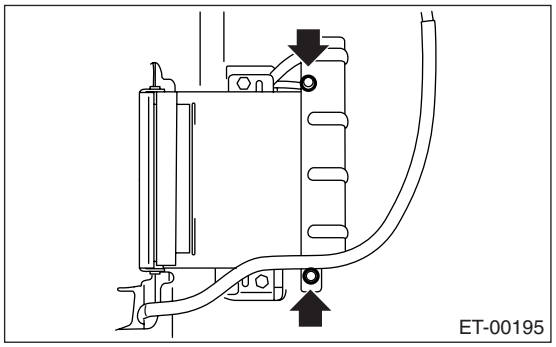
B: INSTALLATION

Install in the reverse order of removal.

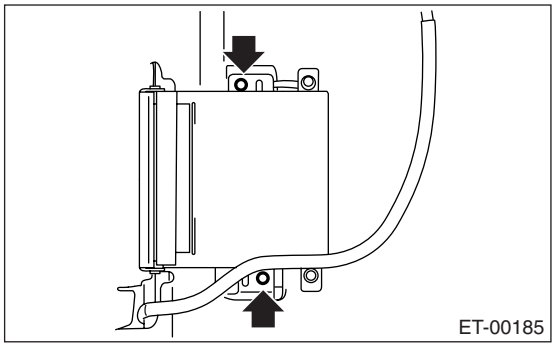
18.Navigation Body

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the driver's seat. <Ref. to SE-7, REMOVAL, Front Seat.>
3) Remove the cover attachment bolts, and remove the cover.



4) Disconnect the connector.
5) Remove the bolts and then remove the navigation unit.



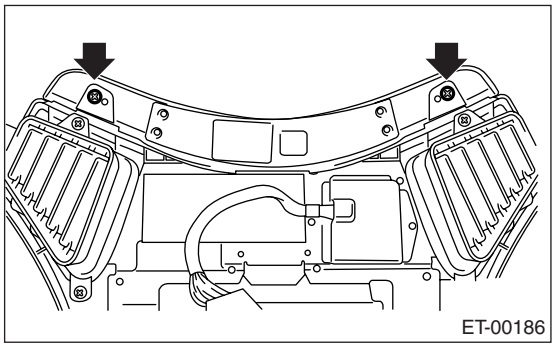
B: INSTALLATION

Install in the reverse order of removal.

19.Navigation Switch

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the control panel. <Ref. to ET-10, REMOVAL, Control Panel.>
3) Remove the screws and then remove the navigation switch.



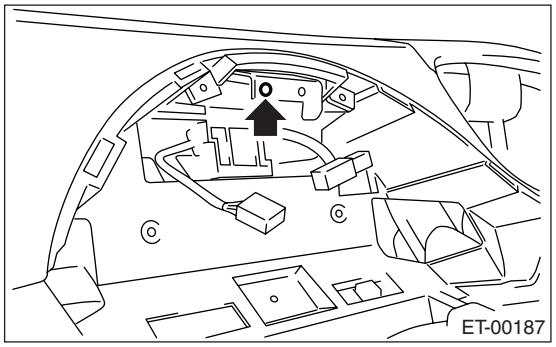
B: INSTALLATION

Install in the reverse order of removal.

20.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-14, REMOVAL, Audio.>
4) Remove the navigation display. <Ref. to ET-22, 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.

21.Multi Function Display (MFD)

A: REMOVAL

<Ref. to ET-22, REMOVAL, Navigation Display.>

B: INSTALLATION

Install in the reverse order of removal.

22.Multi Function Switch

A: REMOVAL

<Ref. to ET-24, REMOVAL, Navigation Switch.>

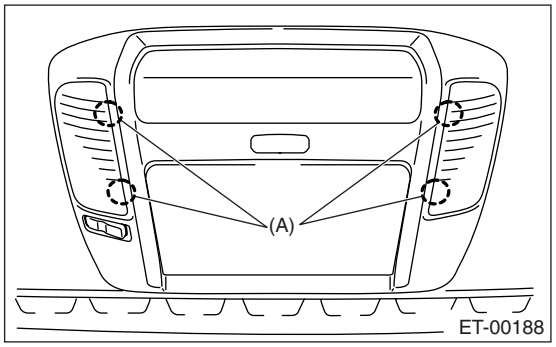
B: INSTALLATION

Install in the reverse order of removal.

23.Rear Entertainment

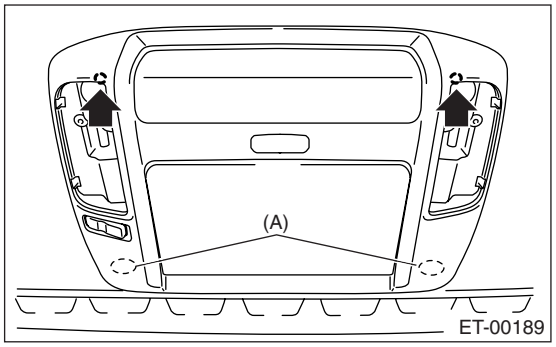
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Insert a flat tip screw driver in the ○ section, and remove the room lamp lens.



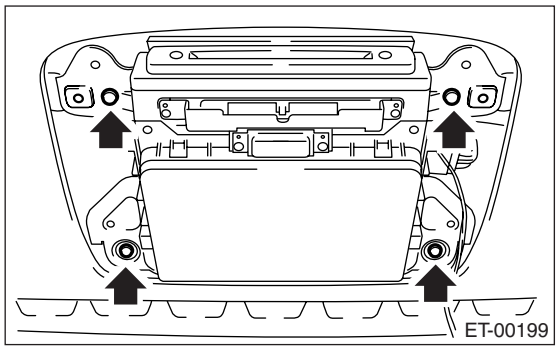
(A) Cutout

3) Remove the bolts, and then remove the monitor cover.

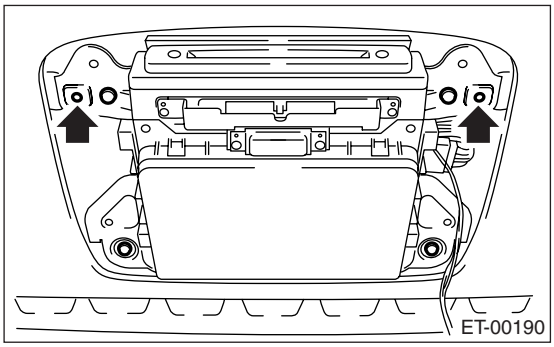


(A) Clip

4) Remove the 4 mounting bolts.



5) Remove the temporary screws and remove the monitor body.



NOTE:
Always support with one hand to prevent the unit from falling.

6) Remove the temporary clips from the roof brace.

B: INSTALLATION

1) Attach the temporary clip and temporary screw to the rear entertainment system body.

NOTE:
When installing a new rear entertainment system, a clip is supplied on the unit, and this step 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 lamp connector, attach the cover and affix with the bolts.
6) Attach the room lamp lens from the outside of the vehicle and snap into place.
Install in the reverse order of removal.

24.AUX Input Terminal

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the quarter trim. <Ref. to EI-45, REMOVAL, Rear Quarter Trim.>
3) Remove the AUX input terminal from the trim.

B: INSTALLATION

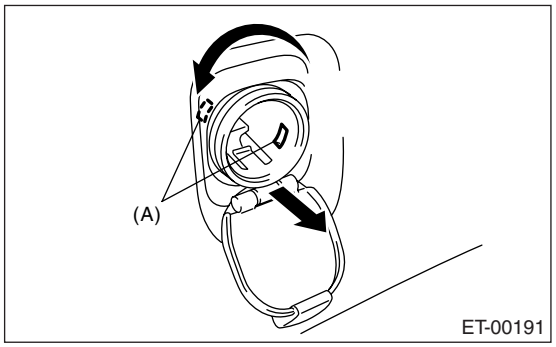
Install in the reverse order of removal.

25.Front Accessory Power Supply Socket

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the console box. <Ref. to EI-39, REMOVAL, Center Console.>
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 2 locations and turning the socket to the left.



B: INSTALLATION

Install in the reverse order of removal.

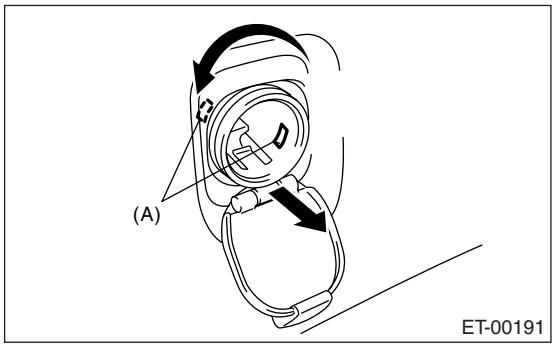
NOTE:
Confirm that the accessory socket is locked and can not be pulled out.

26.Rear Accessory Power Supply Socket

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the console box. <Ref. to EI-39, REMOVAL, Center Console.>
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 2 locations and turning the socket to the left.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Confirm that the accessory socket is locked and can not be pulled out.

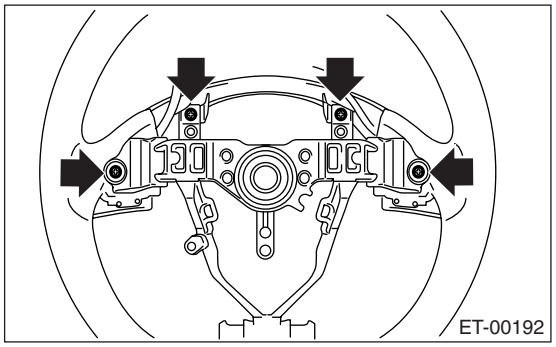
27.Steering Satellite Switch

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-15, REMOVAL, Driver's Airbag Module.>

WARNING:
If there are air bag modules mounted, always refer to "Airbag System" when performing air-bag module service. <Ref. to AB-15, 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.

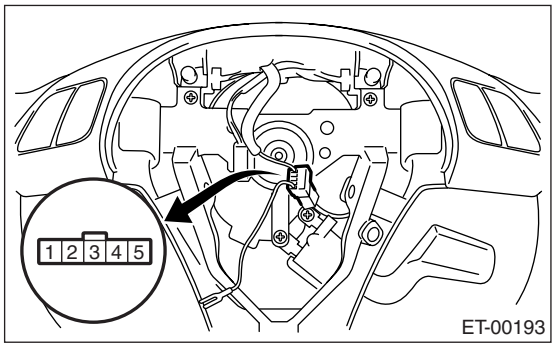


7) Remove the satellite switch.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION



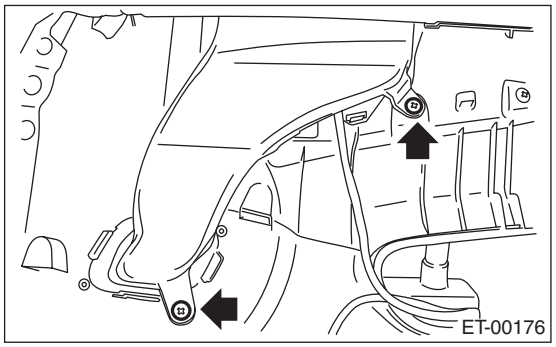
Step		Check	Yes	No
1	**MUTE SWITCH CONTINUITY CHECK.** 1) Press the mute switch. 2) Measure the resistance between satellite switch connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance approx. 22 Ω?	Go to step **2**.	Replace the satellite switch.
2	**VOLUME SWITCH CONTINUITY CHECK.** 1) Press the volume switch. 2) Measure the resistance between satellite switch connector terminals. ***Terminals*** ***No. 1 — No. 2: Volume up*** ***No. 1 — No. 2: Volume down***	Is the resistance approx. 90 Ω? (Volume up) And is the resistance approx. 190 Ω? (Volume down)	Go to step **3**.	Replace the satellite switch.
3	**MODE SWITCH CONTINUITY CHECK.** 1) Press the MODE switch. 2) Measure the resistance between satellite switch connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance approx. 330 Ω?	Go to step **4**.	Replace the satellite switch.
4	**SEEK SWITCH CONTINUITY CHECK.** 1) Press the seek switch. 2) Measure the resistance between satellite switch connector terminals. ***Terminals*** ***No. 1 — No. 2: Seek up*** ***No. 1 — No. 2: Seek down***	Is the resistance approx. 600 Ω? (Seek up) And is the resistance approx. 1.1 kΩ? (Seek down)	Go to step **5**.	Replace the satellite switch.
5	**CHECK SATELLITE SWITCH INSULATION.** 1) Not to operate the satellite switch. 2) Measure the resistance between satellite switch connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance approx. 4.7 kΩ?	Satellite switch is normal.	Replace the satellite switch.

11.Tweeter

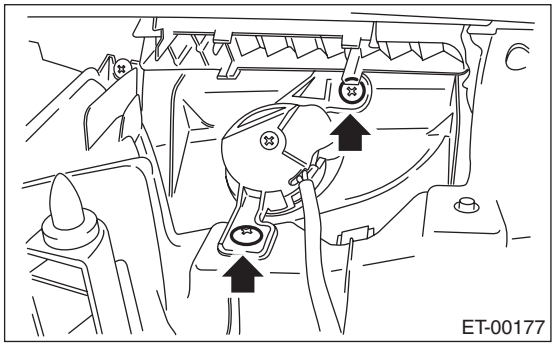
A: REMOVAL

1. FRONT

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-35, REMOVAL, Door Trim.>
3) Remove the side deflector duct.



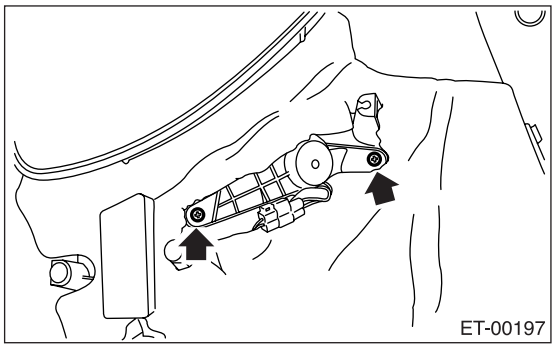
4) Remove the tweeter mounting screws.



5) Remove the tweeter.

2. REAR

1) Disconnect the ground cable from battery.
2) Remove the rear quarter trim. <Ref. to EI-45, REMOVAL, Rear Quarter Trim.>
3) Disconnect the connector, and then remove the tweeter mounting screws.



4) Remove the tweeter.

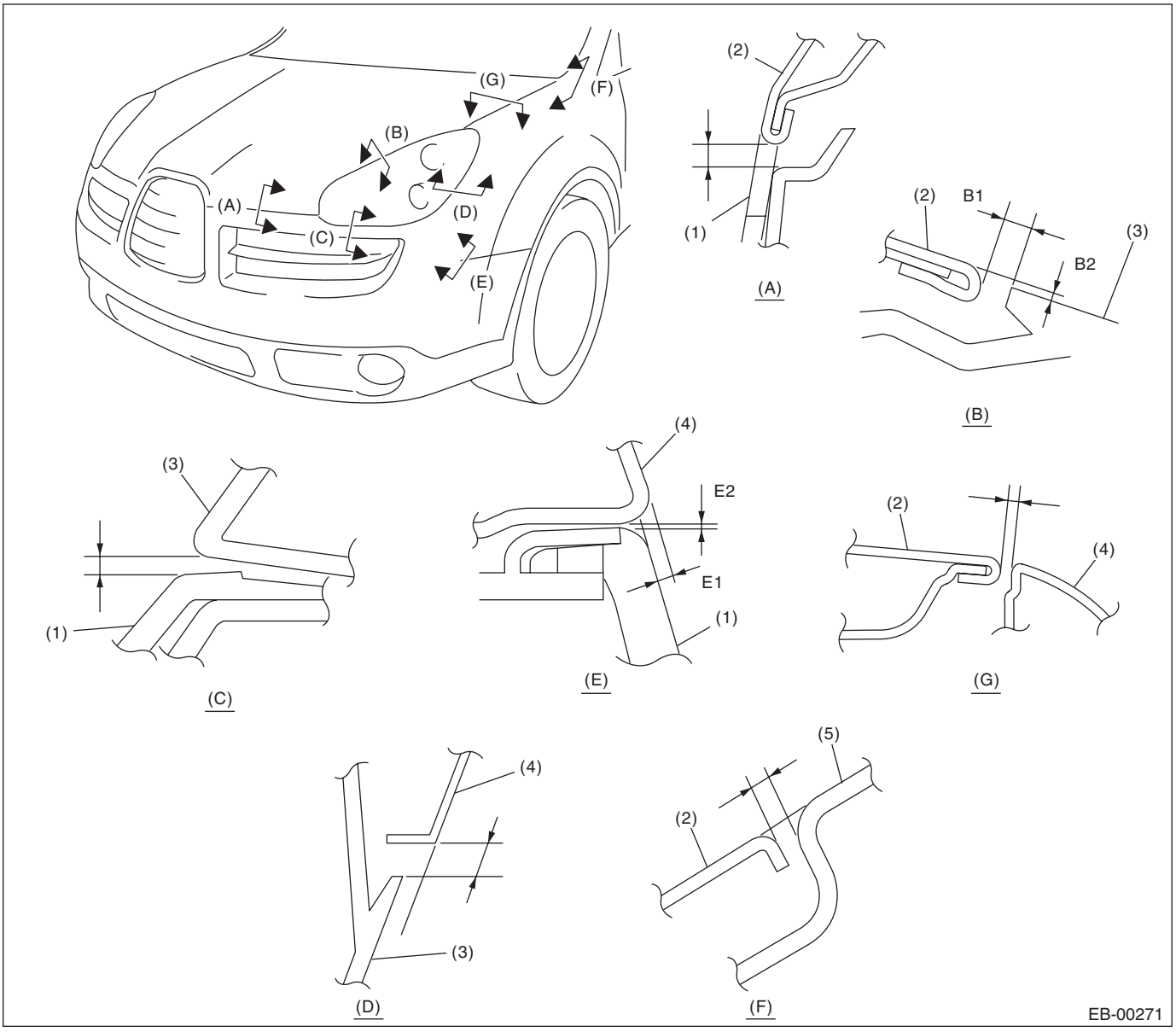
B: INSTALLATION

Install in the reverse order of removal.

1. General Description

A: SPECIFICATION

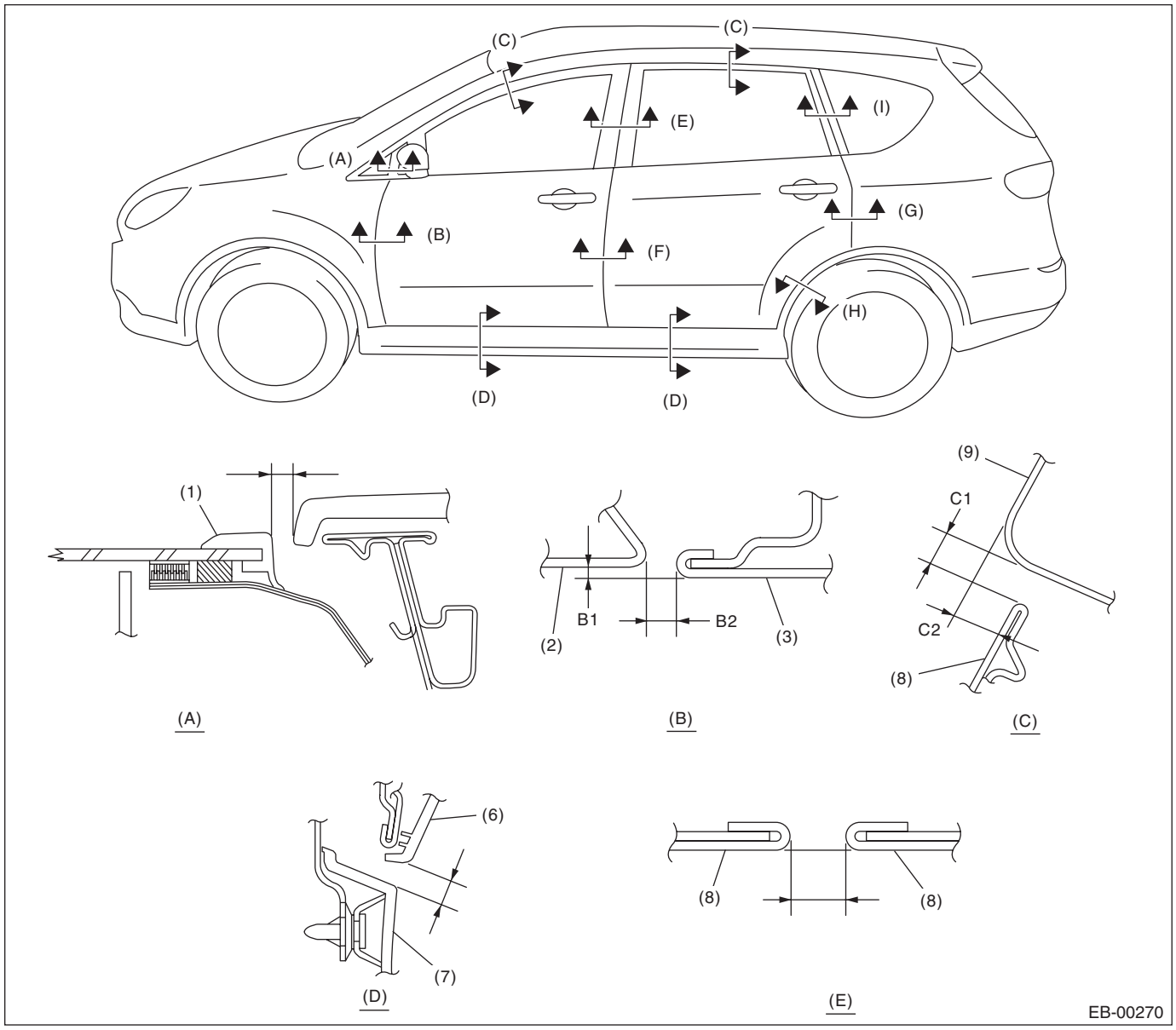
1. FRONT

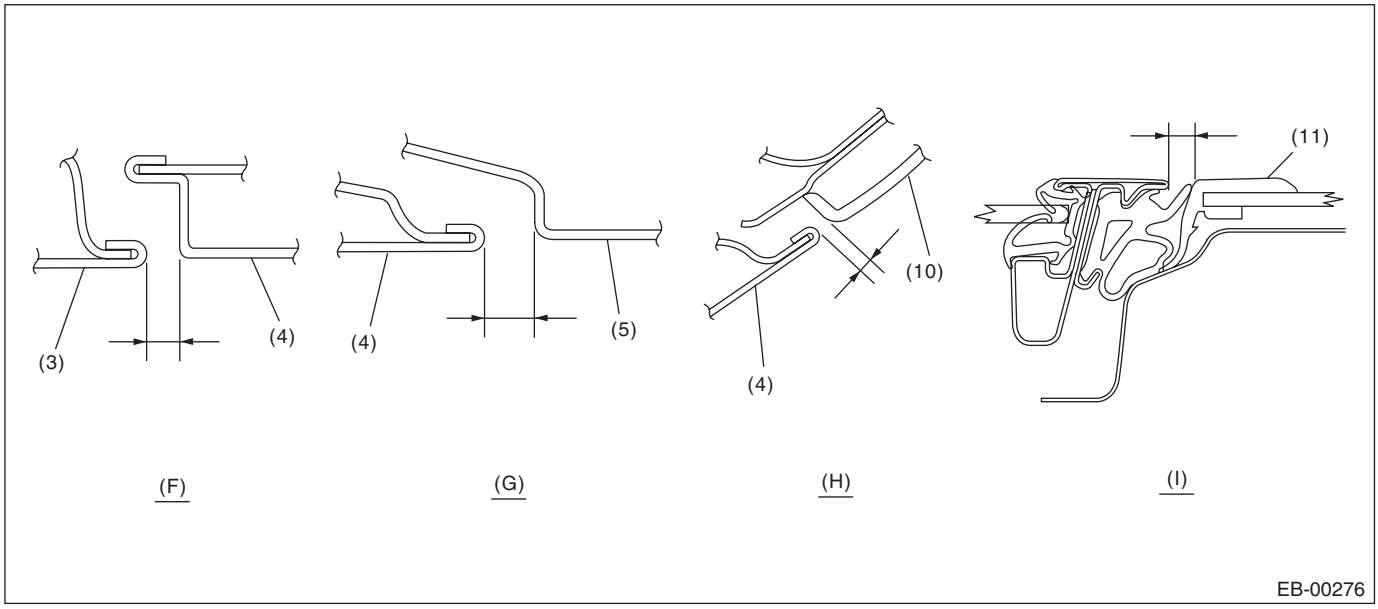


(1) Front bumper
(2) Front hood panel
(3) Headlight
(4) Front fender panel
(5) Front pillar

Section	Part	Specification
(A)	Front hood panel to Front bumper	4.9±1.0 mm (0.19±0.04 in)
(B)	Front hood panel to Headlight	3.5±1.0 mm (0.14±0.04 in)
(C)	Headlight to Front bumper	3.0±1.0 mm (0.12±0.04 in)
(D)	Headlight to Front fender panel	1.5±0.7 mm (0.06±0.03 in)
(E)	Front bumper to Front fender panel	E1: 0.7±0.5 mm (0.03±0.02 in) E2: 0.3 — 0.4 mm (0.012 — 0.016 in)
(F)	Front fender panel to Front pillar	2.0±1.0 mm (0.08±0.04 in)
(G)	Front hood panel to Front bumper	3.5±1.0 mm (0.14±0.04 in)

2. SIDE

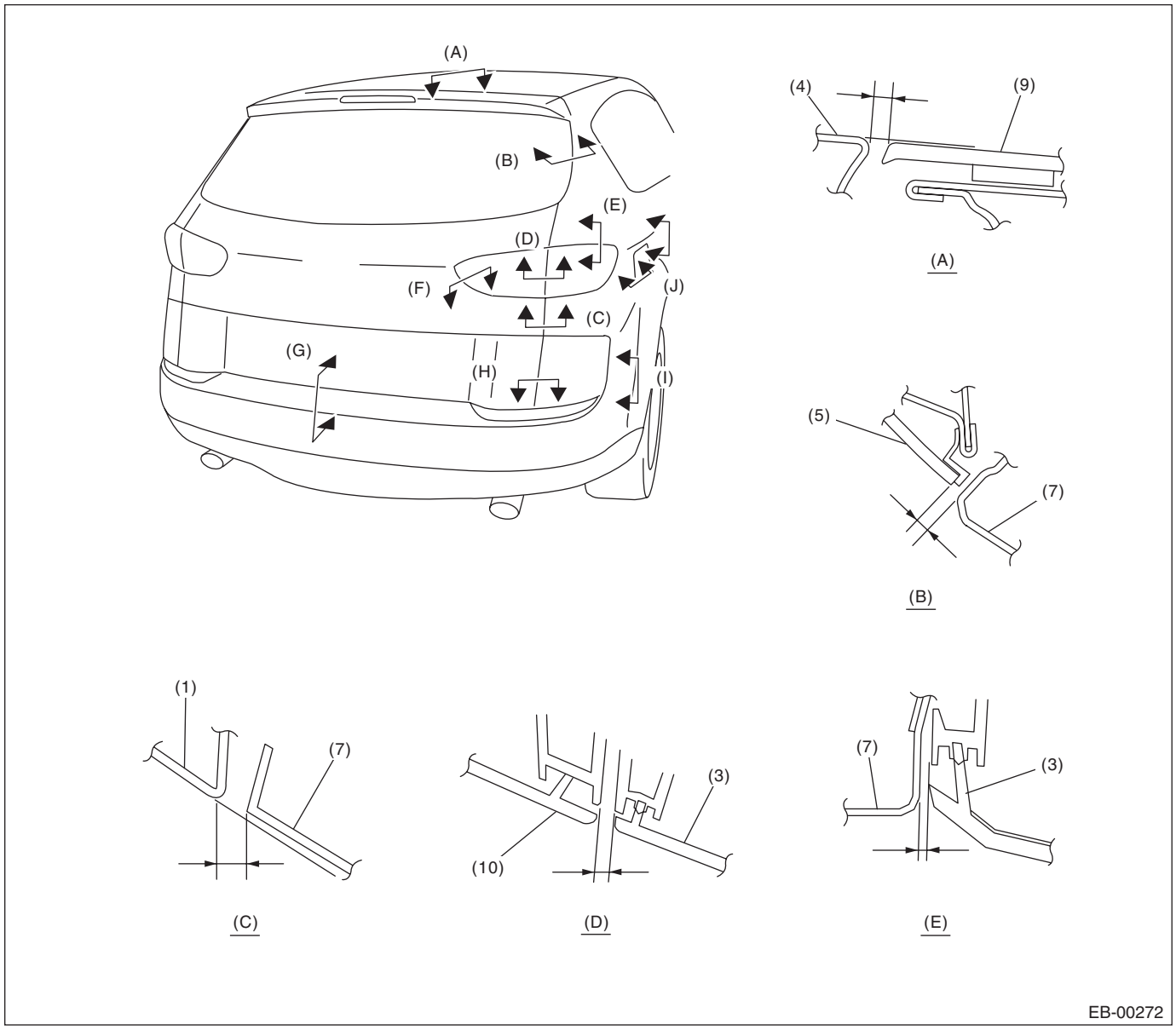


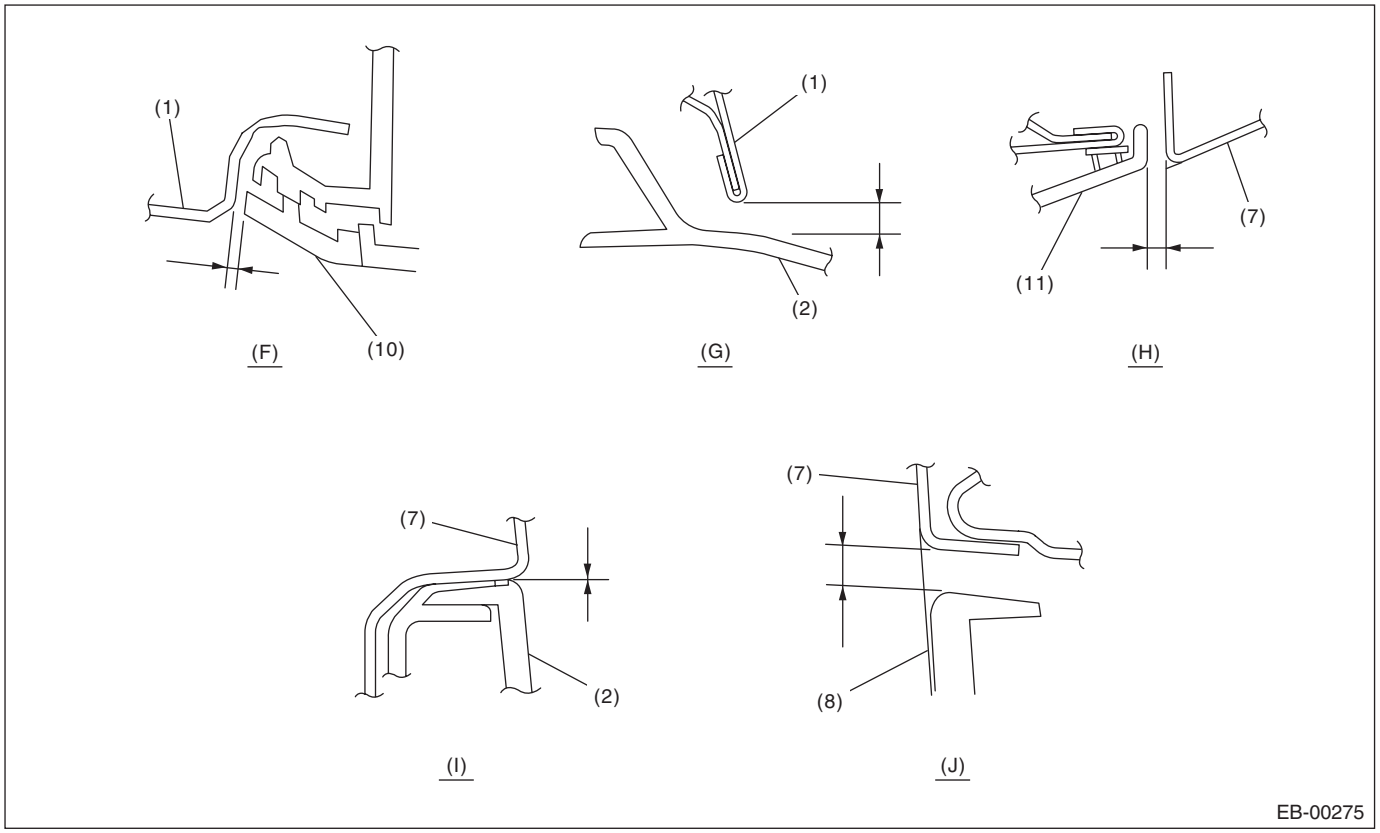


(1) Front quarter glass
(2) Front fender panel
(3) Front door panel
(4) Rear door panel
(5) Rear quarter panel
(6) Door garnish
(7) Side sill garnish
(8) Door sash
(9) Roof panel
(10) Rear quarter garnish
(11) Rear quarter glass

Section	Part	Specification
(A)	Front quarter glass and the peripheral area	5.0±1.5 mm (0.20±0.06 in)
(B)	Front fender panel to Front door panel	B1: 0 — 1.0 mm (0 — 0.04 in) B2: 4.0±1.0 mm (0.16±0.04 in)
(C)	Door sash to Roof panel	C1: 5.0±1.0 mm (0.20±0.04 in) C2: 4.0±1.0 mm (0.16±0.04 in)
(D)	Door garnish to Side sill garnish	8.0±1.5 mm (0.31±0.06 in)
(E)	Front door sash to Rear door sash	5.6±1.0 mm (0.22±0.04 in)
(F)	Front door panel to Rear door panel	4.6±1.0 mm (0.18±0.04 in)
(G)	Rear door panel to Rear quarter panel	4.0±1.0 mm (0.16±0.04 in)
(H)	Rear quarter garnish to Rear door panel	4.0±1.0 mm (0.16±0.04 in)
(I)	Between rear door sash to Rear quarter glass	5.0±1.5 mm (0.20±0.06 in)

3. REAR



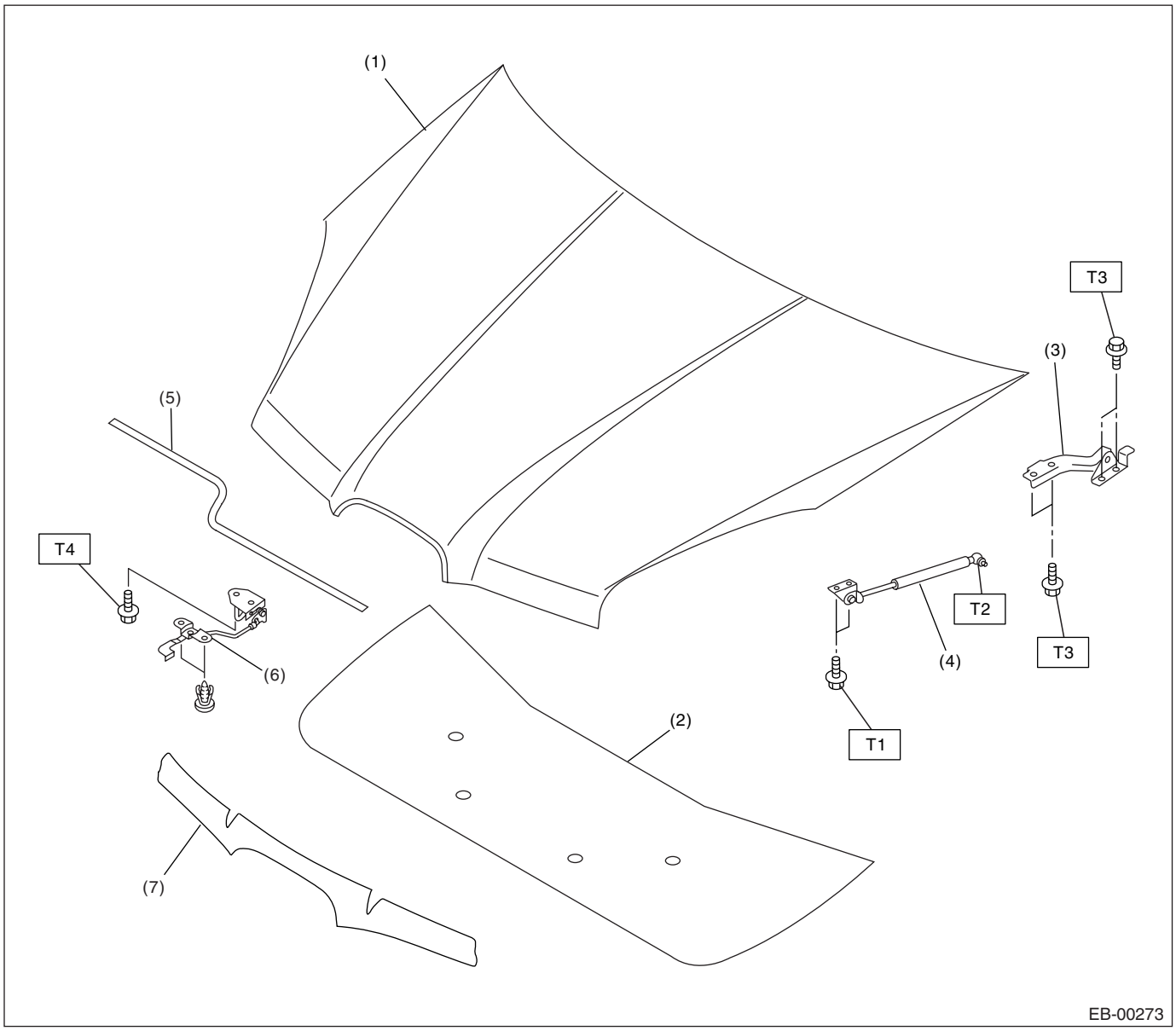


(1) Rear gate panel
(2) Rear bumper
(3) Rear combination light
(4) Roof panel
(5) Rear gate glass
(6) Door quarter glass
(7) Rear quarter panel
(8) Fuel filler flap lid
(9) Roof spoiler
(10) Rear finisher light
(11) Rear gate garnish

Section	Part	Specification
(A)	Roof panel to Roof spoiler	5.4±1.0 mm (0.21±0.04 in)
(B)	Rear gate glass to Rear quarter panel	5.0±1.0 mm (0.20±0.04 in)
(C)	Rear gate panel to Rear quarter panel	4.0±1. 0mm (0.16±0.04 in)
(D)	Rear finisher light to Rear combination light	4.0±1.0 mm (0.16±0.04 in)
(E)	Rear quarter panel to Rear combination light	1.5±0.7 mm (0.06±0.03 in)
(F)	Rear finisher light to Rear gate light	1.5±0.7 mm (0.06±0.03 in)
(G)	Rear gate panel to Rear bumper	7.0±1.5 mm (0.28±0.06 in)
(H)	Rear quarter panel to Rear gate garnish	4.0±1.0 mm (0.16±0.04 in)
(I)	Rear quarter panel to Rear bumper	0.3 — 0.4 mm (0.012 — 0.016 in)
(J)	Area around the Fuel filler flap lid to Quarter panel	3.5±0.5 mm (0.14±0.02 in)

B: COMPONENT

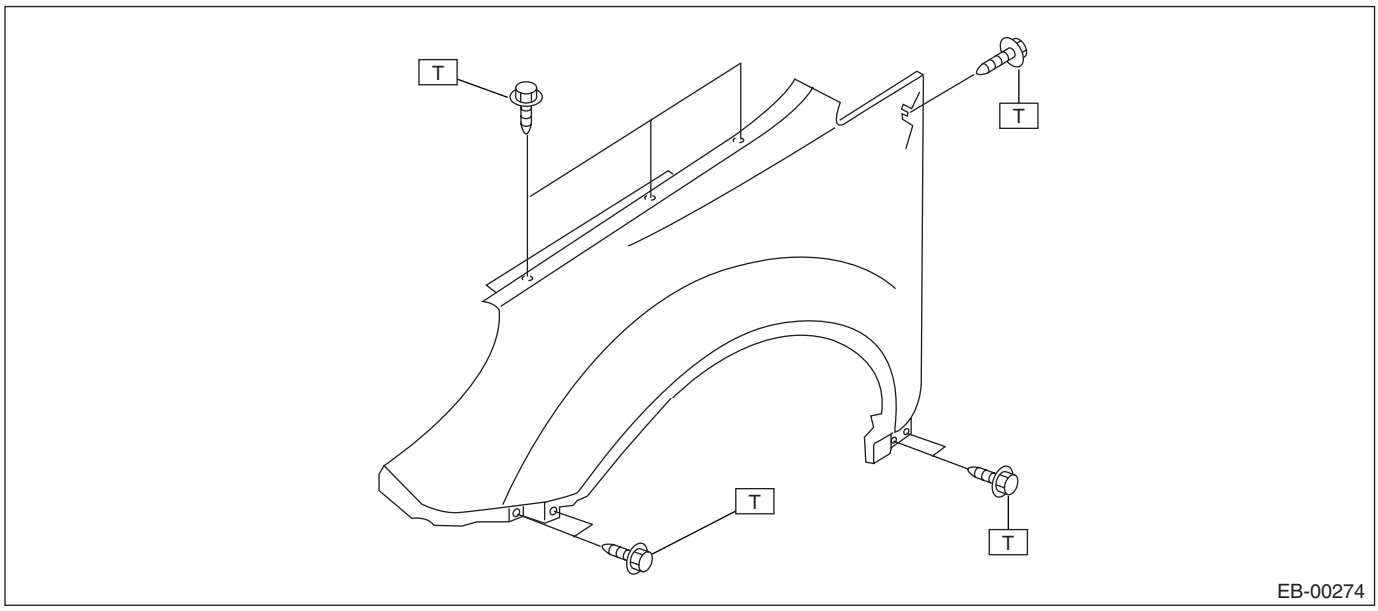
1. FRONT HOOD



(1)	Front hood panel	(6)	Front hood release handle ASSY
(2)	Front hood insulator	(7)	Front grille weatherstrip
(3)	Front hood hinge		
(4)	Front hood damper		
(5)	Front hood weather strip		

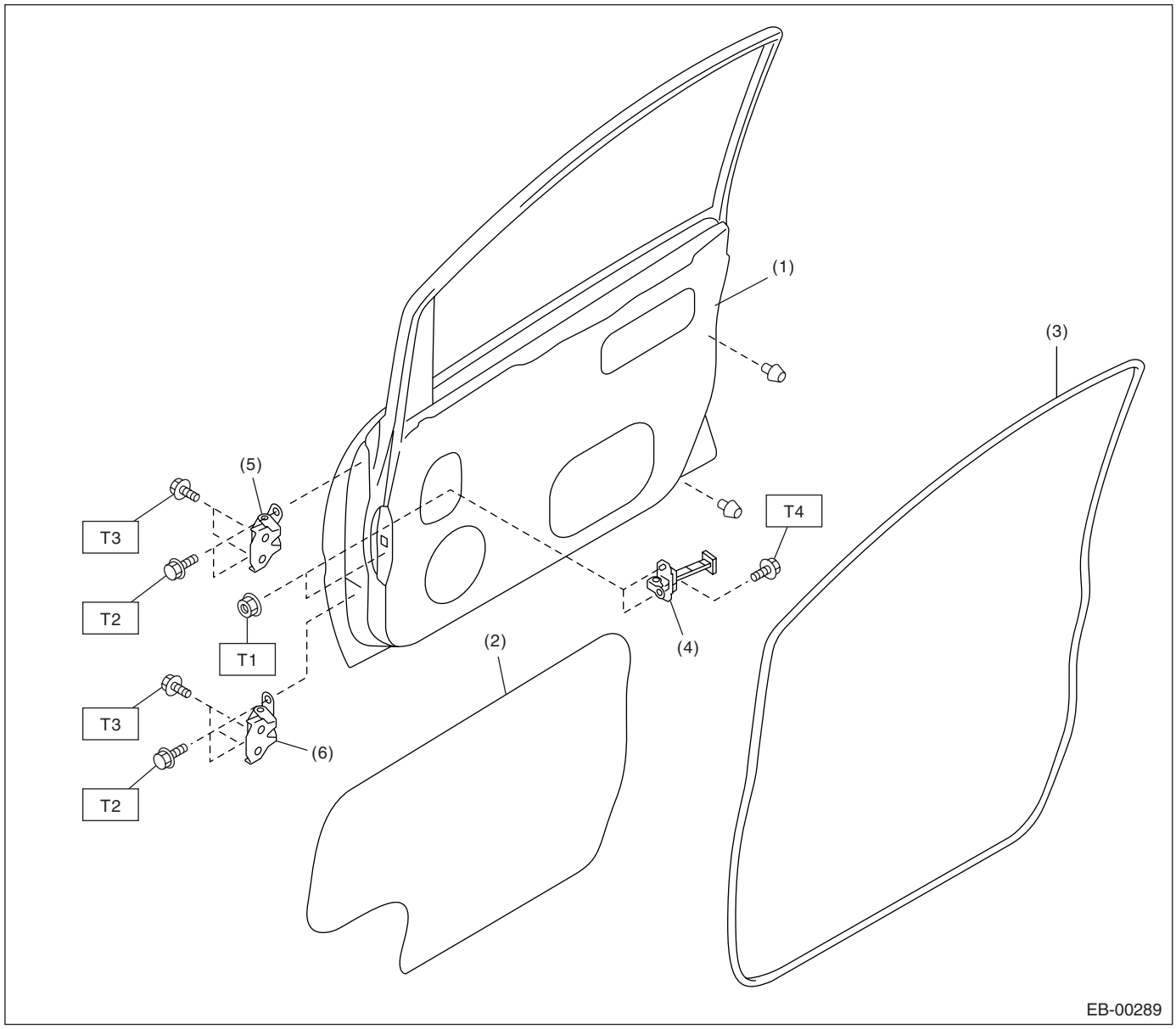
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 20 (2.04, 14.5)
T3: 24.5 (2.5, 18.1)
T4: 33 (3.4, 24.5)

2. FRONT FENDER PANEL



Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.5)

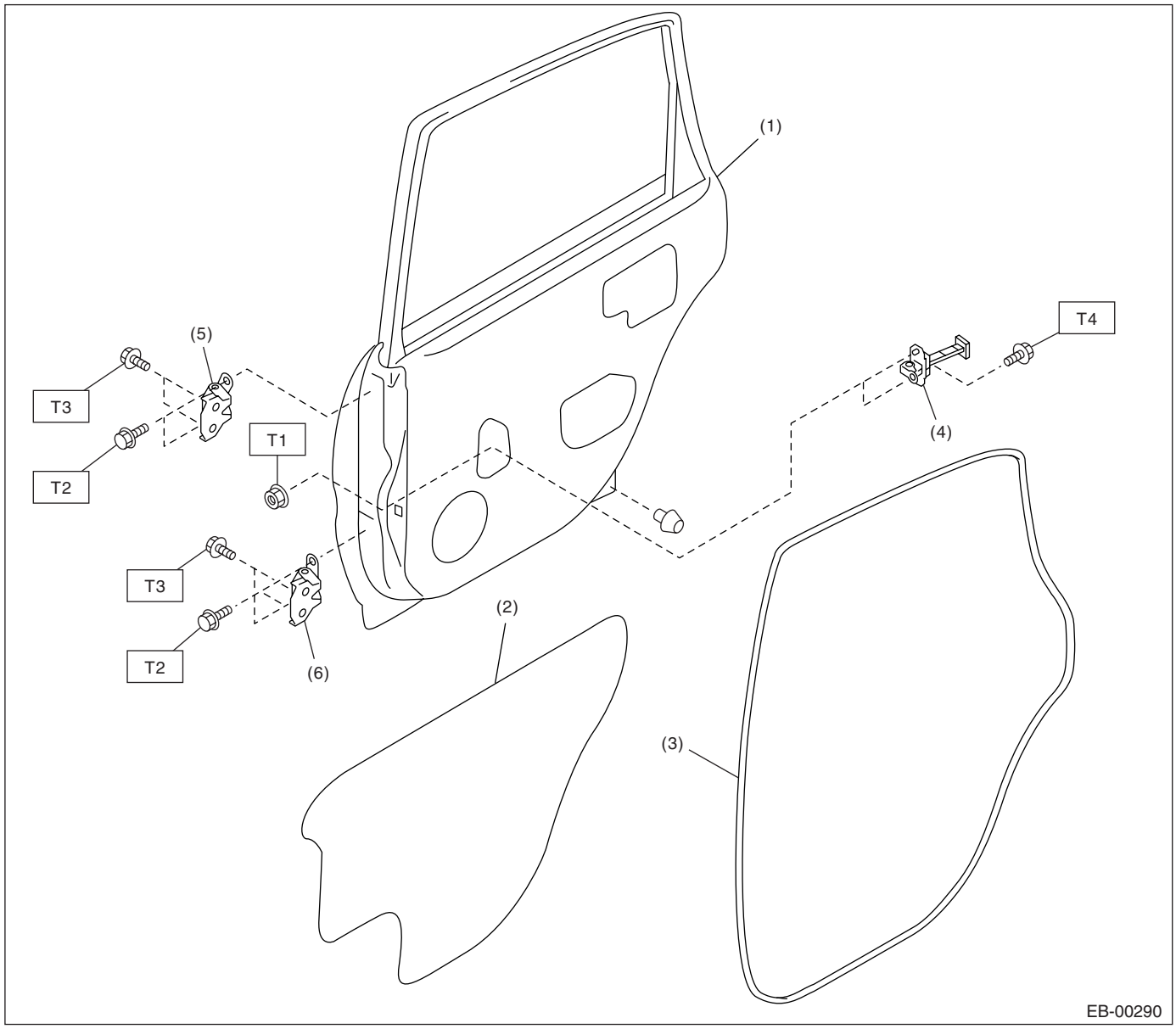
3. FRONT DOOR PANEL



(1) Front door panel
(2) Sealing cover
(3) Front door weather strip
(4) Checker
(5) Upper hinge
(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)

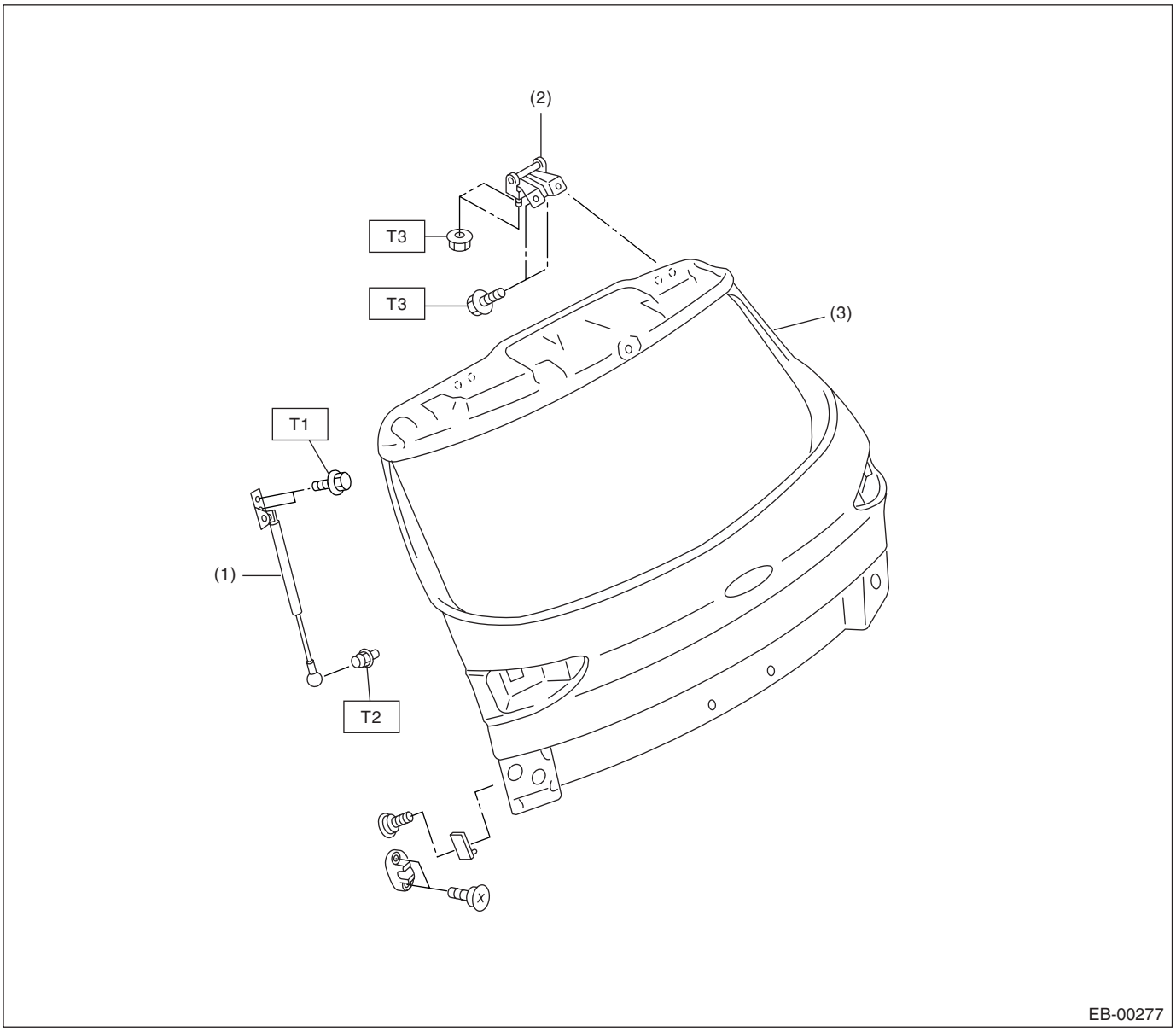
4. REAR DOOR PANEL



(1) Rear door panel
(2) Sealing cover
(3) Rear door weather strip
(4) Checker
(5) Upper hinge
(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)

5. REAR GATE PANEL



(1) Rear gate damper stay
(2) Hinge
(3) Rear gate panel

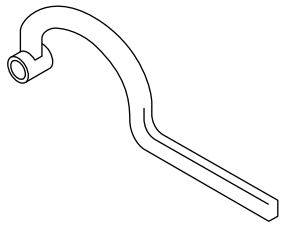
Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.02, 7.2)
T2: 20 (2.04, 14.5)
T3: 25 (2.6, 18.4)

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

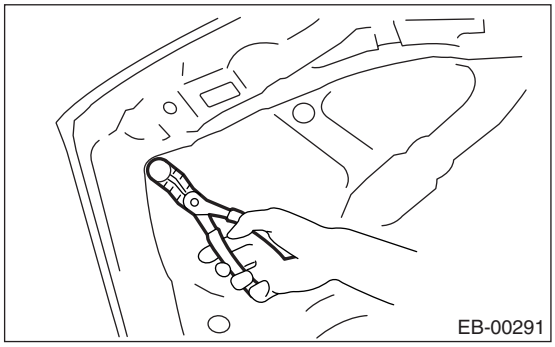
TOOL NAME	REMARKS
Support jack	Used for supporting door panel.
Clip remover	Used for removing various types of clips

2. Front Hood

A: REMOVAL

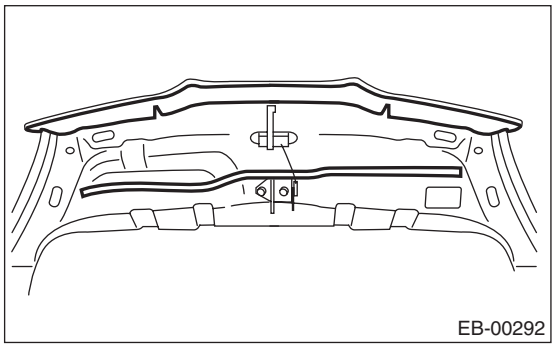
1. FRONT HOOD INSULATOR

1) Release the clips to remove the front hood insulator.

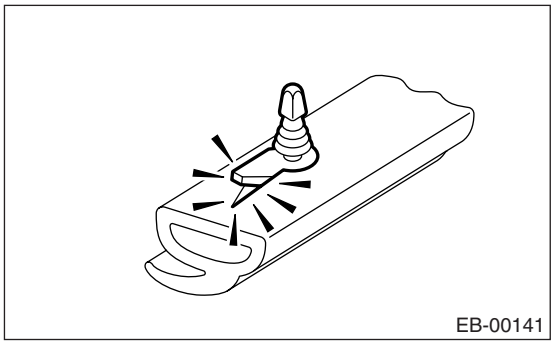


2. FRONT HOOD WEATHER STRIP

1) Remove the weather strip.

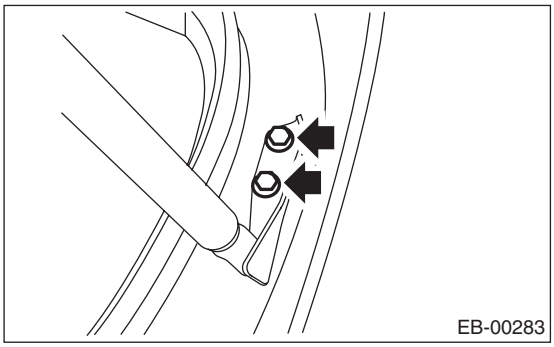


NOTE:
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use clip remover to remove.

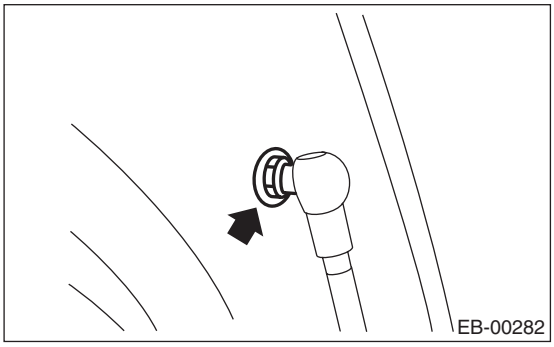


3. FRONT HOOD DAMPER

1) Remove the mounting bolts, and remove the damper stay.

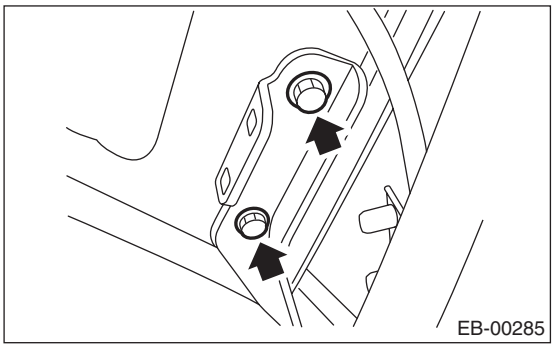


2) Remove the mounting bolt of front hood damper stay.

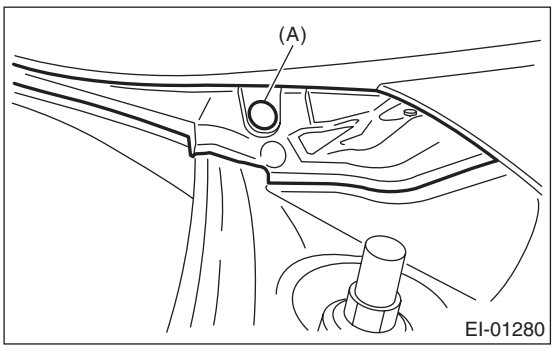


4. FRONT HOOD HINGE

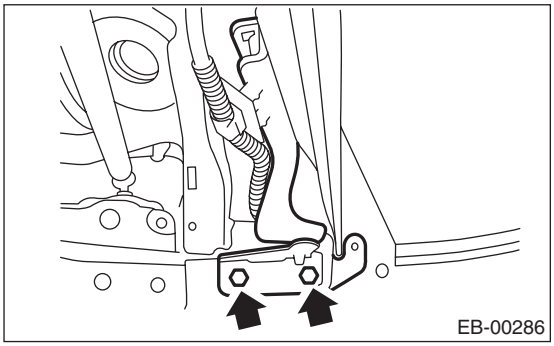
1) Remove the front hood damper.
2) Remove the bolt, and remove the front hood panel.



3) Remove the clip, and remove the cowl side panel front.



4) Remove the front fender. <Ref. to EB-15, REMOVAL, Front Fender.>
5) Remove the bolts of front hood hinge.

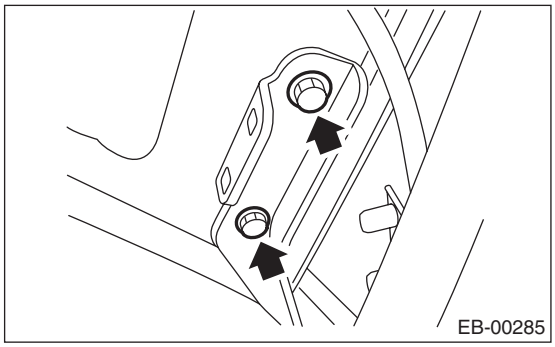


5. FRONT HOOD STRIKER

Refer to the front hood lock assembly of SL section. <Ref. to SL-44, INSPECTION, Front Hood Lock Assembly.>

6. FRONT HOOD PANEL

1) Remove the front hood insulator.
2) Open the front hood to remove the window washer hose.
3) Remove the front hood weather strip.
4) Remove the hood lock assembly.
<Ref. to SL-44, REMOVAL, Front Hood Lock Assembly.>
5) Remove the window washer hose and nozzle. <Ref. to WW-17, 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

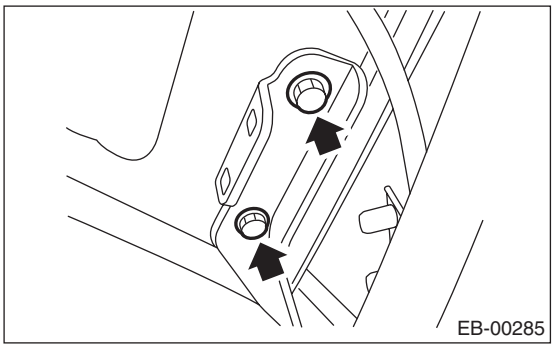
Install in the reverse order of removal.

NOTE:
Be careful not to catch the window washer hose in.

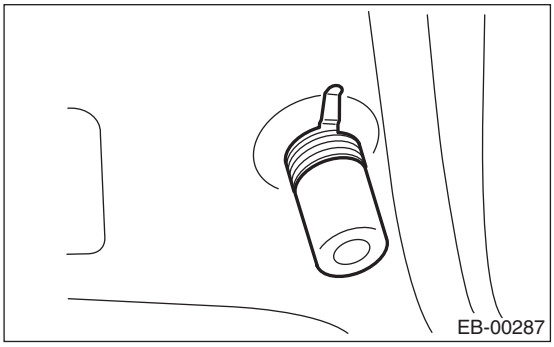
Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to EB-7, FRONT HOOD, COMPONENT, General Description.>

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-44, ADJUSTMENT, Front Hood Lock Assembly.>
4) Rotate the hood buffer to adjust lateral height.



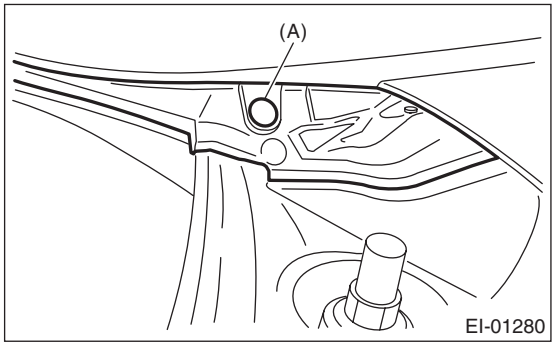
D: DISPOSAL

For the disposal procedures of front hood damper stay, refer to the disposal procedures of rear gate damper stay. <Ref. to EB-24, DISPOSAL, Rear Gate.>

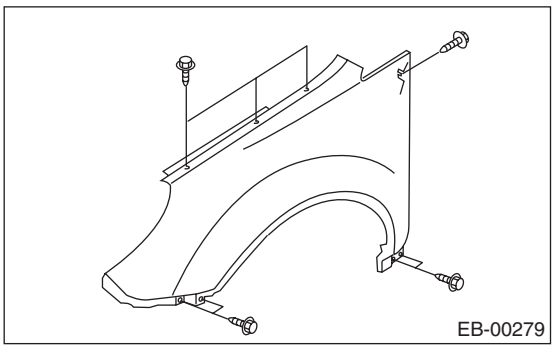
3. Front Fender

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the side sill guarnish. <Ref. to EI-32, REMOVAL, Side Garnish.>
3) Remove the front bumper. <Ref. to EI-21, REMOVAL, Front Bumper.>
4) Remove the headlight assembly. <Ref. to LI-11, REMOVAL, Headlight Assembly.>
5) Remove the mud guard. <Ref. to EI-19, REMOVAL, Mud Guard.>
6) 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.>

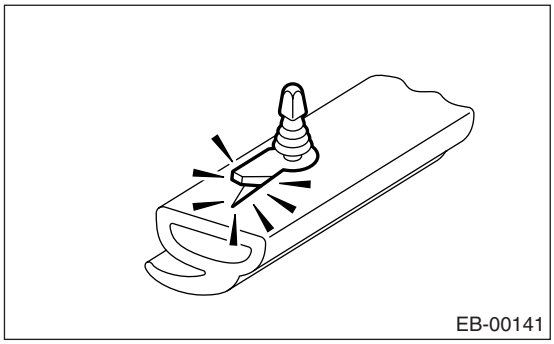
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.5 ft-lb)

4. Front Door

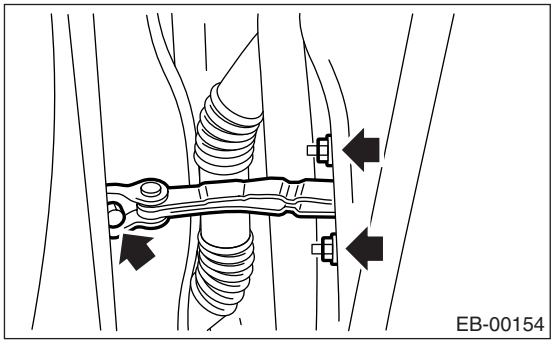
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-35, REMOVAL, Door Trim.>
3) Remove the outer mirror assembly. <Ref. to GW-13, REMOVAL, Outer Mirror Assembly.>
4) Remove the front door speaker. <Ref. to ET-15, REMOVAL, Front Speaker.>
5) Remove the sealing cover. <Ref. to EB-18, REMOVAL, Front Sealing Cover.>
6) Remove the front door glass. <Ref. to GW-9, REMOVAL, Front Door Glass.>
7) Remove the door sash, and remove the front door regulator and motor assemblies. <Ref. to GW-10, REMOVAL, Front Regulator and Motor Assembly.>
8) Remove the front inner remote. <Ref. to SL-34, REMOVAL, Front Inner Remote.>
9) Remove the front door latch assembly. <Ref. to SL-36, REMOVAL, Front Door Latch and Door Lock Actuator Assembly.>
10) Remove the front outer handle. <Ref. to SL-35, REMOVAL, Front Outer Handle.>
11) Remove the front door weather strip.

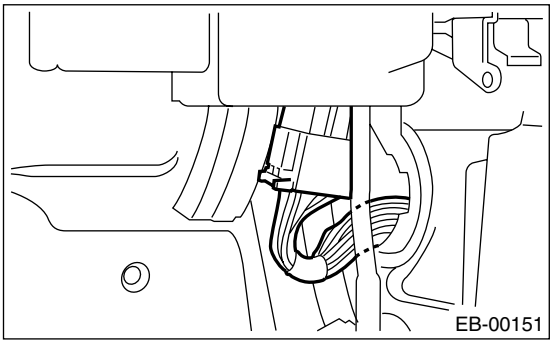
NOTE:
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use clip remover to remove.


EB-00141

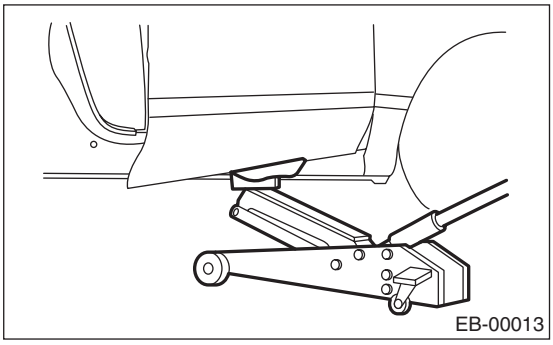
12) Remove the bolts and nuts to remove the door checker.


EB-00154

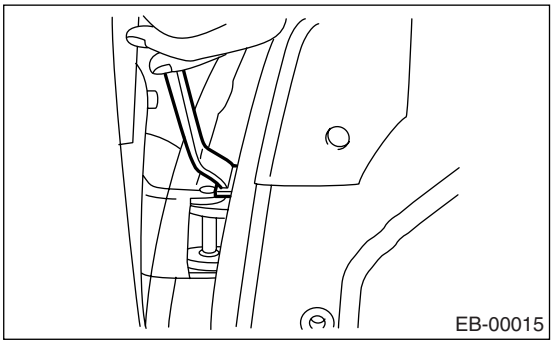
13) Remove the instrument panel lower cover or glove box lower cover. <Ref. to EI-36, REMOVAL, Instrument Panel Lower Cover.> or <Ref. to EI-37, REMOVAL, Glove Box.>
14) Disconnect the connector of door harness from body harness.


EB-00151

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.


EB-00013

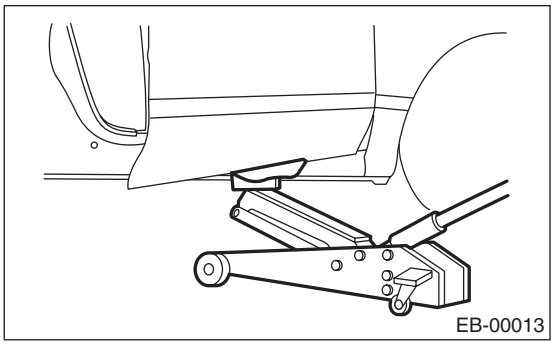
16) Remove the door-side bolts for upper and lower hinges to remove front door panel.


EB-00015

17) Remove the door hinge from vehicle.

B: INSTALLATION

1) Put a wooden block on jack and place the front door on that.

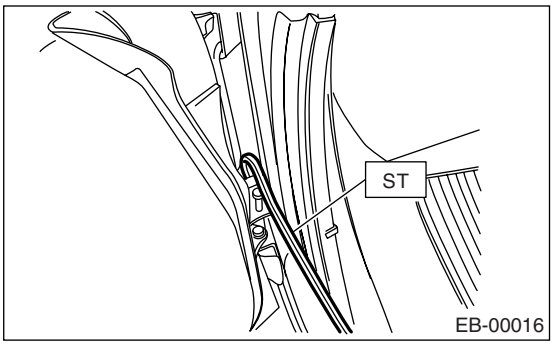


2) Apply grease to the sliding area of door hinges, and install the door hinge to vehicle.
3) Install the front door to upper hinge and lower hinge adjusting by jack.
4) Tighten bolt of door checker.
5) Connect door harness connector, and install the instrument panel lower cover.
6) Install the front pillar lower trim.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to EB-9, FRONT DOOR PANEL, COMPONENT, General Description.>

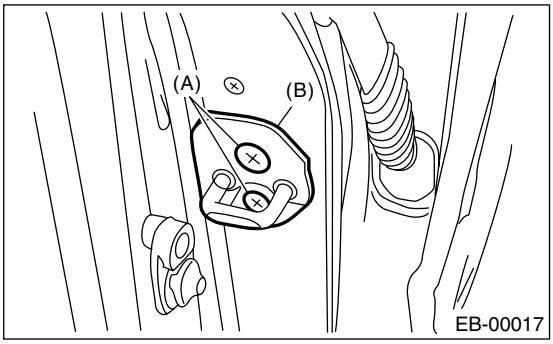
C: ADJUSTMENT

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.

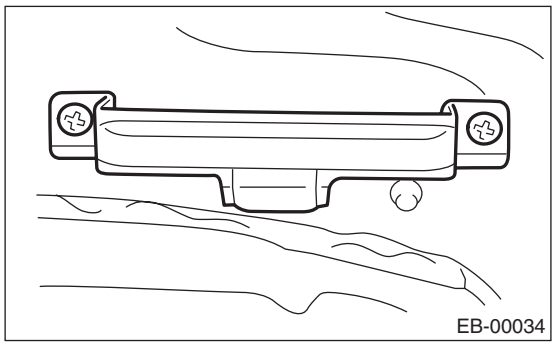
CAUTION:
Do not use an impact wrench. Welding area on the striker nut plate is easily broken.



5. Front Sealing Cover

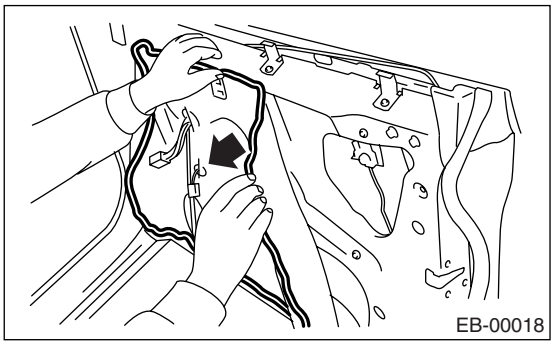
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-35, 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 one.



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

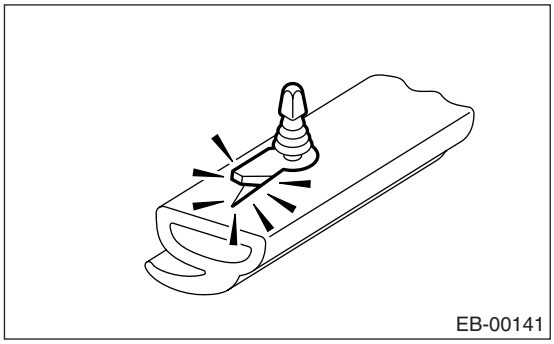
If the sealing cover gets damaged, replace it with a new one.

6. Rear Door

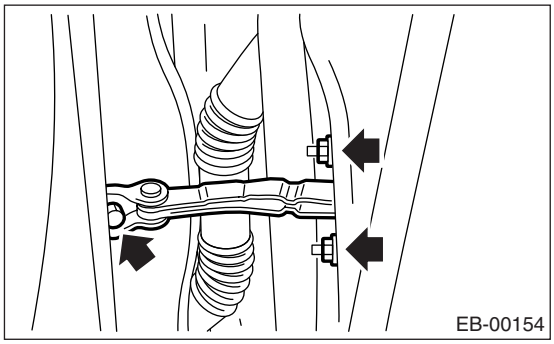
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear door trim. <Ref. to EI-35, REMOVAL, Door Trim.>
3) Remove the rear speaker. <Ref. to ET-17, REMOVAL, Rear Speaker.>
4) Remove the sealing cover. <Ref. to EB-21, REMOVAL, Rear Sealing Cover.>
5) Remove the rear door glass. <Ref. to GW-16, REMOVAL, Rear Door Glass.>
6) Remove the door sash and rear door regulator and motor assemblies. <Ref. to GW-17, REMOVAL, Rear Regulator and Motor Assembly.>
7) Remove the rear inner remote. <Ref. to SL-38, REMOVAL, Rear Inner Remote.>
8) Remove the rear door latch. <Ref. to SL-40, REMOVAL, Rear Door Latch and Door Lock Actuator Assembly.>
9) Remove the rear outer handle. <Ref. to SL-39, REMOVAL, Rear Outer Handle.>
10) Remove the rear door inner weather strip.

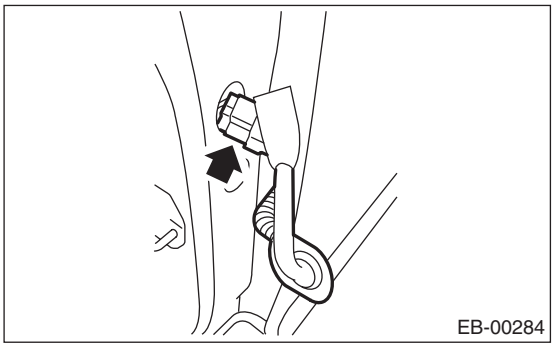
NOTE:
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use clip remover to remove.


EB-00141

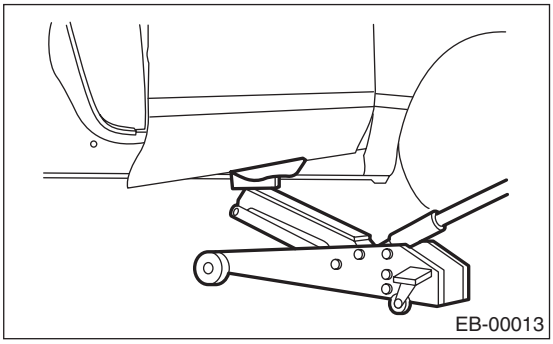
11) Remove the bolts and nuts to remove the door checker.


EB-00154

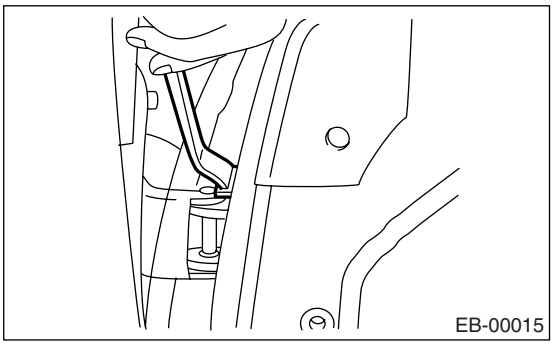
12) Pull the door harness connector inside the center pillar, then disconnect the connector.


EB-00284

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.


EB-00013

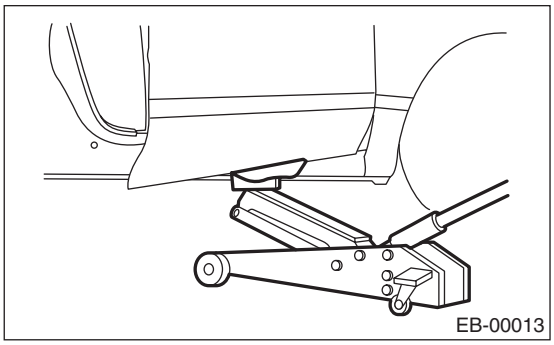
14) Remove the door-side bolts for upper and lower hinges to remove the rear door panel.


EB-00015

15) Remove the door hinge from vehicle.

B: INSTALLATION

1) Put a wooden block on jack and place the rear door on that.

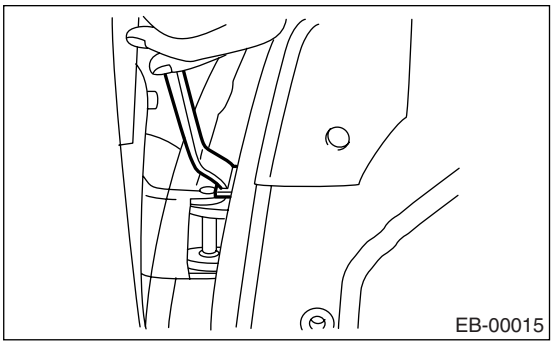


2) Apply grease to the moving part of door hinges.
3) Install the rear door to upper hinge and lower hinge adjusting by jack.
4) Tighten bolt of door checker.
5) Connect the door harness connector.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to EB-10, REAR DOOR PANEL, COMPONENT, General Description.>

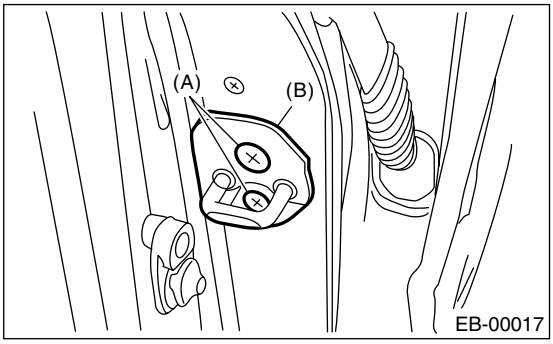
C: ADJUSTMENT

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: REMOVAL

Refer to the front sealing cover. <Ref. to EB-18, REMOVAL, Front Sealing Cover.>

B: INSTALLATION

Refer to the front sealing cover. <Ref. to EB-18, INSTALLATION, Front Sealing Cover.>

C: INSPECTION

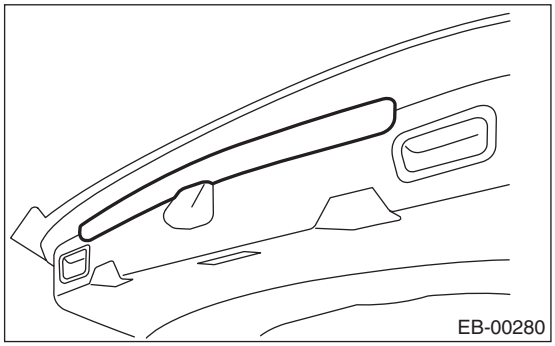
Refer to the front sealing cover. <Ref. to EB-18, INSPECTION, Front Sealing Cover.>

8. Rear Gate

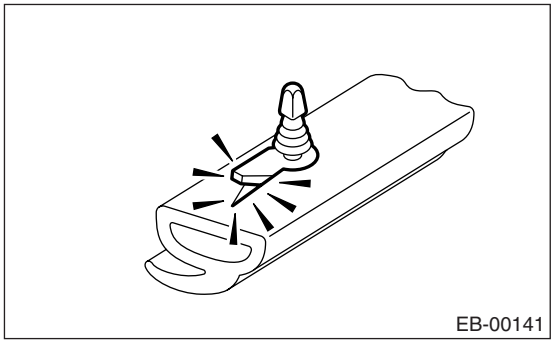
A: REMOVAL

1. REAR GATE PANEL

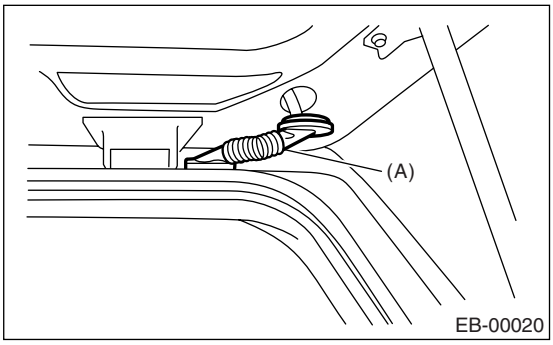
1) Remove the weather strip clip, and remove the rear gate panel weather strip.



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.

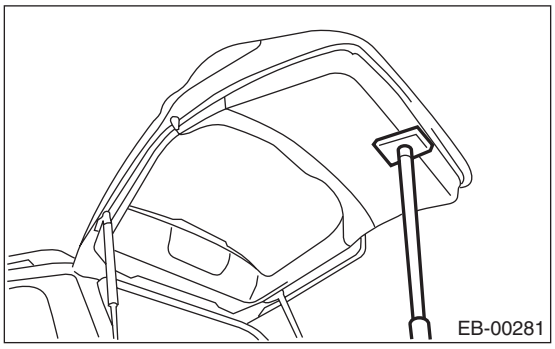


2) Remove the rear gate trim. <Ref. to EI-51, REMOVAL, Rear Gate Trim.>
3) Remove the rear gate garnish. <Ref. to EI-52, REMOVAL, Rear Gate Garnish.>
4) Remove the rear wiper arm. <Ref. to WW-18, REMOVAL, Rear Wiper Arm.>
5) Remove the rear wiper motor. <Ref. to WW-19, REMOVAL, Rear Wiper Motor.>
6) Remove the rear gate latch assembly. <Ref. to SL-43, REMOVAL, Rear Gate Latch Assembly.>
7) Detach the roof spoiler. <Ref. to EI-31, REMOVAL, Roof Spoiler.>
8) Remove the roof trim, and disconnect connector from the rear gate harness connector. <Ref. to EI-50, REMOVAL, Roof Trim.>
9) Disconnect the ground cable from battery.
10) Remove harness clip of each connector from the rear gate panel.
11) Remove the rubber duct (A) connection, and pull out the harness and washer hose from the rear gate.

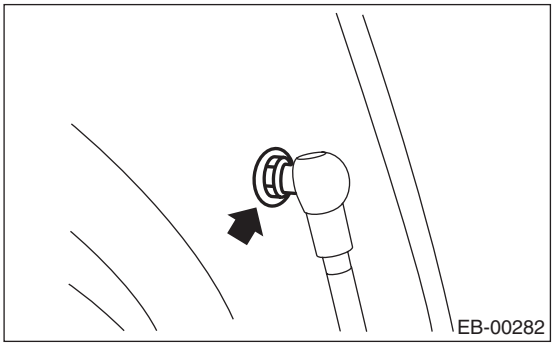


12) Before removing the rear gate damper stay, prevent the rear gate from closing using prop or the like.

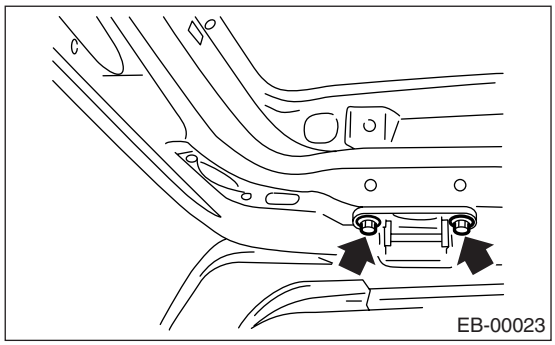
CAUTION:
If the prop comes off, operators may get injured and vehicle may get damaged. Make sure to support the rear gate with secure material to prevent injury or damage.



13) Remove the mounting bolt of rear gate damper stay.



14) Remove the rear gate hinge bolt, and remove the rear gate panel.


EB-00023

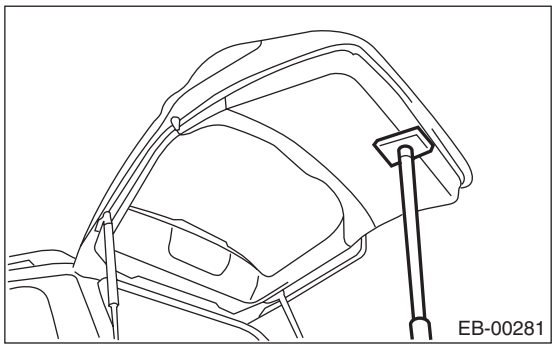
15) Remove the rear gate hinge from the vehicle.

2. REAR GATE DAMPER STAY

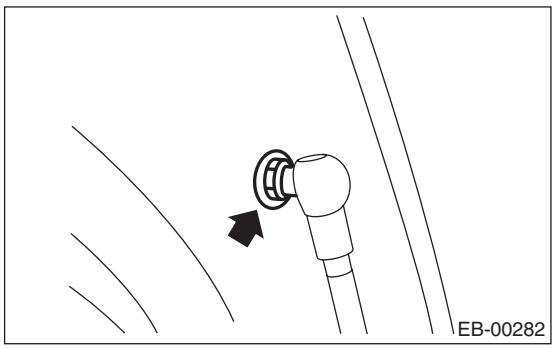
CAUTION:
- **Do not damage piston rods and oil seals.**
- **Never disassemble cylinders: They contain gas.**

1) Before removing the rear gate damper stay, prevent the rear gate from closing using prop or the like.

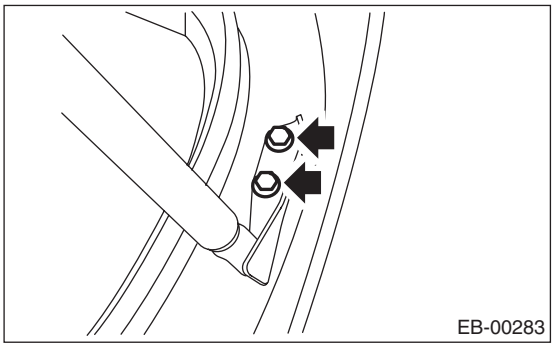
CAUTION:
If the prop comes off, operators may get injured and vehicle may get damaged. Make sure to support the rear gate with secure material to prevent injury or damage.


EB-00281

2) Remove the mounting bolt of rear gate damper stay.


EB-00282

3) Remove the mounting bolts, and remove the damper stay.


EB-00283

B: INSTALLATION

1. REAR GATE PANEL

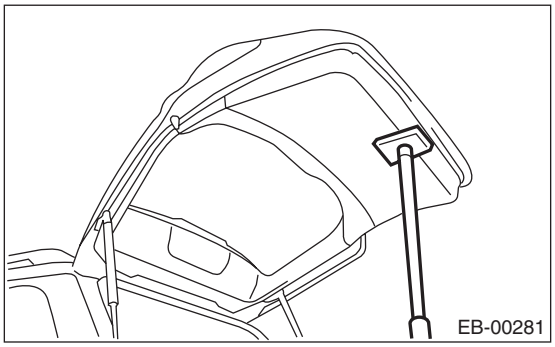
1) Install in the reverse order of removal.
2) Install with attention to make uniform clearance between rear gate panel and body. For the dimension of clearance, refer to “SPECIFICATION” in “General Description”. <Ref. to EB-2, SPECIFICATION, General Description.>

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.


EB-00281

2) Install in the reverse order of removal.

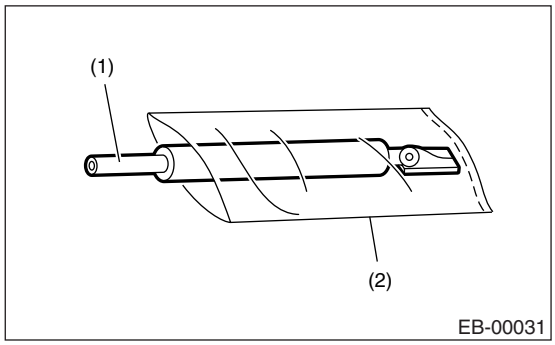
Tightening torque:
Refer to “COMPONENT” of “General Description”.
<Ref. to EB-11, REAR GATE PANEL, COMPONENT, General Description.>

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.

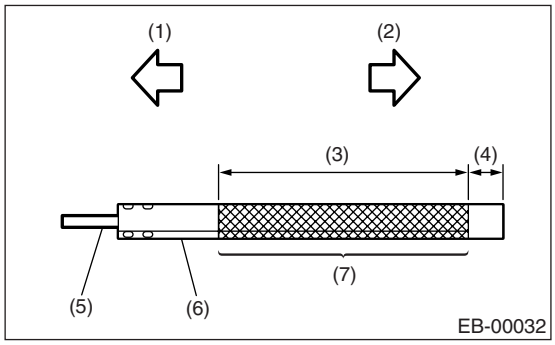
1) Cover with a vinyl sack as shown in the figure.



(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 stay completely.

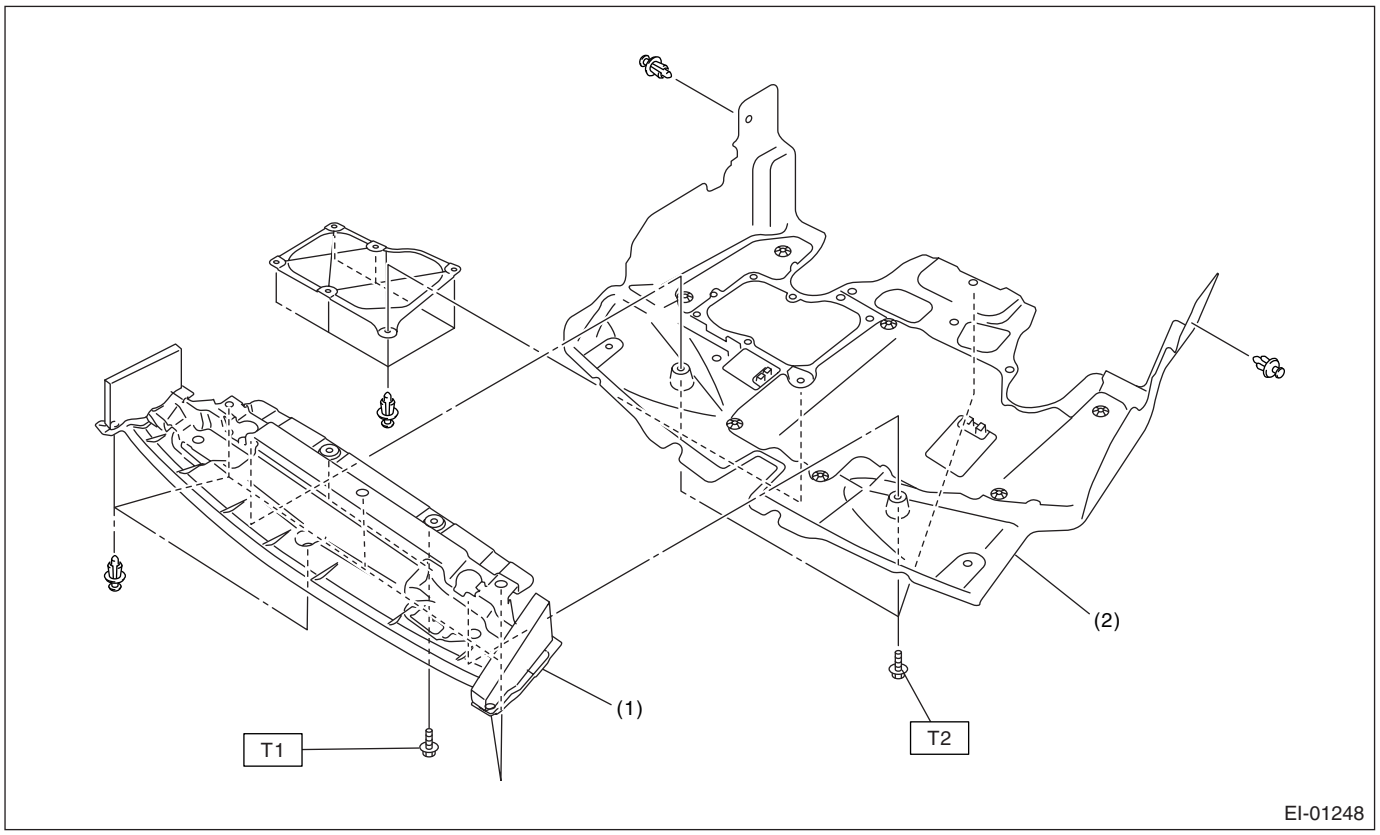


(1) Body side
(2) Door side
(3) 190 mm (7.48 in)
(4) 10 mm (0.39 in)
(5) Piston rod
(6) Cylinder
(7) Portion to be drilled

1. General Description

A: COMPONENT

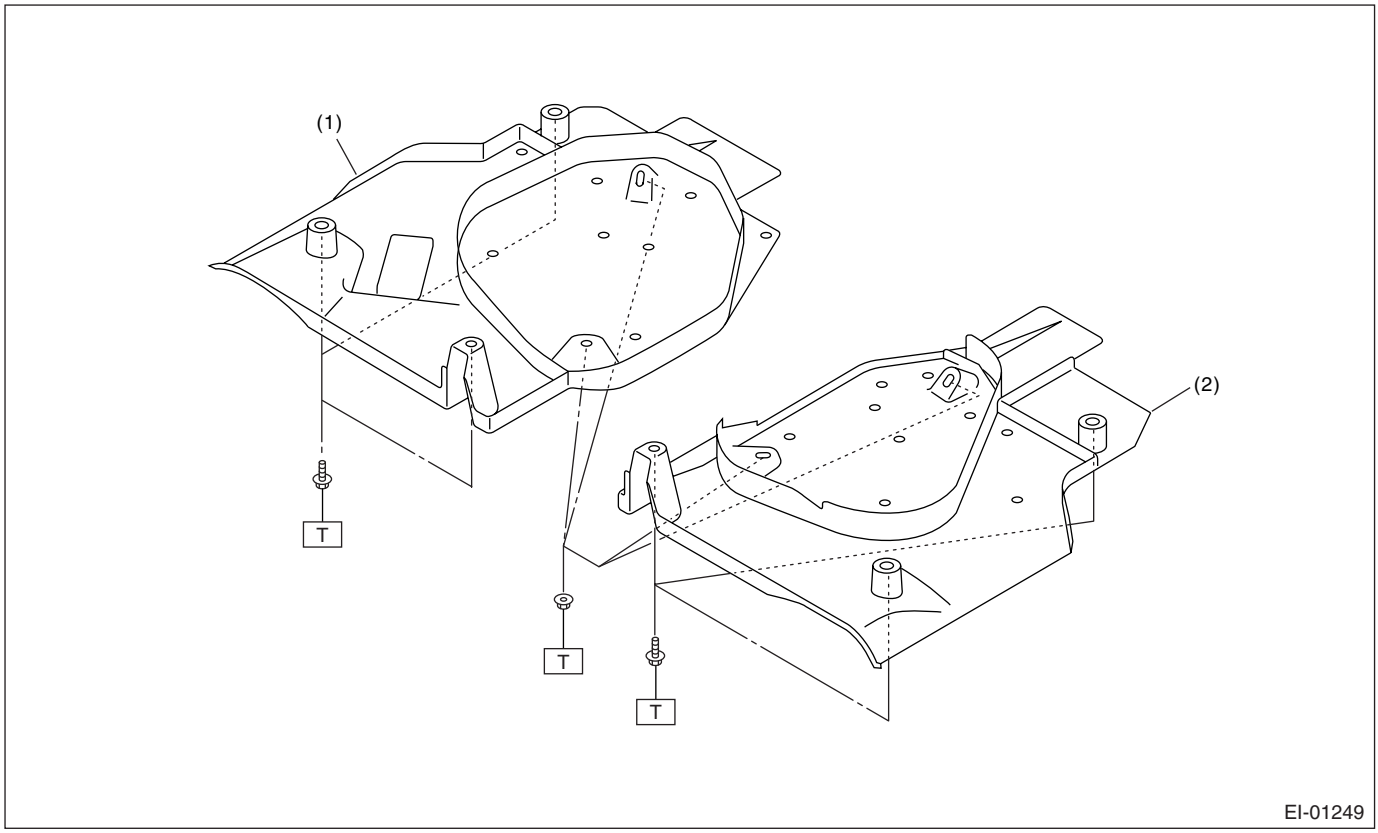
1. UNDER COVER



(1) Front lower cover
(2) Under cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.4)
T2: 17.5 (1.78, 12.7)

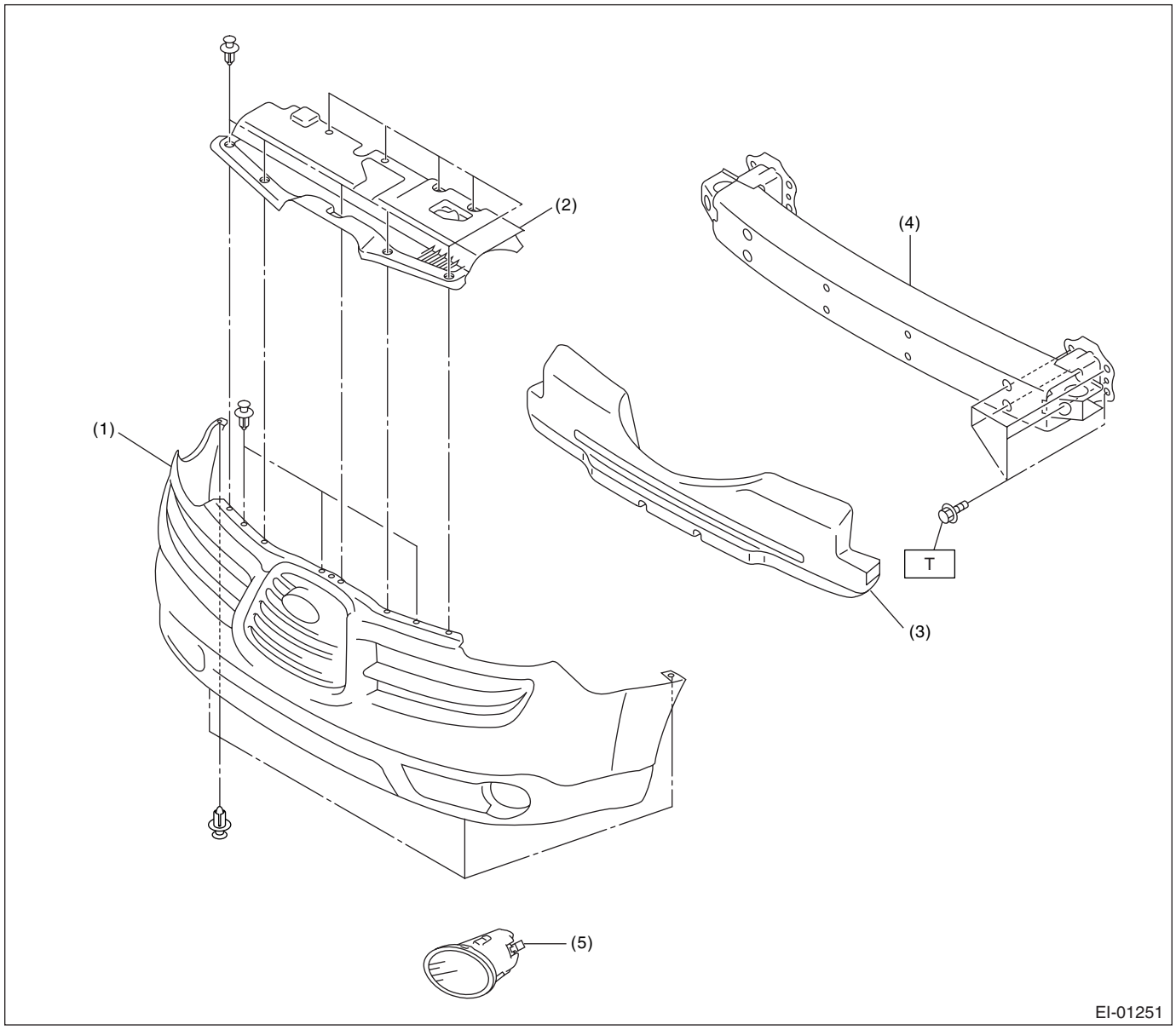
2. UNDER PROTECTOR



(1) Fuel tank protector RH
(2) Fuel tank protector LH

Tightening torque: N·m (kgf-m, ft-lb)
T: 17.5 (1.78, 12.9)

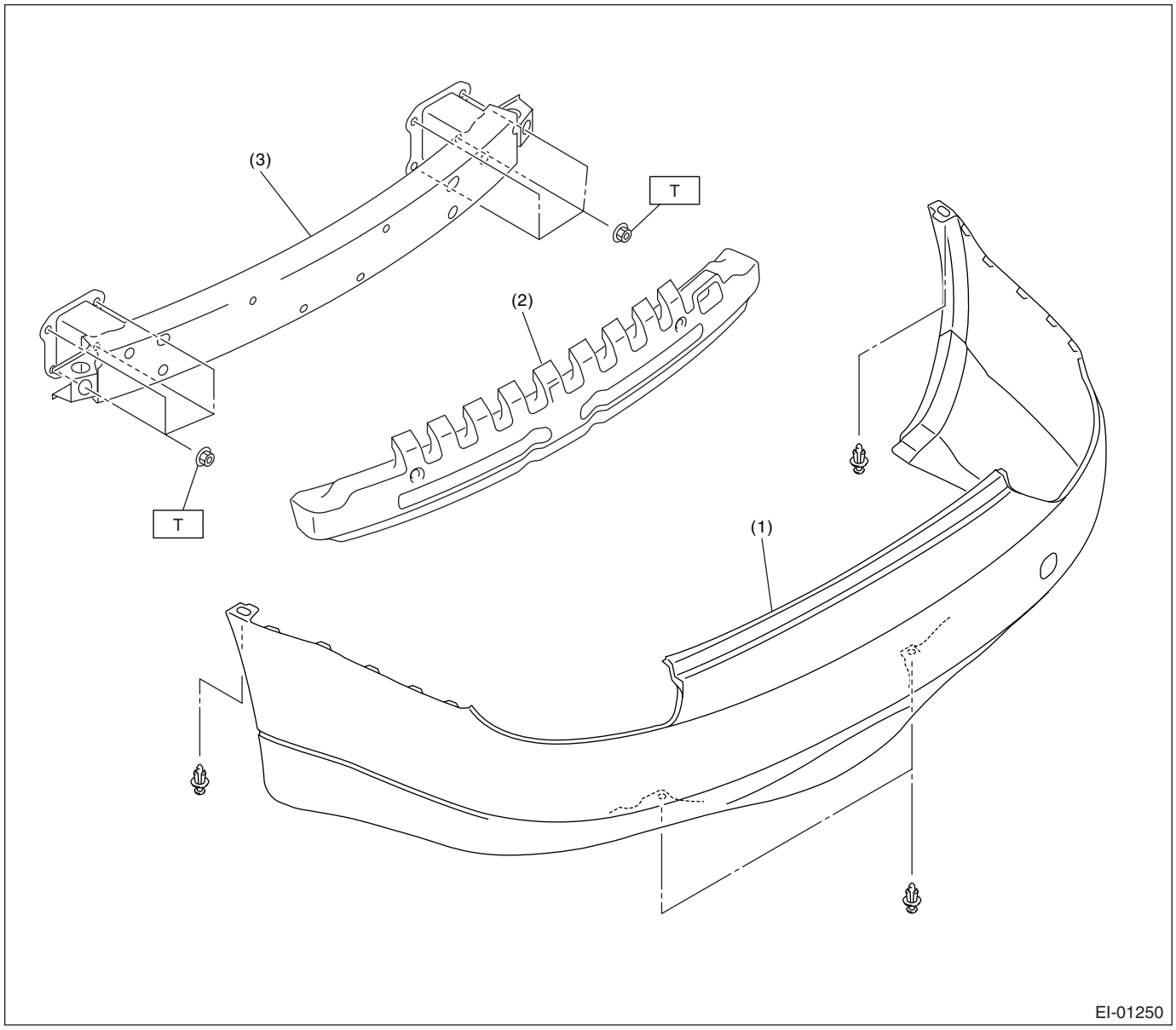
3. FRONT BUMPER



(1) Bumper face
(2) Front upper cover
(3) Energy absorber foam
(4) Bumper beam reinforcement
(5) Fog light cover

Tightening torque: N·m (kgf-m, ft-lb)
T: 33 (3.4, 24)

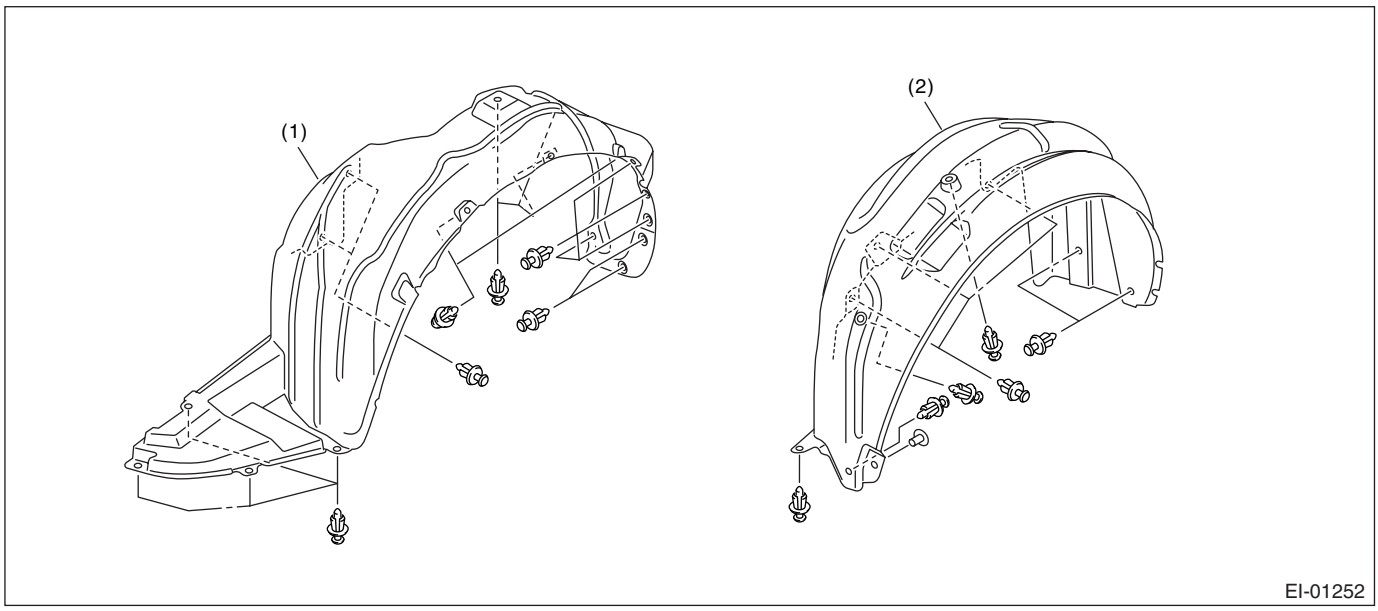
4. REAR BUMPER



(1) Bumper face
(2) Energy absorber foam
(3) Bumper beam reinforcement

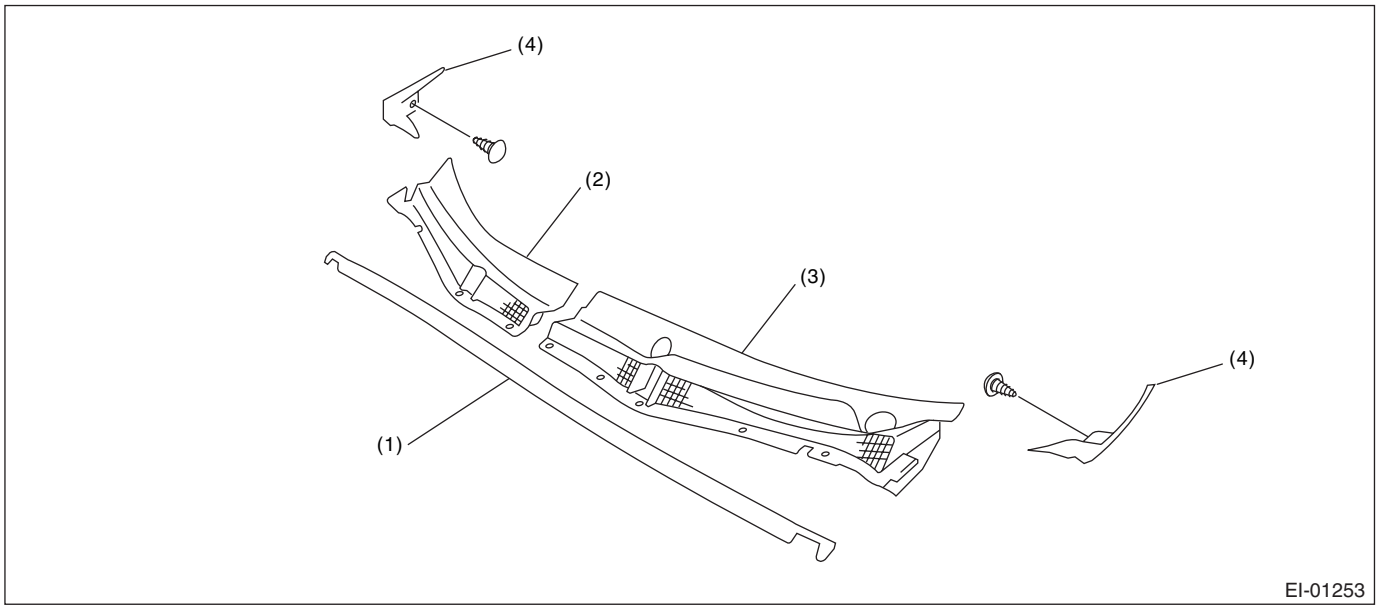
Tightening torque: N·m (kgf-m, ft-lb)
T: 33 (3.4, 24)

5. MUD GUARD



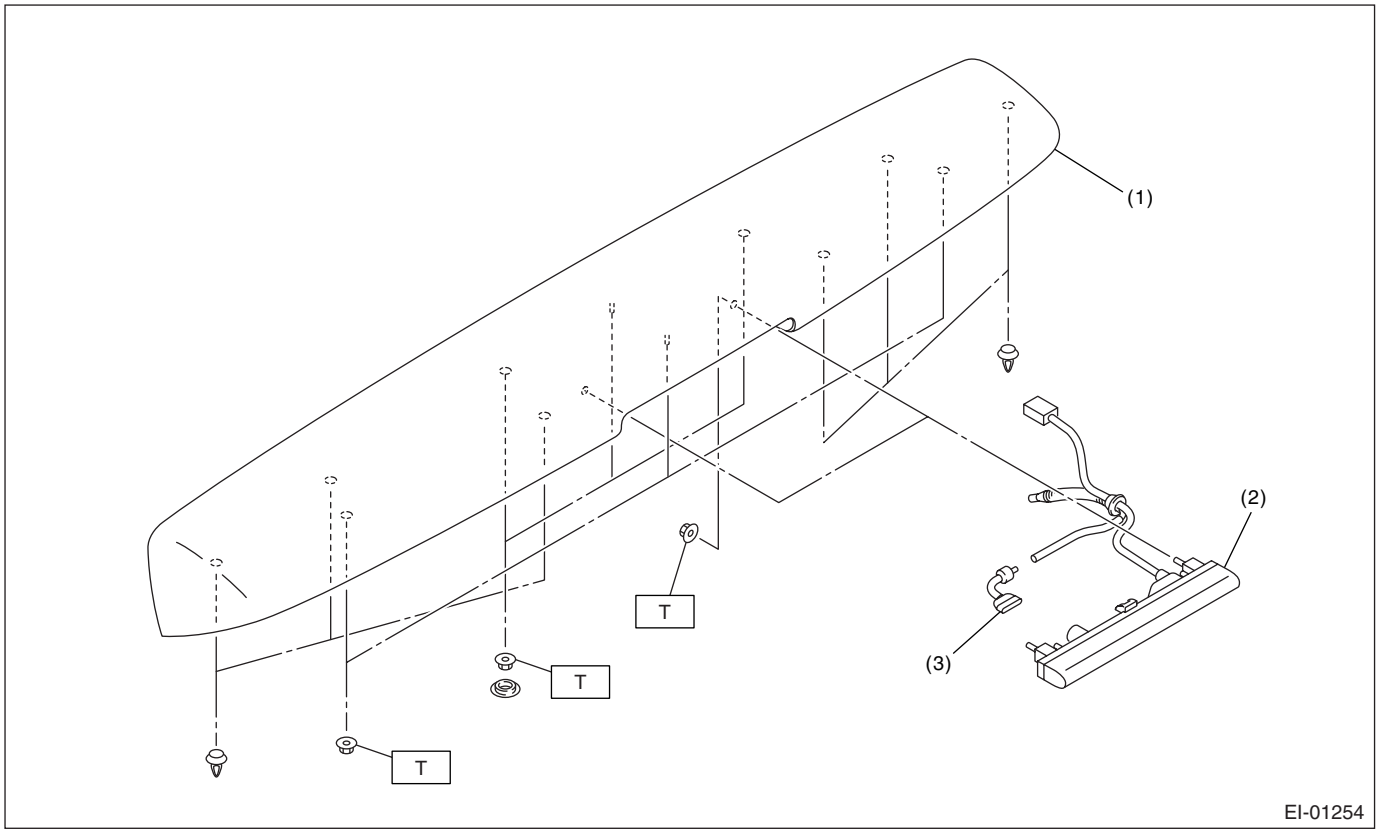
(1) Front mud guard
(2) Rear mud guard

6. COWL PANEL



(1) Weather strip
(2) Cowl panel RH
(3) Cowl panel LH
(4) Cowl panel side

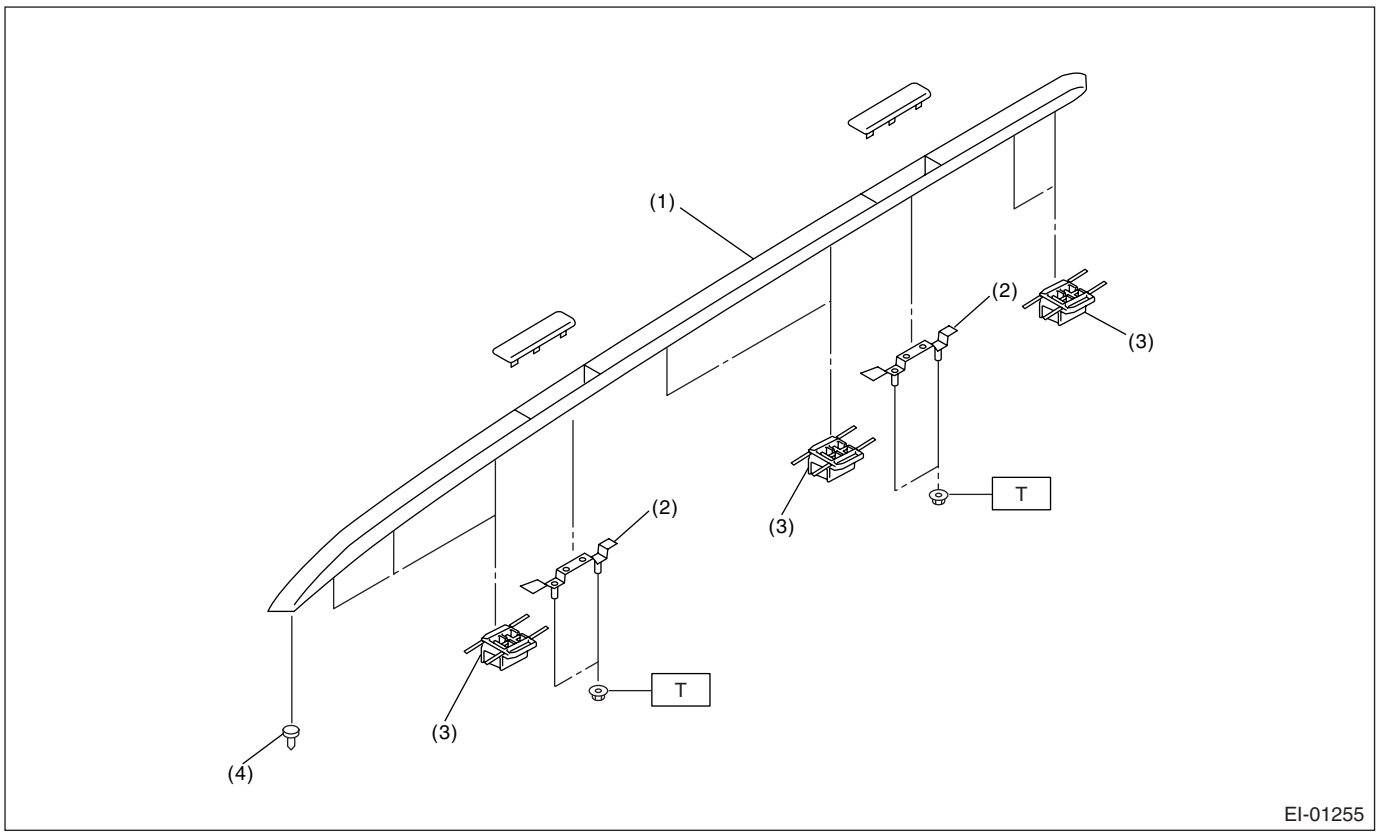
7. ROOF SPOILER



(1) Roof spoiler
(2) High-mounted stop light
(3) Washer nozzle

Tightening torque: N·m (kgf-m, ft-lb)
T: 4.5 (0.46, 3.32)

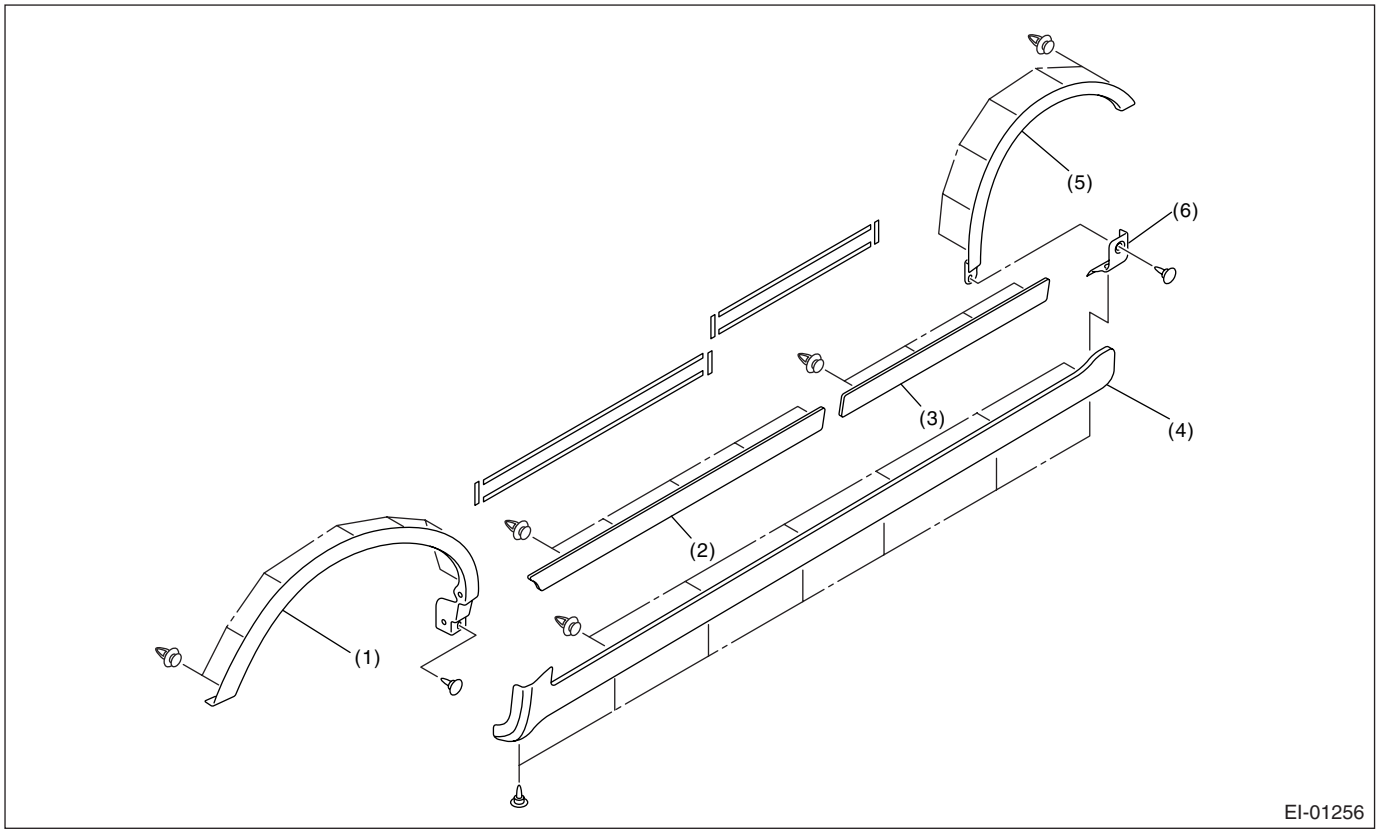
8. ROOF MOLDING



(1) Roof molding
(2) Roof carrier attachment
(3) Clip
(4) Rivet

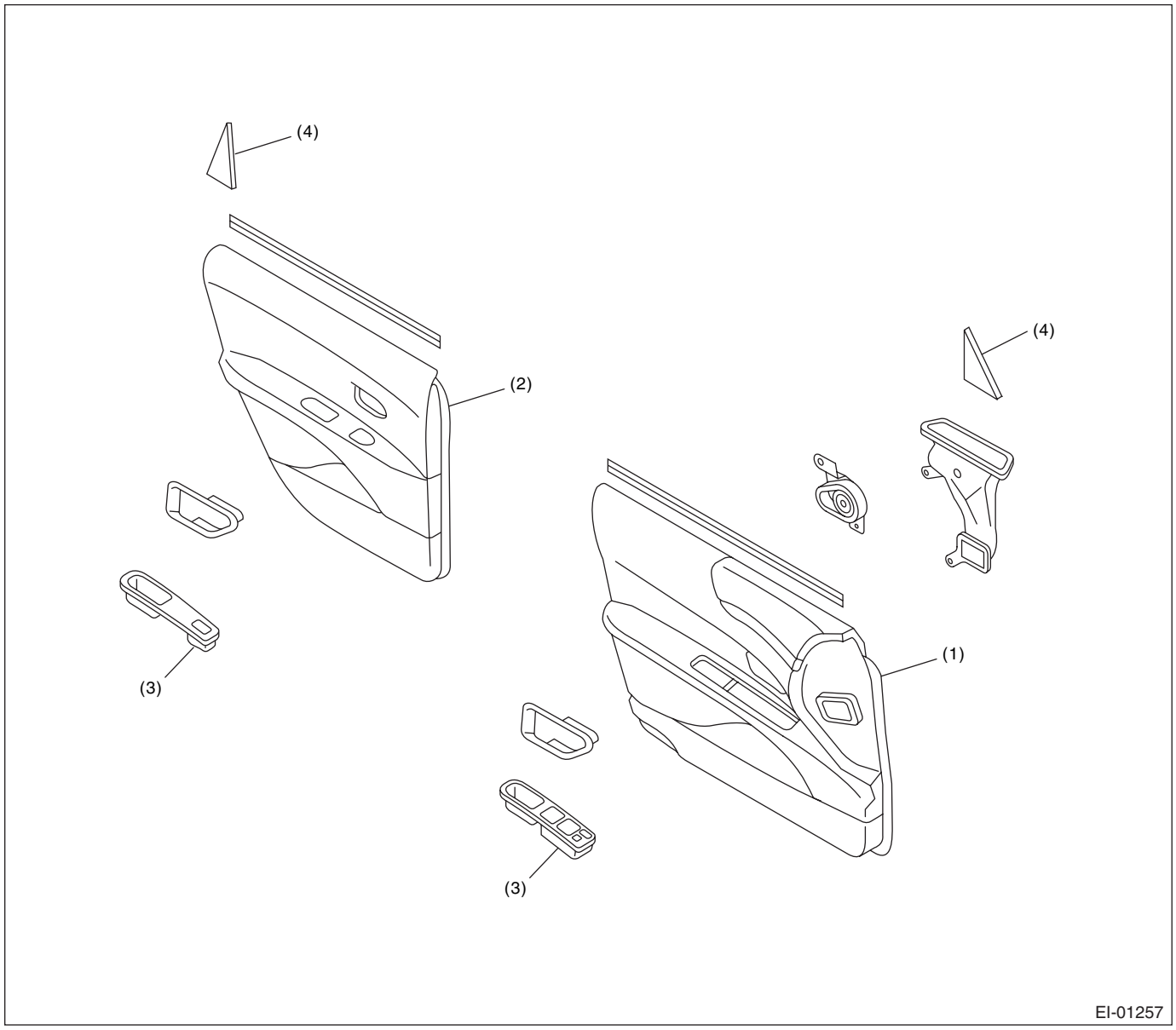
Tightening torque: N·m (kgf-m, ft-lb)
T: **10 (1.0, 7.23)**

9. SIDE GARNISH



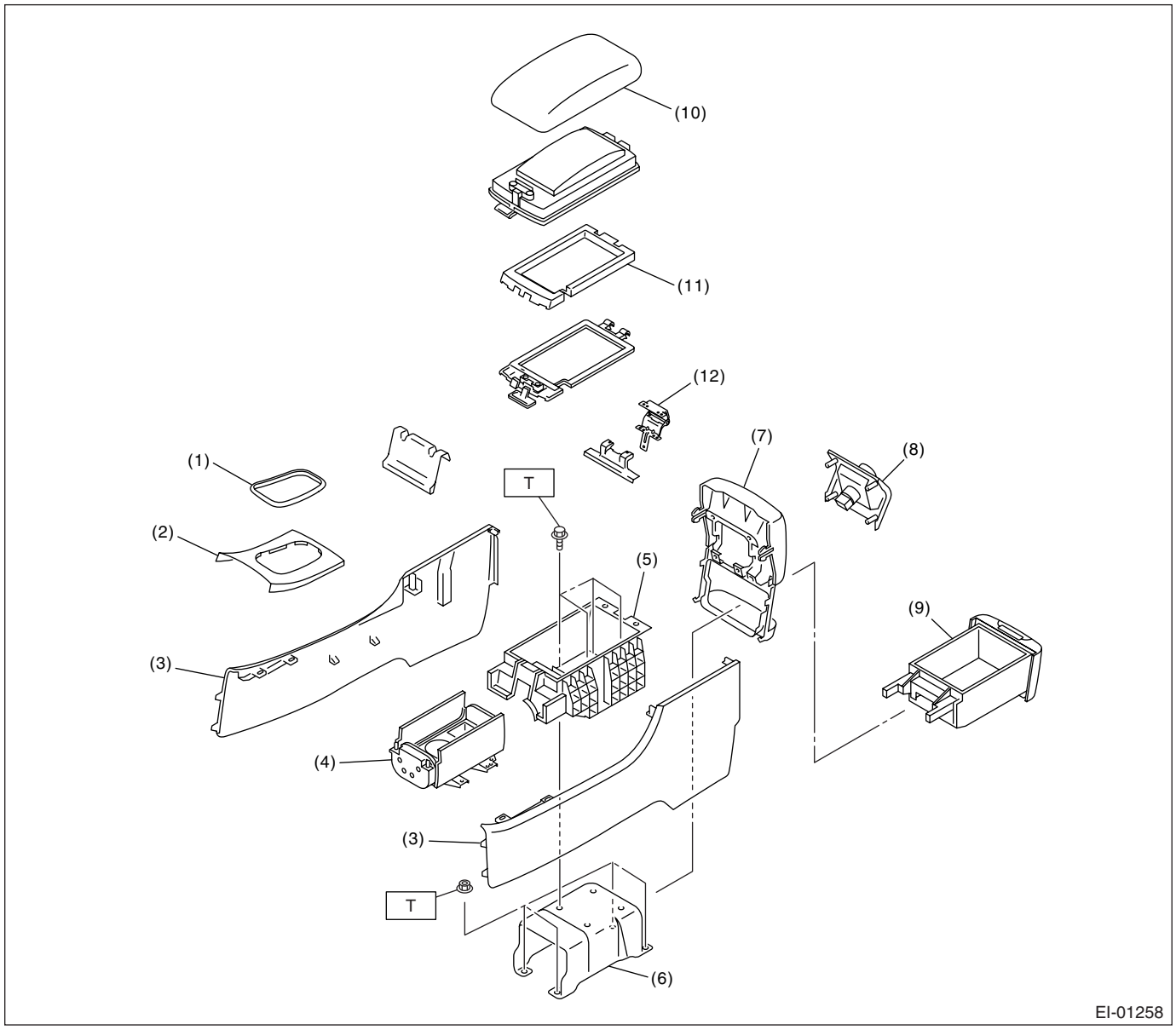
(1) Front fender garnish
(2) Front door garnish
(3) Rear door garnish
(4) Side sill garnish
(5) Rear quarter garnish
(6) Garnish end cover

10.DOOR TRIM



(1) Front door trim
(2) Rear door trim
(3) Power window switch ASSY
(4) Gusset cover

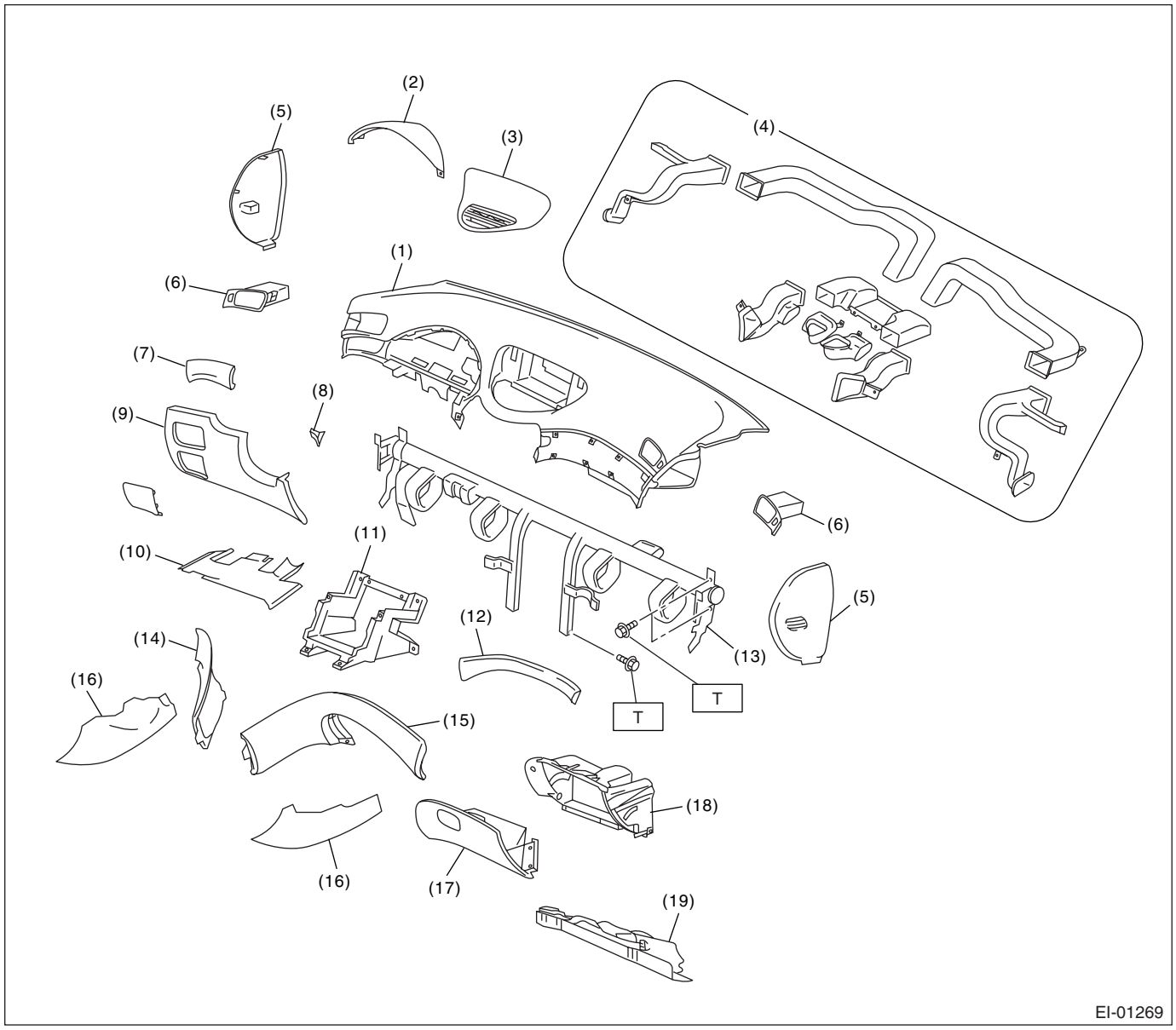
11.CONSOLE BOX



(1) Ring indicator
(2) Console front panel
(3) Console side panel
(4) Cup holder ASSY
(5) Console pocket
(6) Console frame
(7) Console rear panel
(8) Rear A/C switch
(9) Console lower pocket
(10) Console upper lid
(11) Console lower lid
(12) Lid hinge

Tightening torque: N·m (kgf-m, ft-lb)
T: 6.5 (0.66, 4.79)

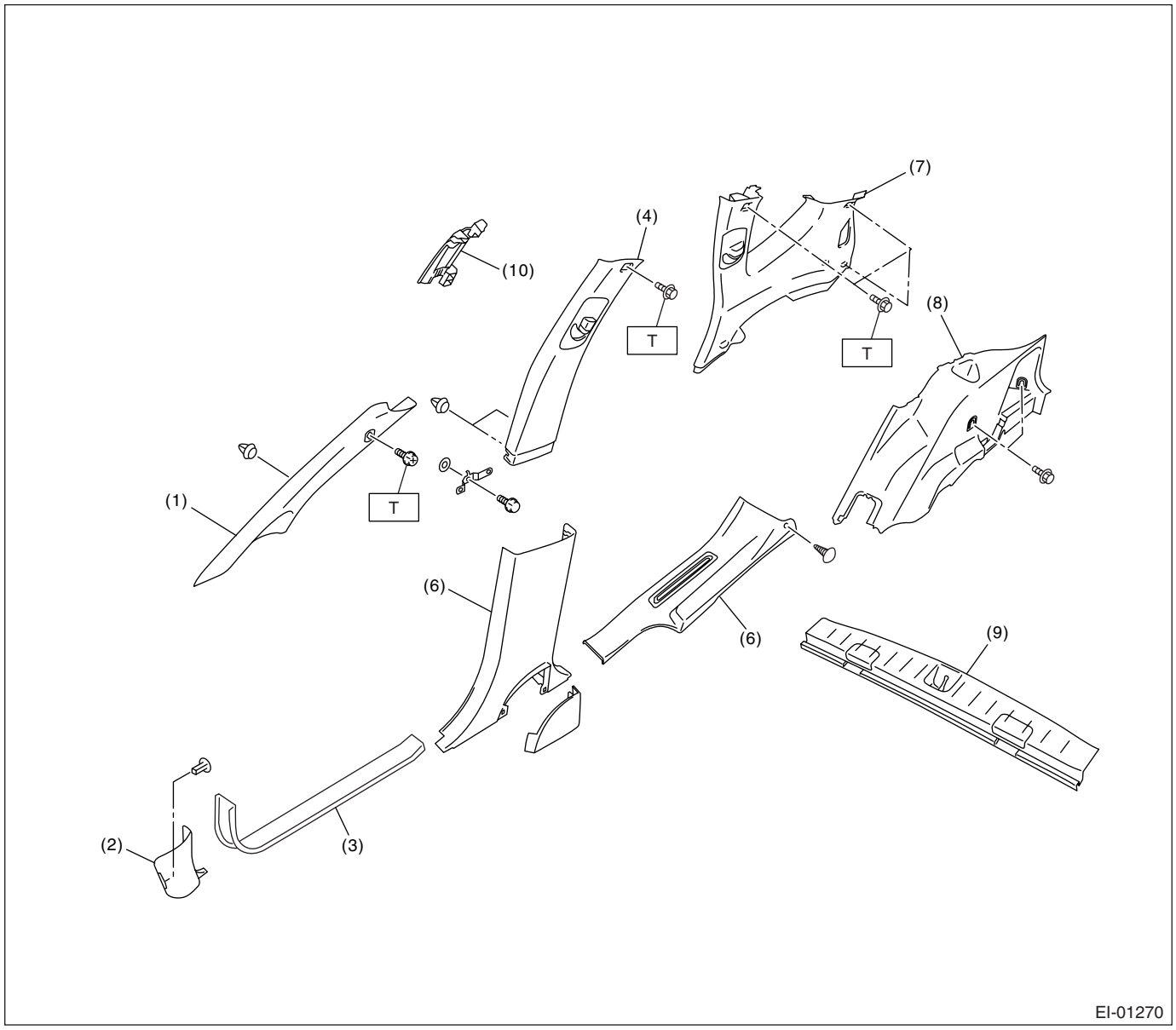
12.INSTRUMENT PANEL



(1) Instrument panel upper ASSY
(2) Meter visor
(3) Center upper grille panel
(4) Air vent duct
(5) Instrument panel side cover
(6) Air vent side grille
(7) Garnish LH
(8) Garnish CTR
(9) Instrument panel lower cover upper
(10) Instrument panel lower cover under
(11) Center console frame
(12) Garnish RH
(13) Steering support beam ASSY
(14) Console side panel upper LH
(15) Console side panel upper RH
(16) Console side panel lower
(17) Glove box lid
(18) Glove box panel
(19) Glove box lower cover

Tightening torque: N·m (kgf-m, ft-lb)
T: 25 (25.5, 18)

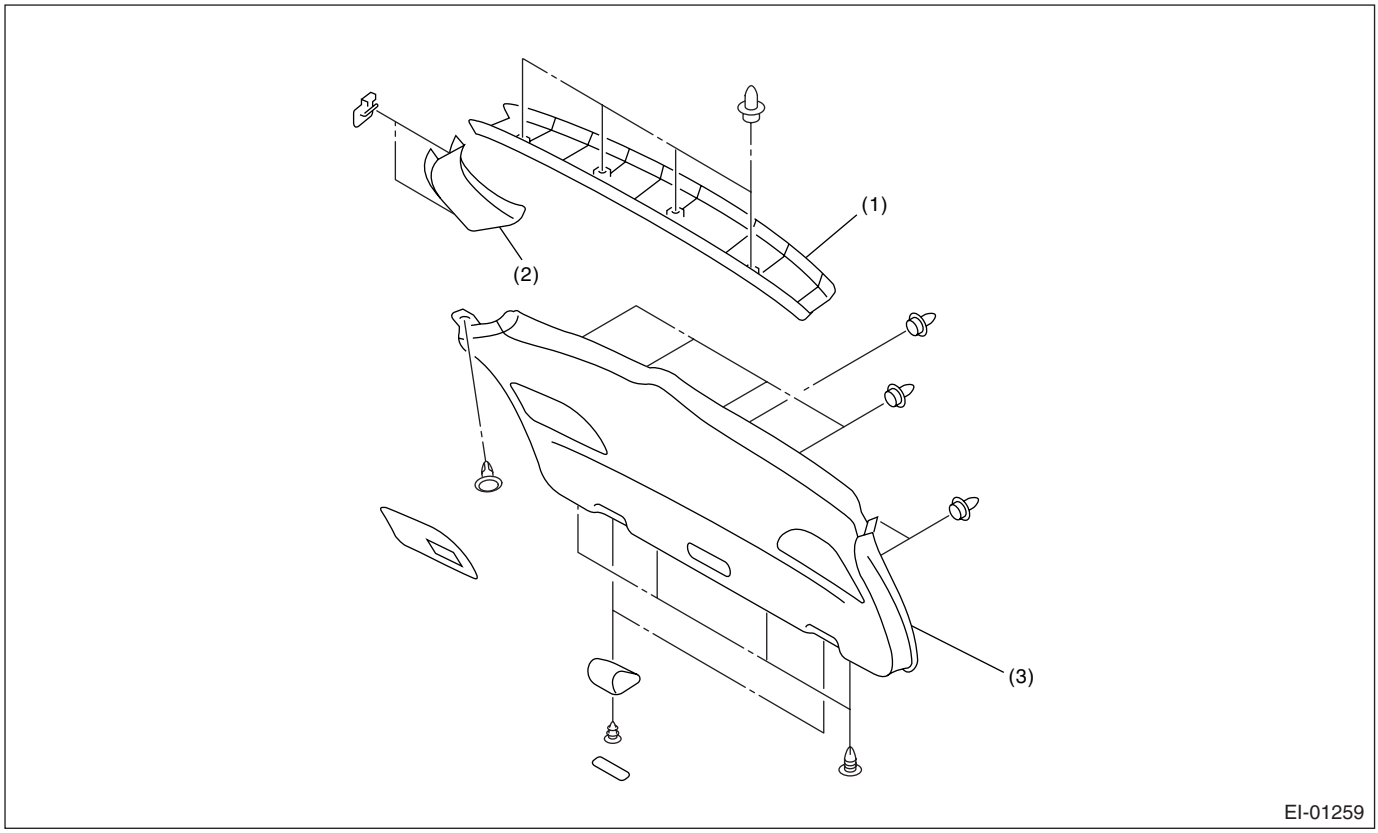
13.SIDE TRIM



(1) Front pillar upper trim
(2) Front pillar lower trim
(3) Front door scuff plate
(4) Center pillar upper trim
(5) Center pillar lower trim
(6) Rear door scuff plate
(7) Rear quarter upper trim
(8) Rear quarter lower trim
(9) Luggage floor end cover

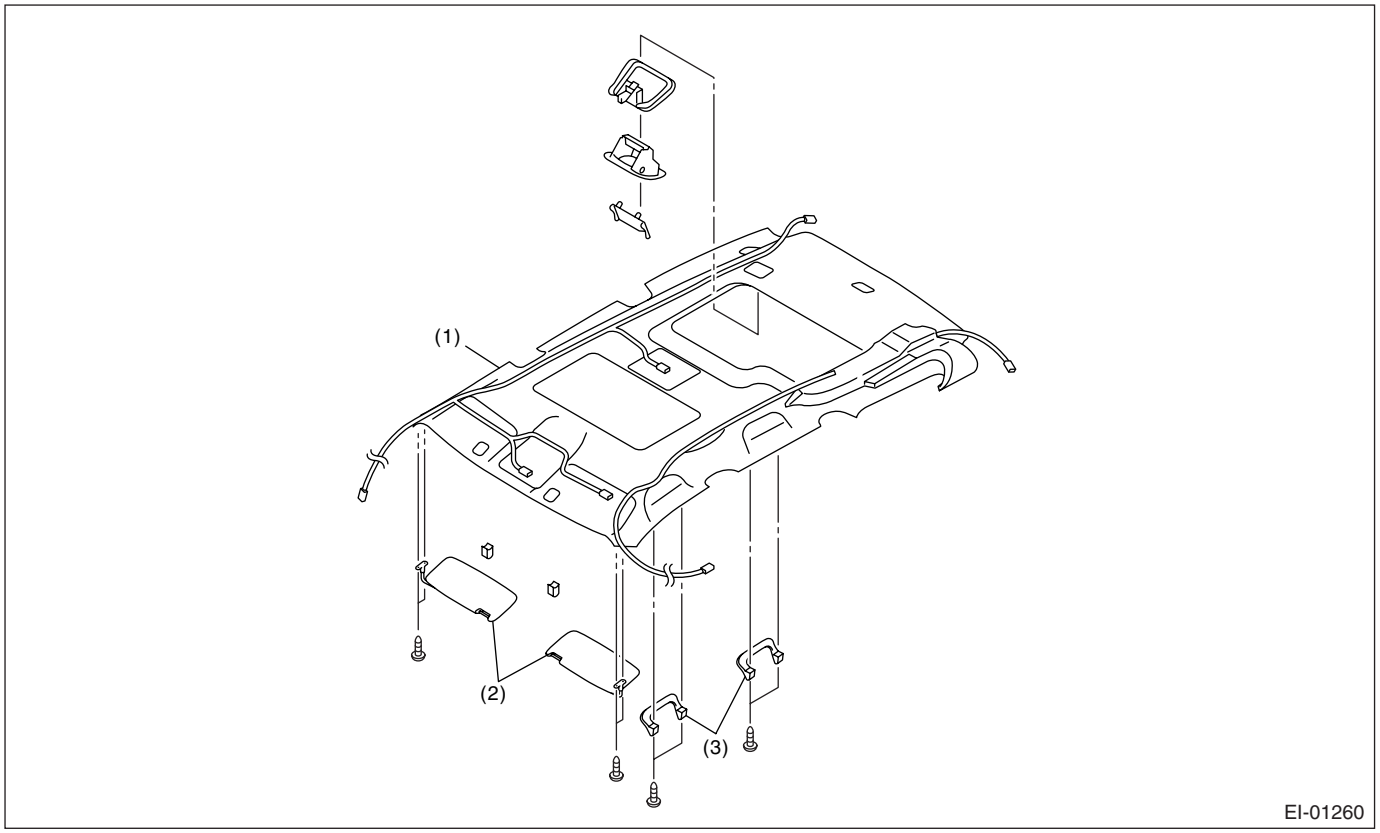
Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.4)

14.REAR GATE TRIM



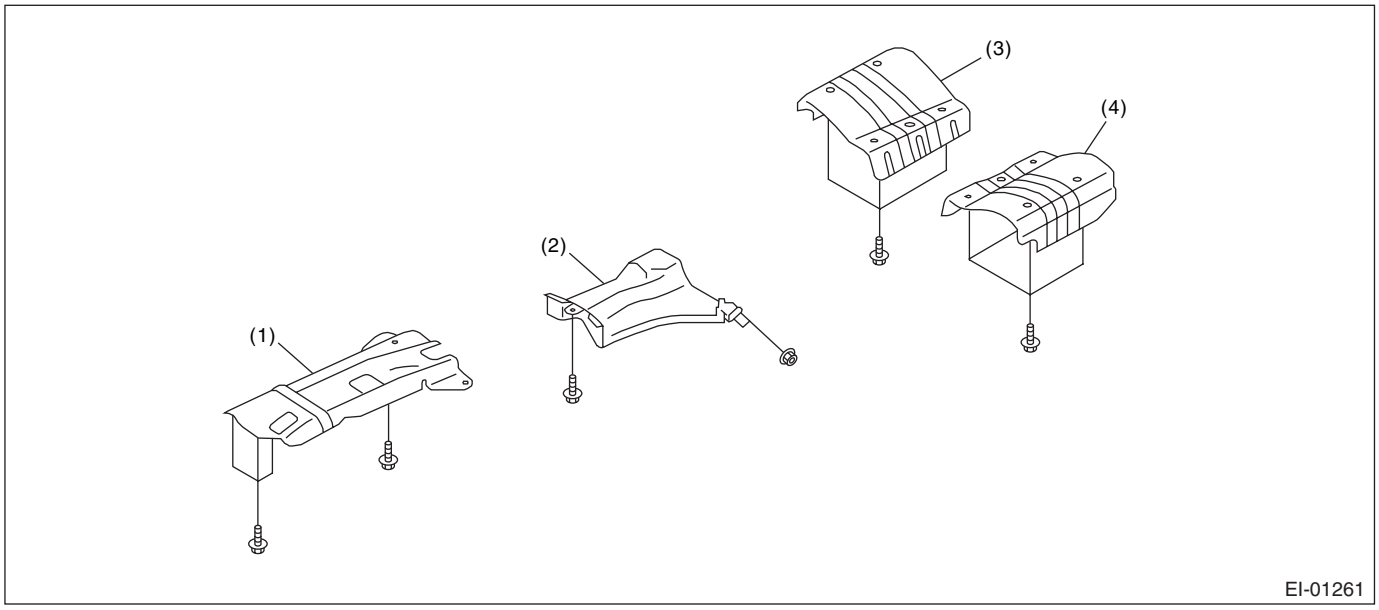
(1) Rear gate panel upper trim (2) Rear gate panel pillar trim (3) Rear gate panel lower trim

15.ROOF TRIM



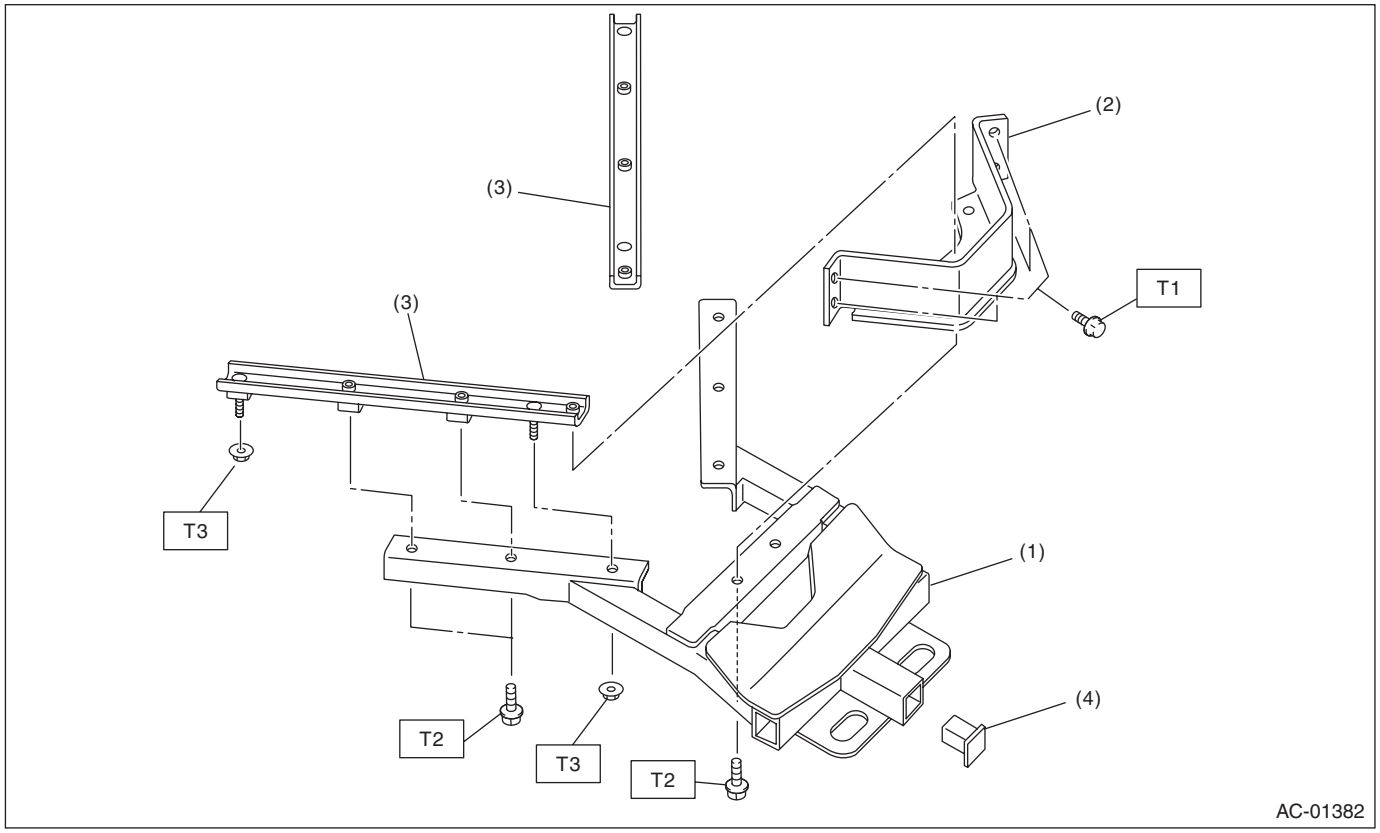
(1) Roof trim
(2) Sun visor
(3) Assist rail

16.HEAT SHIELD COVER



(1) Front heat shield cover
(2) Center heat shield cover
(3) Rear heat shield cover RH
(4) Rear heat shield cover LH

17.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)

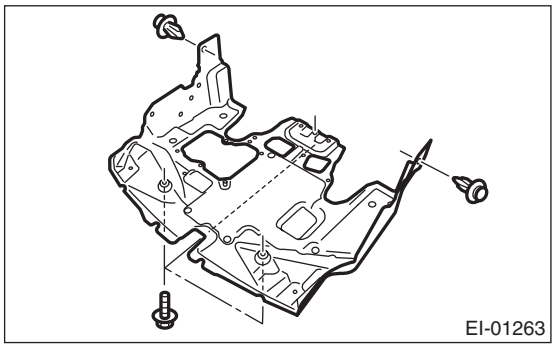
B: PREPARATION TOOL

TOOL NAME	REMARKS
Clip remover	Used for removing trim.
Clip clamp pliers	Used for removal of various clips and clamps.

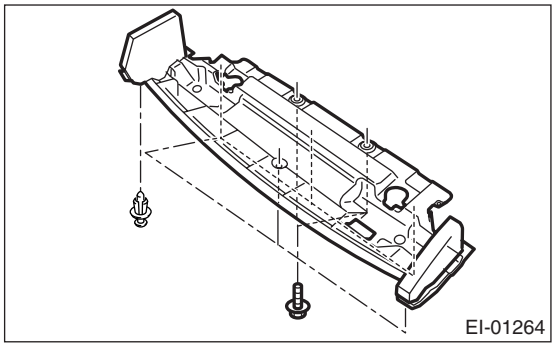
2. Front Under Cover

A: REMOVAL

1) Remove the clips and bolts, then remove the undercover.



2) Remove the clips and bolts, then remove the front lower cover.



B: INSTALLATION

Install in the reverse order of removal.

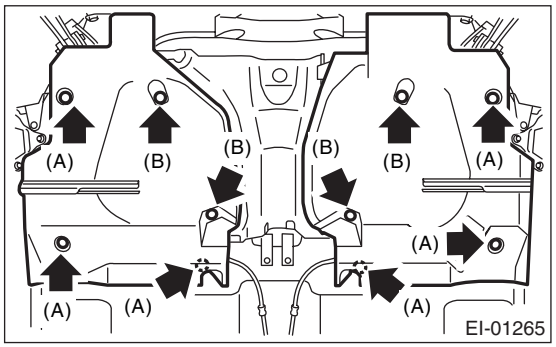
Tightening torque:

Refer to "COMPONENT" of "General Description". <Ref. to EI-2, UNDER COVER, COMPONENT, General Description.>

3. Fuel Tank Protector

A: REMOVAL

1) 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:

Bolt

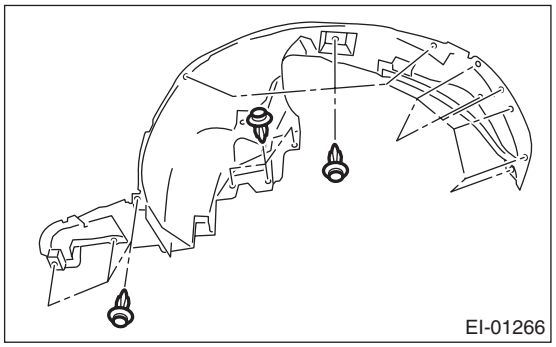
17.5 N·m (1.78 kgf-m, 12.9 ft-lb)

4. Mud Guard

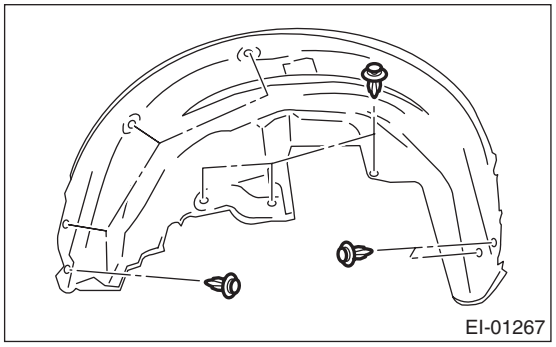
A: REMOVAL

1) Remove the wheels.
2) Loosen the screws and clips to remove mud guard.

- Front mud guard



- Rear mud guard



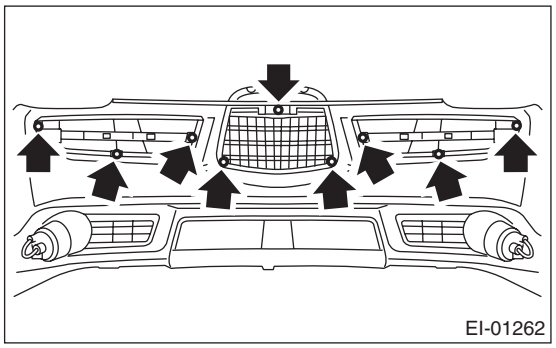
B: INSTALLATION

Install in the reverse order of removal.

5. Front Grille

A: REMOVAL

1) Remove the front bumper. <Ref. to EI-21, REMOVAL, Front Bumper.>
2) Remove the screws, and remove the front grille from bumper face.



B: INSTALLATION

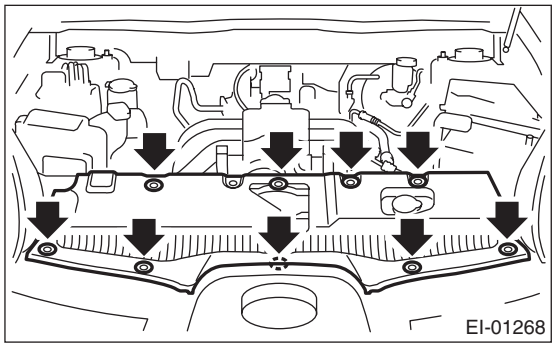
Install in the reverse order of removal.

6. Front Bumper

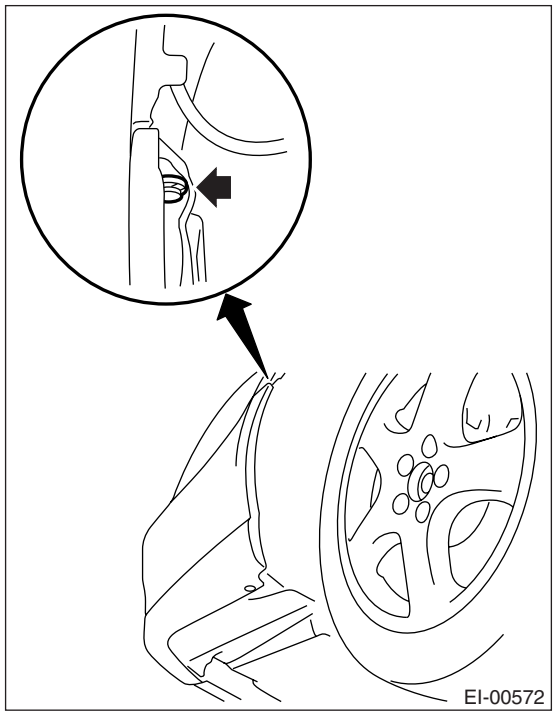
A: REMOVAL

1. FRONT BUMPER FACE

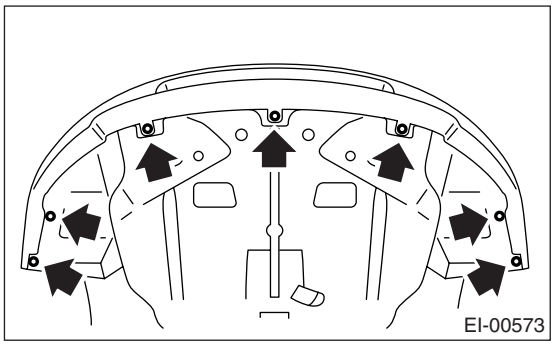
1) Remove the front upper cover.



2) Turn over the front mud guard, and remove the clips connecting the fender and bumper.



3) Remove the clips at the lower side of bumper.

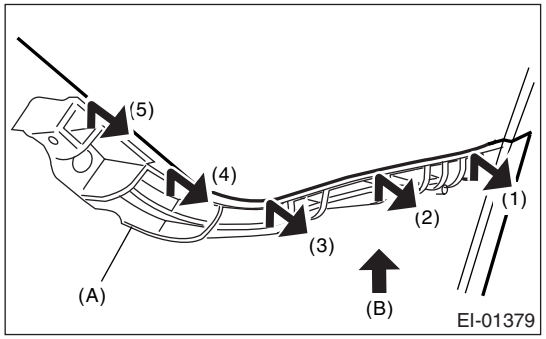


4) Disconnect the fog light connector. (Model with fog light)

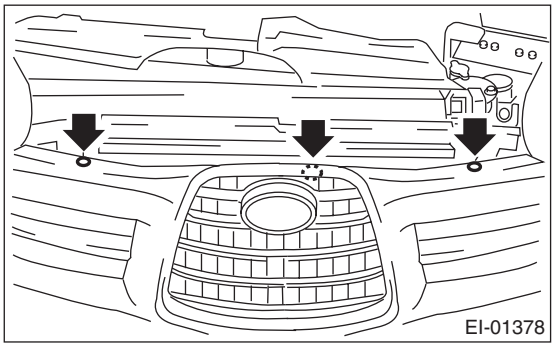
5) Remove the knotch on the bumper face side from guide bracket (A)

CAUTION:
Be careful when removing, as pulling forcefully can damage the knotch on the bumper face side.

NOTE:
Lift the bumper face upward, and removing in the order of (B), (1)-(5) of the fender side, will make it easier to remove.



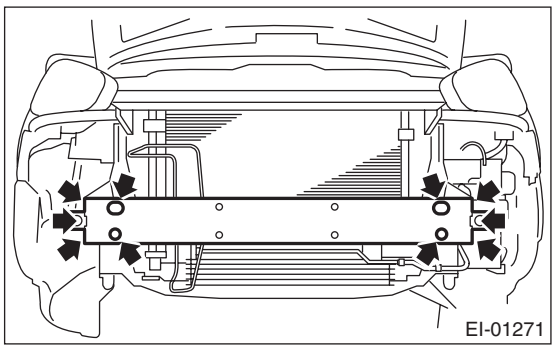
6) Remove the clips, and then remove the bumper face from vehicle body.



7) Remove the front grille from bumper face. <Ref. to EI-20, REMOVAL, Front Grille.>
8) Remove the fog light from bumper face. <Ref. to LI-17, 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.

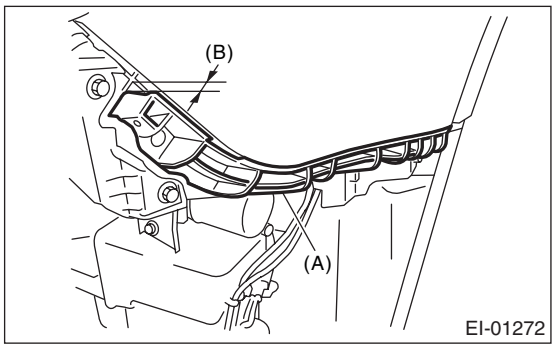


NOTE:
After all bolts are removed, raise the whole bumper beam a little to remove it from vehicle body.

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.

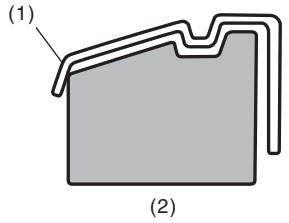
2. FRONT BUMPER BEAM ASSEMBLY

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to EI-5, REAR BUMPER, COMPONENT, General Description.>

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.	 EI-00234 (1) Bumper (2) Set bumper section
2	Masking	Mask specified part (black base) with masking tape. Use masking tape for PP (example, Nichiban No. 533, etc.).	
3	Degreasing/cleaning	Clean all parts to be painted with white gasoline, normal alcohol, etc. to remove dirt, oil, fat, etc.	
4	Primer paint	Apply primer to all parts to be painted, using spray gun. Use primer (clear).	
5	Drying	Dry at normal temperature [10 — 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. • Paint to be used (for each color): Solid paint Hardener PB Thinner T-301 • Mixture ratio: Main agent vs. hardener = 4:1 • Viscosity: 10 — 13 sec./20°C (68°F) • Film thickness: 35 — 45 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)	Use section (block) paint for top coat. • Paint to be used (for each color): Metallic paint Hardener PB Thinner T-306 • Mixture ratio: Main agent vs. hardener = 10:1 • Viscosity: 10 — 13 sec./20°C (68°F) • Film thickness: 15 — 20 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)
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 minutes intervals. • Paint to be used: Metallic paint Hardener PB Thinner T-301 • Mixture ratio: Clear coat vs. hardener = 6:1 • Viscosity: 14 — 16 sec./20°C (68°F) • Film thickness: 25 — 30 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)
9	Drying	60°C (140°F), 60 min. or 80°C (176°F), 30 min. If higher than 80°C (176°F), PP may become be deformed. Keep maximum temperature below 80°C (176°F).	
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.

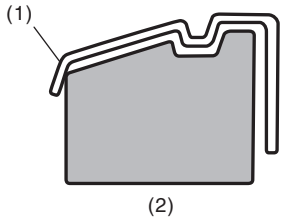
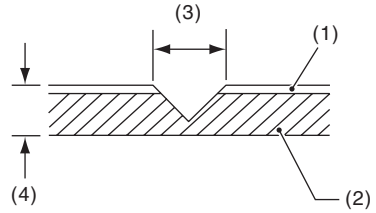
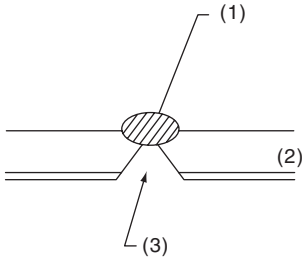
1) Minor damage causing only a change in the luster of the bumper due to a light touch
Almost restorable.

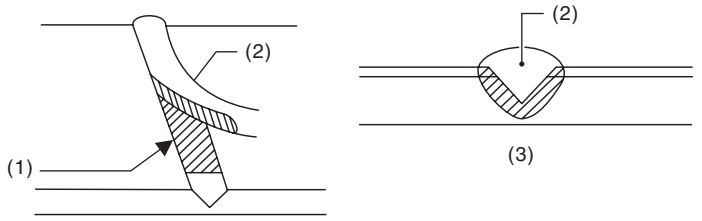
<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>1</td><td>Cleaning</td><td colspan="2">Clean the area to be repaired using water.</td></tr>
<tr><td>2</td><td>Sanding</td><td colspan="2">Grind the repairing area with #500 sand paper in a “feathering” motion.</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Finish</td><td>Resin section</td><td>Coated section</td></tr>
<tr><td>Repeatedly apply wax to the affected area using soft cloth (such as flannel). Recommended wax: NITTO KASEI Soft 99 TIRE WAX BLACK, or equivalent.</td><td rowspan="2">Perform either the same process as for the resin section or process No. 18 and subsequent in the 3) section, depending on the degree and nature of damage.</td></tr>
<tr><td>Polish the waxed area with clean cloth after 5 — 10 minutes.</td></tr>
</table>

2) Deep damage caused by scratching with fences etc.
A dent cannot be repaired but a whitened or swelled part can be removed.

<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>1</td><td>Cleaning</td><td colspan="2">Clean the damaged area with water.</td></tr>
<tr><td>2</td><td>Removal of damaged area</td><td colspan="2">Cut off protruding area, if any, due to collision, using a putty knife.</td></tr>
<tr><td>3</td><td>Sanding</td><td colspan="2">Sand the affected area with #100 — #500 sand paper.</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Finish</td><td>Resin section</td><td>Coated section</td></tr>
<tr><td>Same as step 3 in the “1)” section.</td><td>Perform step 12 and subsequent operations in the “3)” section.</td></tr>
</table>

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.)
Recommended repair kit: PP Part Repair Kit (NRM)

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.	 EI-00234 (1) Bumper (2) Set bumper section
4	Surface preparation	Remove dust, oil, etc. from areas to be repaired and surrounding areas, using a suitable solvent (NRM No. 900 Precleno, white gasoline, or alcohol, 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.	 EI-00235 (1) Paint surface (2) PP base surface (3) 20 — 30 mm (0.79 — 1.18 in) (4) 3 mm (0.12 in)
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 Procedure 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.	 EI-00236 (1) Welded point (Use heater gun and PP welding rod) (2) PP base surface (3) Beveled section NOTE: • Do not melt welding rod until it flows out. This results in reduced strength. • Leave the welded spot unattended until it cools completely.

Process No.	Process name	Job contents
9	Welding	Using a heater gun and PP welding rod, weld the beveled spot while melting both the rod and damaged area.
		 EI-00237 (1) Welding rod (2) Melt hatched area (3) Section NOTE: • Melt the sections indicated by hatched area. • Do not melt the welding rod until it flows out, in order to provide strength. • Always keep the heater gun 1 to 2 cm (0.4 to 0.8 in) away from the welding spot. • Leave the welded spot unattended until it cools completely.
10	Sanding (II)	Remove excess part of weld with a putty knife. If a drill or disc wheel is used instead of the knife, operate it at a rate lower than 1,500 rpm and grind the excess part little by little. A higher rpm will cause the PP substrate to melt from the heat.
		 EI-00042
		Sand the welded spot smooth with #240 sand paper.
11	Masking	Mask the black substrate section using masking tape. Recommended masking tape: Nichiban No. 533 or equivalent
12	Cleaning/degreasing	Completely clean the entire coated area, using solvent similar to that used in Procedure 4.
13	Primer coating	Apply a coat of primer to the repaired surface and its surrounding areas. Mask these areas, if necessary. Recommended primer: Mp/ 364 PP Primer NOTE: Be sure to apply a coat of primer using a spray gun at a pressure of 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi).
14	Leave unattended	Leave the repaired area unattended at 20°C (68°F) for 10 to 15 minutes until primer is half-dry. NOTE: If dirt or dust comes in contact with the coated area, wipe it off with a cloth dampened with alcohol. (Do not use thinner since the coated area tends to melt.)
15	Primer surfacer coating	Apply primer surfacer to the repaired area two or three times at an interval of 3 - 5 minutes. Recommended surfacer: • UPS 300 Flex Primer • No. 303 UPS 300 Exclusive hardener • NPS 725 Exclusive Reducer (thinner) • Mixture ratio: 2 : 1 (UPS 300 : No. 303) • Viscosity: 12 — 14 sec./20°C (68°F) • Coating film thickness: 40 — 50 μ
16	Drying	Allow the coated surface to dry for 60 minutes at 20°C (68°F) [or 30 minutes at 60°C (140°F)].
17	Sanding (III)	Sand the coated surface and its surrounding areas using #400 sand paper and water.

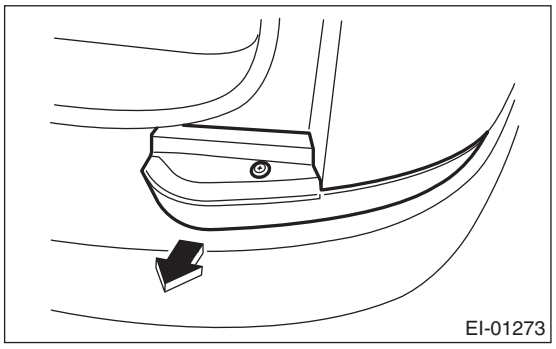
Process No.	Process name	Job contents	
18	Cleaning/degreasing	Same as Process No. 12.	
19	Top coat (I)	Non-colored	Metallic paint
		Use a “block” coating method. • Recommended paint: Suncryl (SC) No. 307 Flex Hardener SC Reducer (thinner) • Mixture ratio: Suncryl (SC) vs. No. 307 Flex Hardener = 3 : 1 • Viscosity: 11 — 13 sec./20°C (68°F) • Coating film thickness: 40 — 50 µ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)	Use a “block” coating method. • Recommended paint: Suncryl (SC) No. 307 Flex Hardener SC Reducer (thinner) • Mixture ratio: Suncryl (SC) vs. No. 307 Flex Hardener = 3 : 1 • Viscosity: 11 — 13 sec./20°C (68°F) • Coating film thickness: 20 — 30 µ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)
20	Leave unattended	Not required.	Leave unattended at 20°C (68°F) for at least 10 minutes until the topcoat area is half-dry. NOTE: Be careful to keep dust or dirt from coming in contact with the affected area.
21	Top coat (II)	Not required.	Apply a clear coat three times at an interval of 3 to 5 minutes. • Recommended paint: SC710 Overlay Clear No. 307 Flex Hardener SC Reducer (thinner) • Mixture ratio: Suncryl (SC) vs. No. 307 Flex Hardener = 3 : 1 • Viscosity: 10 — 13 sec./20°C (68°F) • Coating film thickness: 20 — 30 µ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)
22	Drying	Allow the coated surface to dry for two hours at 20°C (68°F) or 30 minutes at 60°C (140°F)]. NOTE: Do not allow the temperature to exceed 80°C (176°F) since this will deform the PP substrate.	
23	Inspection	Carefully check the condition of the repaired area.	
24	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

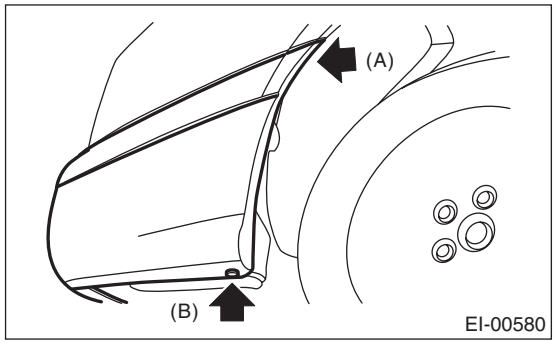
A: REMOVAL

1. REAR BUMPER FACE

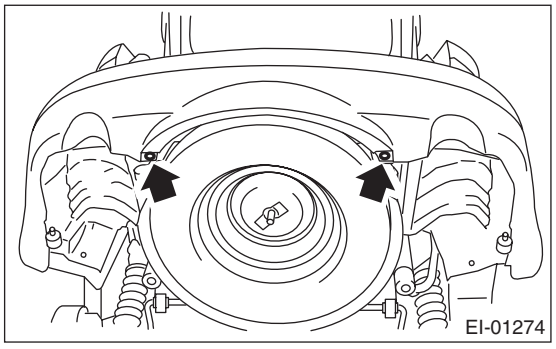
1) Remove the clips, and then remove the reflector.



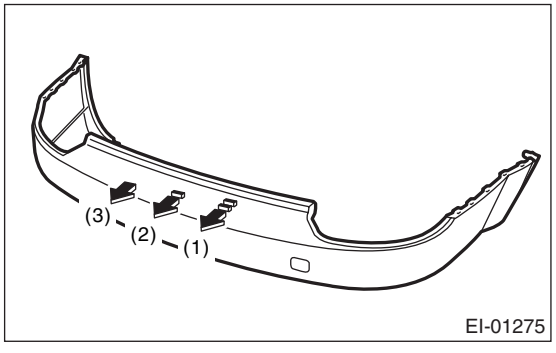
2) Turn over the mud guard, and remove the clip (A) and (B) inside wheel house and in the lower side of bumper.



3) Remove the clips on the lower side of rear bumper.



4) Remove the rear bumper from vehicle body.

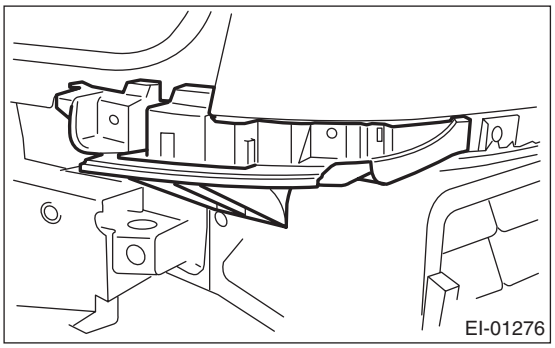


CAUTION:
Do not pull with a excessive force. Otherwise the bracket installation area may be damaged.

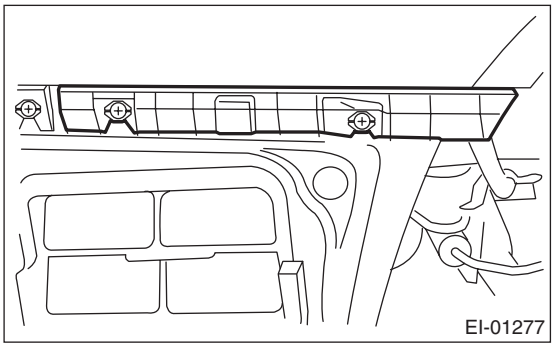
NOTE:
When removing the bumper face from bracket, it is easier to remove from the end in order.

2. REAR BUMPER BRACKET

1) Remove the rear bumper face from vehicle body.
2) Remove the corner bracket.

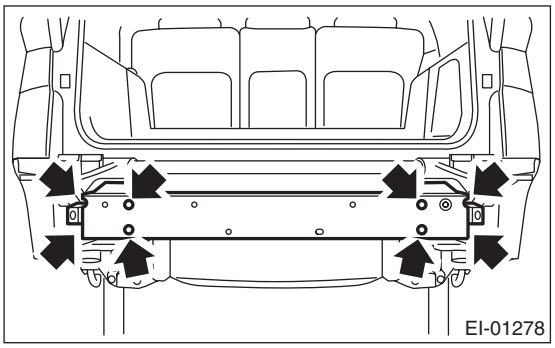


3) Remove the lower brackets from vehicle body.



3. REAR BUMPER BEAM ASSEMBLY

1) Remove the rear bumper face.
2) Remove the energy absorber foam.
3) Remove the nuts, and remove the bumper beam assembly from vehicle body.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to EI-6, MUD GUARD, COMPONENT, General Description.>

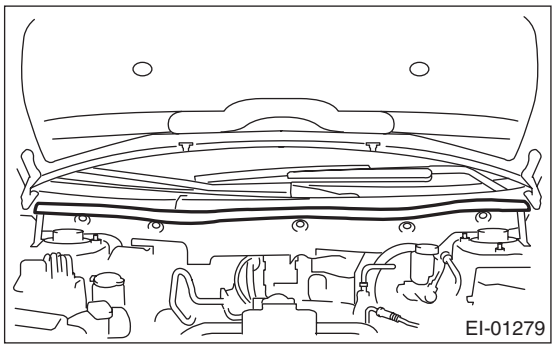
C: REPAIR

Refer to front bumper repair. <Ref. to EI-23, REPAIR, Front Bumper.>

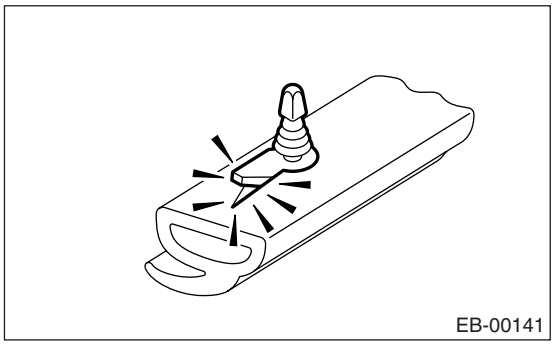
8. Cowl Panel

A: REMOVAL

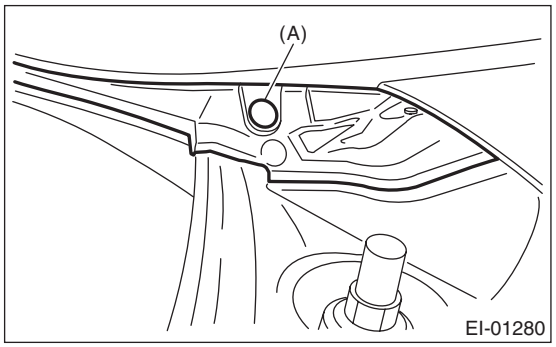
1) Remove the wiper arm. <Ref. to WW-15, REMOVAL, Front Wiper Arm.>
2) Remove the weather strip clips, and remove the weather strip.



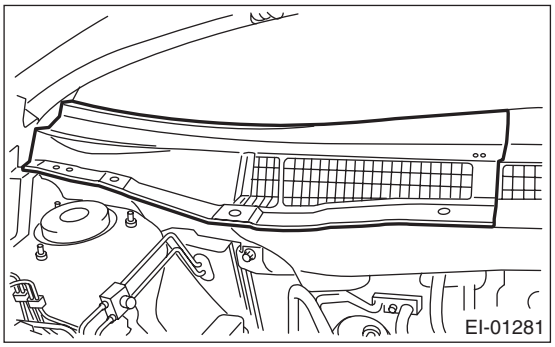
NOTE:
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use a clip remover to remove.



3) Remove the clip and remove the cowl panel side.



4) Pull and remove the cowl panel RH.

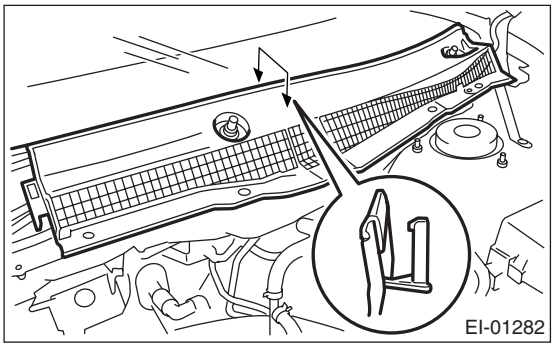


5) Remove the cowl panel LH.

B: INSTALLATION

Install in the reverse order of removal.

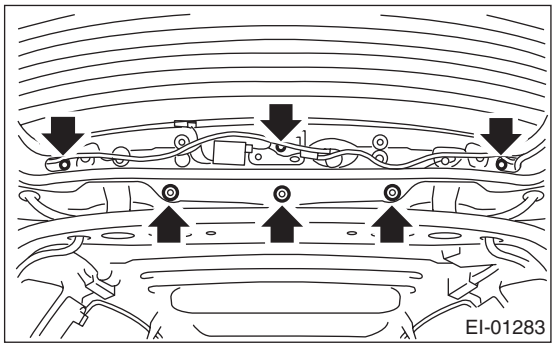
NOTE:
Hook the craw of cowl panel to the windshield.



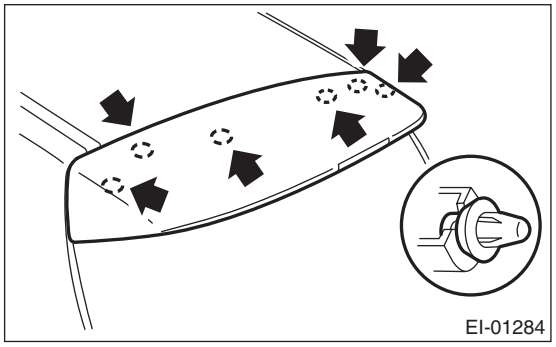
9. Roof Spoiler

A: REMOVAL

1) Remove the rear gate upper trim. <Ref. to EI-51, REMOVAL, Rear Gate Trim.>
2) Disconnect the connector of high-mounted stop light and the washer hose of rear washer.
3) Remove the nuts.



4) Remove the clips, and remove the roof spoiler.



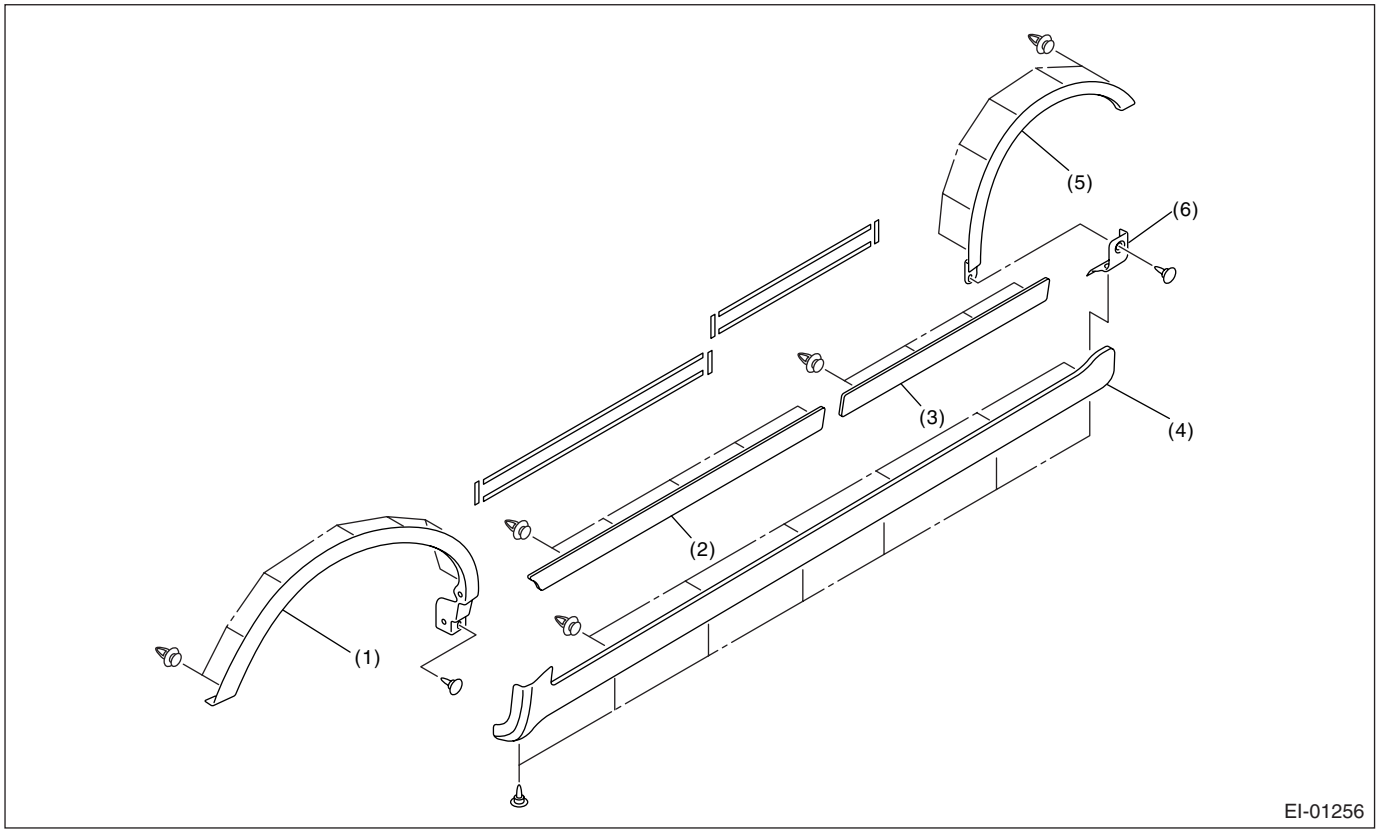
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
4.5 N·m (0.46 kgf-m, 3.32 ft-lb)

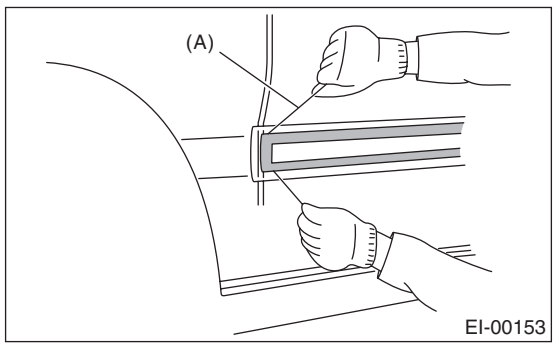
10.Side Garnish

A: REMOVAL

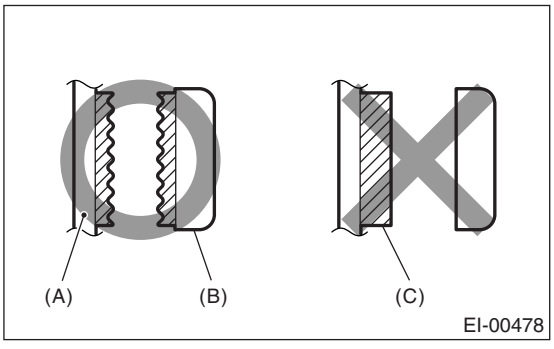


(1) Front fender garnish
(2) Front door garnish
(3) Rear door garnish
(4) Side sill garnish
(5) Rear quarter garnish
(6) Garnish end cover

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 sill spoiler.
(1) Insert a thin piece of string (A) of 0.8 mm (0.031 in) (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 spoiler.
• 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.



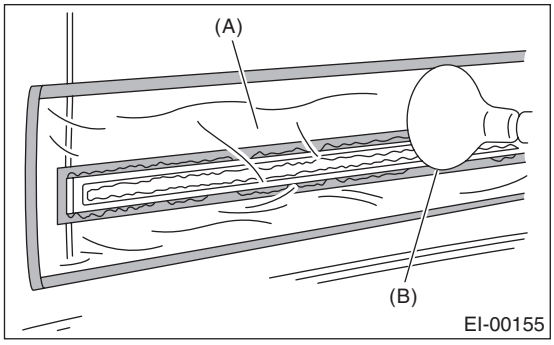
(A) Panel
(B) Door garnish
(C) Double-sided tape

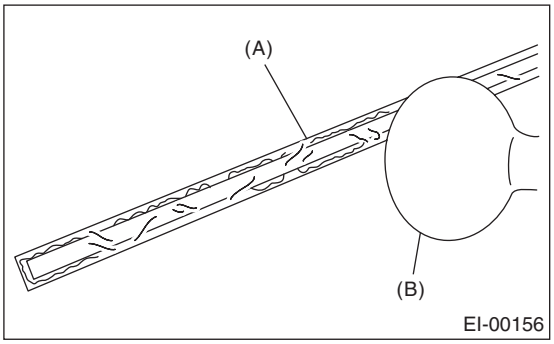
(3) Apply masking tape around the double-sided tape remaining on the surface of body or spoiler.
(4) Apply solvent uniformly on the double-sided tape using a brush.

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 spoiler.

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 lamp (B).



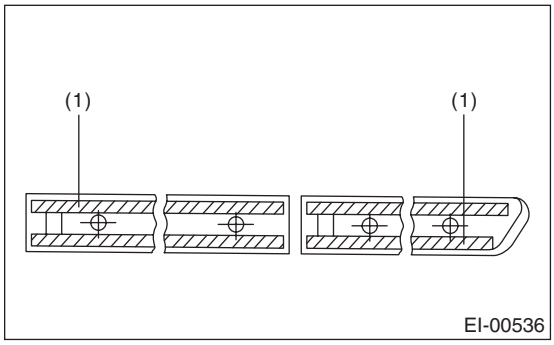


CAUTION:
Do not heat the double-sided tape until the surface becomes white and excessively dried.

(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 5mm (0.197in)

Primer:
3M K-500 or equivalent

Double-sided tape:
3M 5531-5 or equivalent

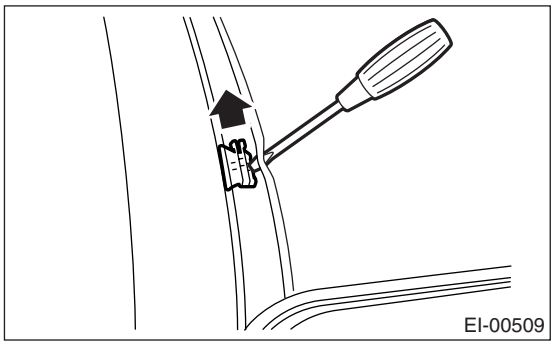
2) Heat the adhering part using a heat lamp.
Body side: 40 — 60°C (104 — 140°F)
Door garnish side: 20 — 30°C (68 — 86°F)
3) Peel off the backing sheet of double-sided tape, align the clip position, and then adhere the tape to the body while taking care to avoid air entering.

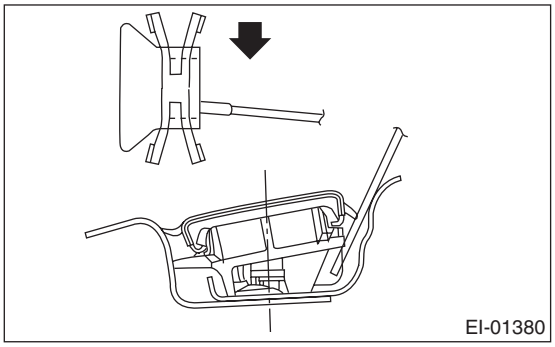
CAUTION:
To keep the adhesion, do not wash the vehicle within 24 hours from installation.

11.Roof Molding

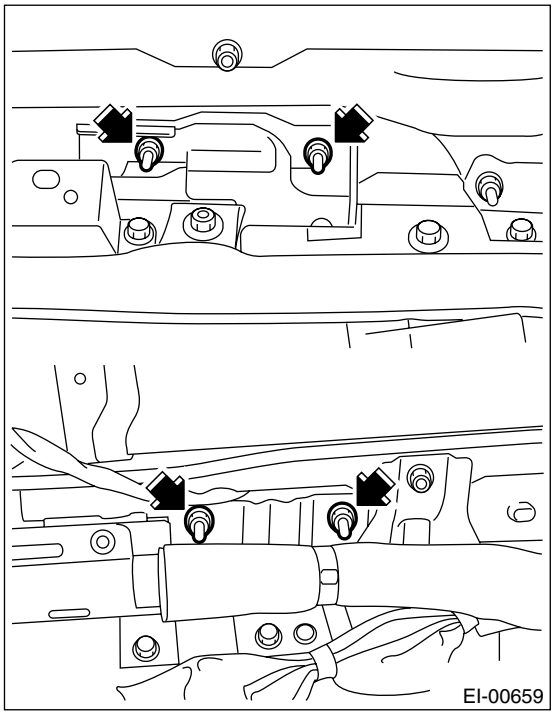
A: REMOVAL

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-50, INSTALLATION, Roof Trim.>
4) Remove the nuts, and remove the roof carrier attachment.



B: INSTALLATION

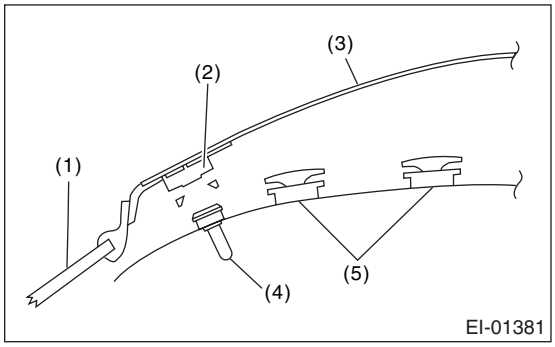
1) Install the roof carrier attachment.

Tightening torque:
7.5 N·m (0.77 kgf-m, 5.53 ft-lb)

2) Remove each clip from the roof molding, and install them to the vehicle side.

CAUTION:
Always replace clips damaged during removal of the roof moulding with new clips.

3) Push the front edge of roof molding against the front window, and install the positioning clip on the front end to the rivet on the vehicle side.

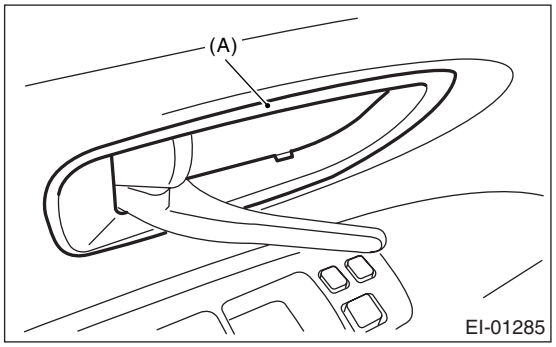


(1) Windshield
(2) Positioning clips
(3) Roof molding
(4) Rivet
(5) Clip

12.Door Trim

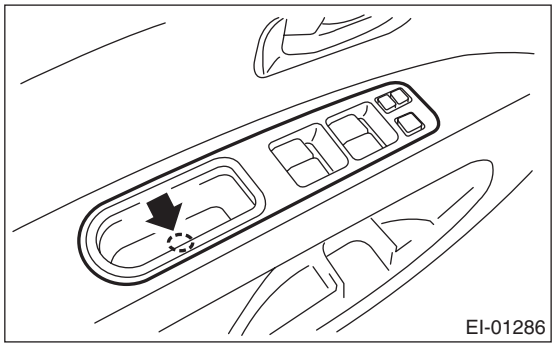
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the cover (A) at inner remote.

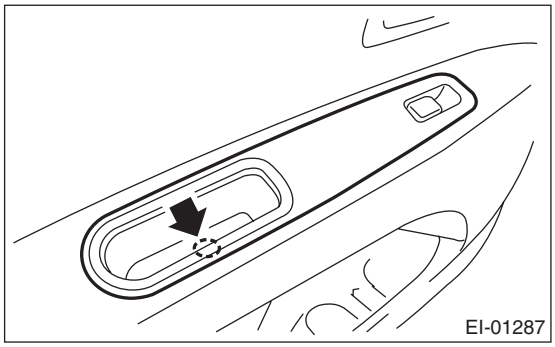


3) Remove the bottom cover at the pull handle.
4) Remove the screw to remove the power window switch assembly.

- Front door

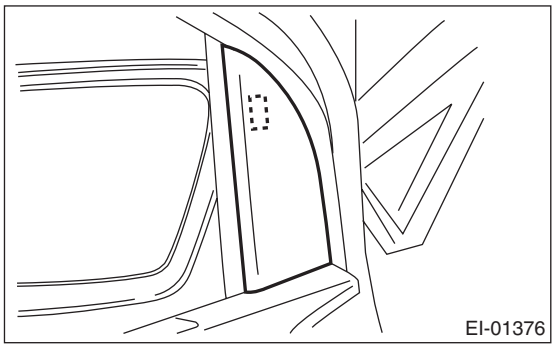


- Rear door

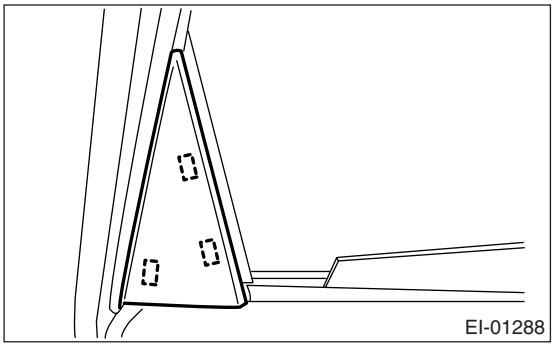


5) Remove the gusset cover.

- Front door

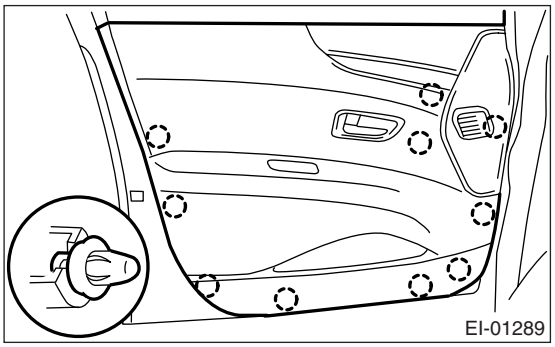


- Rear door

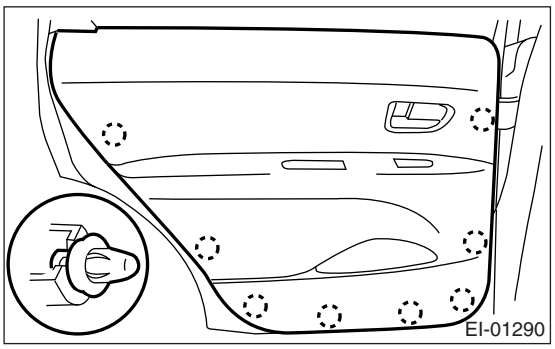


6) Remove the clip, and disconnect the each connector to remove the door trim.

- Front door trim



- Rear door trim



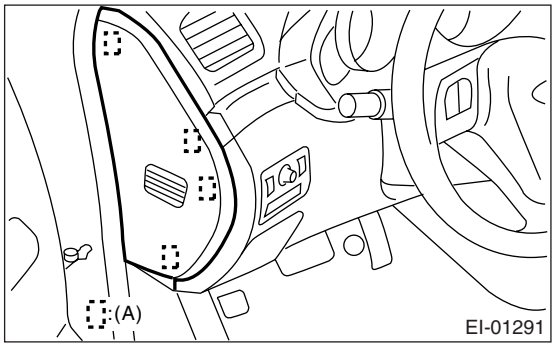
B: INSTALLATION

Install in the reverse order of removal.

13. Instrument Panel Lower Cover

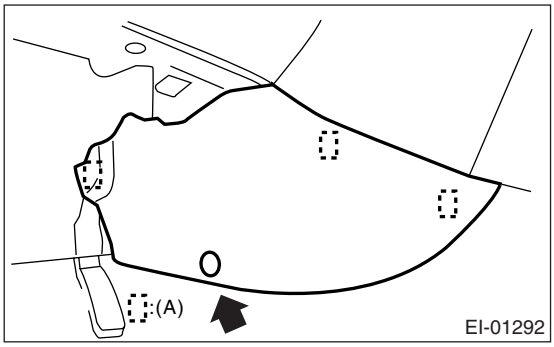
A: REMOVAL

1) Remove the front door scuff plate and front pillar lower trim. <Ref. to EI-43, REMOVAL, Side Trim.>
2) Remove the instrument panel side cover LH.



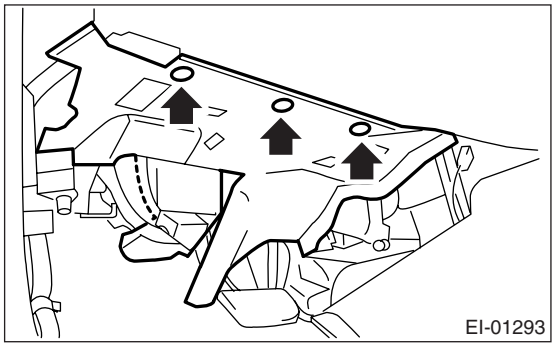
(A) Hook

3) Remove the clips, and remove the console side panel lower LH.

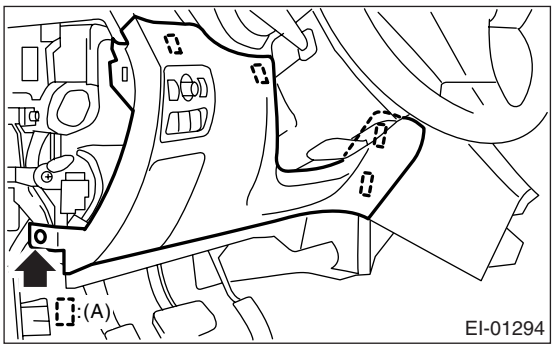


(A) Hook

4) Remove the clips, and remove the instrument panel lower cover under.



5) Remove the clips and hooks, disconnect the connectors, and then remove the instrument panel lower cover upper.



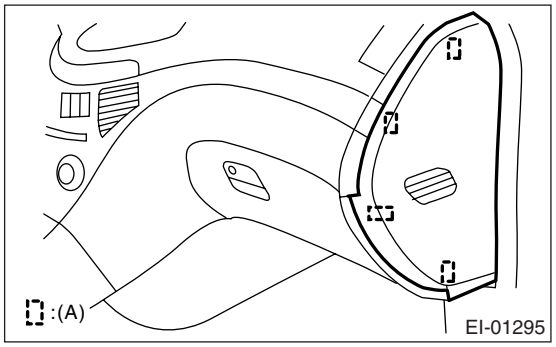
B: INSTALLATION

Install in the reverse order of removal.

14.Glove Box

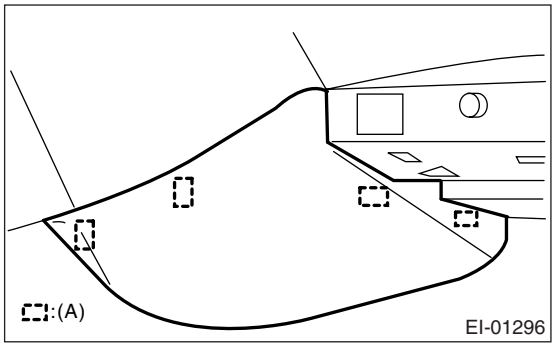
A: REMOVAL

1) Remove the front door scuff plate and front pillar lower trim. <Ref. to EI-43, REMOVAL, Side Trim.>
2) Remove the instrument panel side cover RH.



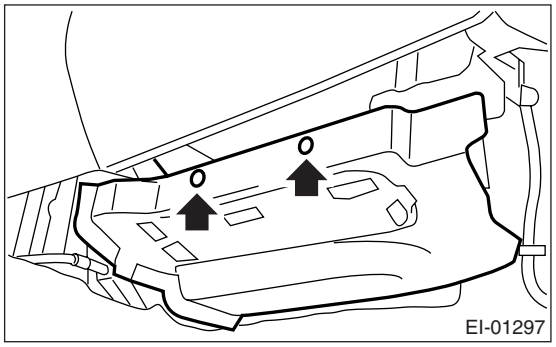
(A) Hook

3) Remove the console side panel lower RH.

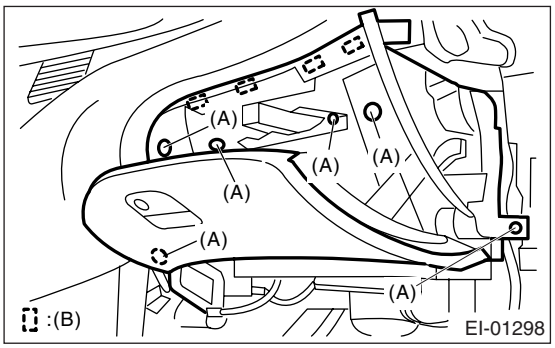


(A) Hook

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 clips (A), left and right stoppers of glove box lid (B) and damper strap, and then remove the glove box lid.

NOTE:
The glove box lid can be removed without using the glove box assembly.

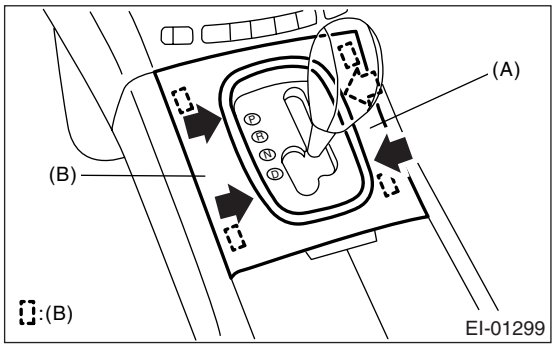
B: INSTALLATION

Install in the reverse order of removal.

15.Console Box

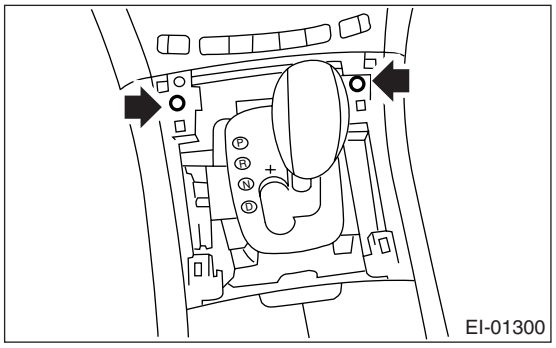
A: REMOVAL

1) Remove the ring indicator (A) and console front panel (B).

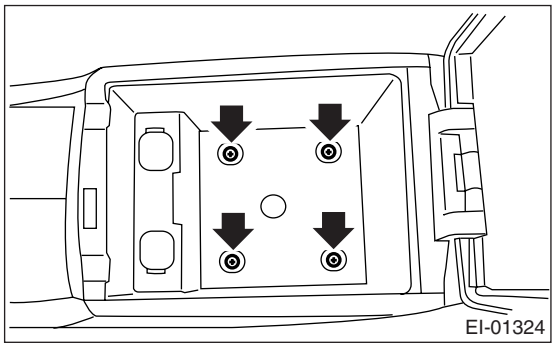


NOTE:
The ring indicator can be easily removed by inserting the clip remover or equivalent into the positions indicated by arrows.

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

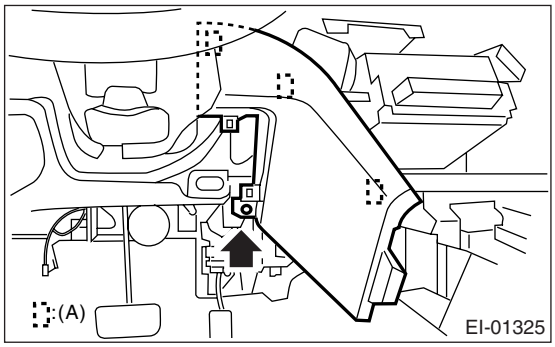
Install in the reverse order of removal.

16.Center Console

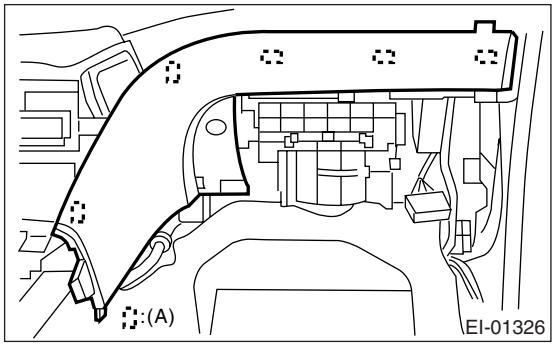
A: REMOVAL

1) Remove the control panel. <Ref. to AC-31, REMOVAL, Control Panel.>
2) Remove the instrument panel lower cover. <Ref. to EI-36, REMOVAL, Instrument Panel Lower Cover.>
3) Remove the glove box. <Ref. to EI-37, REMOVAL, Glove Box.>
4) Remove the console box. <Ref. to EI-38, 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.

17.Instrument Panel Assembly

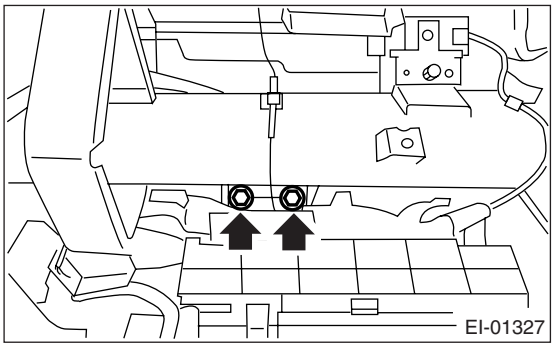
A: REMOVAL

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 pulling force may damage the harness.
• Be careful to the harness of airbag system. Damage of the harness may cause the air bag system malfunction.
• Take care not to damage the interior trims when removing the instrument panel from the vehicle body.

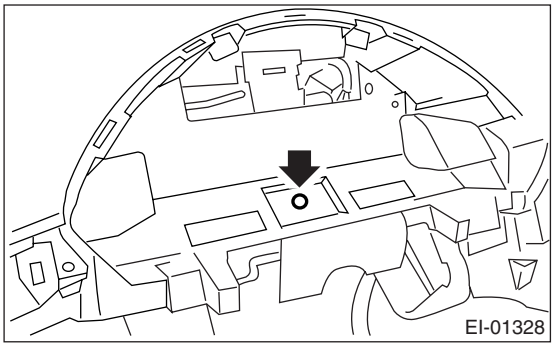
NOTE:
• Putting alignment marks to each connector as necessary facilitates the reassembly work.
• When storing the removed instrument panel, be sure to prepare a table or the like to put the instrument panel on in order to prevent damage.

1. INSTRUMENT PANEL UPPER

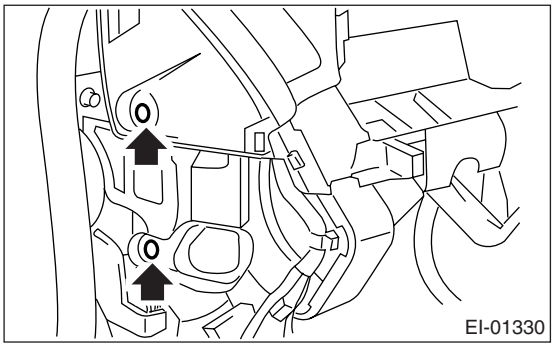
1) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
2) Remove the console box. <Ref. to EI-38, REMOVAL, Console Box.>
3) Remove the instrument panel lower cover. <Ref. to EI-36, REMOVAL, Instrument Panel Lower Cover.>
4) Remove the glove box. <Ref. to EI-37, REMOVAL, Glove Box.>
5) Remove the center console. <Ref. to EI-39, REMOVAL, Center Console.>
6) Remove the audio unit. <Ref. to ET-14, REMOVAL, Audio.>
7) Remove the combination meter assembly. <Ref. to IDI-11, REMOVAL, Combination Meter.>
8) Remove the upper grille. <Ref. to AC-46, UPPER GRILL, REMOVAL, Air Vent Grille.>
9) Remove the multi function display or navigation monitor, and warning box. <Ref. to ET-22, REMOVAL, Navigation Display.>
10) Remove the front pillar upper trim. <Ref. to EI-43, REMOVAL, Side Trim.>
11) Remove the mounting bolts of the passenger's side air bag module.



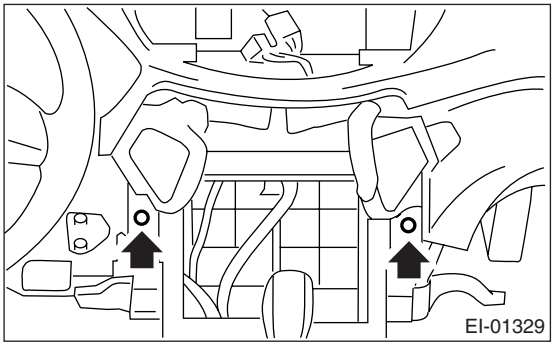
12) Remove the following screws.
• In combination meter house



• At the sides (left and right) of instrument panel



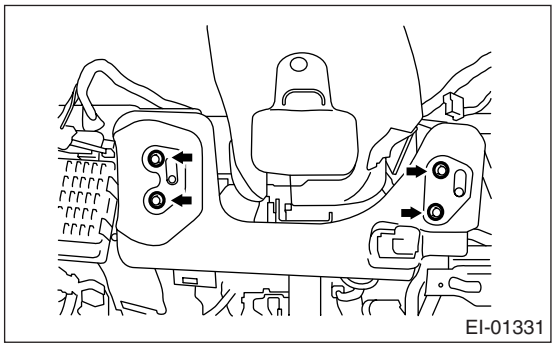
• Instrument panel center



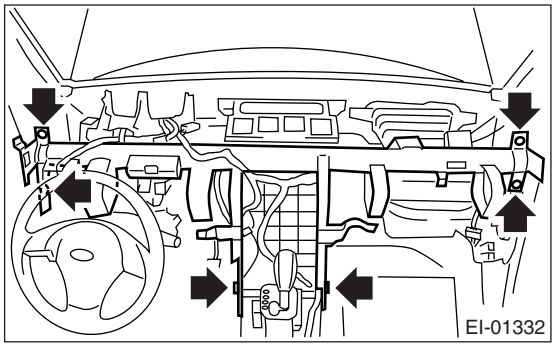
13) Make sure that the instrument panel upper is removed from the steering support beam
14) Disconnect the connectors, and remove the instrument panel from vehicle body.
15) Remove the heater vent duct. <Ref. to AC-48, REMOVAL, Heater Vent Duct.>
16) Remove the air vent grille. <Ref. to AC-46, REMOVAL, Air Vent Grille.>
17) Remove the passenger airbag module. <Ref. to AB-16, 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.


EI-01331

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.


EI-01332

3. INSTRUMENT PANEL ASSEMBLY

1) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
2) Remove the console box. <Ref. to EI-38, REMOVAL, Console Box.>
3) Remove the instrument panel lower cover. <Ref. to EI-36, REMOVAL, Instrument Panel Lower Cover.>
4) Remove the glove box. <Ref. to EI-37, REMOVAL, Glove Box.>
5) Remove the center console. <Ref. to EI-39, REMOVAL, Center Console.>
6) Remove the front pillar upper trim. <Ref. to EI-43, 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.

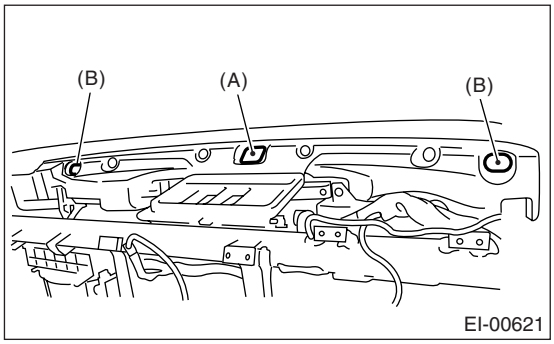
10) Make sure that the each harness connector is disconnected, and remove the instrument panel assembly from the vehicle body.

NOTE:
Remove the passenger's side door trim to facilitate the work.

B: INSTALLATION

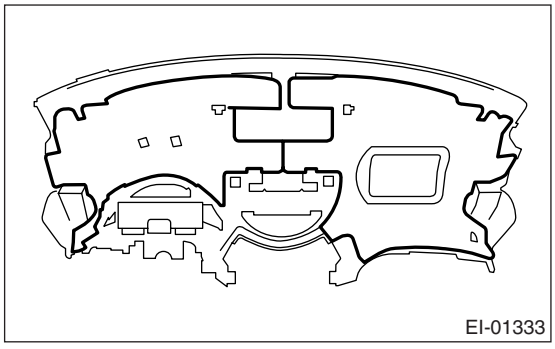
1. INSTRUMENT PANEL UPPER

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

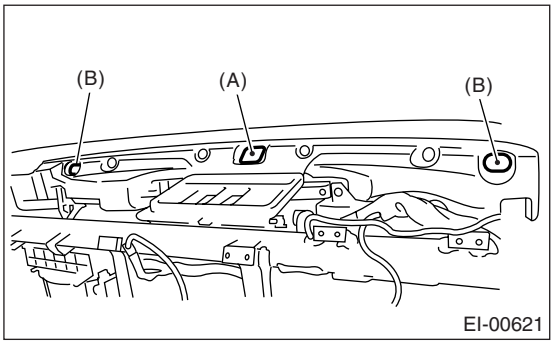
1) Temporarily tighten the steering support beam with bolts, and then route the harness.
2) Make sure that there is no mutual interference in each pedal, and then tighten each bolt.

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)

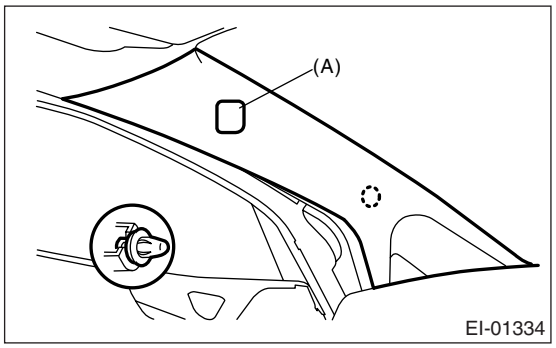
5) Install in the reverse order of removal.

18.Side Trim

A: REMOVAL

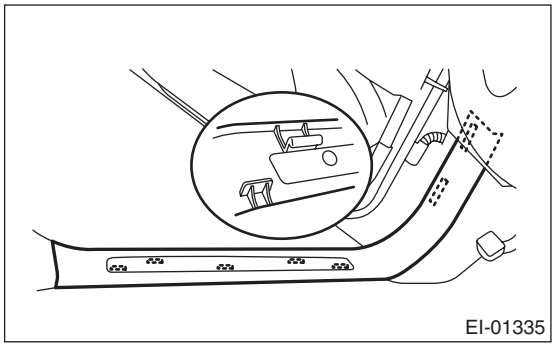
1. FRONT PILLAR UPPER TRIM

1) Remove the cap (A) on the upper side of pillar trim, and remove the bolt inside.
2) Remove the front pillar upper trim.



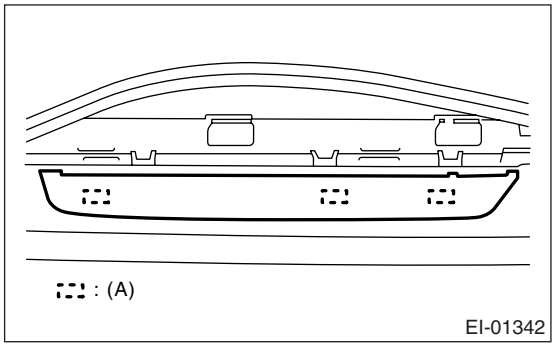
2. FRONT DOOR SCUFF PLATE

1) Remove the front door scuff plate.



(A) Claw

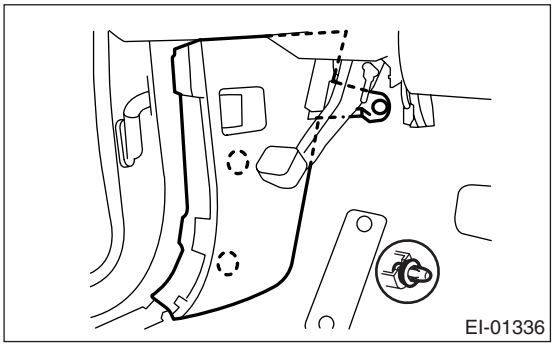
2) Remove the scuff plate outer.



(A) Claw

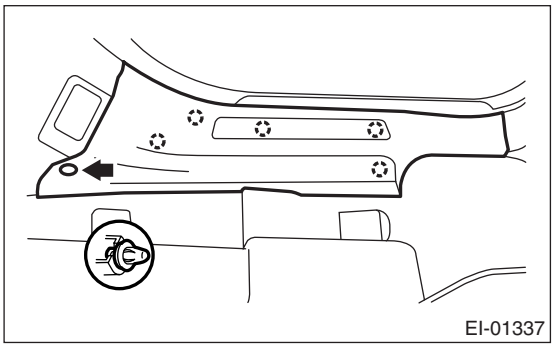
3. FRONT PILLAR LOWER TRIM

1) Front door scuff plate
2) Remove the clip, and remove the front pillar trim.

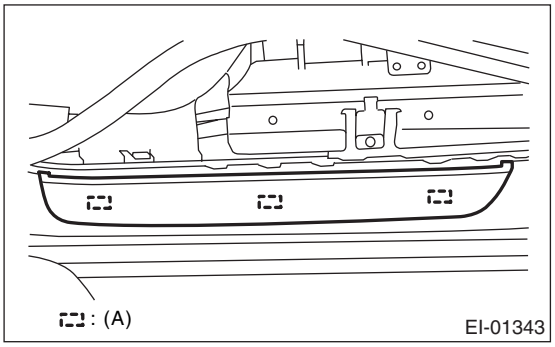


4. REAR DOOR SCUFF PLATE

1) Remove the clips and disengage the claws on the rear side of scuff plate, and then remove the rear door scuff plate.



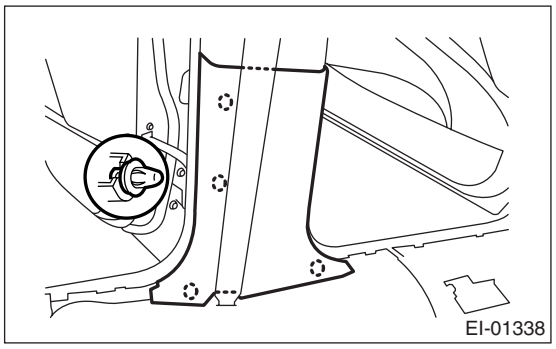
2) Remove the scuff plate outer.



(A) Claw

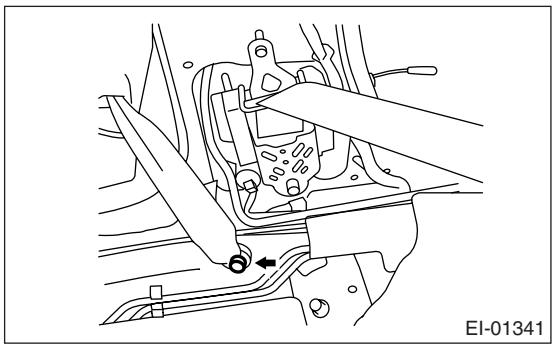
5. CENTER PILLAR LOWER TRIM

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.

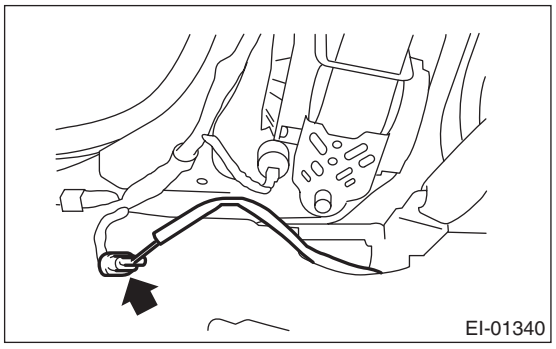

EI-01338

6. CENTER PILLAR UPPER TRIM

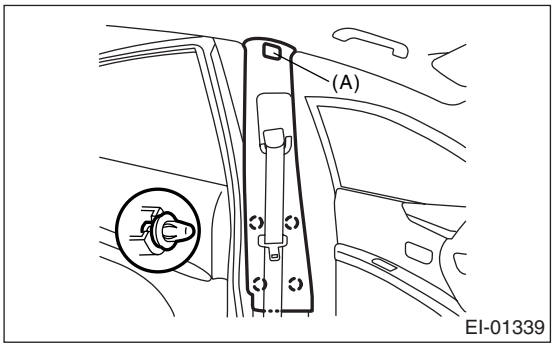
1) When removing the parts of passenger's side, disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
2) Remove the front door scuff plate.
3) Remove the rear door scuff plate.
4) Remove the center pillar lower trim.
5) Turn over the floor mat to remove the seat belt lower anchor bolt.


EI-01341

6) Disconnect the connector of belt tension sensor on passenger's side.


EI-01340

7) Remove the cap (A) on the upper side of pillar trim, and remove the bolt inside.
8) Remove the clip, and remove the center pillar upper trim.



EI-01339

B: INSTALLATION

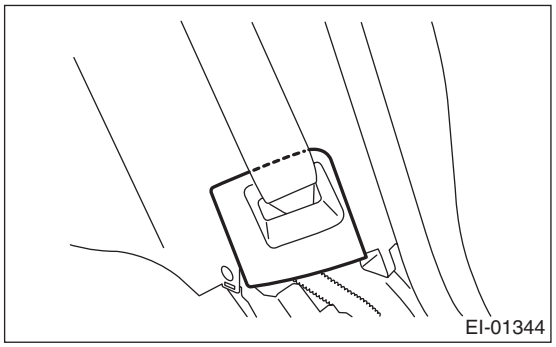
Install each side trim in the reverse order of removal.

NOTE:
When installing the side trim, make sure that the clips and hooks match the holes of vehicle body before pushing the parts.

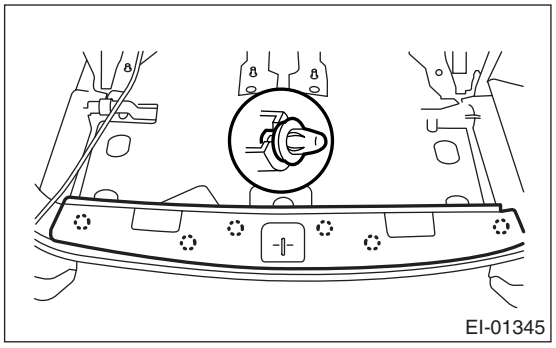
19.Rear Quarter Trim

A: REMOVAL

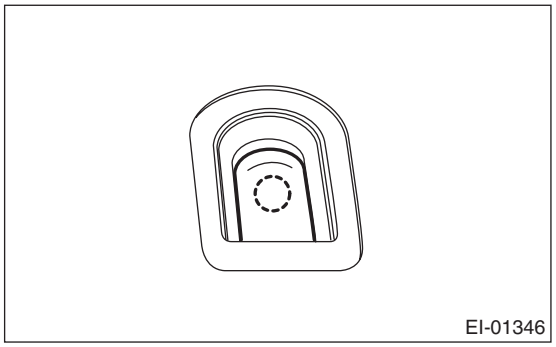
1) Remove the third-row seats. <Ref. to SE-17, REMOVAL, Third-row Seats.>
2) Remove the rear door scuff plate. <Ref. to EI-43, REMOVAL, Side Trim.>
3) Remove the lower anchor cover.


EI-01344

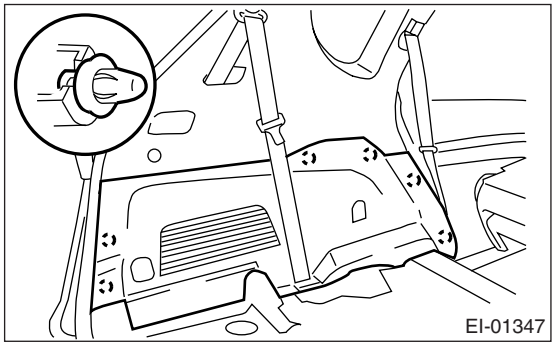
4) Remove the luggage floor mat and utility box.
5) Remove the luggage floor end cover.


EI-01345

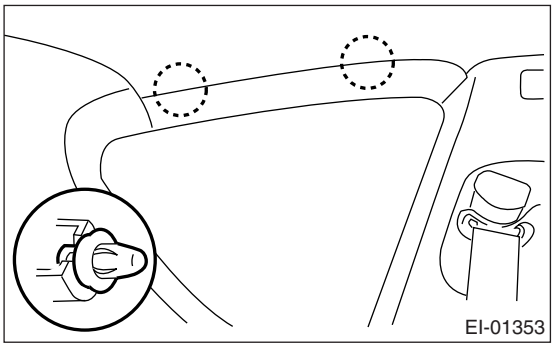
6) Remove the cover, and remove the bolts inside.


EI-01346

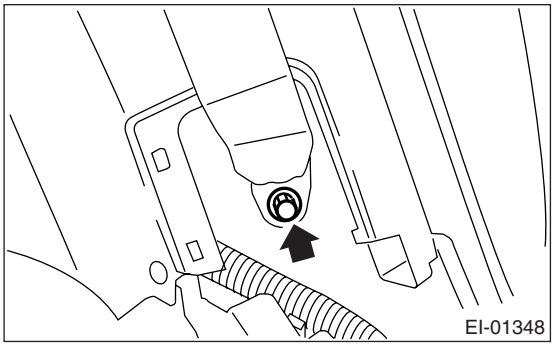
7) Remove the rear quarter lower trim.


EI-01347

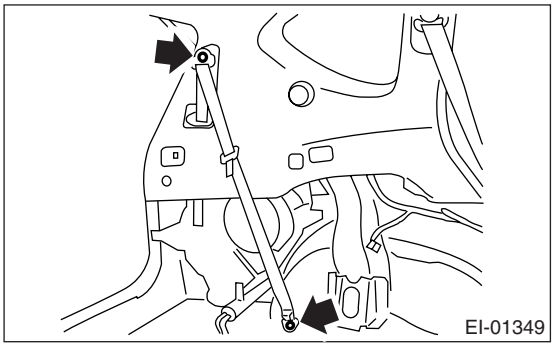
8) Remove the rear quarter top trim.


EI-01353

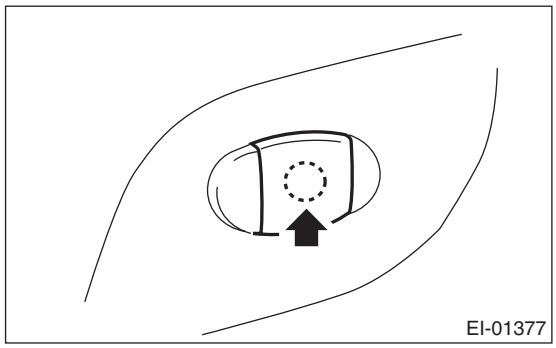
9) Remove the lower anchor bolts of second-row seat belts.


EI-01348

10) Remove the upper and lower anchor bolts of third-row seat belts.

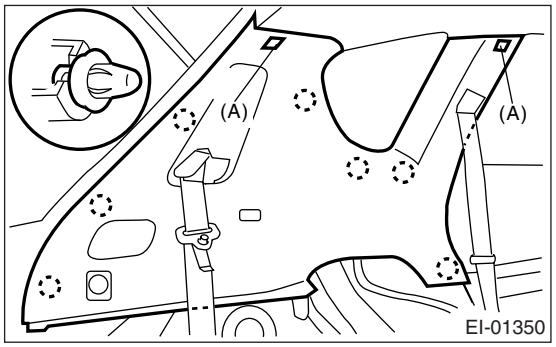

EI-01349

11) Remove the cover, and remove the bolts inside.


EI-01377

12) Remove the cap (A) on the upper side of 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.

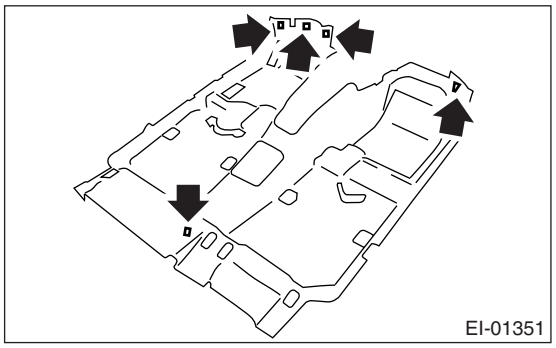
20.Floor Mat

A: REMOVAL

1. FRONT FLOOR MAT

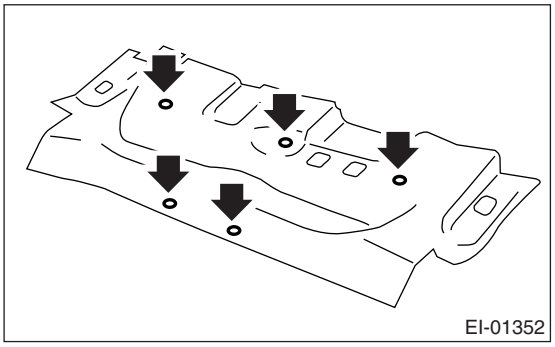
1) Remove the front seats. <Ref. to SE-7, REMOVAL, Front Seat.>
2) Remove the second–row seats. <Ref. to SE-12, REMOVAL, Second-row Seats.>
3) Remove the console box. <Ref. to EI-38, REMOVAL, Console Box.>
4) Remove the instrument panel lower cover. <Ref. to EI-36, REMOVAL, Instrument Panel Lower Cover.>
5) Remove the glove box. <Ref. to EI-37, REMOVAL, Glove Box.>
6) Remove the following trims. <Ref. to EI-43, 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-45, REMOVAL, Remote Openers.>
8) Remove the navigation unit. <Ref. to ET-23, REMOVAL, Navigation Body.>
9) Remove the clips, then remove the front floor mats.


EI-01351

2. REAR FLOOR MAT

1) Remove the second–row seats. <Ref. to SE-12, REMOVAL, Second-row Seats.>
2) Remove the third-row seats. (7 seater model)<Ref. to SE-17, REMOVAL, Third-row Seats.>
3) Remove the luggage box (front). (5 seater model)
4) Remove the rear quarter lower trim. <Ref. to EI-45, REMOVAL, Rear Quarter Trim.>
5) Remove the clips, then remove the rear floor mats.


EI-01352

B: INSTALLATION

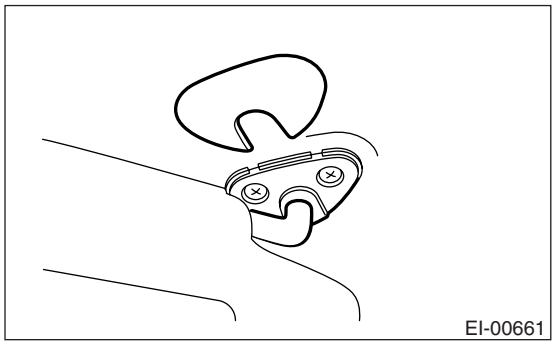
Install in the reverse order of removal.

NOTE:
- Secure the mat firmly with hook and clip.
- Insert the mat edge firmly into the groove of side sill cover.

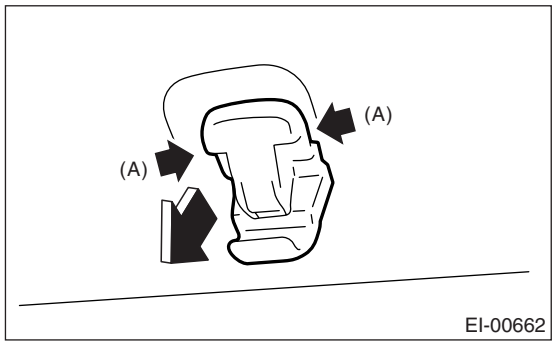
21.Sun Visor

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.



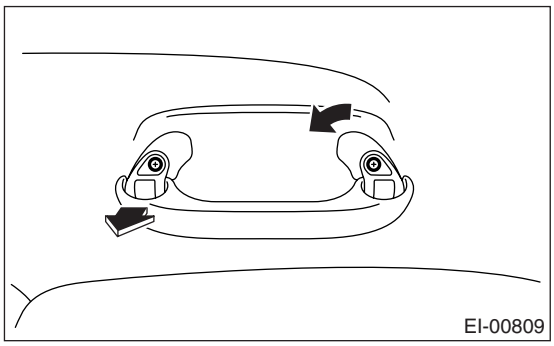
B: INSTALLATION

Install in the reverse order of removal.

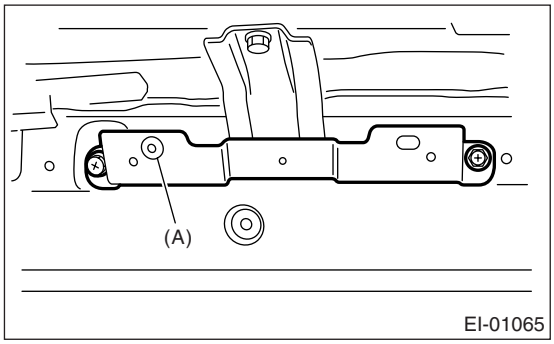
22.Assist Grip

A: REMOVAL

1) Remove the screw cover, and remove the screw inside.
2) Pull the left side of assist grip toward you, and rotate the right side of it counterclockwise to remove.



3) Remove the roof trim. <Ref. to EI-50, REMOVAL, Roof Trim.>
4) Remove the bolts, and remove the assist grip bracket.



(A) Grommet

B: INSTALLATION

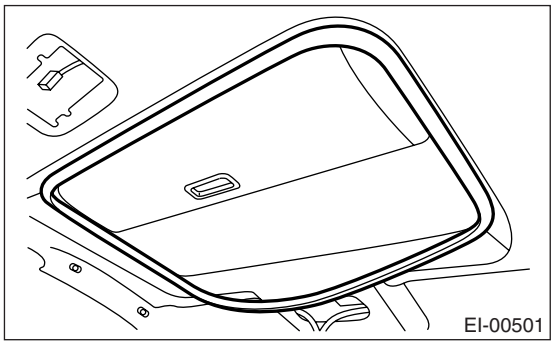
Install in the reverse order of removal.

CAUTION:
Be sure to install the grommet to assist grip bracket.
When the assist grip is installed with no grommet, it ill cause the grip to not return properly.

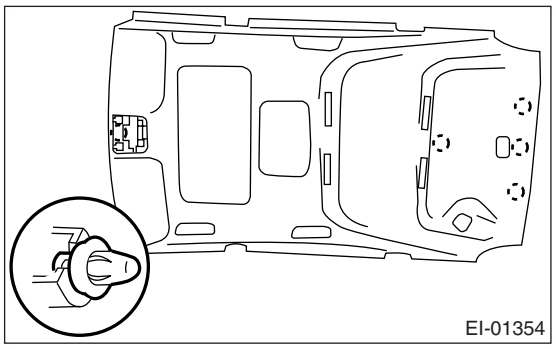
23.Roof Trim

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the spot map light. <Ref. to LI-29, REMOVAL, Spot Map Light.>
3) Remove the room light or rear entertainment (model with rear entertainment system). <Ref. to LI-30, REMOVAL, Room Light.>
4) Remove the sun visor. <Ref. to EI-48, REMOVAL, Sun Visor.>
5) Remove the assist grip. <Ref. to EI-49, REMOVAL, Assist Grip.>
6) Remove the front pillar upper trim and center pillar upper trim. <Ref. to EI-43, REMOVAL, Side Trim.>
7) Remove the rear quarter upper trim. <Ref. to EI-45, REMOVAL, Rear Quarter Trim.>
8) Remove the sunroof opening trim.



9) Remove the clips and each harness, pull out the rear center seat belt, and remove the roof trim.



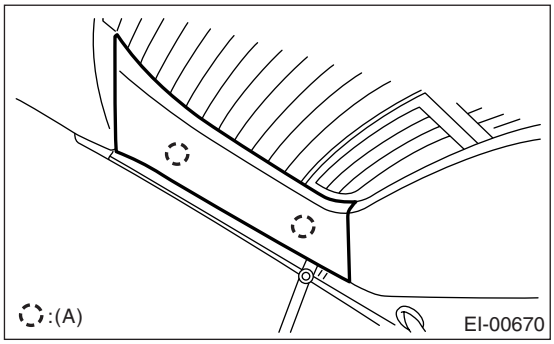
B: INSTALLATION

Install in the reverse order of removal.

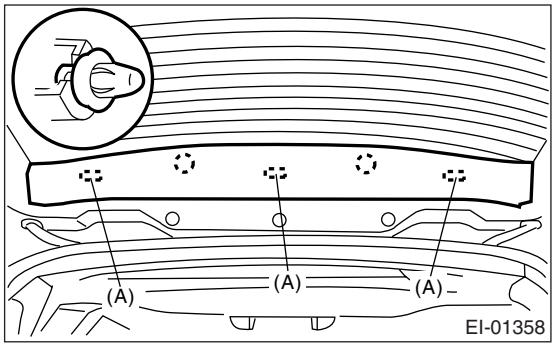
24.Rear Gate Trim

A: REMOVAL

1) Remove the claws (A), and remove the rear gate pillar trim.

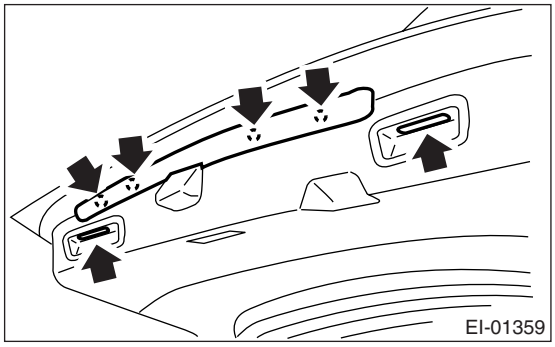


2) Remove the clips and claws (A), and remove the rear gate upper trim.

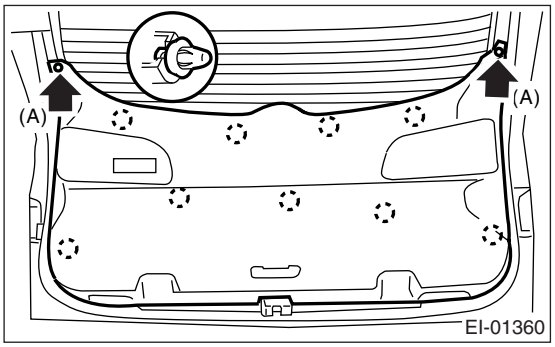


3) Remove the cover in the inner handle, and loosen the inside screw.

4) Turn over the weather strip, and remove the clips.



5) Remove the clips (A), and remove the rear gate lower trim.



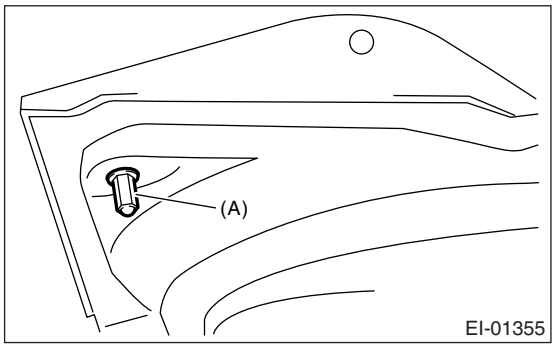
B: INSTALLATION

Install in the reverse order of removal.

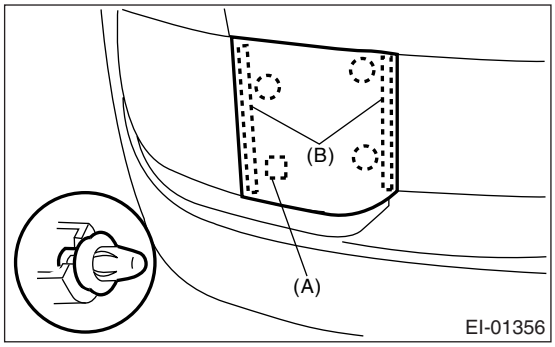
25.Rear Gate Garnish

A: REMOVAL

1) Remove the hexagon cap nut (A).



2) Remove the rear gate garnish.



(A) Hexagon cap nut
(B) Double-sided tape

B: INSTALLATION

Use new double-sided tapes, and install in the reverse order of removal.

NOTE:
Refer to the installing procedure of side garnish.

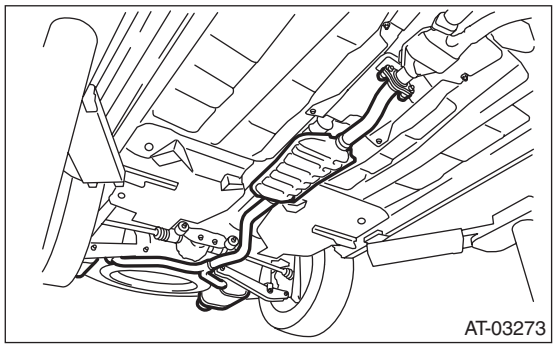
Tightening torque:
4.5 N·m (0.46 kgf-m, 3.32ft-lb)

26.Heat Shield Cover

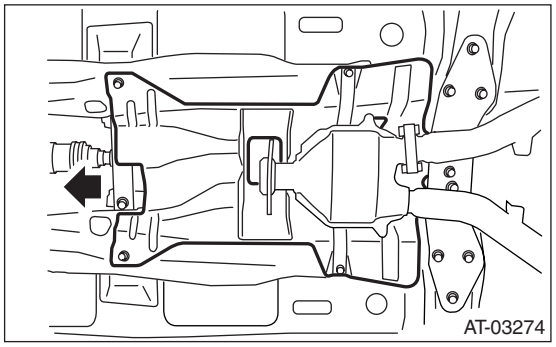
A: REMOVAL

1. FRONT HEAT SHIELD COVER

1) Remove the rear exhaust pipe and muffler.

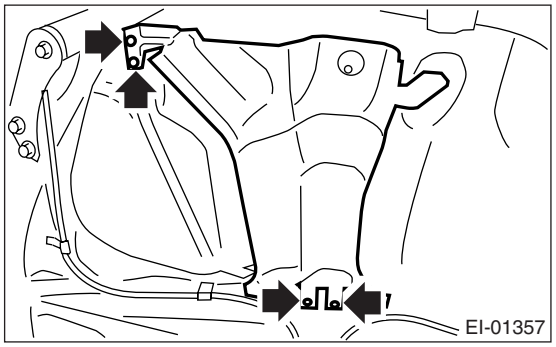


2) Remove the bolts to remove the front heat shield cover.



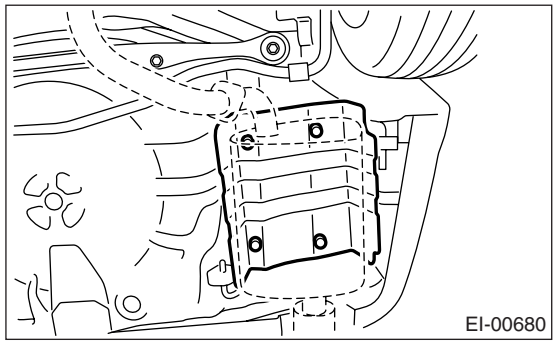
2. CENTER HEAT SHIELD COVER

1) Remove the fuel tank protector. <Ref. to EI-18, 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)-6, REMOVAL, Rear Exhaust Pipe.>
2) Remove the rear heat shield cover.



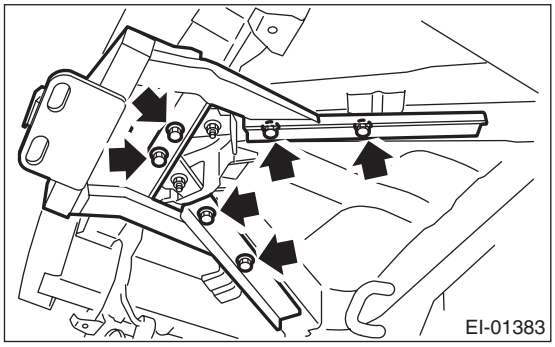
B: INSTALLATION

Install in the reverse order of removal.

27.Trailer Hitch

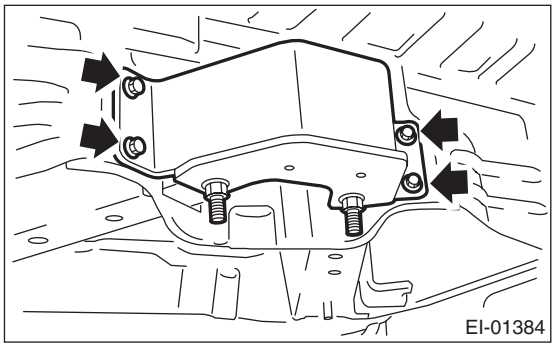
A: REMOVAL

1) Remove the spare tire hoist. <Ref. to WT-13, 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

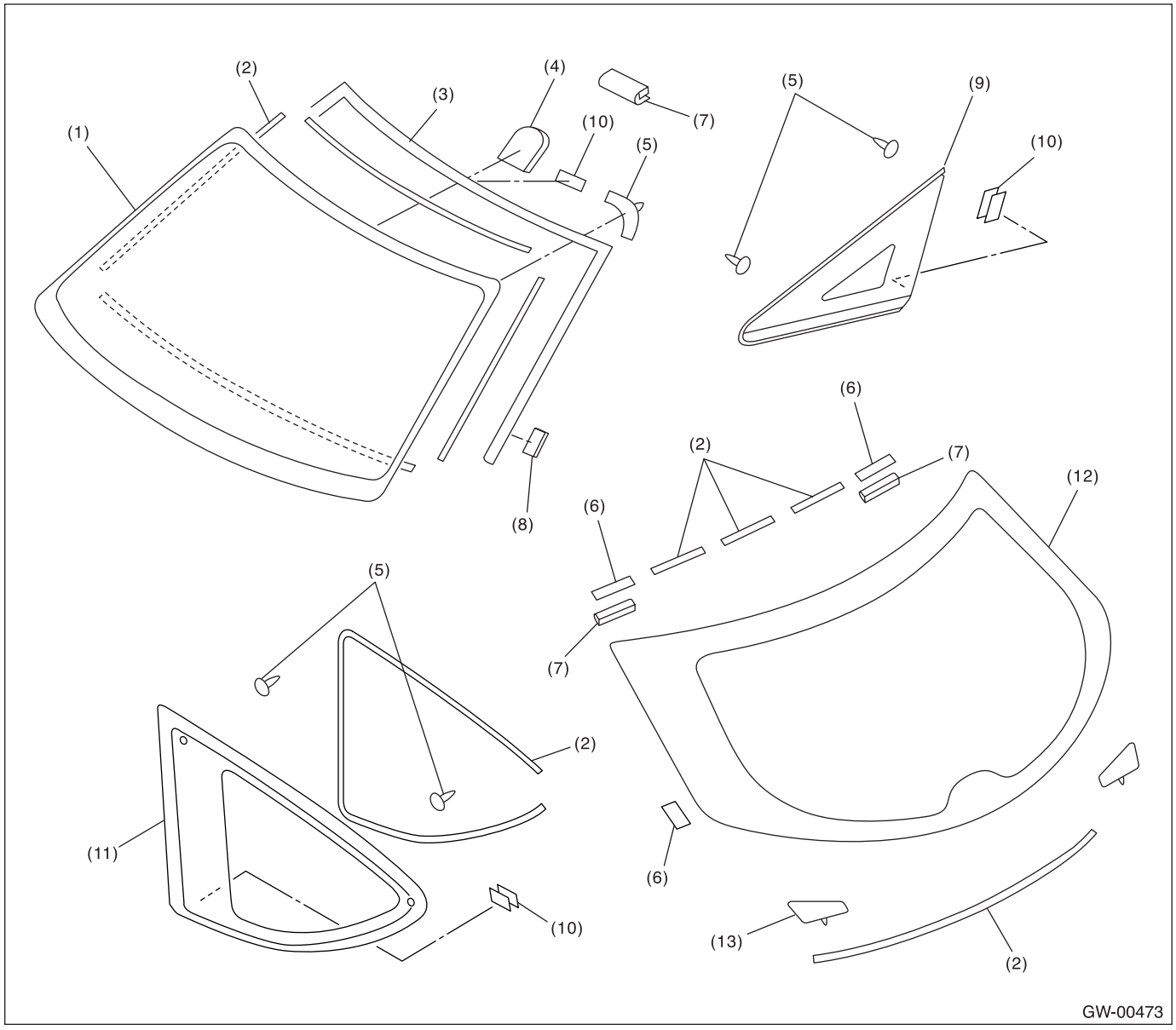
Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to EI-16, TRAILER HITCH, COMPONENT, General Description.>

1. General Description

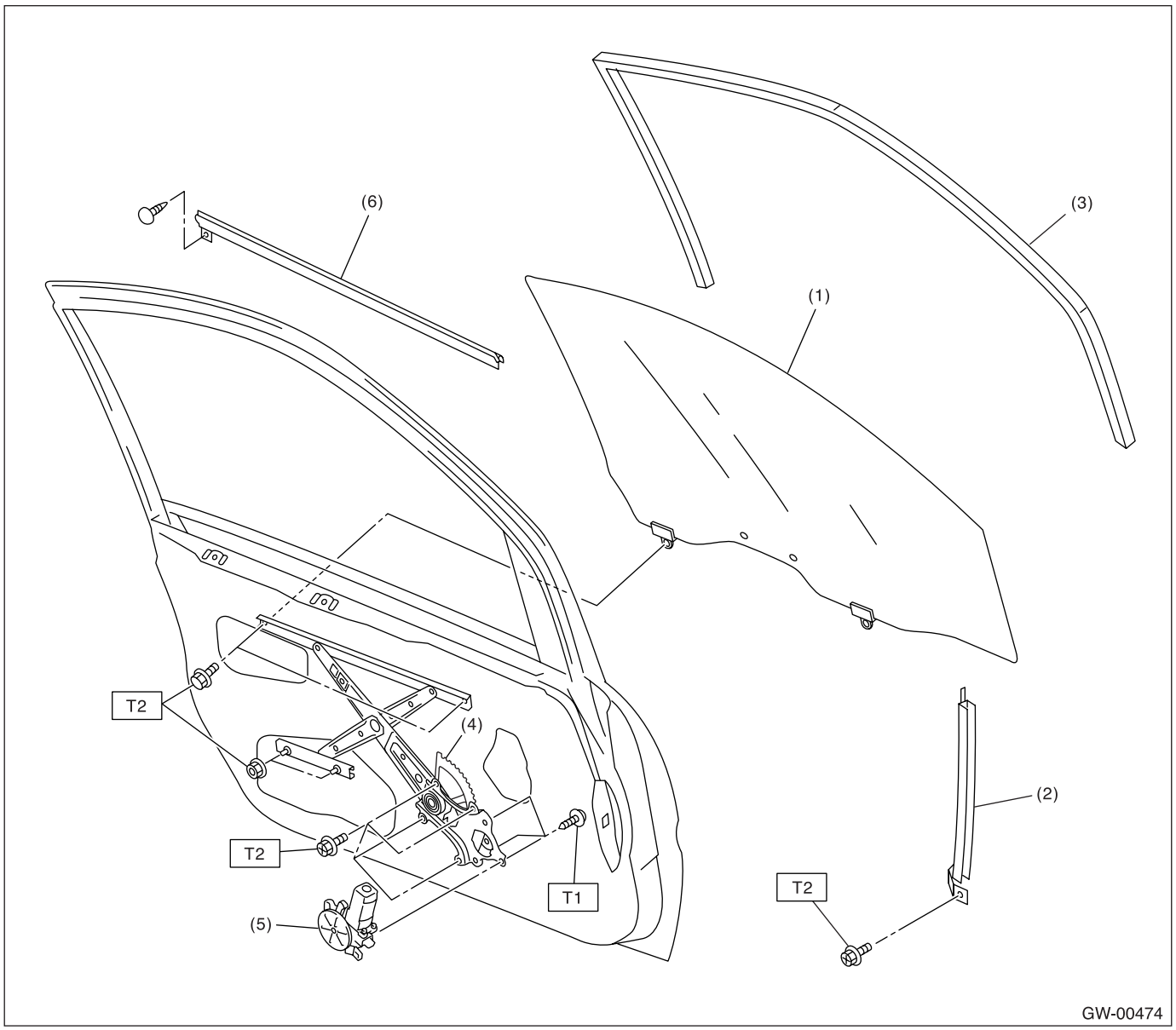
A: COMPONENT

1. FIXED GLASS



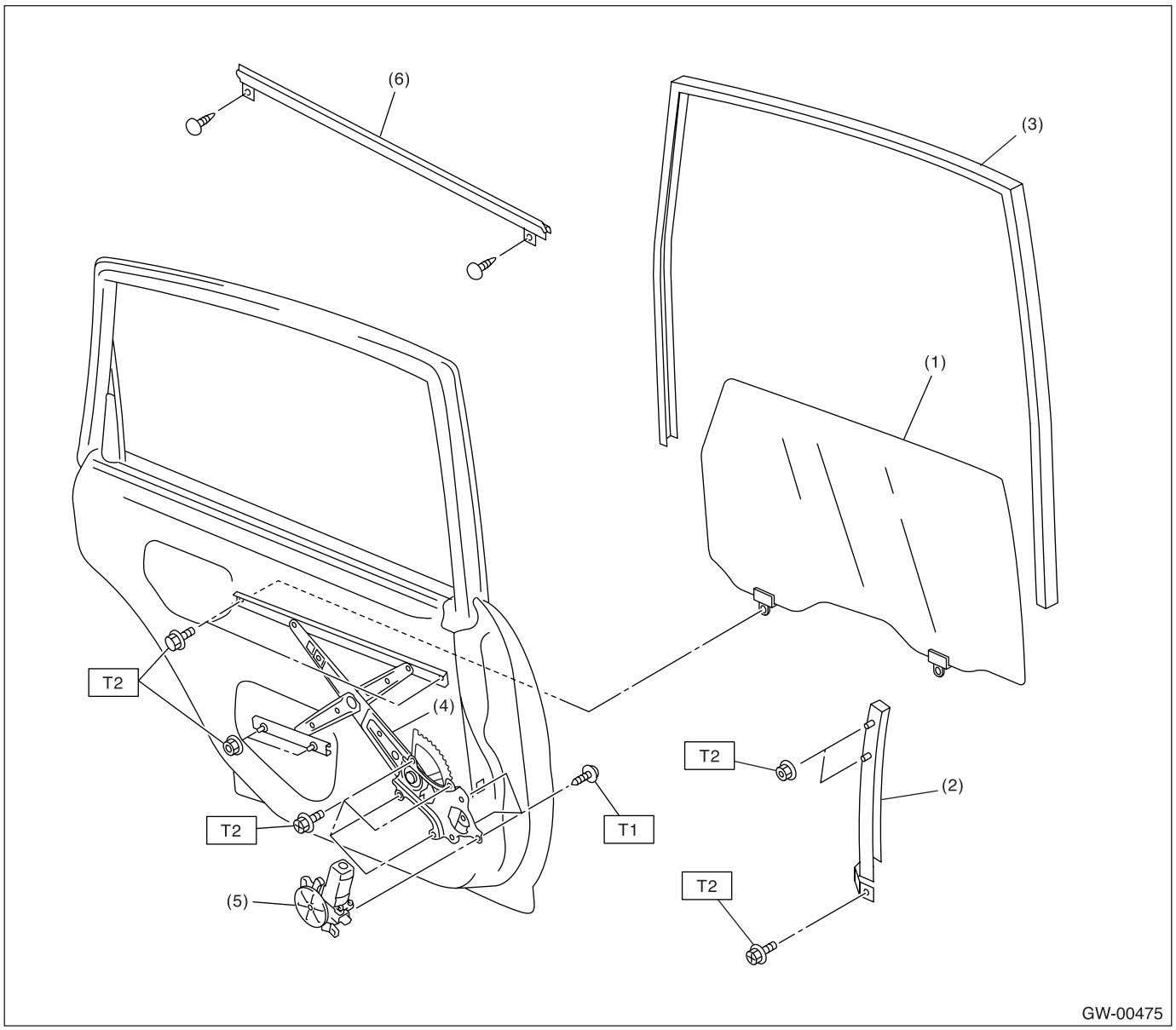
(1) Windshield glass
(2) Dam rubber
(3) Molding front
(4) Rearview mirror mount
(5) Locating pin
(6) Spacer
(7) Fastener
(8) Seal
(9) Front quarter glass
(10) Fastener
(11) Rear quarter glass
(12) Rear gate glass
(13) Glass clip pin

2. FRONT DOOR GLASS



(1)	Glass	(4)	Regulator ASSY	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Door sash	(5)	Motor ASSY	***T1: 4.9 (0.5, 3.6)***
(3)	Glass run rubber	(6)	Weather strip	***T2: 7.4 (0.75, 5.5)***

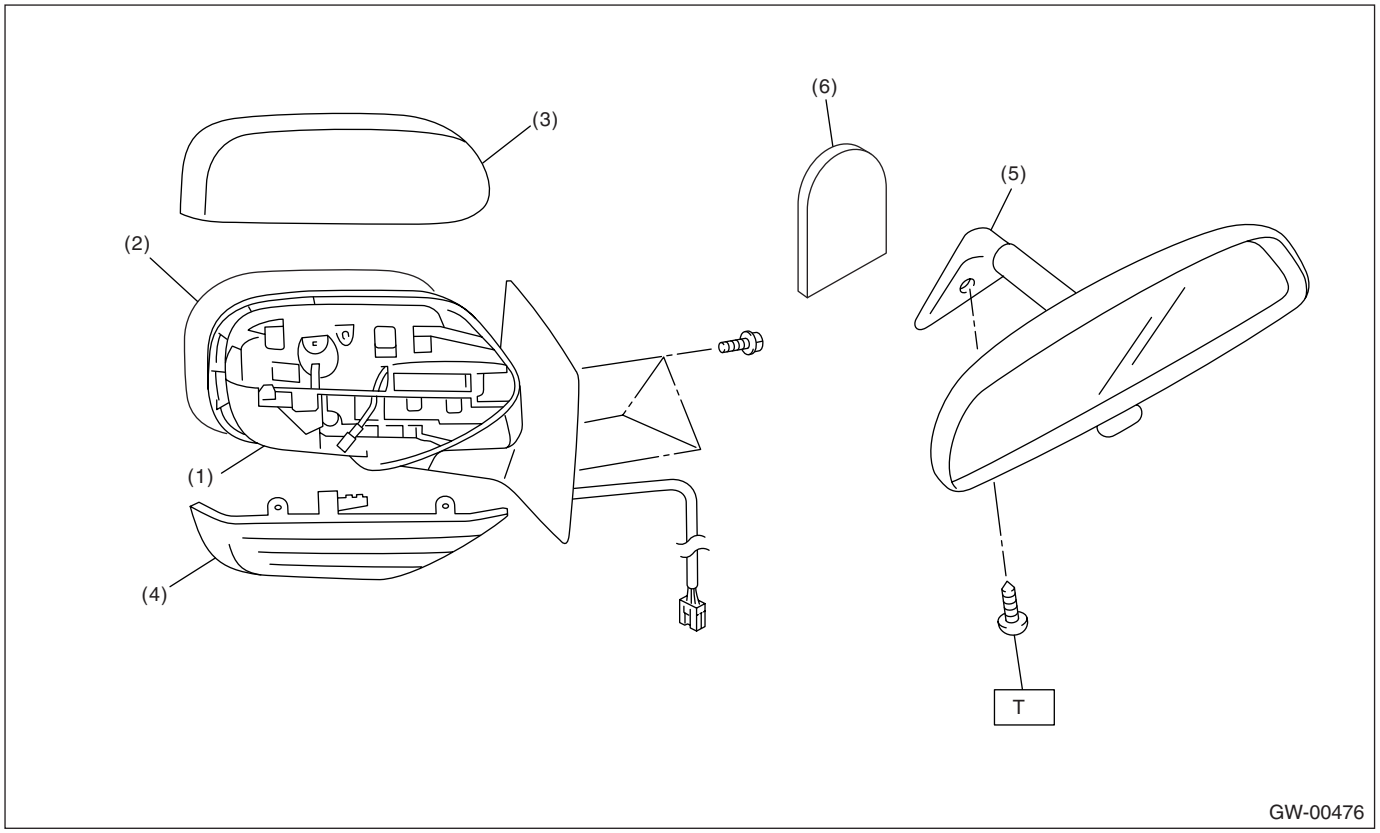
3. REAR DOOR GLASS



(1) Glass
(2) Door sash
(3) Glass run rubber
(4) Regulator ASSY
(5) Motor ASSY
(6) Weather strip

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.5)

4. MIRROR



(1) Outer mirror
(2) Mirror
(3) Scalp cap
(4) Side turn signal light
(5) Rearview mirror
(6) Mount

Tightening torque: N·m (kgf-m, ft-lb)
T: 2 (0.2, 1.5)

B: CAUTION

- When electrical connectors are disconnected, always conduct an operational check after connecting them again.
- Avoid impact and damage to the glass.

C: PREPARATION TOOL

1. 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.
TORX® T20	Used for removing and installing the rearview mirror.

2. Power Window System

A: WIRING DIAGRAM

<Ref. to WI-124, Power Window System.>

B: INSPECTION

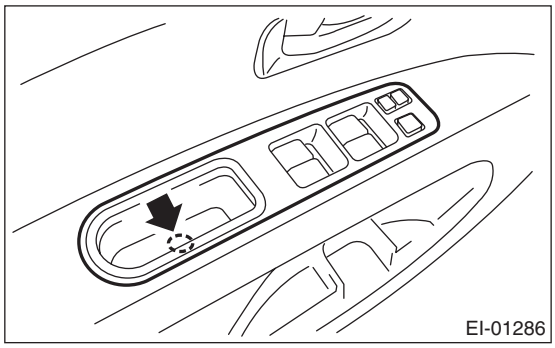
Symptom	Repair order
All power windows do not operate.	1. Fuse (SBF-4) 2. Power window circuit breaker 3. Power window relay 4. Wiring Harness 5. Body integrated unit
Particular window does not operate.	1. Power window main switch 2. Power window sub switch 3. Power window motor 4. Wiring Harness
“Window Lock” does not operate.	Power window main switch

3. Power Window Control Switch

A: REMOVAL

1. MAIN SWITCH

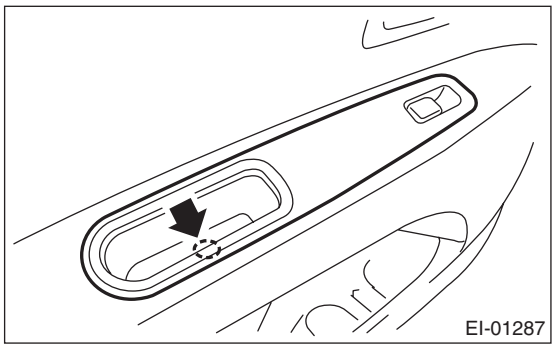
1) Disconnect the ground cable from battery.
2) Peel the cover inside the hand grip, and remove the screw.
3) Remove the power window switch cover assembly.



4) Disconnect the harness connector.
5) Remove the clip, 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.

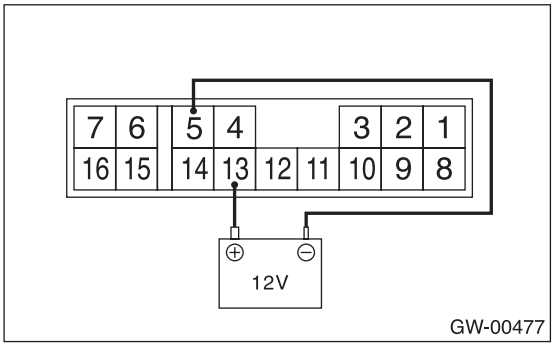
B: INSTALLATION

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

	Switch position	Terminal No.	Standard
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

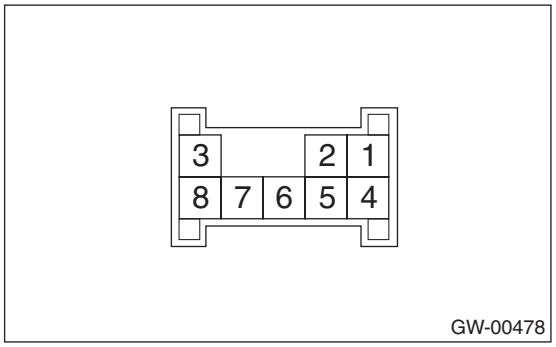
	Switch position	Terminal No.	Standard
Rear RH seat	UP	13 and 16, 5 and 15	Less than 1 Ω
	OFF	5 and 16, 5 and 15	Less than 1 Ω
	DOWN	13 and 15, 5 and 16	Less than 1 Ω

	Switch position	Terminal No.	Standard
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

Replace the main switch if faulty.

2. SUB SWITCH

Measure the switch resistance.



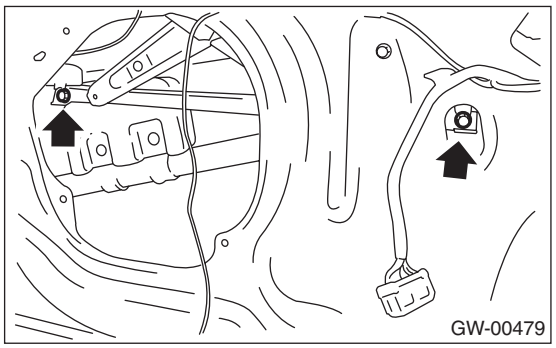
	Switch position	Terminal No.	Standard
Passenger's seat and rear seat	UP	5 and 8, 7 and 4	Less than 1 Ω
	OFF	6 and 5, 7 and 4	Less than 1 Ω
	DOWN	8 and 7, 6 and 5	Less than 1 Ω

Replace the sub switch if faulty.

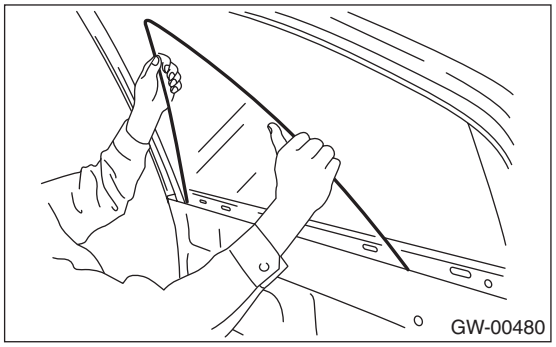
4. Front Door Glass

A: REMOVAL

1) Remove the front door trim. <Ref. to EI-35, REMOVAL, Door Trim.>
2) Remove the sealing cover. <Ref. to EB-18, REMOVAL, Front Sealing Cover.>
3) 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.

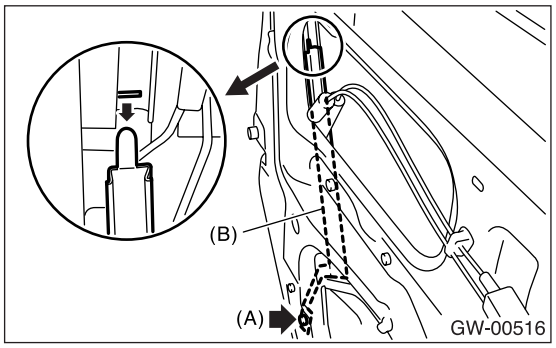


4) Tilt the door glass forward, then remove the door glass from the glass run rubber.
5) Remove the door glass.



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.

6) Remove the bolt (A), and then remove the door sash (B).



B: INSTALLATION

Install in the reverse order of removal.

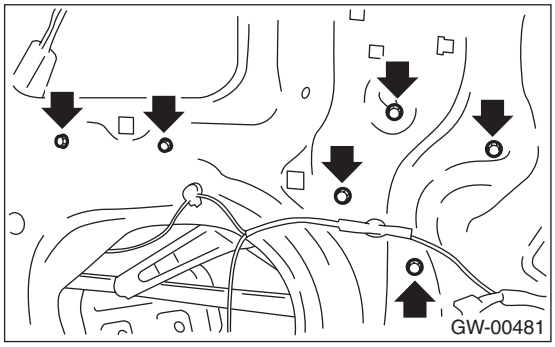
CAUTION:
Make sure that the glass stay is placed securely in sash.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to GW-3, FRONT DOOR GLASS, COMPONENT, General Description.>

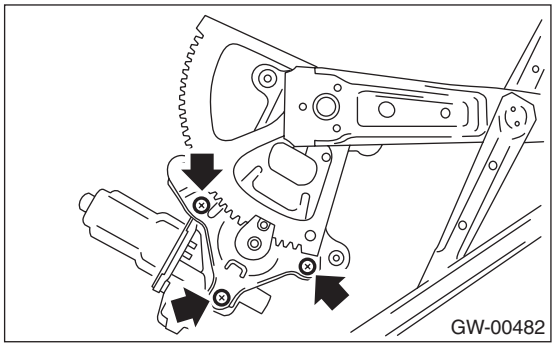
5. Front Regulator and Motor Assembly

A: REMOVAL

1) Remove the door glass. <Ref. to GW-9, 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-129, Remote Control Mirror System.>

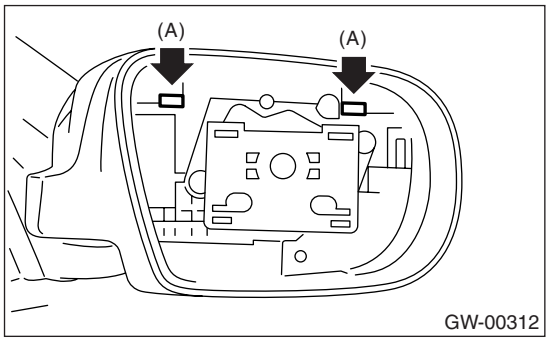
B: INSPECTION

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

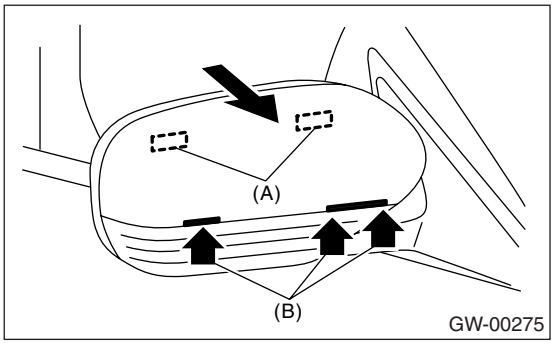
7. Scalp Cap

A: REPLACEMENT

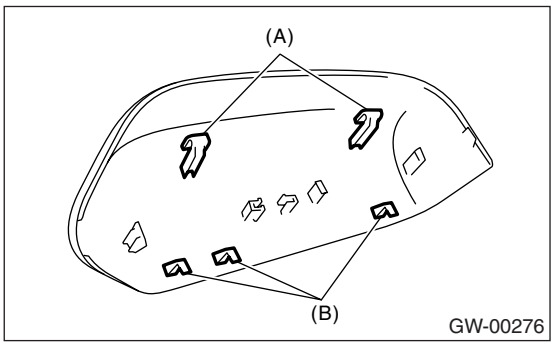
1) Remove the outer mirror. <Ref. to GW-14, REPLACEMENT, Outer Mirror.>
2) Press in the upper side clips (A) from inside of the outer mirror.



3) Pull the scalp cap frontward of outer mirror, remove the upper side clips (A) and lower side hooks (B), and then remove the scalp cap.



4) Insert the lower hooks (B) of scalp cap to outer mirror and push the upper clips (A) in.



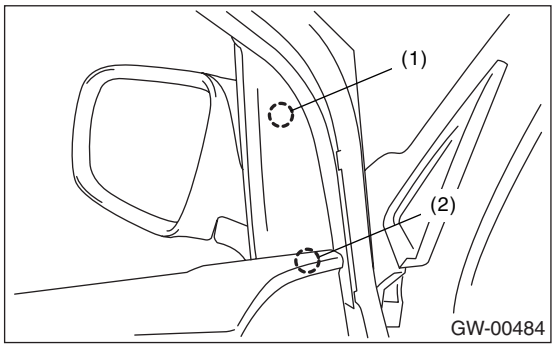
5) Install the scalp cap securely.

CAUTION:
Do not remove the scalp cap forcibly. The lower hooks may be damaged.

8. Outer Mirror Assembly

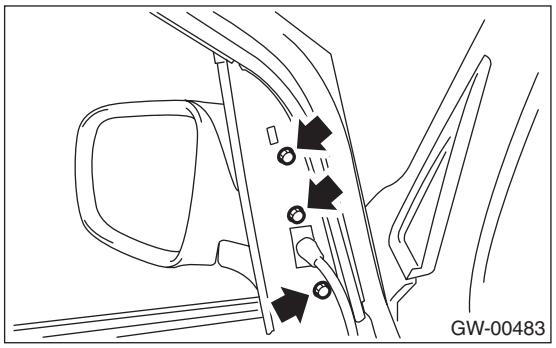
A: REMOVAL

1) Remove the mirror gusset cover.



(1) Clip
(2) Hook

2) Remove the door trim. <Ref. to EI-35, REMOVAL, Door Trim.>
3) Disconnect the mirror connector.
4) Remove the screws to remove outer mirror assembly.

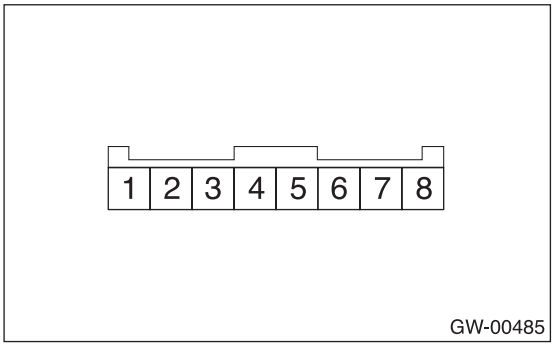


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Check that the rearview mirror moves properly when the battery voltage is applied to terminals.



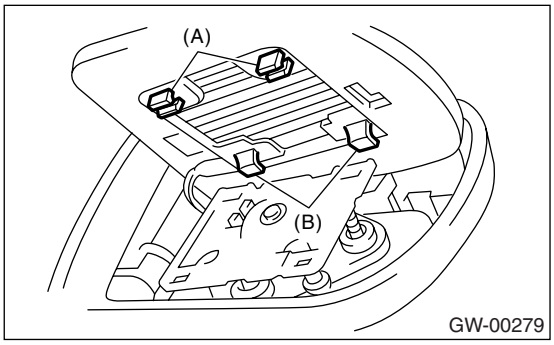
Mirror movement	Terminal No.
OFF	—
UP	5 (+) and 6 (–)
DOWN	6 (+) or 5 (–)
LEFT	8 (+) and 7 (–)
RIGHT	7 (+) or 8 (–)

Replace the outer mirror assembly if defective.

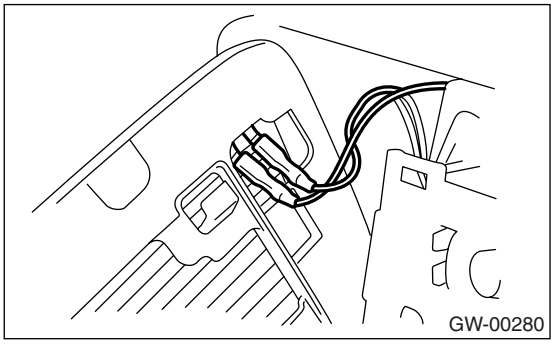
9. Outer Mirror

A: REPLACEMENT

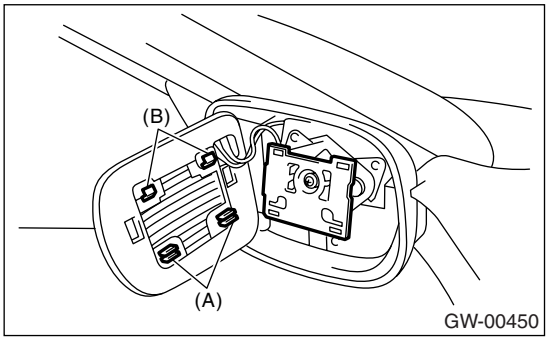
1) Face the mirror upward.
2) Use a flat tip screwdriver to remove clip (A).
3) Lift the lower mirror up to remove hooks (B).



4) Disconnect the mirror heater connector from side of the mirror. (Model with mirror heater)



5) Catch the hooks (B) and install clips (A).

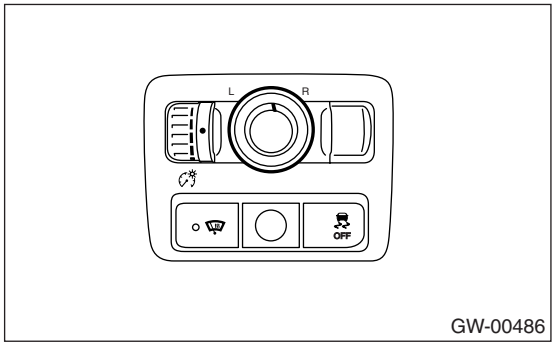


CAUTION:
• When removing the mirror, be careful not to damage the back surface of mirror with a flat tip screwdriver.
• When installing the mirror, insert the hook and clip securely.

10.Remote Control Mirror Switch

A: REMOVAL

1) Remove the instrument panel lower cover. <Ref. to EI-36, REMOVAL, Instrument Panel Lower Cover.>
2) Disconnect the connector.



3) Remove the remote control mirror switch from instrument panel lower cover.

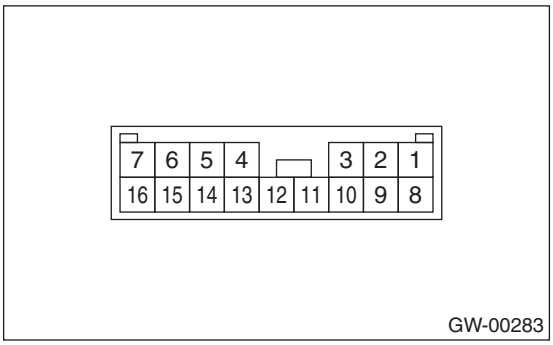
B: INSTALLATION

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

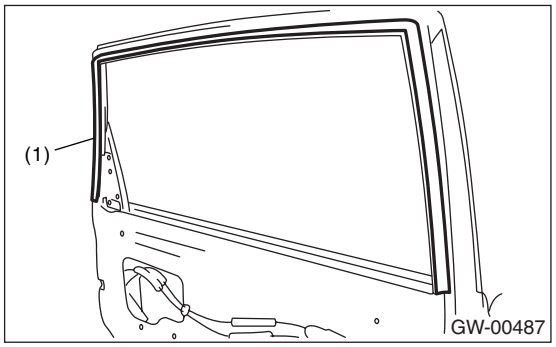
Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
UP	10 and 8 15 and 14	Less than 1 Ω
DOWN	10 and 15 8 and 14	Less than 1 Ω
LEFT	10 and 9 15 and 14	Less than 1 Ω
RIGHT	10 and 15 9 and 14	Less than 1 Ω

Replace the remote control mirror switch if defective.

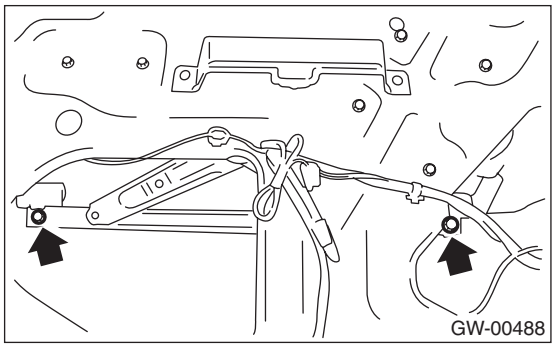
11.Rear Door Glass

A: REMOVAL

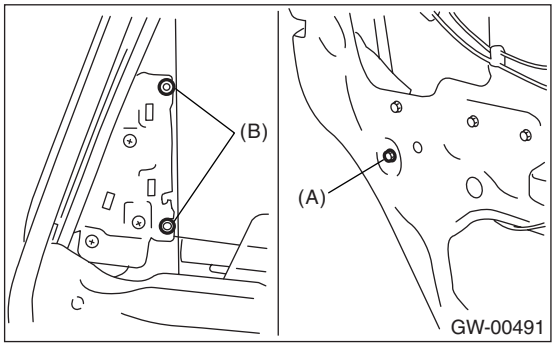
1) Remove the rear door trim. <Ref. to EI-35, REMOVAL, Door Trim.>
2) Remove the sealing cover. <Ref. to EB-21, REMOVAL, Rear Sealing Cover.>
3) Apply the protective tape (1) to the areas as shown in the figure.



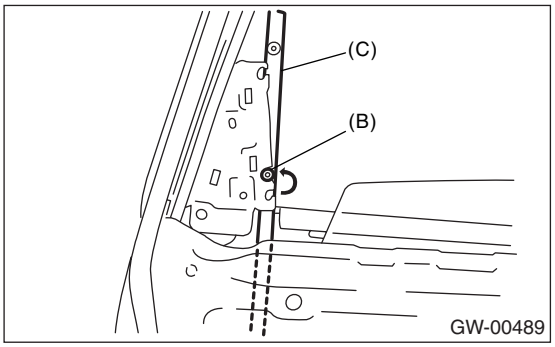
4) Operate the power window switch to move the glass to the position shown in the figure, and then remove the two bolts through service holes.



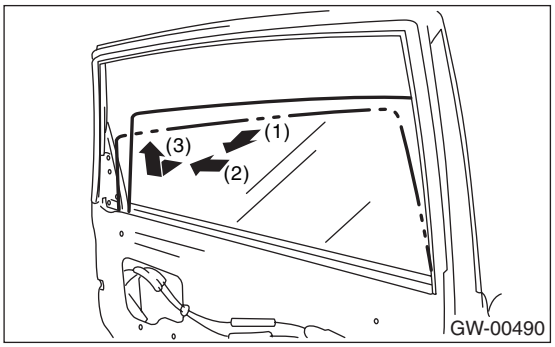
5) Remove the sash retaining bolts (A), and loosen the retaining nuts (B).



6) Move the sash (C) upward, and move the nut (B) to the position on rear door as shown in the figure.



7) 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.

8) Remove the glass run rubber.
9) Remove the door sash.

B: INSTALLATION

Install in the reverse order of removal.

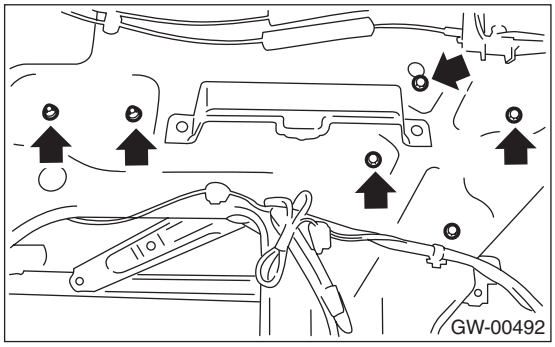
CAUTION:
Make sure that the glass run rubber is placed securely in door frame and sash.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to GW-4, REAR DOOR GLASS, COMPONENT, General Description.>

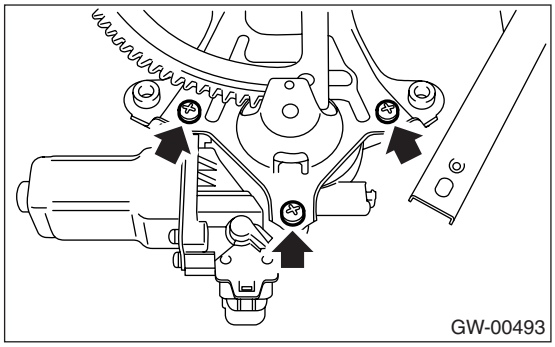
12.Rear Regulator and Motor Assembly

A: REMOVAL

1) Remove the rear door glass. <Ref. to GW-16, REMOVAL, Rear 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.



B: INSTALLATION

1) 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.

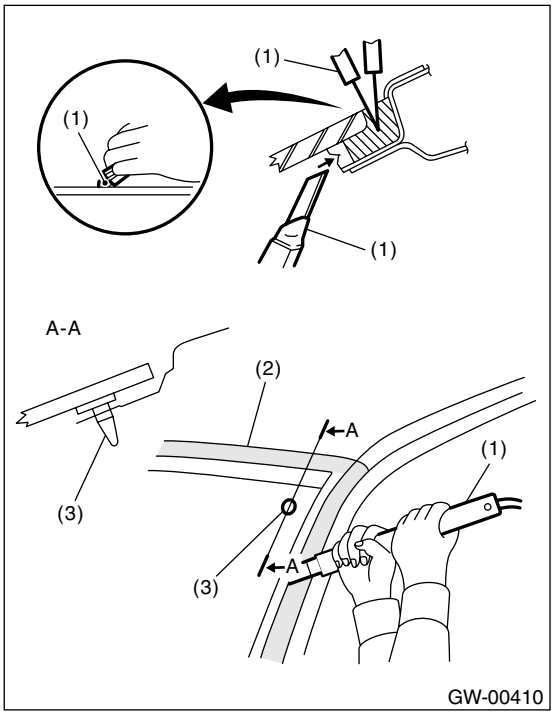
13.Windshield Glass

A: REMOVAL

1. USING WINDSHIELD GLASS KNIFE

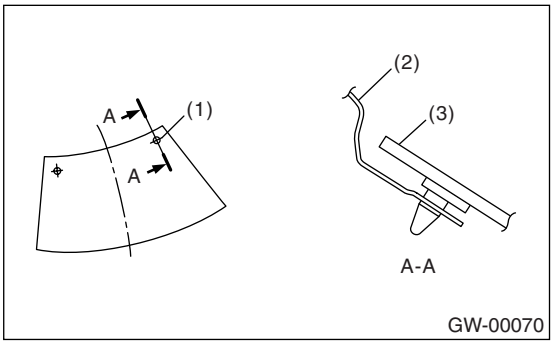
1) Remove the cowl panel. <Ref. to EI-30, REMOVAL, Cowl Panel.>
2) Remove the molding front.
3) Tape the body side of the circumference of windshield glass for protection.
4) Apply sufficient amount of soapy water to the adhesive part.
5) Insert the windshield glass knife into adhesive part.
6) While 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) Windshield glass knife
(2) Tape for protection
(3) Locating pin

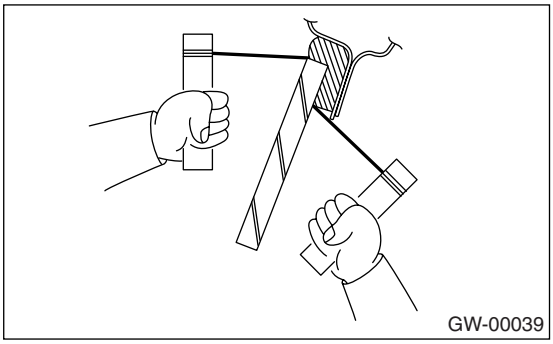
• The locating pins are bonded to the corners of glass. Use piano wire to disconnect the pins.



(1) Locating pin
(2) Body panel
(3) Windshield glass

2. USING PIANO WIRE

1) Remove the cowl panel. <Ref. to EI-30, REMOVAL, Cowl Panel.>
2) Remove the molding front.
3) Tape the body side of the circumference of windshield glass for protection.
4) Make a hole in the adhesive part using drill or knife.
5) Pass the piano wire through the hole, and attach both the wire ends securely to pieces of wood.



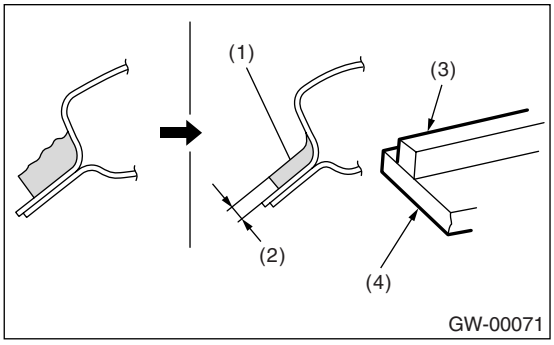
6) Pull the wire ends alternately to cut off the adhesive part.

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

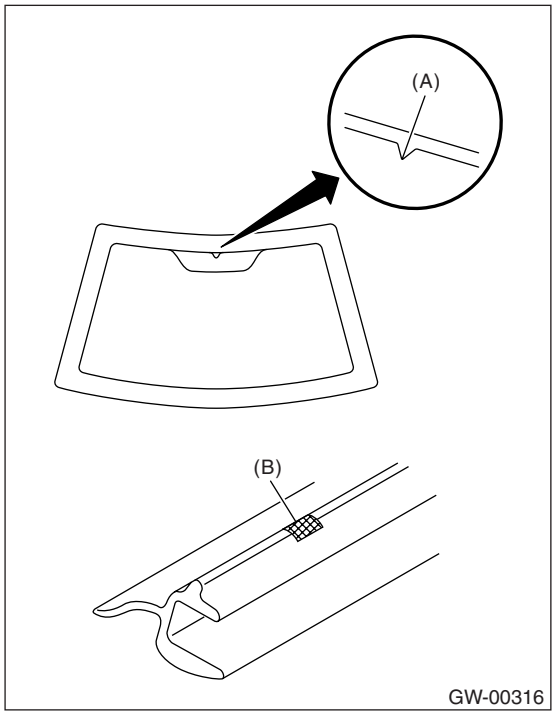
1) Clean the external circumference of windshield glass with alcohol or white gasoline.
2) Remove the adhesive layer on the body using cutter knife to obtain smooth face of 2 mm (0.08 in) thick.

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) Install the dam rubber.
5) Fit the mark (B) on molding to the notch (A) of glass side, and install the molding to entire perimeter of glass.



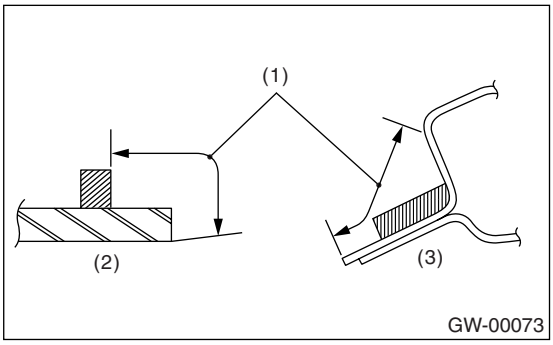
6) Apply two types of primers to the adhesive layer of glass using sponge.

Glass primer:
Dow Automotive
ESSEX U-401, U-402

7) Apply the primer to the adhesive layer of body.

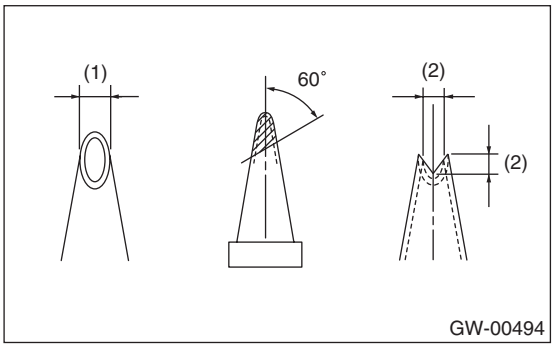
Painted surface primer:
Dow Automotive
ESSEX U-413

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

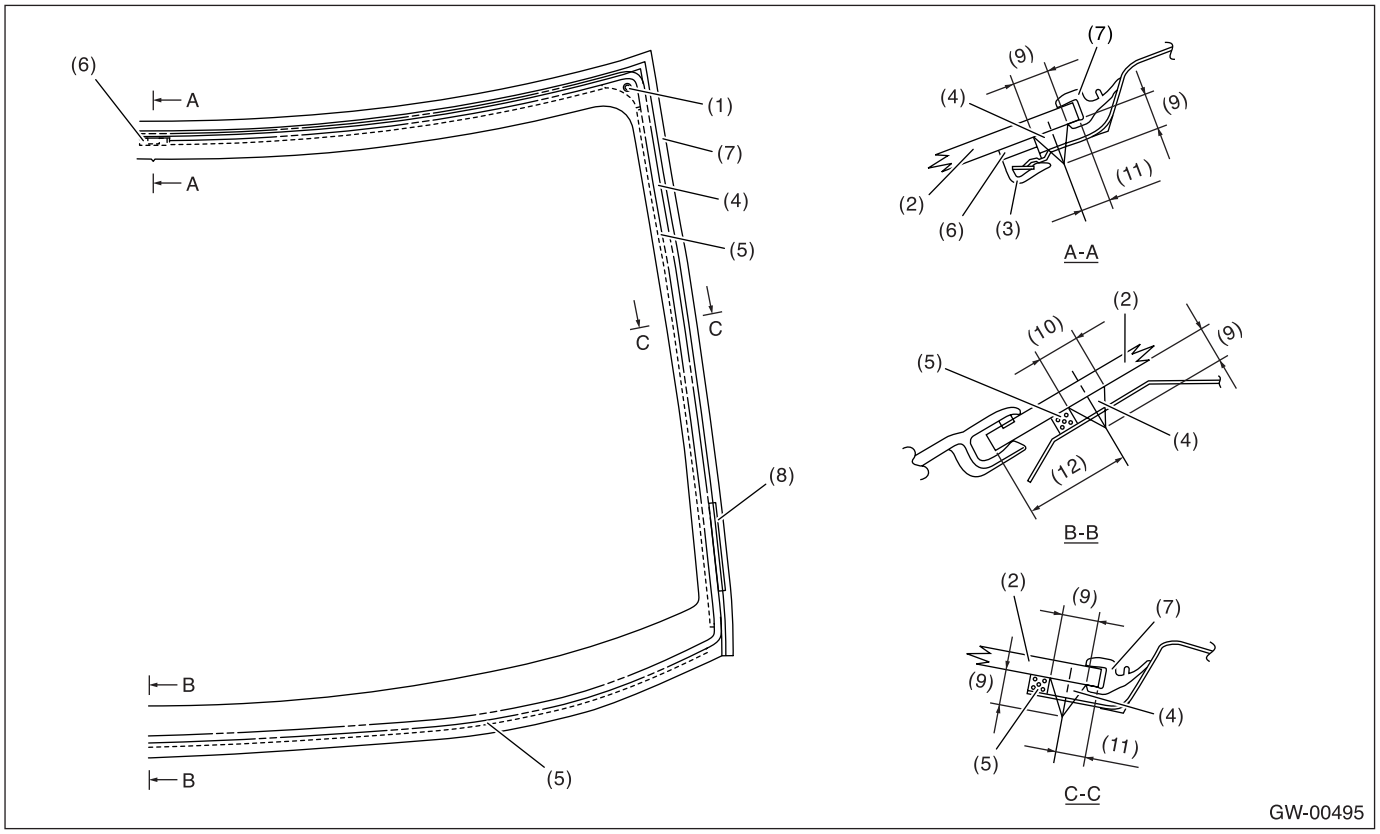
8) Cut off the cartridge nozzle tip as shown and set it in sealant gun.



(1) 10 mm (0.39 in)
(2) 9 mm (0.35 in)

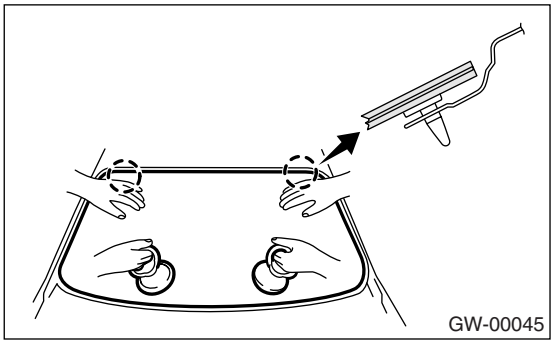
9) Apply adhesive to the glass end surface as shown.

Adhesive:
Dow Automotive
ESSEX U-400HV or equivalent



(1)	Locating pin	(5)	Dam rubber	(9)	9 mm (0.35 in)
(2)	Glass	(6)	Fastener	(10)	10 mm (0.39 in)
(3)	Fastener	(7)	Molding front	(11)	7.5 mm (0.29 in)
(4)	Adhesive	(8)	Seal	(12)	25 mm (0.98 in)

10) Fit the locating pins, and install windshield glass using suction rubber cup.



11) Lightly press the windshield glass for tight fit.
12) Make flush the adhesive surface jutted out using spatula.
13) 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.

14) After curing of adhesive, pour the water on external surface of vehicle to check that there are no water leaks.

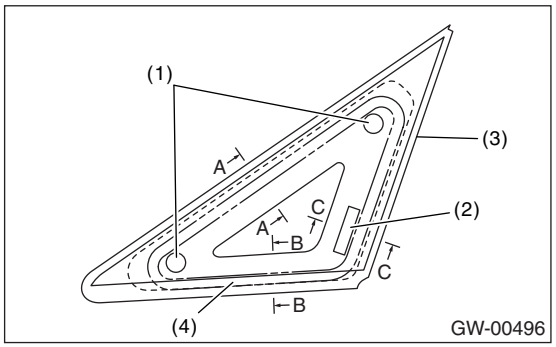
NOTE:
When a vehicle is returned to the user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

15) Install the cowl panel. <Ref. to EI-30, INSTALLATION, Cowl Panel.>

14.Front Quarter Glass

A: REMOVAL

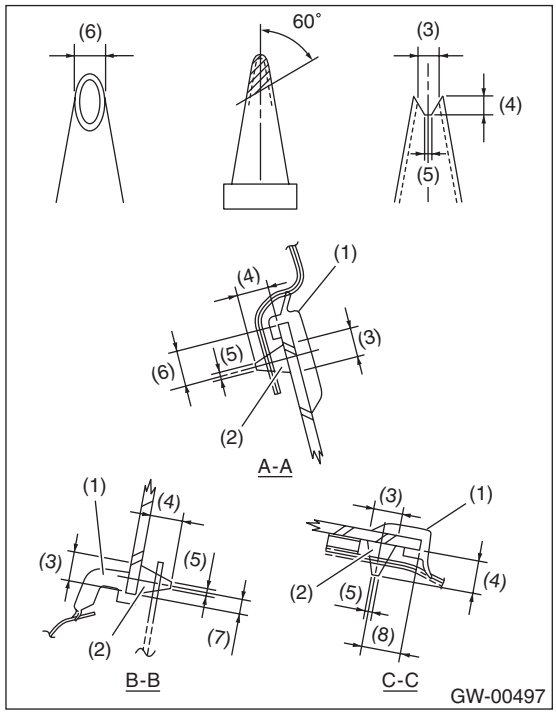
Remove the front quarter glass in the same procedure as for windshield glass. <Ref. to GW-18, REMOVAL, Windshield Glass.>



(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-19, 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.

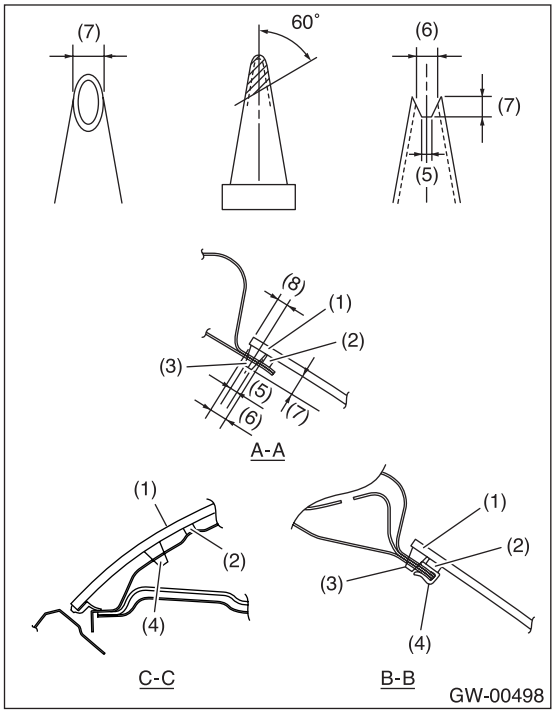
15.Rear Gate Glass

A: REMOVAL

1) Remove the rear wiper motor. <Ref. to WW-19, 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-18, REMOVAL, Windshield Glass.>

B: INSTALLATION

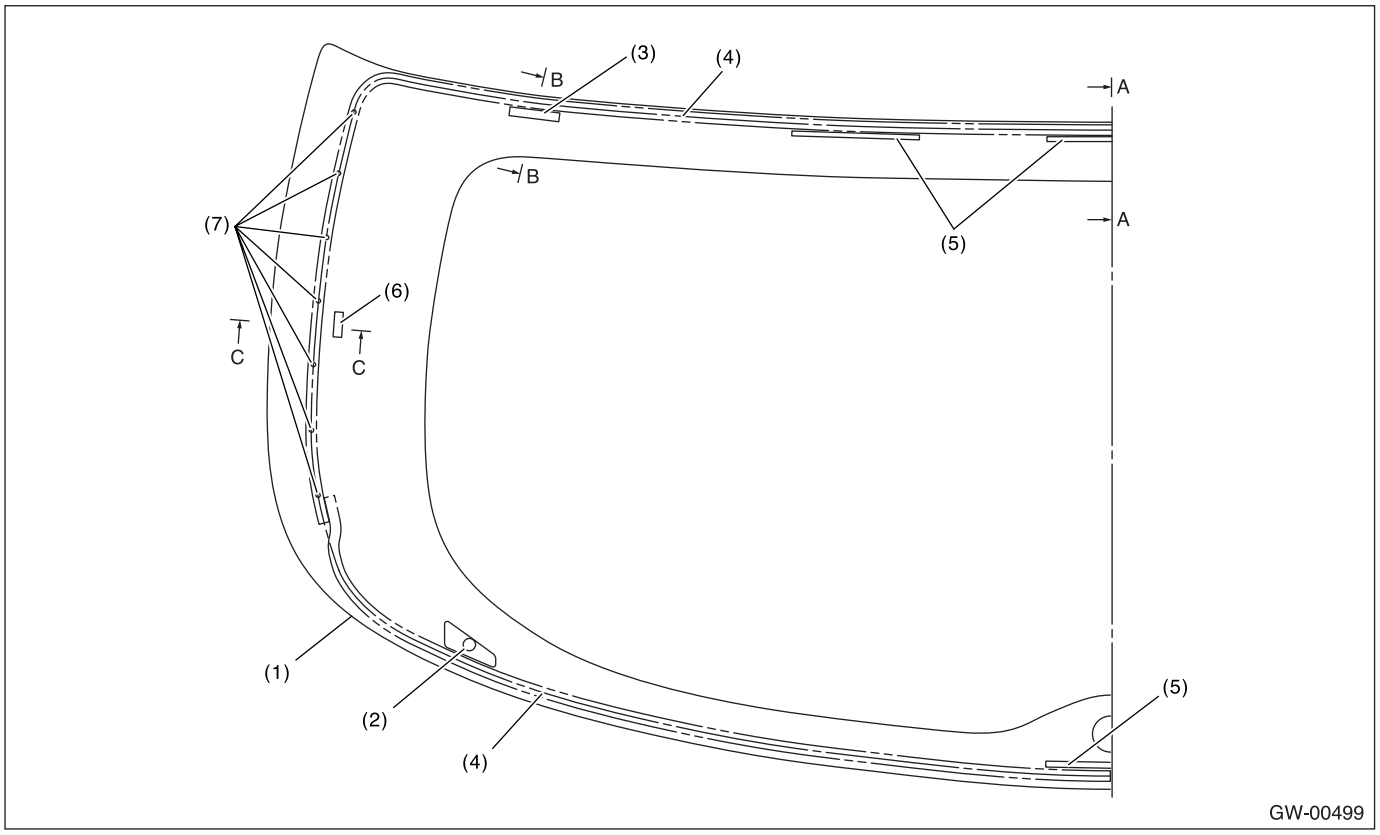
1) Mount the fastener on the body.
2) Install the dam rubber.
3) Cut off the cartridge nozzle tip as shown and set it in sealant gun.



(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) 5.5 mm (0.22 in)

4) Apply adhesive in the same procedure as for windshield glass. <Ref. to GW-19, INSTALLATION, Windshield Glass.>
5) 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.

6) About one hour after installation, conduct a leak test.



(1) Glass
(2) Glass clip pin
(3) Fastener
(4) Adhesive
(5) Dam rubber
(6) Spacer
(7) Marks for applying the primer

7) 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.

8) Connect the rear defogger terminals.
9) Install the rear wiper. <Ref. to WW-19, INSTALLATION, Rear Wiper Motor.>

16.Rear Window Defogger System

A: WIRING DIAGRAM

<Ref. to WI-128, Rear Defogger System.>

B: INSPECTION

Symptom	Repair order
Rear window defogger does not operate.	1. Fuse (M/B No. 10) (F/B No. 22) 2. Rear defogger relay 3. Defogger switch 4. Rear defogger condenser 5. Defogger wire 6. Wiring harness 7. Body integrated unit

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.

17.Rear Window Defogger

A: INSPECTION

1. CHECK WITH SUBARU SELECT MONITOR

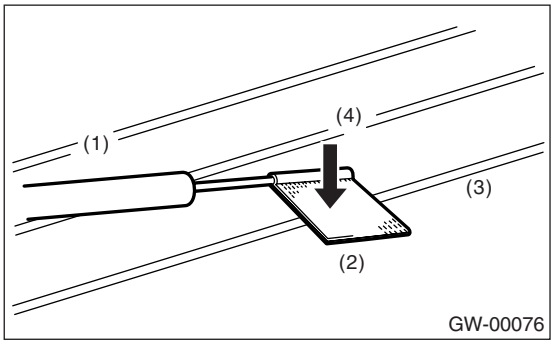
CAUTION:
Check that the rear window defogger timer is in initial setting or customize setting before performing inspection.

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL TO THE BODY INTEGRATED UNIT.** Check the input signal when the rear window defogger switch is operated using Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Integ. unit} from the «main menu». 4) Select the {Current Data Display & Save}. 5) Check the input signal when the rear window defogger switch is set to ON.	After rear defogger switch is set to ON, does it turn to OFF in 15 minutes? Or does it repeat 15 minutes operation and 2 minutes stop?	END.	Replace the body integrated unit. <Ref. to SL-52, REMOVAL, Body Integrated Unit.>

2. HEAT WIRE INSPECTION

CAUTION:
Use a dry and soft cloth when wiping dirt off the glass. Move the cloth along the heat wire to avoid damaging it.

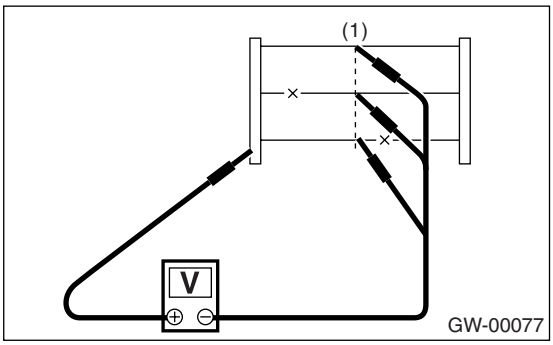
1) Turn the ignition switch to ON.
2) Turn the defogger switch to ON.
3) Wrap the tips of tester probe with aluminum foil to avoid damage to heat wire.



(1) Tester probe
(2) Aluminum foil
(3) Heat wire
(4) Press

4) Measure the voltage at heat wire center with DC voltmeter.

Standard voltage:
Approx. 6 V



(1) Center of heat wire

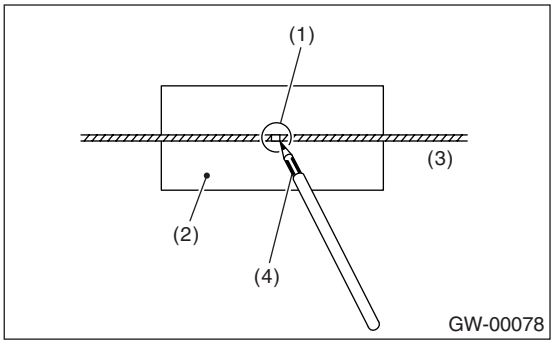
Voltage	Criteria
Approx. 6 V	Normal
Approx. 12 V or 0 V	Open

NOTE:
• If the measured value is 12 volts, heat wire is open between heat wire center and positive (+) terminal of tester probe.
• If it is 0 V, the circuit is open between heat wire center and ground.

5) Connect the tester probe of positive lead of voltmeter to positive terminal of heat wire and move tester probe of negative lead along the heat wire up to the negative terminal end. If voltage changes from zero to several volts during movement of tester probe, heat wire is open at the voltage change point.

B: REPAIR

1) Clean the broken portion with alcohol or white gasoline.
2) Mask both side of wire with thin film.
3) Apply the conductive silver composition (DUPONT No. 4817) to the broken portion.



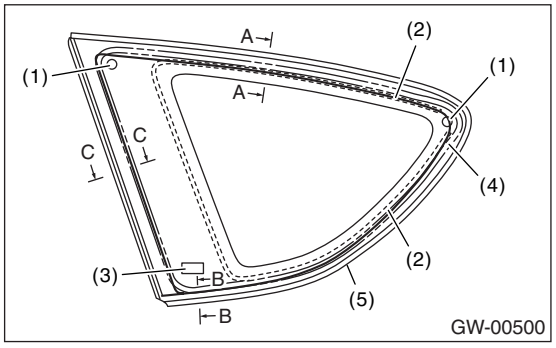
(1) Broken portion
(2) Thin film
(3) Broken wire
(4) Conductive silver composition (DUPONT No. 4817)

4) After repair, check the wire.

18.Rear Quarter Glass

A: REMOVAL

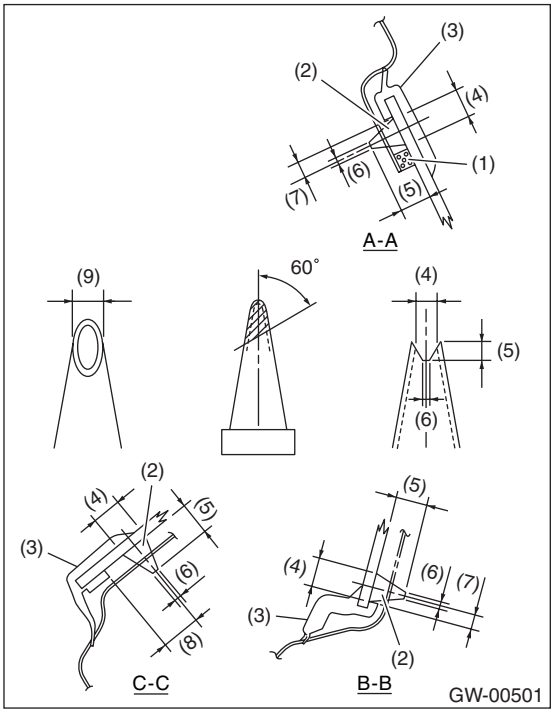
Remove the glass in the same procedure as for windshield glass. <Ref. to GW-18, REMOVAL, Windshield Glass.>



(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-19, 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.

19.Sun Roof Glass

A: REMOVAL

<Ref. to SR-5, REMOVAL, Glass Lid.>

B: INSTALLATION

<Ref. to SR-5, INSTALLATION, Glass Lid.>

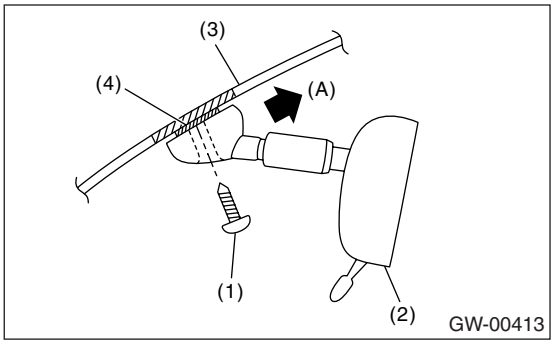
C: ADJUSTMENT

<Ref. to SR-5, ADJUSTMENT, Glass Lid.>

20.Rearview Mirror

A: REMOVAL

1) Remove the TORX® 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

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to GW-5, MIRROR, COMPONENT, General Description.>

CAUTION:
When tightening the mounting TORX® screw, be sure to observe the tightening torque. Otherwise, the mount may be damaged in over-torque conditions.

C: INSPECTION

Check that the mirror is not damaged.

21.Wiper Deicer System

A: WIRING DIAGRAM

<Ref. to WI-107, Wiper Deicer System.>

B: INSPECTION

Symptom	Repair order
Wiper deicer does not operate.	1. Fuse (F/B No. 4, 9) 2. Wiper deicer relay 3. Wiper deicer switch 4. Wiring harness 5. Body integrated unit

Refer to “Rear Window Defogger” for inspection.
<Ref. to GW-25, INSPECTION, Rear Window Defogger.>

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 min.
- Ambient temperature at 5°C (41°F) or more continues for 10 sec.
- Malfunction occurs on ambient sensor.
- Vehicle speed below 15 km/h (9 MPH) continues 15 min.
- Malfunction occurs in CAN communication.

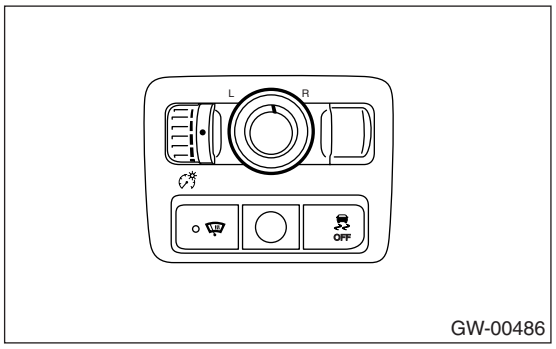
C: REPAIR

Refer to “Rear Window Defogger” for repair.
<Ref. to GW-26, REPAIR, Rear Window Defogger.>

22.Wiper Deicer Switch

A: REMOVAL

1) Remove the instrument panel lower cover. <Ref. to EI-36, 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

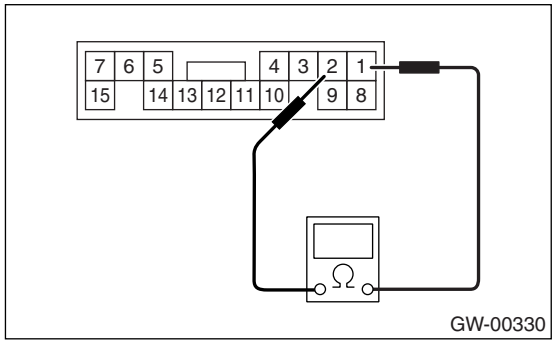
1. CHECK WITH SUBARU SELECT MONITOR

CAUTION:
Check whether the wiper deicer timer is in initial setting or customize setting before performing inspection.

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL TO THE BODY INTEGRATED UNIT.** Check the input signal when the wiper deicer switch is operated using Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Integ. unit} from the «main menu». 4) Select the {Current Data Display & Save}. 5) Check the input signal when the wiper deicer switch is set to ON.	After the wiper deicer switch is set to ON, does it turn to OFF in 15 minutes? Or does it operate continuously?	END.	Replace the body integrated unit. <Ref. to SL-52, REMOVAL, 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.

1. General Description

A: SPECIFICATION

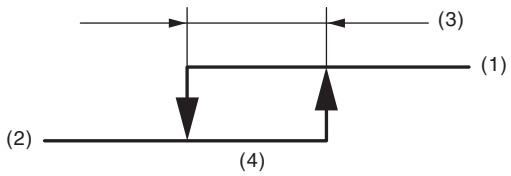
1. HEATER SYSTEM

Item		Specification	Condition
Heating capacity		5.2 kW (4,471 kcal/h, 17,743 BTU/h) or more	• Mode selector switch: HEAT • Temperature control switch: FULL HOT • Temperature difference between hot water and inlet air: 65°C (149°F) • Hot water flow rate: 360 ℓ (95.1 US gal, 79.2 Imp gal)/h
Air flow rate		340 m^3 (11,301 cu ft)/h	Heat mode (FRESH), FULL HOT at 12.5 V
Max air flow rate		550 m^3 (16,245 cu ft)/h	• Temperature control switch: FULL COLD • Blower fan speed: 6th position • Mode selector lever: RECIRC
Heater core size (height × length × width)		264 × 110 × 27 mm (10.4 × 4.33 × 1.06 in)	—
Blower Motor	Type	Brush motor 220W or less	12 V
	Fan type and size (diameter × width)	Sirocco fan type 165 ×75 mm (6.51 × 2.95 in)	—

2. A/C SYSTEM

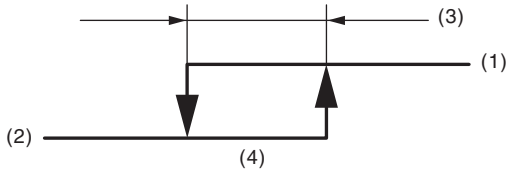
- Single A/C model (front only)

Item		Specification
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_2FCF_3) [0.87±0.03 kg (1.92±0.07 lb)]
Compressor	Type	Inclined plate (SWASH PLATE), fixed capacity (10SR17), Temperature fuse
	Exhaust	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	1.16
Condenser	Type	Corrugated fin (Sub cool type)
	Core face area	0.29 m^2 (3.122 sq ft)
	Core thickness	16 mm (0.63 in)
	Radiation area	7.65 m^2 (82.35 sq ft)
Receiver drier	Effective inner capacity	190 cm^3 (11.6 cu in)
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 ×75 mm (6.50 × 2.95 in)
	Power consumption	260 W

Item			Specification
Condenser fan (Sub fan)		Motor type	Magnet
		Power consumption	160 W
		Fan outer diameter	320 mm (12.6 in)
Radiator fan (Main fan)		Motor type	Magnet
		Power consumption	160 W
		Fan outer diameter	320 mm (12.6 in)
Idling speed (A/C ON)		MPFI model	800±100 rpm
Triple switch (Pressure switch)	Low-pressure switch working pressure	ON → OFF	196±20 kPa (2.00±0.20 kg/cm^2, 28.4±2.9 psi)
		OFF → ON	$225\ ^{+25}_{-29}$ kPa ($2.29\ ^{+0.25}_{-0.30}$ kg/cm^2, $32.6\ ^{+3.6}_{-4.2}$ psi)
	High-pressure switch working pressure	ON → OFF	$3{,}140\ ^{+50}_{-200}$ kPa ($32.02\ ^{+0.51}_{-2.04}$ kg/cm^2, $455.4\ ^{+7.25}_{-29.0}$ psi)
		OFF → ON	2,550±200 kPa (26.00±2.04 kg/cm^2, 369.8±29.0 psi)
	Middle-pressure switch operating pressure	ON → OFF	1,370±120 kPa (13.97±1.22 kg/cm^2, 198.65±17.35 psi)
		OFF → ON	1,770±100 kPa (18.05±1.02 kg/cm^2, 256.81±14.50 psi)
Thermo-control amplifier working temperature (Evaporator outlet air)			 AC-00601 (1) ON (2) OFF (3) 1±0.5°C (33.8±0.9°F) (4) $4\ ^{+1.5}_{0}$°C ($39.2\ ^{+2.7}_{0}$ °F)

- Dual A/C model (Front A/C and Rear cooler)

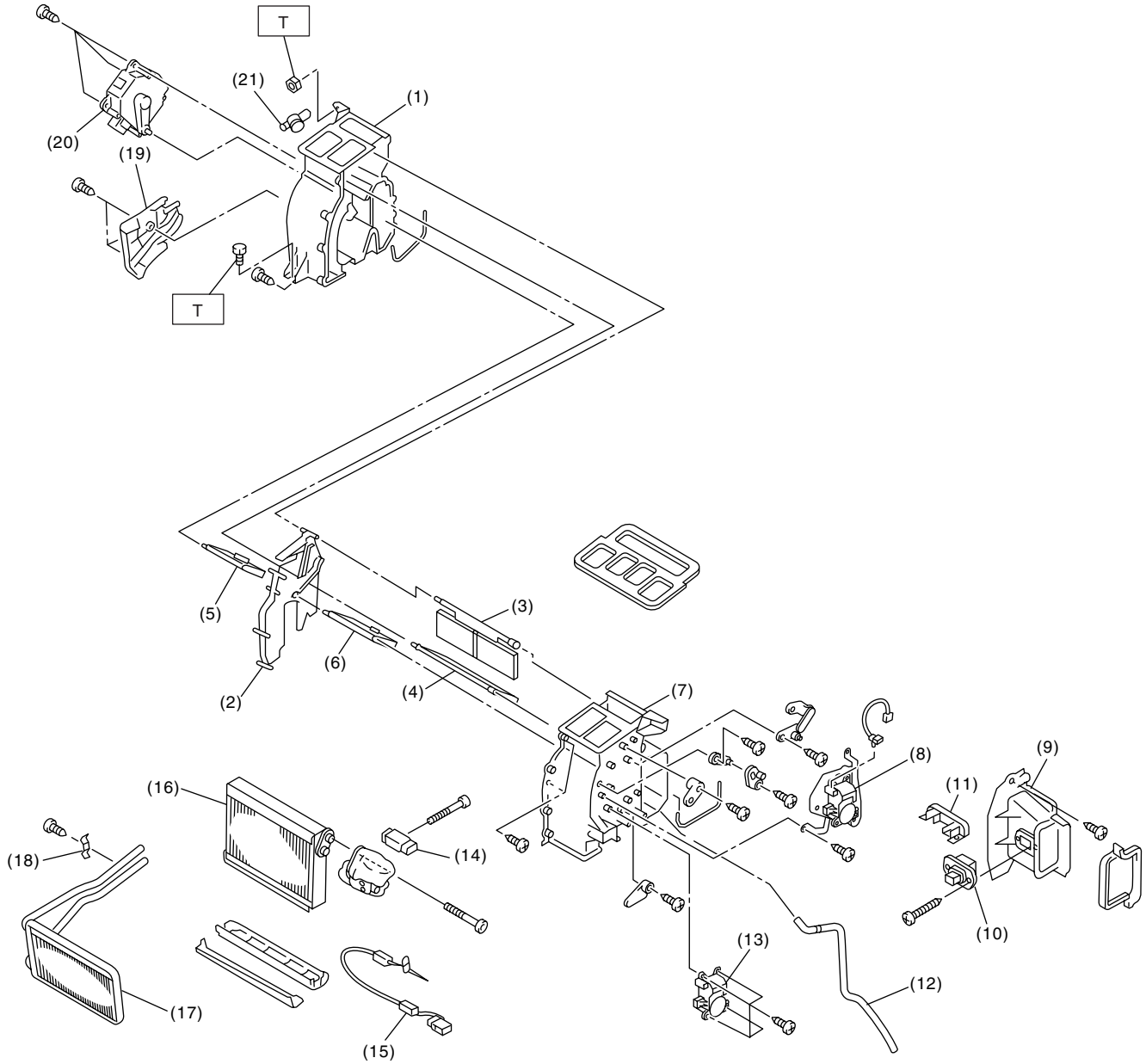
Item			Specification
Type of air conditioner		Front	Reheat air-mix type
		Rear	Cooler
Cooling capacity			7.2 kW (5,331 kcal/h, 21,154 BTU/h)
Refrigerant			HFC-134a (CH_2FCF_3) [0.87±0.03 kg (1.92±0.07 lb)]
Compressor		Type	Inclined plate (SWASH PLATE), fixed capacity (10SR17), Temperature fuse
		Exhaust	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 (3.7 in)
		Pulley ratio	1.16
Condenser		Type	Corrugated fin (Sub cool type)
		Core face area	0.29 m^2 (2.077 sq ft)
		Core thickness	16 mm (0.63 in)
		Radiation area	7.65 m^2 (61.57 sq ft)
Receiver drier		Effective inner capacity	280 cc (17.1 cu in)
Expansion valve	Front	Type	Box time (external pressure equalizing type)
	Rear	Type	
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 ×75 mm (6.49 × 2.95 in)
		Power consumption	260 W
	Rear	Fan type	Sirocco fan
		Outer diameter× width	150 ×70 mm (5.91 × 2.95 in)
		Power consumption	150 W or less
Condenser fan (Sub fan)		Motor type	Magnet
		Power consumption	160 W
		Fan outer diameter	320 mm (12.6 in)
Radiator fan (Main fan)		Motor type	Magnet
		Power consumption	160 W
		Fan outer diameter	320 mm (12.6 in)
Idling speed (A/C ON)		MPFI model	800±100 rpm

<table>
<tr><th colspan="3">Item</th><th>Specification</th></tr>
<tr><td rowspan="6">Triple switch
(Pressure switch)</td><td rowspan="2">Low-pressure switch working pressure</td><td>ON → OFF</td><td>196±20 kPa
(2.00±0.20 kg/cm^2, 28.4±2.9 psi)</td></tr>
<tr><td>OFF → ON</td><td>225 $^{+25}_{-29}$ kPa
(2.29 $^{+0.25}_{-0.30}$ kg/cm^2, 32.6 $^{+3.6}_{-4.2}$ psi)</td></tr>
<tr><td rowspan="2">High-pressure switch working pressure</td><td>ON → OFF</td><td>3,140 $^{+50}_{-200}$ kPa
(32.02 $^{+0.51}_{-2.04}$ kg/cm^2, 455.4 $^{+7.25}_{-29.0}$ psi)</td></tr>
<tr><td>OFF → ON</td><td>2,550±200 kPa
(26.00±2.04 kg/cm^2, 369.8±29.0 psi)</td></tr>
<tr><td rowspan="2">Middle-pressure switch operating pressure</td><td>ON → OFF</td><td>1,370±120 kPa
(13.97±1.22 kg/cm^2, 198.65±17.35 psi)</td></tr>
<tr><td>OFF → ON</td><td>1,770±100 kPa
(18.05±1.02 kg/cm^2, 256.81±14.50 psi)</td></tr>
<tr><td colspan="3">Thermo-control amplifier working temperature
(Evaporator outlet air)</td><td> 

AC-00601
(1) ON
(2) OFF
(3) 1±0.5°C (33.8±0.9°F)
(4) 4 $^{+1.5}_{0}$°C (39.2 $^{+2.7}_{0}$ °F)</td></tr>
</table>

B: COMPONENT

1. HEATER COOLING UNIT



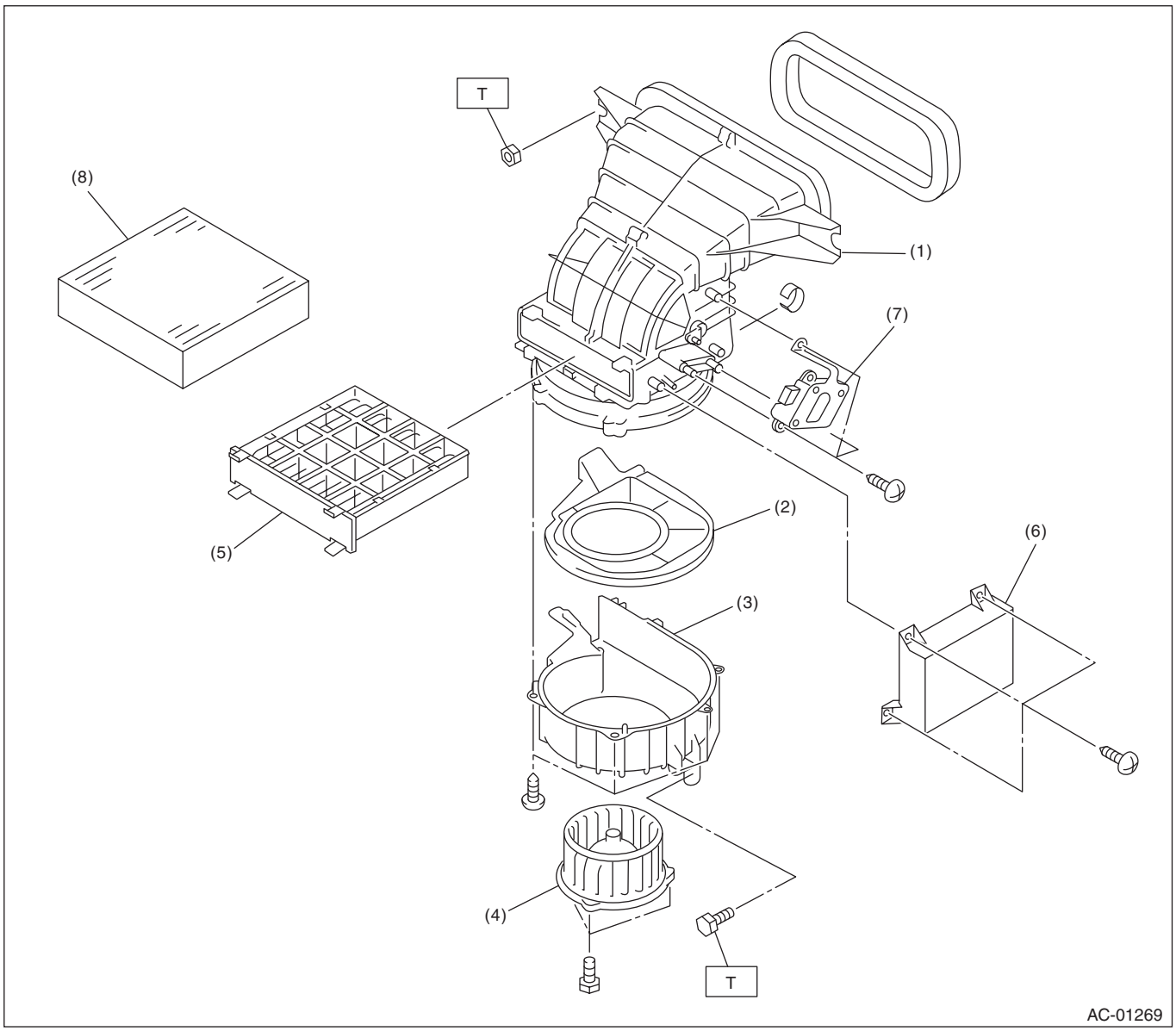
AC-01268

(1) Heater unit case LH
(2) Separator
(3) Mode door RR
(4) Mode door FR
(5) Air mix door LH
(6) Air mix door RH
(7) Heater unit case RH
(8) Mode door actuator
(9) Evaporator cover
(10) Power transistor
(11) Pipe cover
(12) Drain hose
(13) Air mix door actuator RH
(14) Expansion valve
(15) Evaporator sensor
(16) Evaporator
(17) Heater Core
(18) Heater pipe clamp
(19) Heater core cover
(20) Air mix door actuator LH
(21) Aspirator

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

2. BLOWER MOTOR UNIT

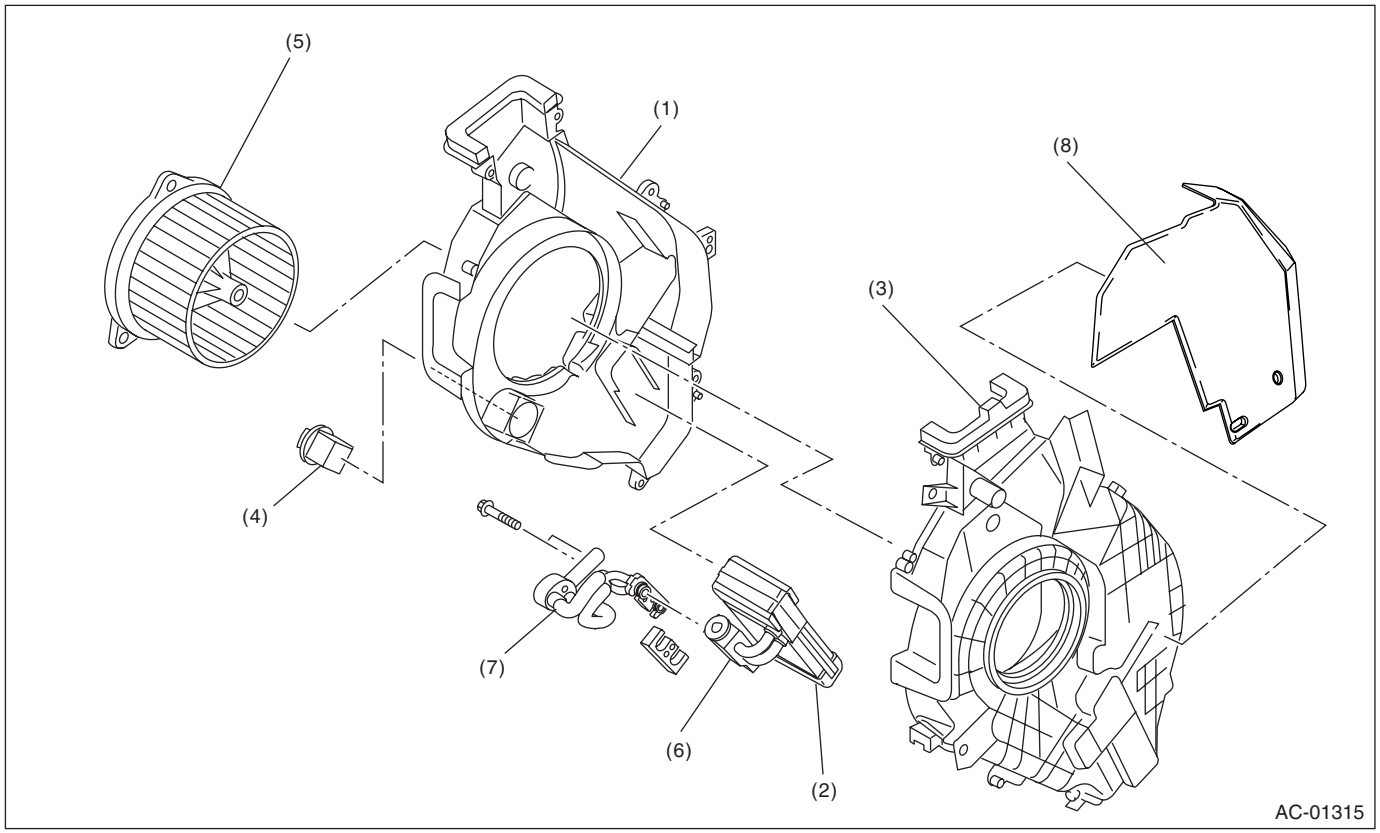
Front



(1) Upper case
(2) Blower plate
(3) Lower case
(4) Blower motor
(5) Filter cover
(6) Control unit (Auto A/C model)
(7) FRESH/RECIRC door actuator
(8) Filter

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

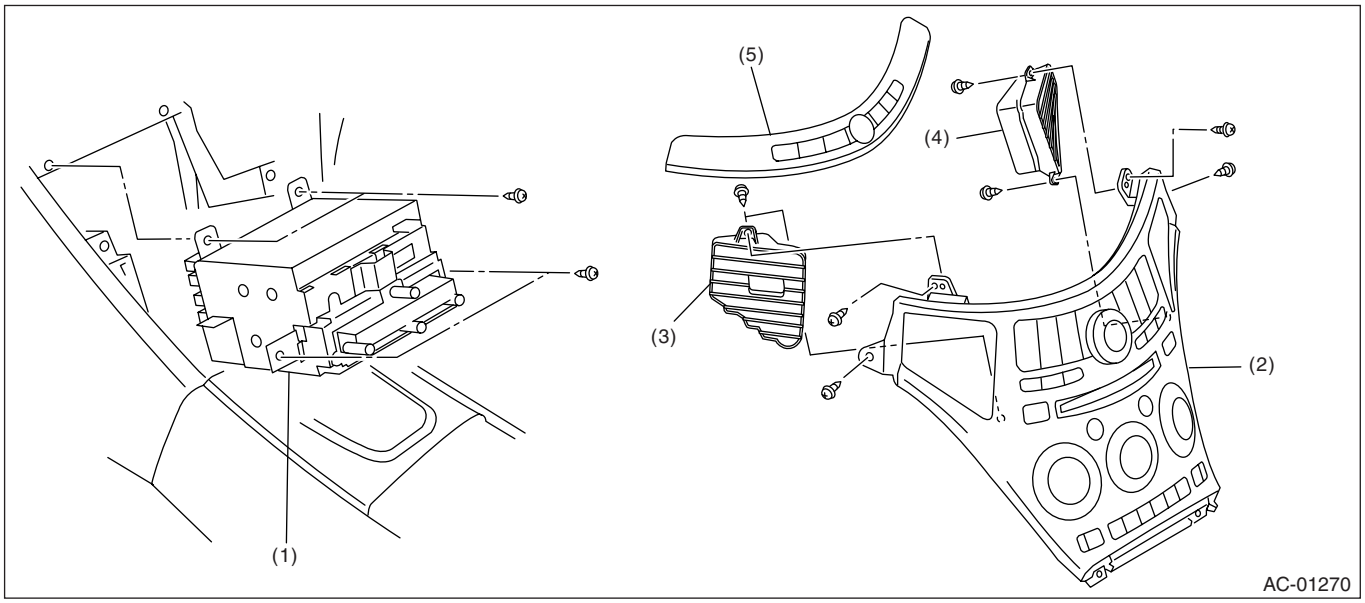
Rear



(1) Inner case
(2) Evaporator
(3) Outer case
(4) Blower resistor
(5) Blower motor
(6) Expansion valve
(7) Expansion tube
(8) Cover

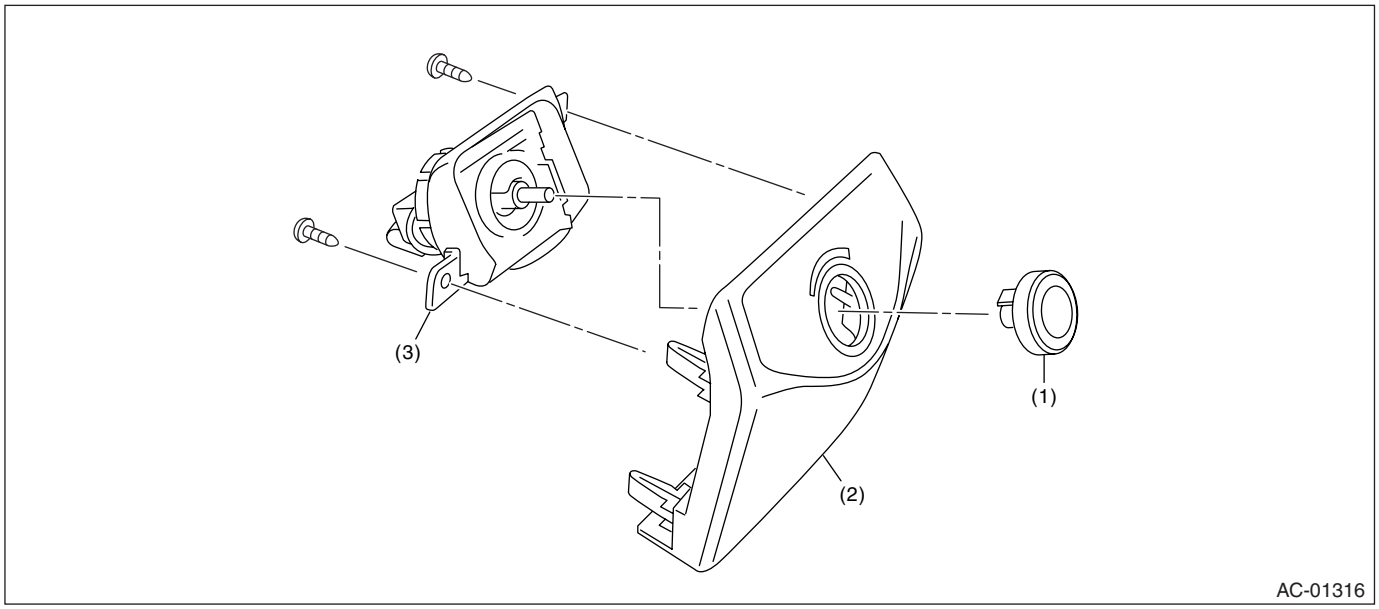
Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

3. CONTROL PANEL



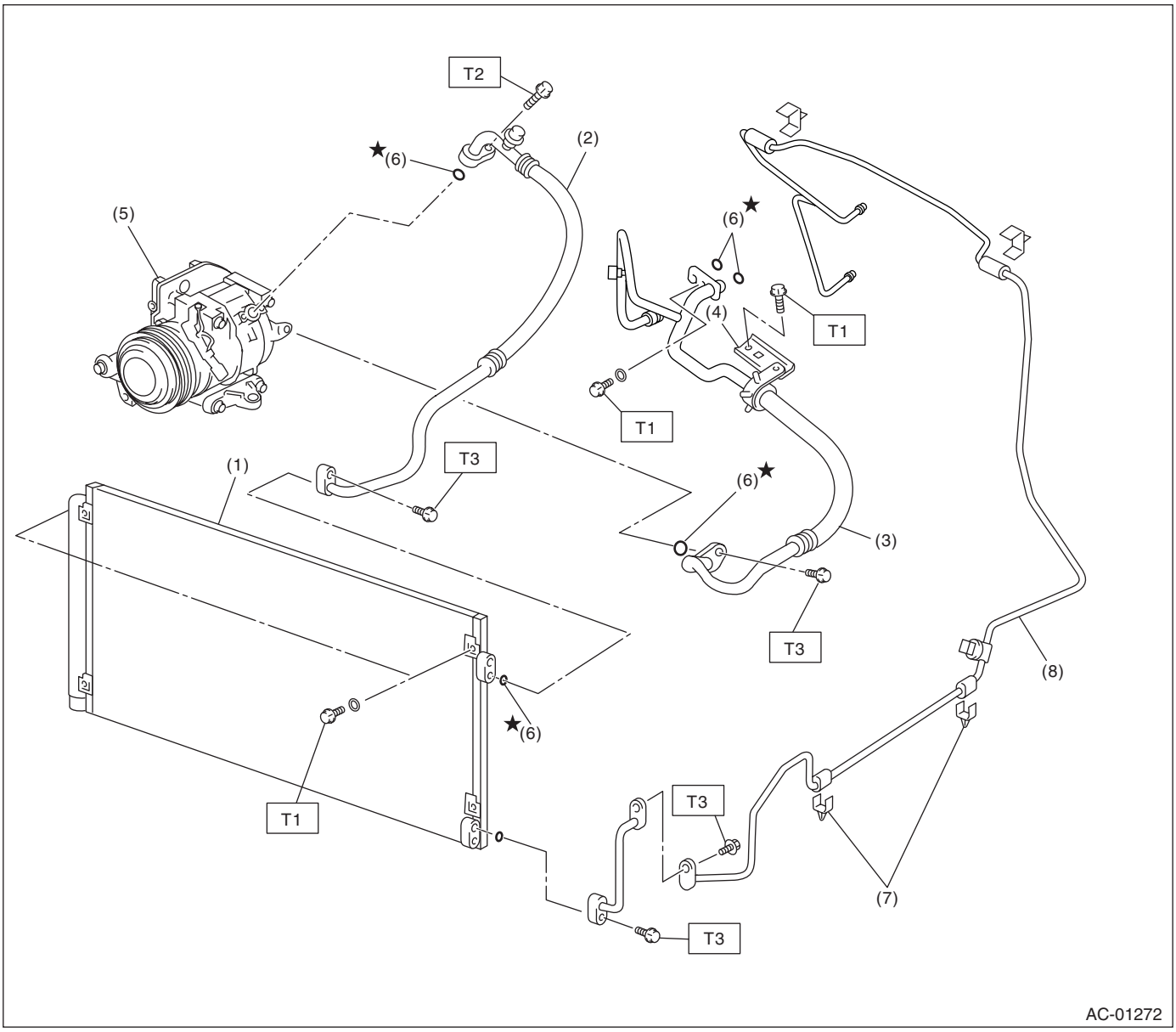
(1) Audio ASSY
(2) Control panel
(3) Center duct (RH)
(4) Center duct (LH)
(5) Navigation, MFD control switch

Rear cooler model



(1) Dial
(2) Control panel
(3) Blower switch

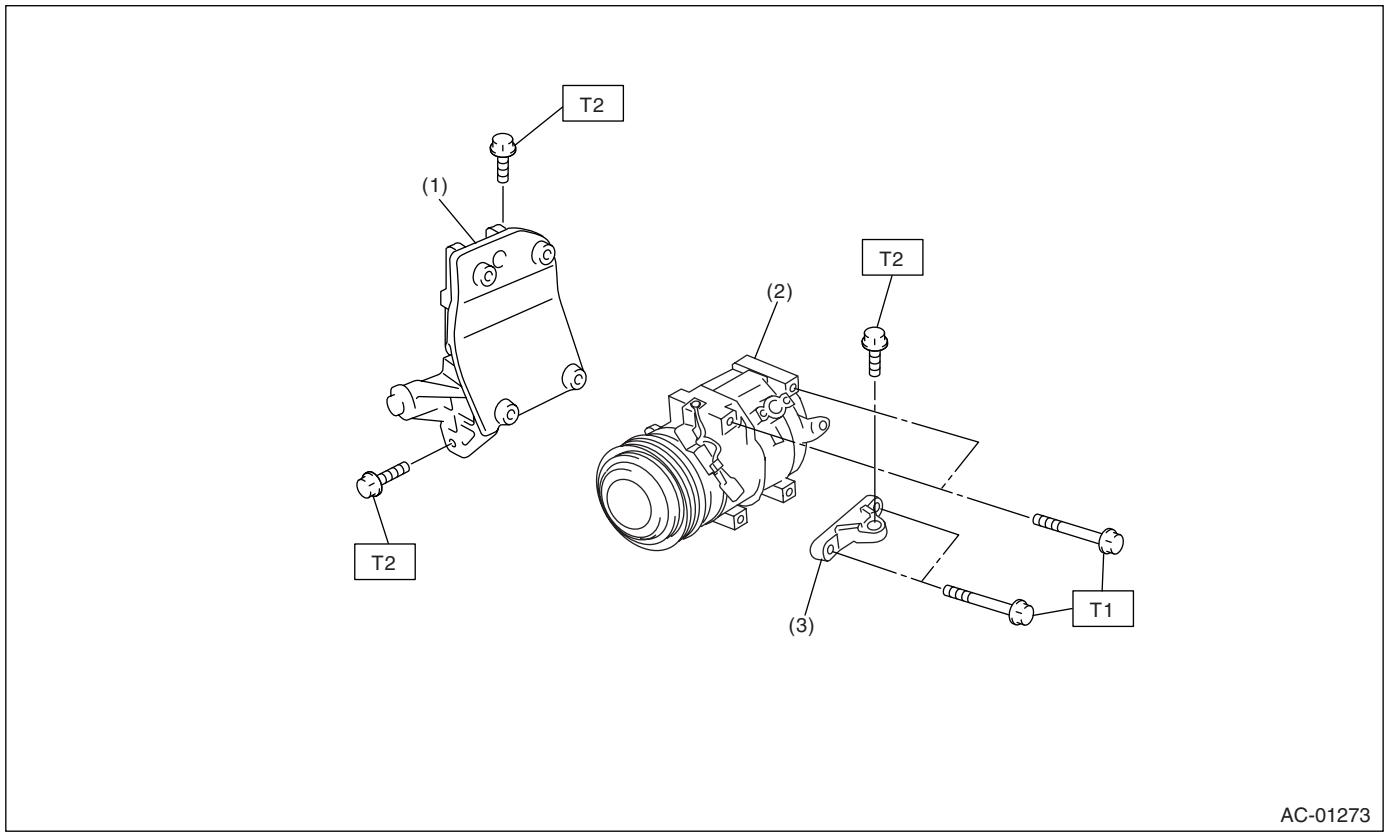
4. AIR CONDITIONING UNIT



(1)	Condenser	(5)	Compressor
(2)	Hose (High-pressure)	(6)	O-ring
(3)	Hose (Low-pressure)	(7)	Clamp
(4)	Bracket	(8)	Tube

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)

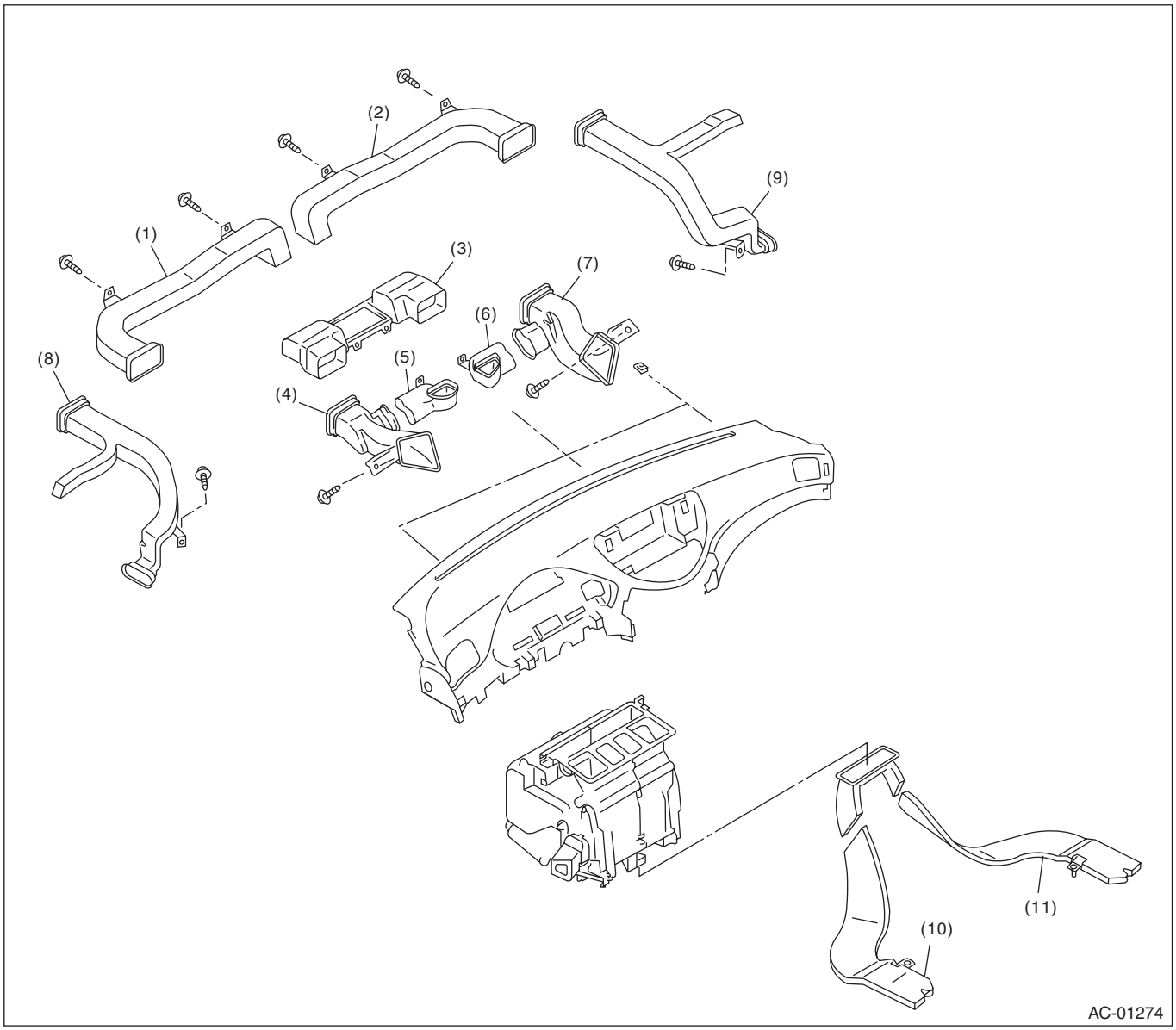
5. COMPRESSOR



(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)

6. HEATER DUCT

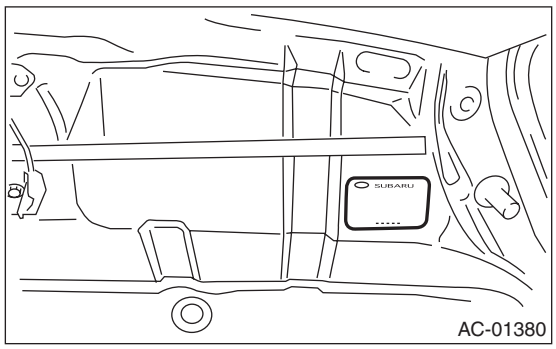


(1) Side ventilation duct (LH)
(2) Side ventilation duct (RH)
(3) Center ventilation duct
(4) Center duct (LH)
(5) Upper duct (LH)
(6) Upper duct (RH)
(7) Center duct (RH)
(8) Side defroster duct (LH)
(9) Side defroster duct (RH)
(10) Rear heater duct (LH)
(11) Rear heater duct (RH)

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 (A) attached to the vehicle.
Before maintenance, check which A/C system is installed to the vehicle.



2. COMPRESSOR OIL

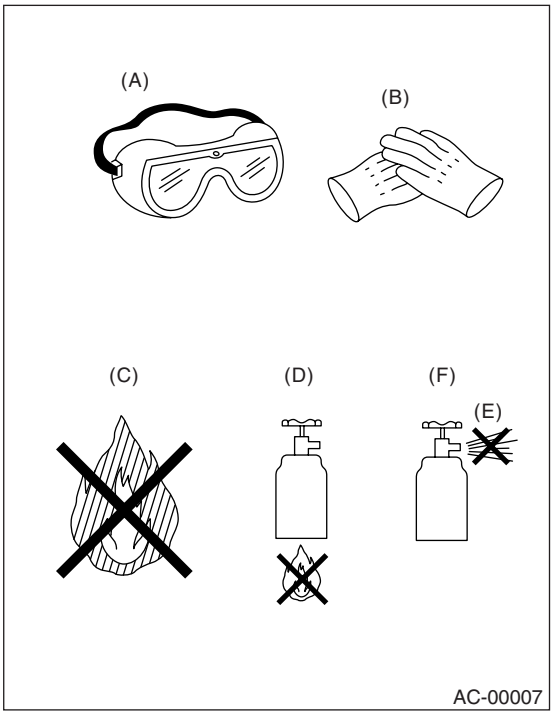
• HFC-134a compressor oil has no compatibility with that of CFC-12 system.
• Use only Denso Oil 8, the manufacturer-authorized compressor oil for the HFC-134a system.
• Do not mix multiple compressor oils.
If CFC-12 compressor oil is used in the HFC-134a A/C system, the compressor may become stuck due 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

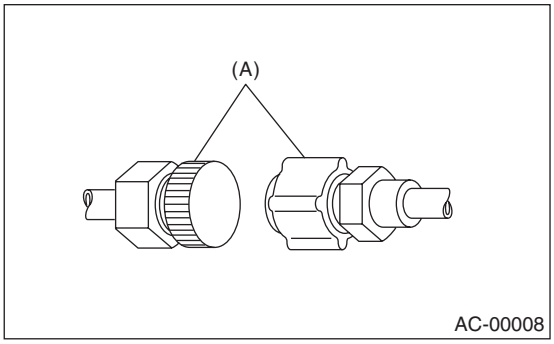
• The refrigerant boils at approx. –30°C (22°F). When handling it, be sure to wear protective goggles and protective gloves. Direct contact of the refrigerant with skin may cause frostbite.
If the refrigerant gets into your eye, avoid rubbing your eyes with your hands. Wash your eye with plenty of water, 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°C (104°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.
• 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

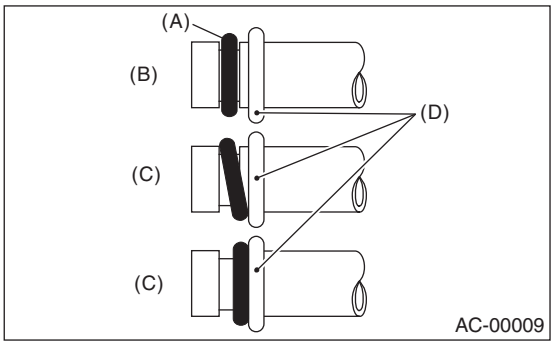
5. O-RING CONNECTIONS

- Always use a new O-ring.
- In order to keep the O-rings free of lint which can cause a refrigerant gas leak, perform operations without gloves and cloth.
- Apply compressor oil to O-rings to avoid sticking, before installation.
- Use a torque wrench to tighten the O-ring fittings. Over-tightening will cause damage to the O-ring and cause tube end distortion.
- If the work is interrupted before completing pipe connections, recap the tubes, 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 at a right angle to tube beads.

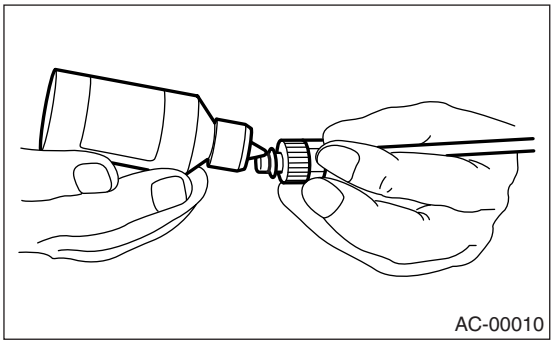


(A) O-ring
(B) OK
(C) NG
(D) Groove

- 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 tube.



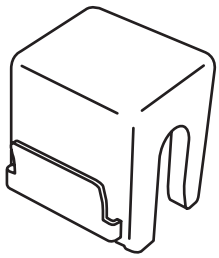
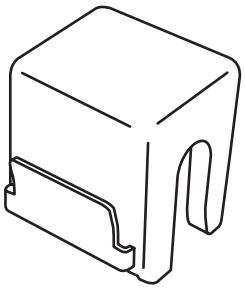
- After tightening, use a clean cloth to remove excess compressor oil from the connections and any oil which may have run on the vehicle body or other parts.
- If any leakage is suspected after tightening, do not tighten the connections further, but disconnect the connections, remove the O-rings, and check the O-rings, threads, and connections.

D: PREPARATION TOOL

CAUTION:
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. 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.
In order to prevent the mixture of HFC-134a and CFC-12 parts and liquid, the tool and screw type and the type of service valves used are different. The gas leak detectors for the HFC-134a and CFC-12 systems must also not be interchanged.

	HFC-134a	CFC-12
Tool & screw type	Millimeter size	Inch size
Valve type	Quick joint type	Screw-in type

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST73499XA00A	73499XA00A	S/T REMOVER PD	Used to disconnect the connector for a quick joint type air conditioner piping (high pressure side).
 ST73499XA01A	73499XA01A	S/T REMOVER PS	Used to disconnect the connector for a quick joint type air conditioner piping (high pressure side).

NOTE:
Read the instruction manual for the connector remover before using.

2. GENERAL TOOL

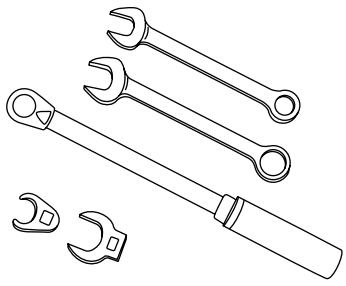
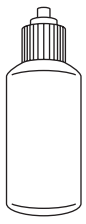
ILLUSTRATION	Name and Function
 AC-00213	WRENCH Various **WRENCHES** will be required to service any A/C system. A 7 to 40 N·m (0.7 to 4.1 kg-m, 5 to 30 ft-lb) torque wrench and various crow-foot wrenches will be needed. Open end or flare nut wrenches will be needed to hold the tube and hose fittings.
 AC-00012	Applicator bottle A small **APPLICATOR BOTTLE** is recommended to apply compressor oil to the various parts. It can be available at a hardware or drug store.

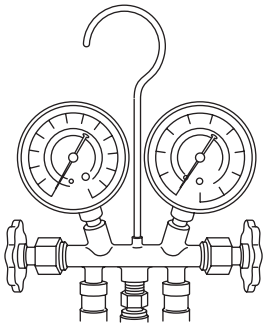
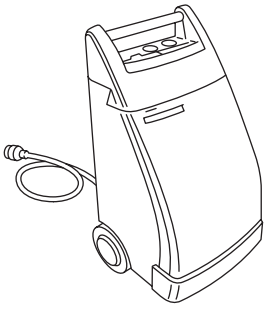
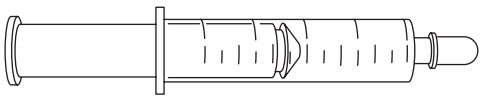
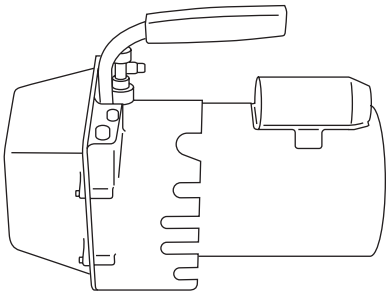
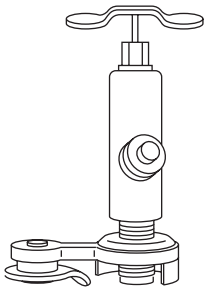
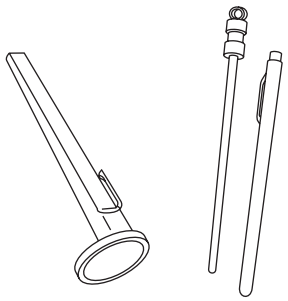
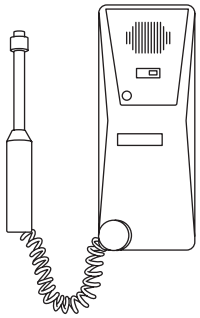
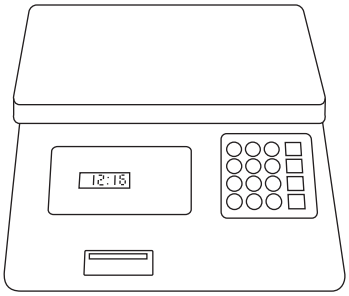
ILLUSTRATION	Name and Function
 AC-00013	Manifold gauge set A **MANIFOLD GAUGE SET** (with hoses) is be available at either a refrigerant supplier or an automotive equipment supplier.
 AC-00014	Refrigerant recovery system A **REFRIGERANT RECOVERY SYSTEM** is used for the recovery and recycling of A/C system refrigerant after contaminants and moisture have been removed from the refrigerant.
 AC-00015	Syringe A graduated plastic **SYRINGE** will be needed to add oil into the system again. A syringe can be available at a pharmacy or drug store.
 AC-00016	Vacuum pump A **VACUUM PUMP** is necessary (for a good working condition), and may be available at either a refrigerant supplier or an automotive equipment supplier.
 AC-00017	Can tap A **CAN TAP** for the 397 g (14 oz.) can is available at an automotive equipment supplier.

ILLUSTRATION	Name and Function
 AC-00018	Thermometer A Pocket **THERMOMETER** is available at either a industrial hardware store or a refrigerant supplier.
 AC-00019	Electronic leak detector An **ELECTRONIC LEAK DETECTOR** can be available at either a specialty tool supplier or an A/C equipment supplier.
 AC-00020	Scale A **WEIGHT SCALE** such as an electronic charging scale or a bathroom scale with digital display will be needed, if a 13.6 kg (30 lb) refrigerant container is used.

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^2, 18 — 28 psi)
High pressure: 1,471 — 1,667 kPa (15 — 17 kg/cm^2, 213 — 242 psi)
Ambient temperature: 30 — 35°C (86—95°F)

B: INSPECTION

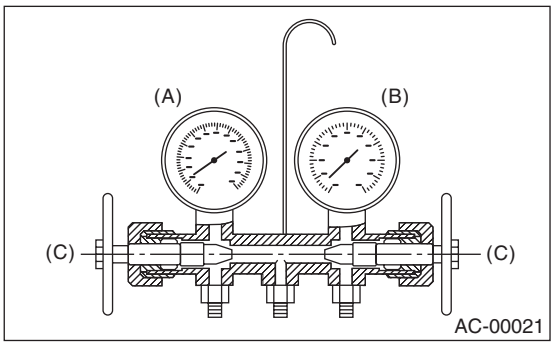
Symptom	Probable cause	Repair order
High-pressure side is unusually high.	• Defective condenser fan motor • Clogged condenser fin • Too much refrigerant • Air inside the system • Defective receiver dryer	• Replace the fan motor. • Clean the condenser fin. • Discharge refrigerant. • Replace the receiver dryer. • After evacuating again, charge an appropriate amount of refrigerant.
High-pressure side is unusually low.	• Defective compressor • Not enough refrigerant • Clogged expansion valve • Expansion valve frozen temporarily by moisture.	• Replace the compressor. • Check for leaks. • Replace the expansion valve. • Fully evacuate the expansion valve.
Low-pressure side is unusually high.	• Defective compressor • Defective expansion valve • Too much refrigerant	• Replace the compressor. • Replace the expansion valve. • Discharge refrigerant.
Low-pressure side is unusually low.	• Not enough refrigerant • Clogged expansion valve • Expansion valve frozen temporarily by moisture. • Saturated receiver dryer	• Check for leaks. • Replace the expansion valve. • Replace the receiver dryer.

3. Refrigerant Recovery Procedure

A: PROCEDURE

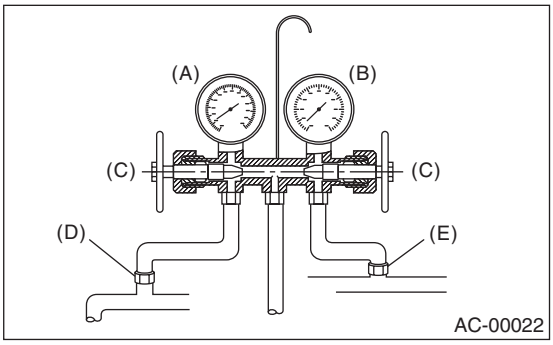
CAUTION:
• During operation, be sure to wear protective goggles and protective gloves.
• Connect the refrigerant recovery system with the manifold gauge set to discharge the refrigerant from the A/C system and recycle the gas.
• When recycling the discharged refrigerant, keep service cans on hand. Because 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-25, PROCEDURE, Compressor Oil.>
2) Stop the engine.
3) Make sure the valves on low-/high-pressure sides of manifold gauge set are fully closed.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

4) Install the low-/high-pressure hoses to the service ports on the low-/high-pressure sides of the vehicle respectively.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close
(D) Low-pressure side service port
(E) High-pressure side service port

5) Connect the center hose to the refrigerant recovery system.
6) Follow the operation manual to activate the refrigerant recovery system.

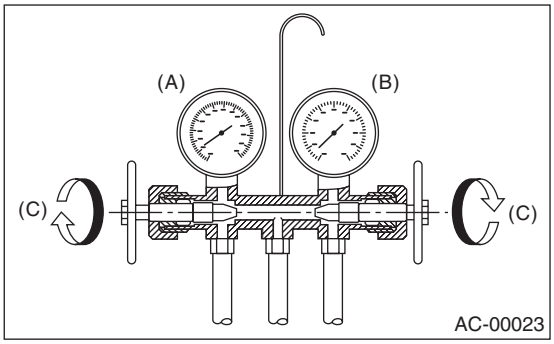
4. Refrigerant Charging Procedure

A: PROCEDURE

CAUTION:
• During operation, be sure to wear protective goggles and protective gloves.
• Before charging the refrigerant, evacuate the system to remove small amounts of moisture remaining in the system.
The moisture in the system can be completely evacuated only under the minimum vacuum level. The minimum vacuum level affects the temperature in the system.
• The list below shows the vacuum values necessary to boil water at various temperatures. In addition, the vacuum levels indicated on the gauge are approx. 3.3 kPa (25 mmHg, 0.98 inHg) lower than those measured at 304.8 m (1,000 ft) above sea level.

Vacuum level required to boil water (at sea level)	
Temperature	Vacuum
1.7°C (35°F)	100.9 kPa (757 mmHg, 29.8 inHg)
7.2°C (45°F)	100.5 kPa (754 mmHg, 29.7 inHg)
12.8°C (55°F)	99.8 kPa (749 mmHg, 29.5 inHg)
18.3°C (65°F)	99.2 kPa (744 mmHg, 29.3 inHg)
23.9°C (75°F)	98.5 kPa (739 mmHg, 29.1 inHg)
29.4°C (85°F)	97.2 kPa (729 mmHg, 28.7 inHg)
35°C (95°F)	95.8 kPa (719 mmHg, 28.3 inHg)

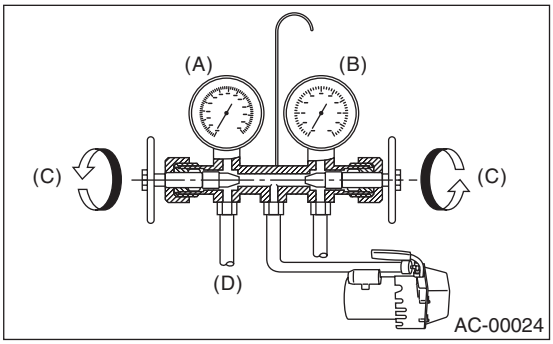
1) Close the valves on low-/high-pressure sides of the manifold gauge.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

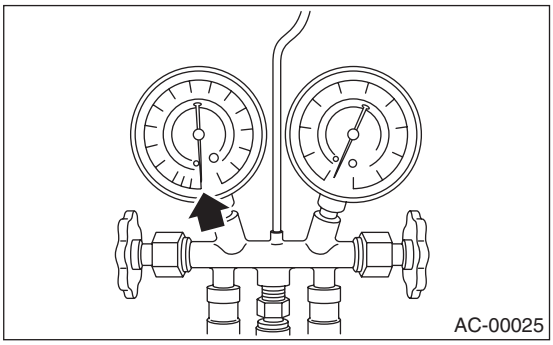
2) Install the low-/high-pressure hoses to the corresponding service ports on the vehicle.
3) Connect the center hose of the manifold gauge set with the vacuum pump.

4) Carefully open the valves on the low-/high-pressure sides to activate the vacuum pump.

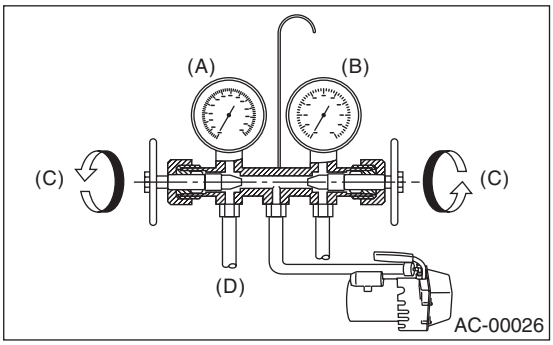


(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Slowly open
(D) Vacuum pump turn on

5) After the low-pressure gauge reaches 100.0 kPa (750 mmHg, 29.5 inHg) or higher, evacuate the system for approx. 15 minutes. (Continue evacuation).

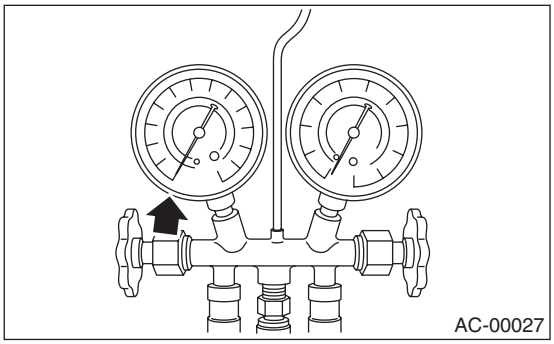


6) After 15 minutes of evacuation, if the reading shows 100.0 kPa (750 mmHg, 29.5 inHg) or higher, close the valves on the both sides to stop the vacuum pump.

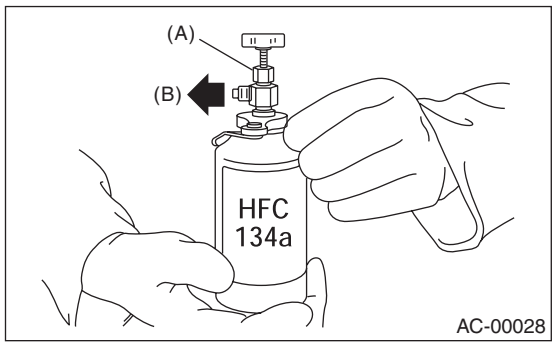


(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close
(D) Vacuum pump turn off

7) Note the low-pressure gauge reading.

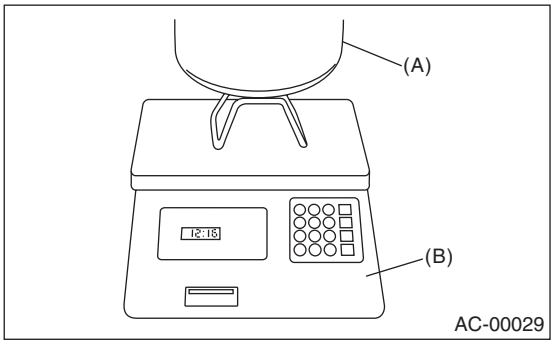


8) Leave it at least 5 minutes, and then check the low-pressure gauge reading for any changes.
If the gauge indicator shows near zero point, it is a sign of leakage. Check pipe connector points, repair them, and make sure there is no leakage.
9) Follow the can tap operation manual, install to the refrigerant can.



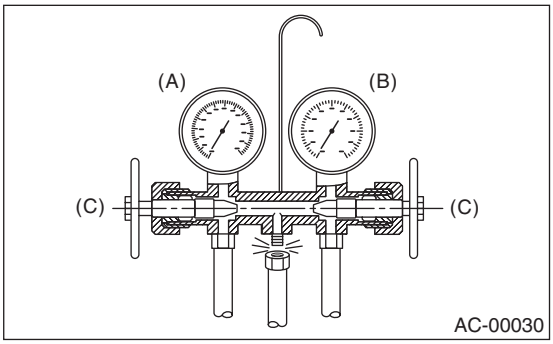
(A) Tap valve
(B) Center manifold hose

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 weight of the refrigerant amount to use using a scale.



(A) Refrigerant container (HFC-134a)
(B) Scale

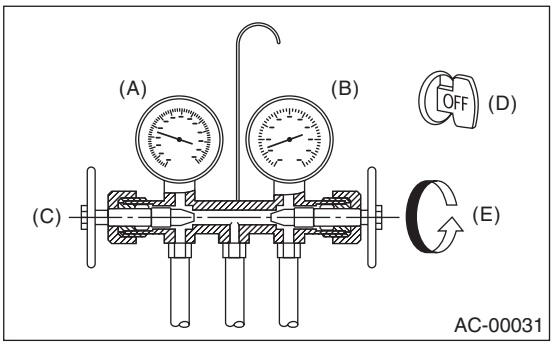
12) Confirm that all the 3 hoses are connected securely to the manifold gauge set.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

13) Open the valve on the HFC-134a source.
14) Loosen the center hose connection on the manifold gauge set (if applicable, press a purge valve on the manifold gauge set) for a few seconds to allow the air in the center hose to escape by the refrigerant pressure.
15) Stop the engine and carefully open the high-pressure valve.

CAUTION:
Do not open the low-pressure valve.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close
(D) Ignition switch OFF
(E) Slowly open

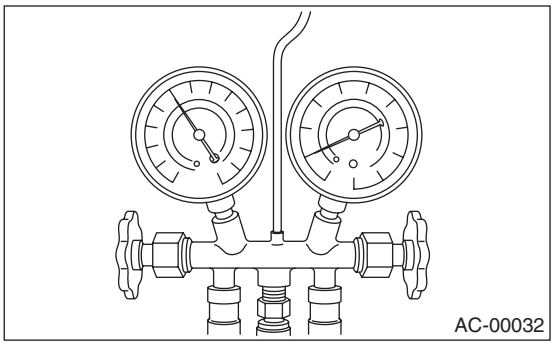
CAUTION:
Never run the engine while charging from the high-pressure side.

16) Close the high-pressure valve when the low-pressure gauge reaches 98 kPa (1 kg/cm^2, 14 psi).
Using a leak tester, check the system for leaks.
If any leakage is found after the refrigerant recovery is completed, repair the applicable area.

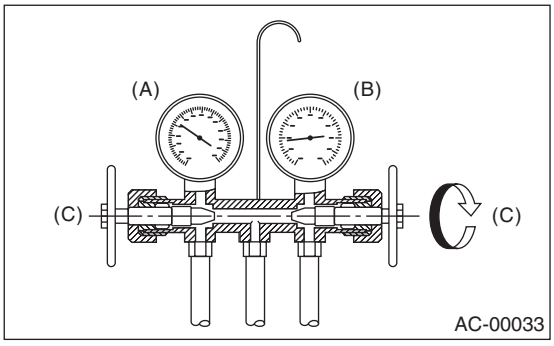
17) After confirming that there are no leaks with the leak test, charge the required amount of refrigerant.

CAUTION:
Never run the engine while charging from the high-pressure side.

18) Close the high-pressure valve when;
• the readings of low- / high-pressure gauges become almost equal, after the charging speed is reduced,
• the HFC-134a source becomes empty, or the system is full with the gas.



19) If the HFC-134a source is empty, close the high-pressure valve, close the valve on the can tap, and replace the HFC-134a source with a new one to restart the operation.

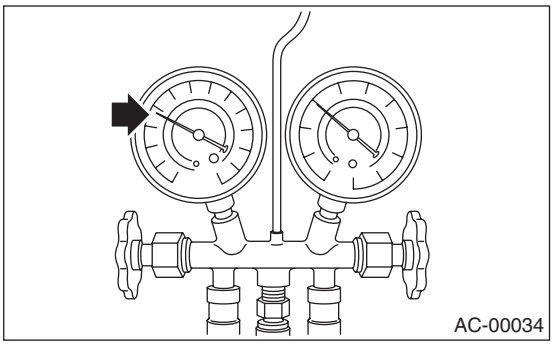


(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

20) Confirm that both the low- / high-pressure valves can be closed. Start the engine with the A/C switch OFF.
21) Quickly repeat ON-OFF cycles a few times to prevent initial compressor damage.
22) Set up the vehicle as follows:
• A/C switch ON
• Engine running at 1,500 rpm
• Blower setting speed “HI”, (For models with rear coolers, also turn the rear cooler fan switch to “HI”)
• Temperature setting to “MAX COOL”
• Air inlet setting to “RECIRC”
• Window open

23) While reading the low-pressure gauge, carefully open the low-pressure valve with the refrigerant source connected and the service hose purged.

CAUTION:
Never open the high-pressure valve with the engine running. The high-pressure gas will backflow resulting in an explosion of the can.



24) Adjust the refrigerant flow to maintain the pressure on the low-pressure side at 276 kPa (2.81 kg/cm^2, 40 psi) max.
25) After the system is fully charged, close the low-pressure valve.
26) Close the valve on the refrigerant source.

Refrigerant amount		
Refrigerant	Minimum	Maximum
HFC-134a	840 g (1.85 lb)	900 g (1.98 lb)

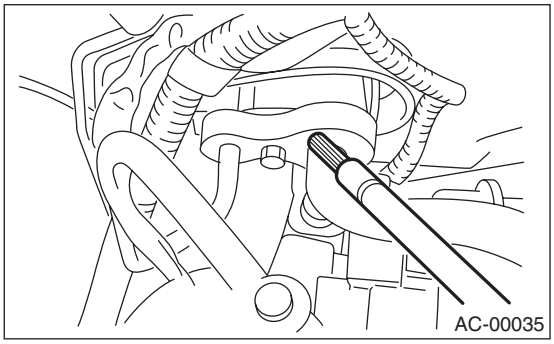
27) Disconnect the hose from the service port, and install the service port cap.

5. Refrigerant Leak Check

A: INSPECTION

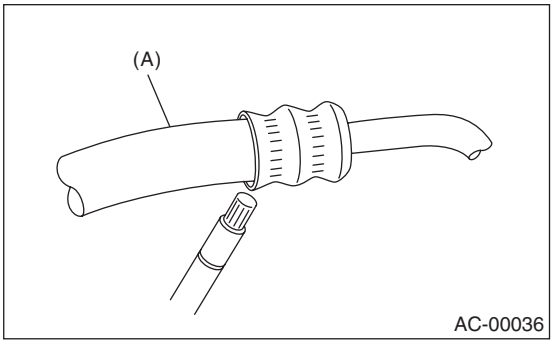
1) At engine speed below 1500rpm, operate the A/C system for approx. 10 minutes, and confirm that the high-side pressure shows at least 690 kPa (7.03 kg/cm^2, 100 psi). Then stop the engine to start the leak test.
2) Starting from the connection between high-pressure pipe and evaporator, check the system 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 (dual 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 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



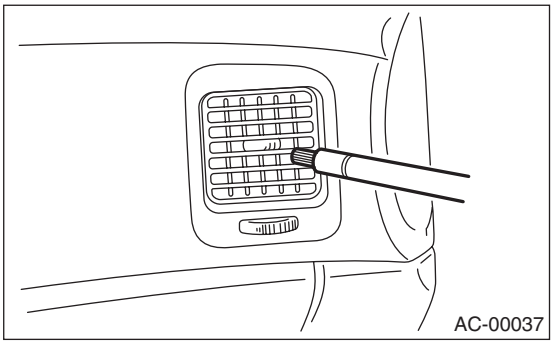
9) Visually check the rubber area of the flexible hose for cracks.
Check the entire length of the flexible hose, especially the connection with the metal hose end.

CAUTION:
Carefully check the external surface of hoses and tubes at approx. 25 mm (0.98 in) per second.

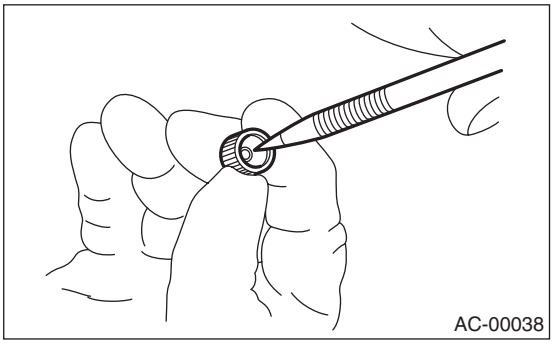


(A) Flexible hose

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 grill on the instrument panel. While moving the tester closer to the grill, run the blower for 1 or 2 seconds, then stop it. Check the grill at that point for at least 10 seconds.



12) Check the valve in the service port.
13) Visually check the rubber seal in the service port cap.



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.

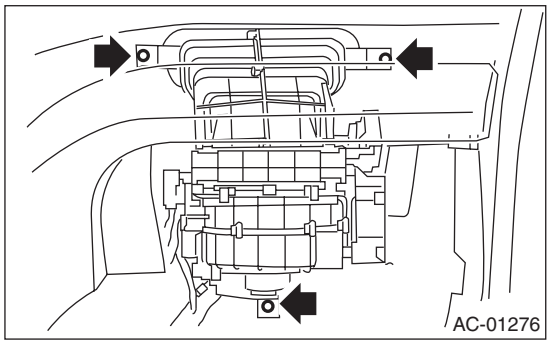
B: REPLACEMENT

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.

7. Blower Motor Unit Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-37, 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

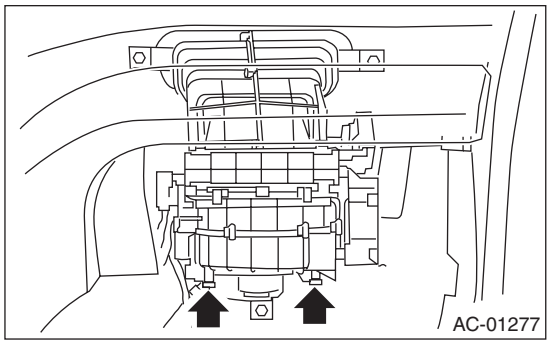
Install in the reverse order of removal.

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.>

8. Blower Motor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box lower cover. <Ref. to EI-37, REMOVAL, Glove Box.>
3) Disconnect the connector of the blower motor.
4) Loosen the screw to remove the blower motor.

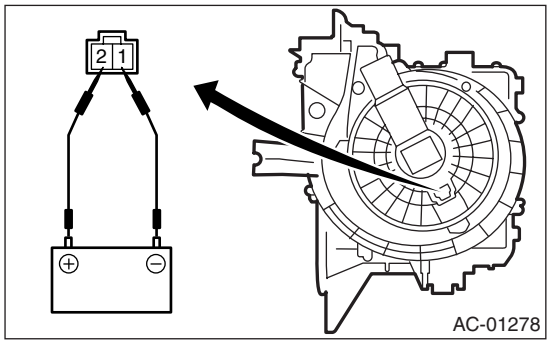


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

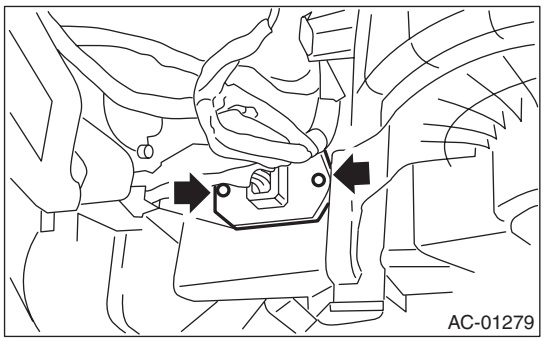
Connect the battery positive (+) terminal to terminal No. 2 of the blower motor connector, and the negative (–) terminal to terminal No. 1. Check the blower motor for smooth rotation.



9. Power Transistor (Auto A/C Model)

A: REMOVAL

1) Remove the glove box lower cover on passenger side. <Ref. to EI-37, REMOVAL, Glove Box.>
2) Disconnect the power transistor connector.
3) Remove the two screws and remove the power transistor.



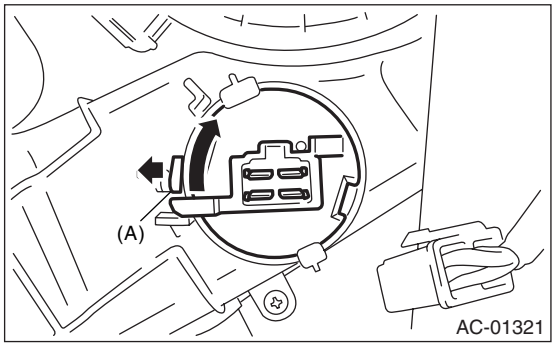
B: INSTALLATION

Install in the reverse order of removal.

10. Blower Resistor (Dual A/C Model)

A: REMOVAL

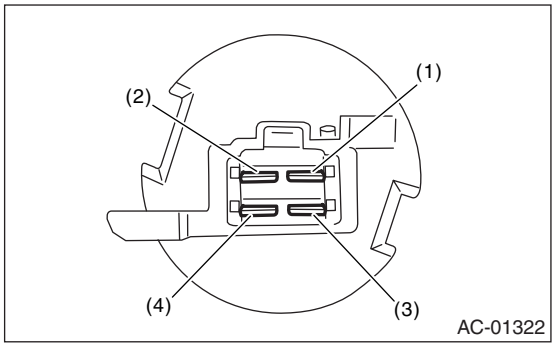
1) Remove the quarter trim. <Ref. to EI-45, REMOVAL, Rear Quarter Trim.>
2) Disconnect the blower resistor connector.
3) Remove the lock (A) and rotate to the right, and remove the blower resistor.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION



Measure the blower resistor resistance.

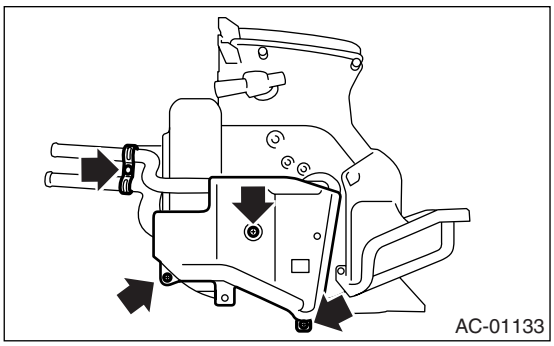
Terminal No.	Standard
1 and 3	Approximately 0.42Ω
1 and 2	Approximately 1.42 Ω
4 and 1	Approximately 3.2 Ω

If NG, replace the blower resistor.

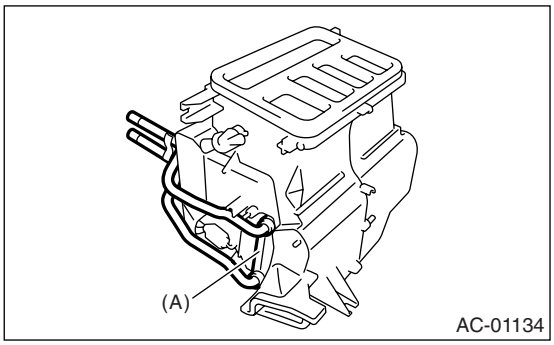
11.Heater Core

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Draw out the refrigerant with the refrigerant recovery unit <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
3) Remove the heater and cooling unit. <Ref. to AC-35, 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

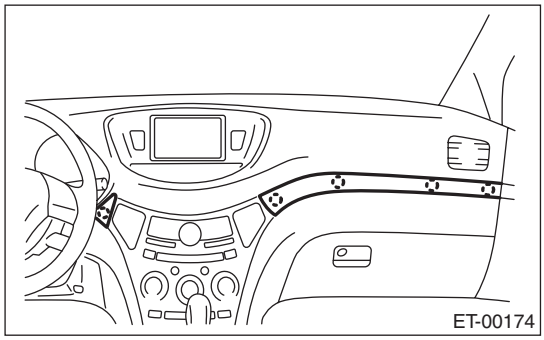
Install in the reverse order of removal.

12.Control Panel

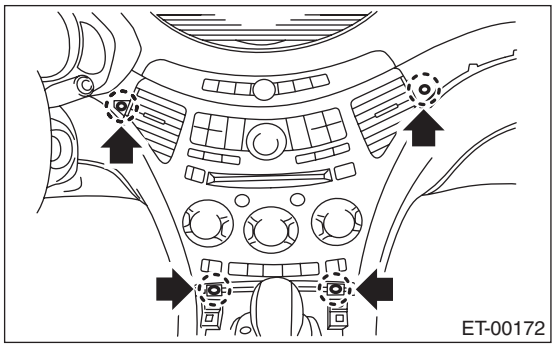
A: REMOVAL

1. FRONT

1) Disconnect the ground cable from battery.
2) Remove the front console panel. <Ref. to ET-14, REMOVAL, Audio.>
3) Remove the instrument panel ornament and the drivers side and passengers 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 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.

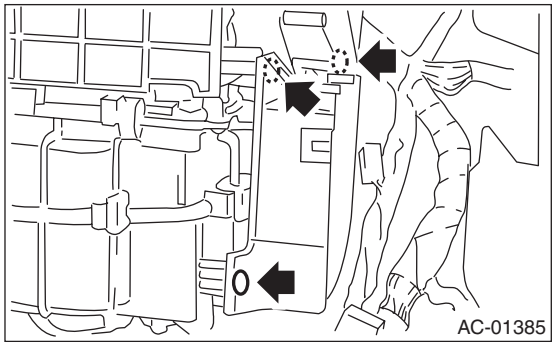
B: INSTALLATION

Install in the reverse order of removal.

13.Control Unit (Auto A/C Model)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-37, REMOVAL, Glove Box.>
3) Remove the screw, disconnect the connector and remove the control unit.



B: INSTALLATION

Install in the reverse order of removal.

14.Compressor

A: INSPECTION

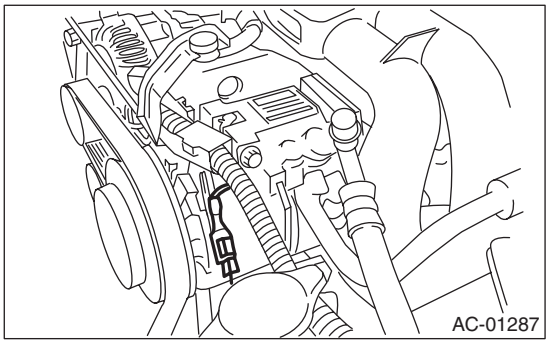
1. MAGNETIC CLUTCH CLEARANCE

Check the clearance of the entire circumference around the drive plate and pulley.

Standard:
0.45±0.15 mm (0.0177±0.0059 in)

2. MAGNETIC CLUTCH OPERATION

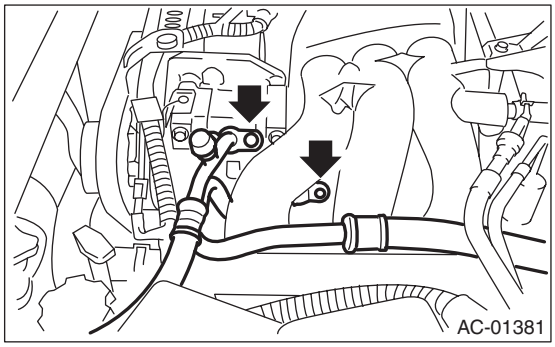
1) Disconnect the compressor connector.
2) Connect the positive (+) lead from the battery to the compressor connector terminal, and the negative (–) lead to the compressor body.



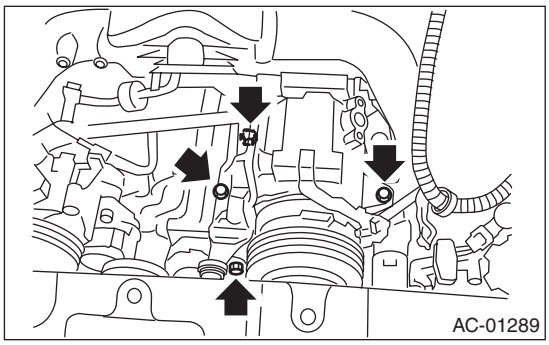
3) Check the magnet clutch engagement.
If there is a problem, replace the compressor.

B: REMOVAL

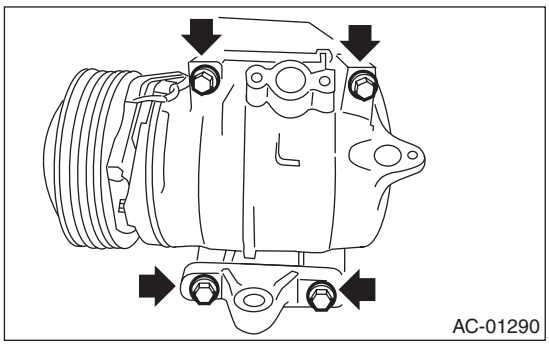
1) Perform the compressor oil return operation. <Ref. to AC-25, PROCEDURE, Compressor Oil.>
2) Turn the A/C switch to OFF and stop the engine.
3) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
4) Disconnect the ground cable from battery.
5) Remove the V-belts. <Ref. to ME(H6DO)-31, REMOVAL, V-belt.>
6) Remove the generator. <Ref. to SC(H6DO)-19, 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

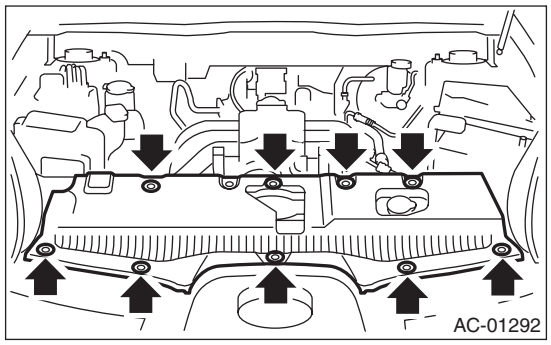
1) Install in the reverse order of removal.
2) Replace the O-rings on low-/high-pressure hoses with new parts, then apply compressor oil.
3) After replacing the compressor, adjust the amount of compressor oil. <Ref. to AC-25, PROCEDURE, Compressor Oil.>
4) Charge refrigerant. <Ref. to AC-21, PROCEDURE, 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.>

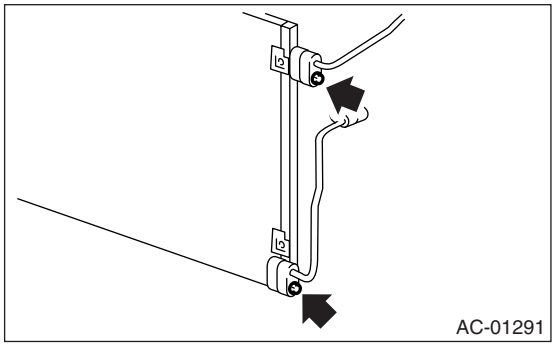
15.Condenser

A: REMOVAL

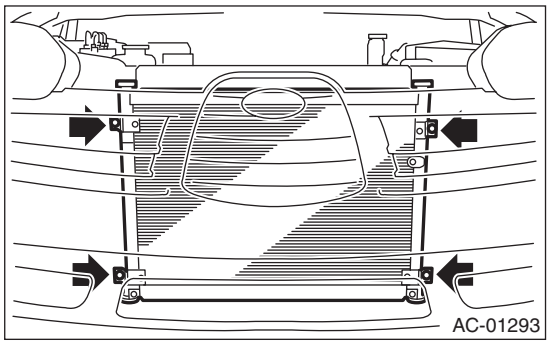
1) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
2) Disconnect the ground cable from battery.
3) Remove the bumper upper cover.



4) Disconnect the pressure hose and pipe from the condenser.



5) 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-25, 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-21, PROCEDURE, Refrigerant Charging Procedure.>

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AC-11, AIR CONDITIONING UNIT, COMPONENT, General Description.> <Ref. to CO(H6DO)-5, RADIATOR AND RADIATOR FAN, COMPONENT, General Description.>

C: INSPECTION

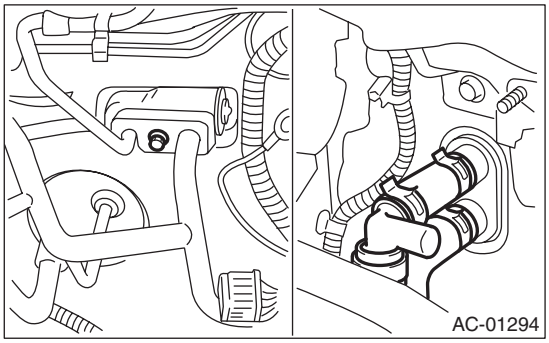
1) Check to see that the condenser fins are not clogged with debris or insects. Blow with compressed air or flush fins with water as needed.
2) Inspect for oil leakage from the condenser. If a failure is found, replace the condenser with a new one.

16.Heater and Cooling Unit

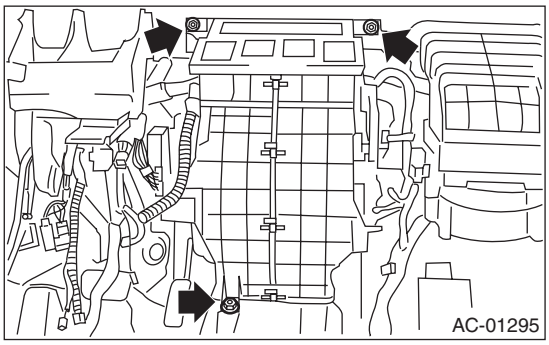
A: REMOVAL

1. FRONT

1) Disconnect the ground cable from battery.
2) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-20, 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-40, REMOVAL, Instrument Panel Assembly.>
6) Remove the support beam.
7) Remove the blower motor unit assembly. <Ref. to AC-26, 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 the refrigerant. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
3) Remove the quarter trim. <Ref. to EI-45, REMOVAL, Rear Quarter Trim.>
4) Remove the bolts, then disconnect the rear tube.
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-21, PROCEDURE, Refrigerant Charging Procedure.>

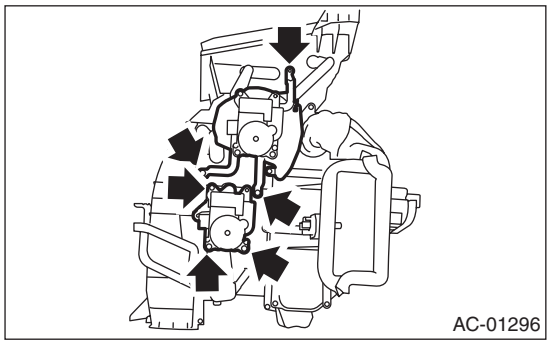
Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AC-6, HEATER COOLING UNIT, COMPONENT, General Description.>

17.Evaporator

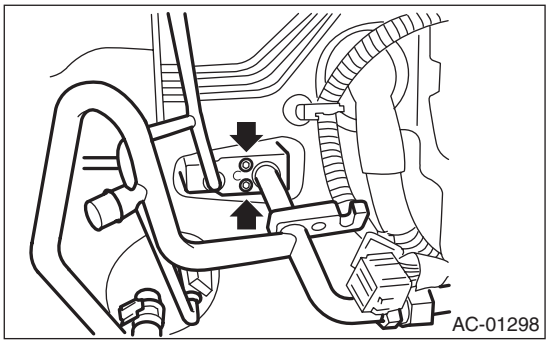
A: REMOVAL

1. FRONT

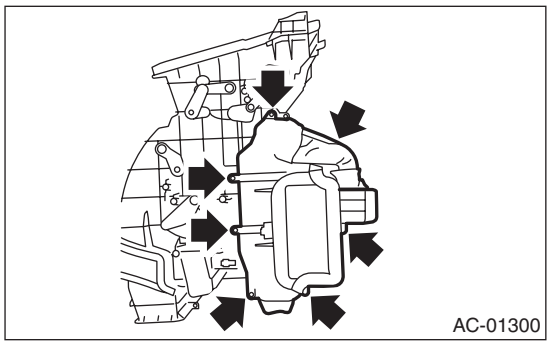
1) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
2) Disconnect the ground cable from battery.
3) Remove the blower motor unit assembly. <Ref. to AC-26, REMOVAL, Blower Motor Unit Assembly.>
4) Disconnect the connector, remove the screw and then remove the air-mix door actuator and mode door actuator.


AC-01296

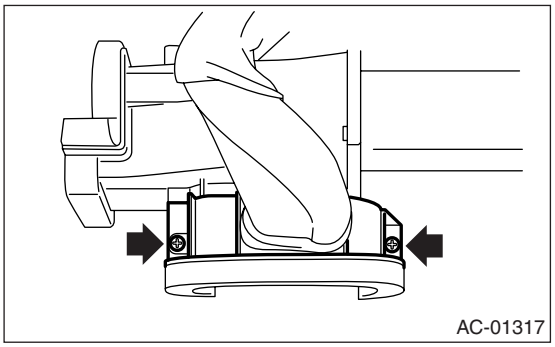
5) Remove the bolts holding the expansion valve, and remove the expansion valve.


AC-01298

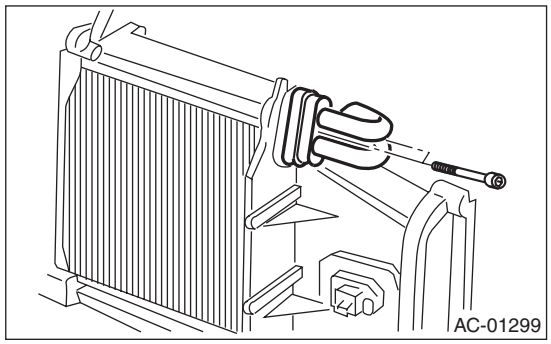
6) Remove the screws and pull out the evaporator.


AC-01300

7) Remove the pipe cover from the evaporator.


AC-01317

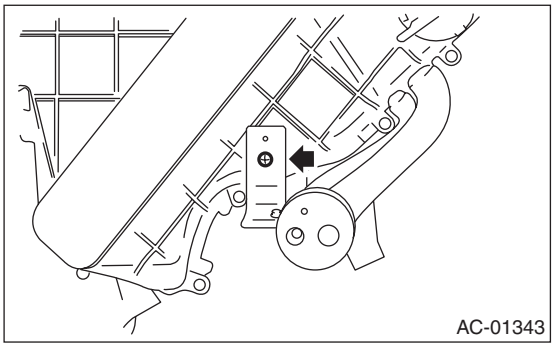
8) Remove the bolt which holds the pipe to evaporator, and remove the evaporator.


AC-01299

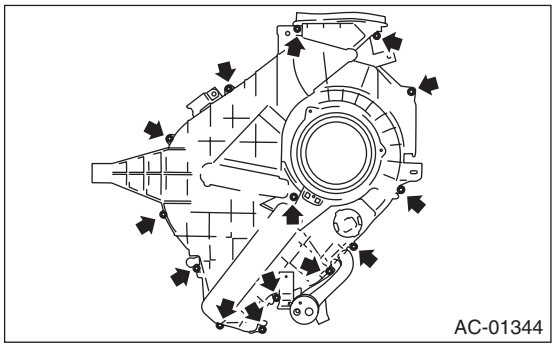
CAUTION:
If the evaporator is replaced, add an appropriate amount of compressor oil to the evaporator. <Ref. to AC-25, REPLACEMENT, Compressor Oil.>

2. REAR

1) Using the refrigerant recovery system, discharge the refrigerant. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
2) Disconnect the ground cable from battery.
3) Remove the rear cooler unit. <Ref. to AC-35, REMOVAL, Heater and Cooling Unit.>
4) Remove the pipe bracket bolts and remove the bracket.


AC-01343

5) Remove the screws, and then remove the cooler unit.



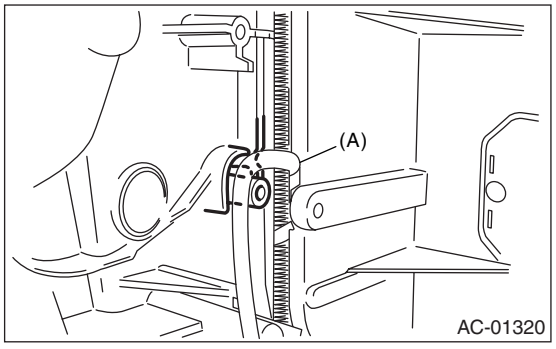
6) Remove from the cooler unit and disconnect the tube from the evaporator.

CAUTION:
If the evaporator is replaced, add an appropriate amount of compressor oil to the evaporator. <Ref. to AC-25, REPLACEMENT, Compressor Oil.>

B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Route the cord (A) of the evaporator through the location shown on the illustration.



(A) Code

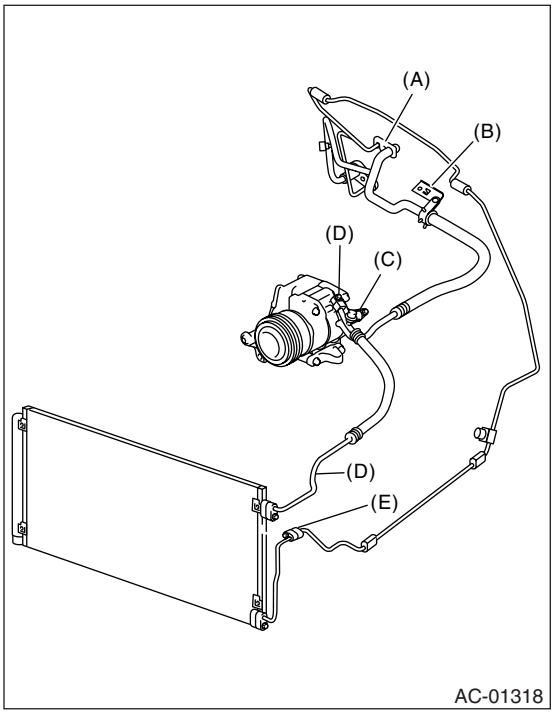
18.Hose and Tube

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-20, 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 tube attaching bolt (E).
13) Remove the high-pressure tube from vehicle.



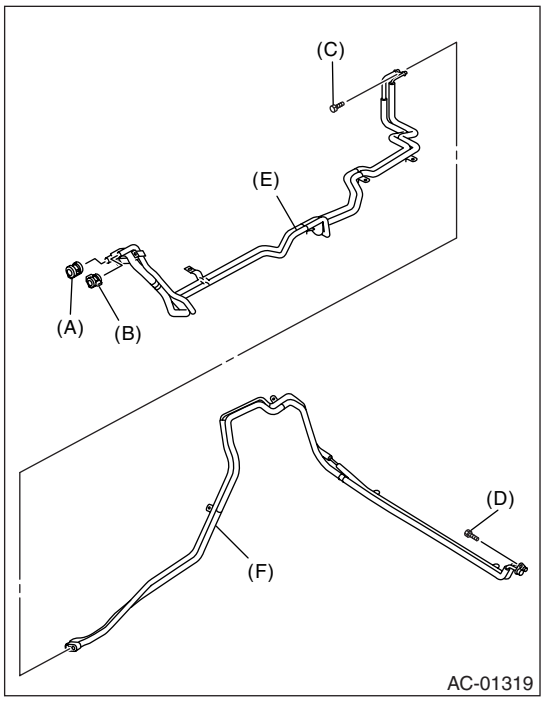
2. REAR

1) Disconnect the ground cable from battery.
2) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
3) Remove the sheet and floor mat. <Ref. to EI-47, REMOVAL, Floor Mat.>
4) Remove the ECM bracket and tube protector. <Ref. to FU(H6DO)-32, REMOVAL, Engine Control Module (ECM).>
5) Remove the quick connectors (A and B).
ST REMOVER PS73499XA01A
ST REMOVER PD73499XA00A

NOTE:
Refer to the instruction manual for the ST when working.

6) Remove the tube bracket.
7) Remove the front tube and rear tube connecting bolts (C)
8) Remove the connecting bolts (D) of the rear cooler unit.

9) Remove the front tube (E) and rear tube (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-21, PROCEDURE, Refrigerant Charging Procedure.>

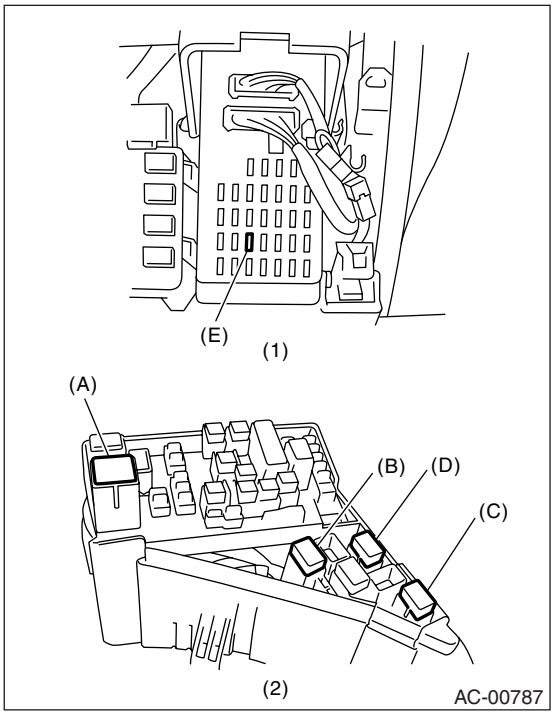
Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AC-11, AIR CONDITIONING UNIT, COMPONENT, General Description.>

C: INSPECTION

Check the hoses for cracks, damage and expansion. If any fault is found, replace with new parts.

19.Relay and Fuse

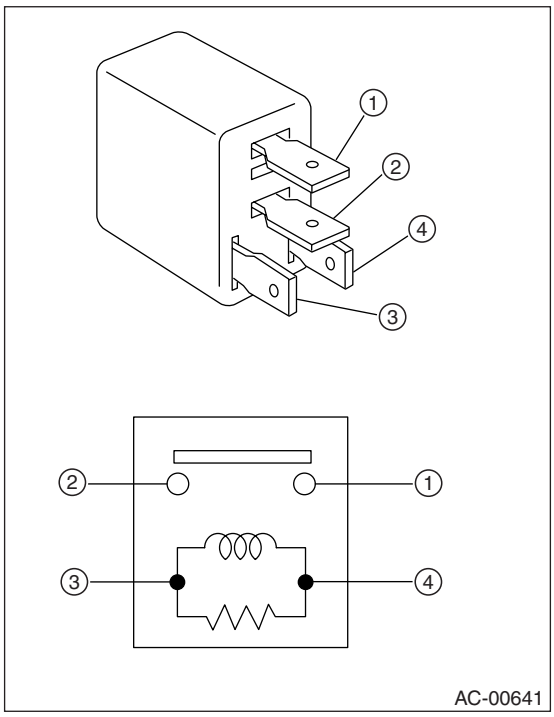
A: LOCATION



(1) Joint box
(2) Main fuse box

Main fan relay 1	(A)
Main fan relay 2	(B)
Sub fan relay	(C)
A/C relay	(D)
A/C Fuse	(E)

B: INSPECTION



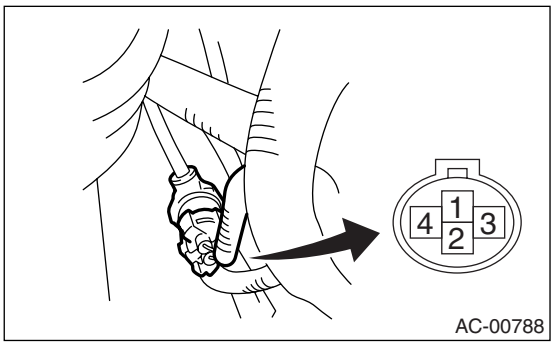
(3) — (4): Continuity exists
(1) — (2): Continuity does not exist

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 one.

20.Pressure Switch (Triple Pressure Switch)

A: INSPECTION

1) Connect the manifold gauge to the service valve on the high-pressure side.
2) Remove the pressure switch harness connector. Using a circuit tester, inspect the ON-OFF operation of the pressure switch.



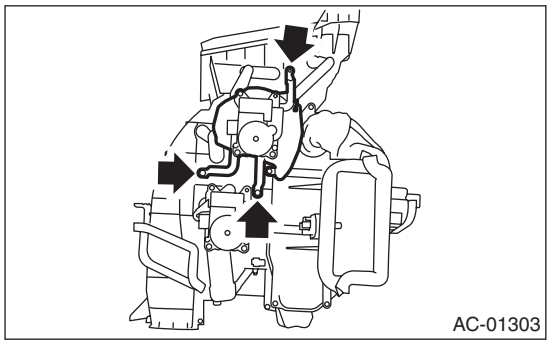
	Terminal No.	OPERATION	Standard kPa (kg/cm^2, psi)
High and low pressure switch	1 and 2	Turns OFF.	Rise to $3{,}140^{+50}_{-200}$ ($32.02^{+0.51}_{-2.04}$, $455.4^{+7.25}_{-29.0}$)
			Decrease to 196±20 (2.00±0.20, 28.4±2.9)
		Turns ON.	Rise to 225^{+25}_{-29} ($2.29^{+0.25}_{-0.30}$, $32.6^{+3.6}_{-4.2}$)
			Decrease to 2,550±200 (26.00±2.04, 369.8±29.0)
Middle pressure switch	3 and 4	Turns OFF.	Increase to 1,370±120 (14±1, 199±14)
		Turns ON.	Increase to 1,770±100 (18±1, 256±14)

21.Actuator

A: REMOVAL

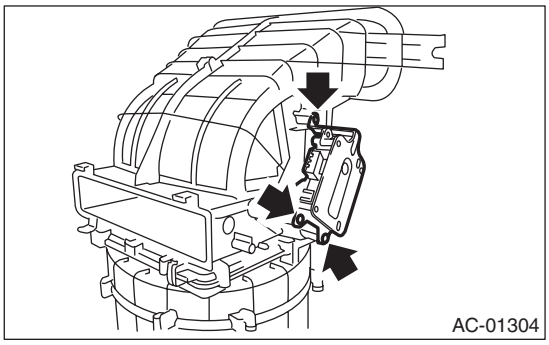
1. MODE DOOR ACTUATOR

Disconnect the connector, remove the screw, and then remove the mode door actuator from the heater and cooling unit.



2. FRESH/RECIRC DOOR ACTUATOR

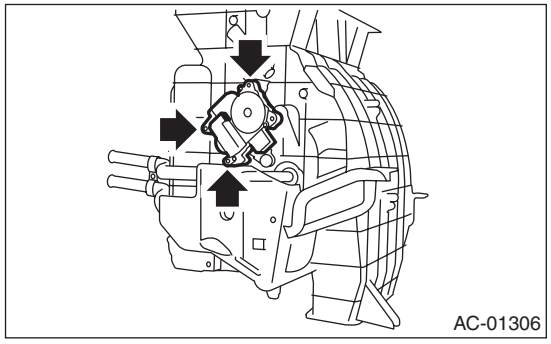
Disconnect the connector, remove the screw, and then remove the intake door actuator from the blower motor unit.



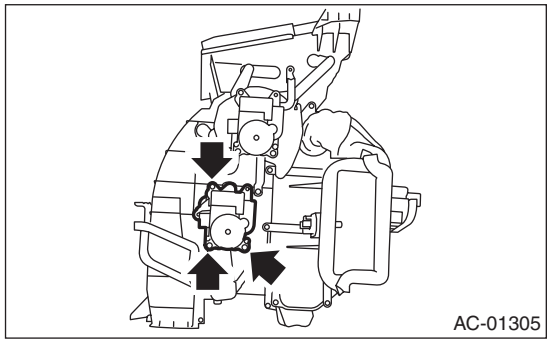
3. AIR MIX DOOR ACTUATOR (AUTO A/C MODEL)

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



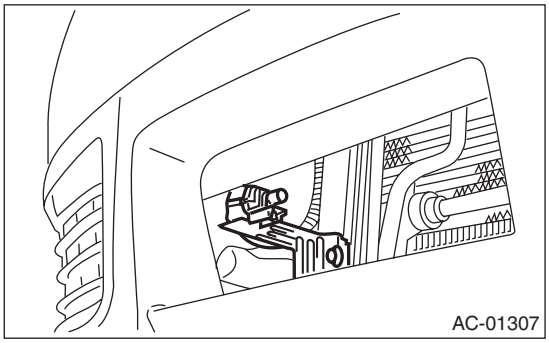
B: INSTALLATION

Install in the reverse order of removal.

22. Ambient Sensor (Auto A/C Model)

A: REMOVAL

1) Disconnect the ground cable from 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.

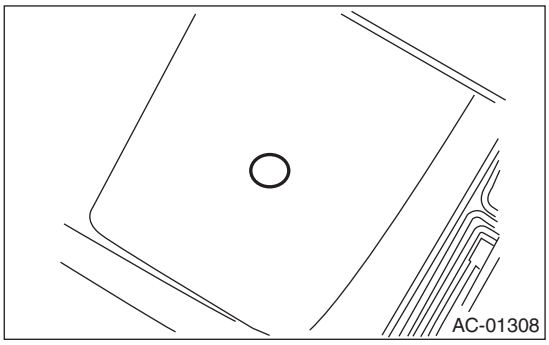
C: INSPECTION

<Ref. to AC(diag)-31, AMBIENT SENSOR, Diagnostic Procedure for Sensors.>

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)-37, SUNLOAD SENSOR, Diagnostic Procedure for Sensors.>

24.In-vehicle Sensor (Auto A/C Model)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower panel on driver's side. <Ref. to EI-36, 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

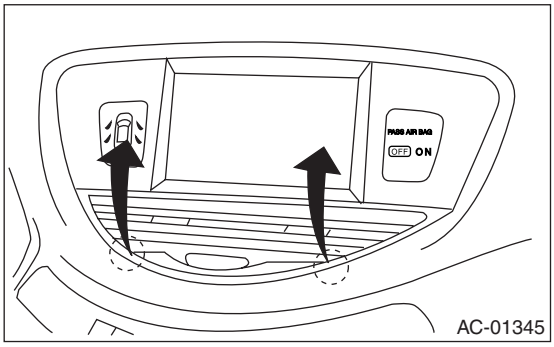
<Ref. to AC(diag)-33, IN-VEHICLE SENSOR, Diagnostic Procedure for Sensors.>

25.Air Vent Grille

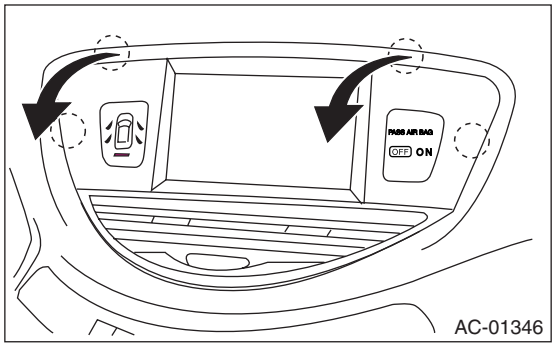
A: REMOVAL

1. UPPER GRILL

1) Disconnect the ground cable from battery.
2) Lift the upper grill, and remove the catch on the hazard switch side.



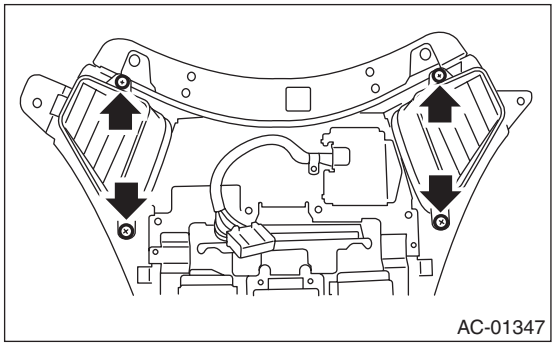
3) Hold the side of the monitor and remove the catch on the upper, right and left sides.



4) Detach the connectors and remove the panel.

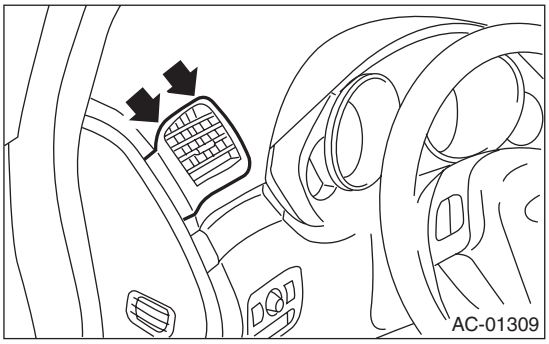
2. CENTER GRILLE

1) Disconnect the ground cable from battery.
2) Remove the front control panel. <Ref. to AC-31, FRONT, REMOVAL, Control Panel.>
3) Remove the screw, and remove the center grill



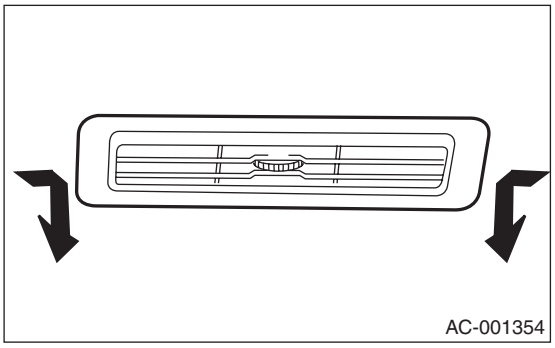
3. SIDE GRILLE

Remove the catch in 2 locations to remove the side air vent grill.



4. ROOF GRILL

Remove the catch, and remove the roof air vent grill.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

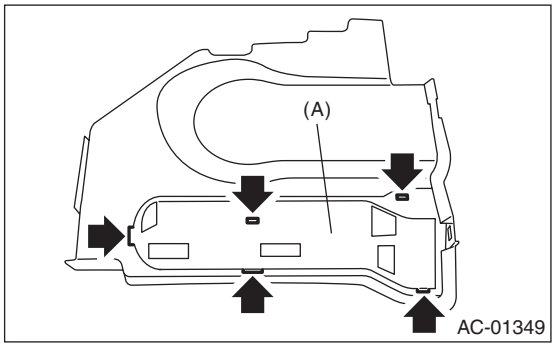
1) Check that the direction and amount of air can be adjusted smoothly.
2) Check that the adjustment can be maintained in each position.

26.Heater Duct

A: REMOVAL

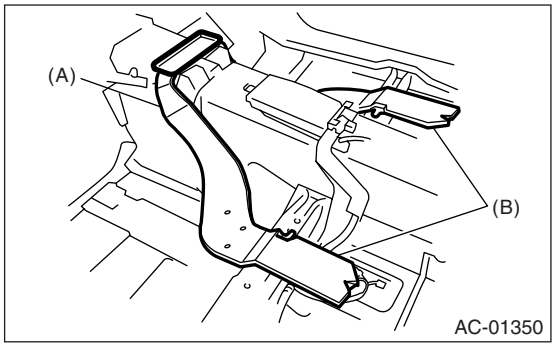
1. FRONT HEATER DUCT

1) Remove the instrument panel lower cover. <Ref. to EI-36, 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-35, 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

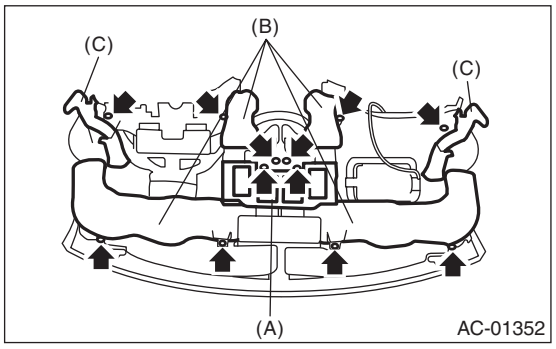
Install in the reverse order of removal.

27.Heater Vent Duct

A: REMOVAL

1. INSTRUMENT

1) Remove the instrument panel. <Ref. to EI-36, 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-50, REMOVAL, Roof Trim.>

NOTE:
The roof duct is one piece with the roof trim. If it requires replacement, replace the roof trim.

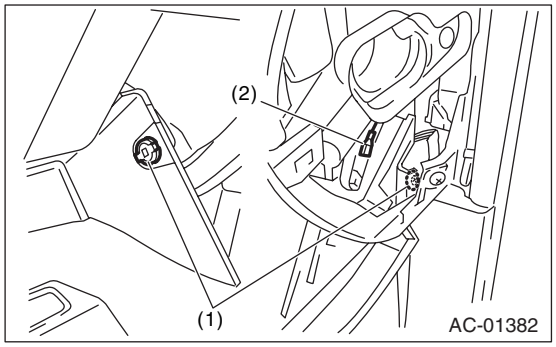
B: INSTALLATION

Install in the reverse order of removal.

28.A/C Filter

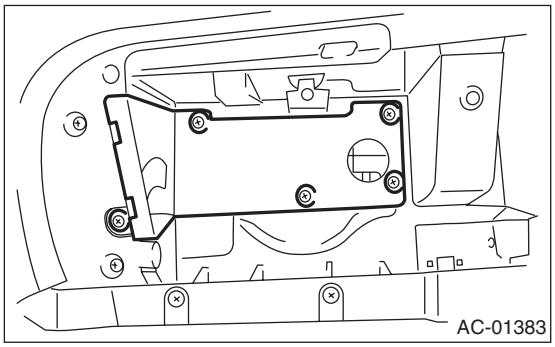
A: REPLACEMENT

1) Remove the instrument panel lower cover. <Ref. to EI-37, REMOVAL, Glove Box.>
2) Remove the 2 clips and the damper (string)

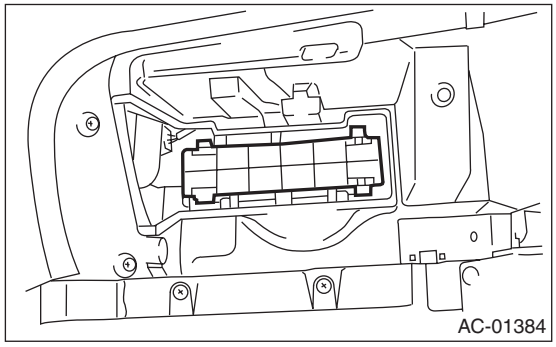


(1) Clip
(2) Damper (String)

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.

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 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 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)
		Wire 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
		FRESH/RECIRC door actuator
		Wiring harness

Symptom	Repair order
Air does not come out of the rear A/C.	Rear cooler blower
	Rear cooler blower resistor
	Rear cooler switch
	Wiring harness
Air does not come out of the rear A/C.	Air conditioner switch
	Compressor
	Rear cooler switch
	Rear cooler expansion valve

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**START INSPECTIONS.** 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)-15, A/C OR SELF-DIAGNOSIS SYSTEMS DOES NOT OPERATE, Diagnostics for A/C System Malfunction.>
2	**IDENTIFY MALFUNCTION PART.** Identify the malfunction part with self-diagnosis.	Can the malfunction part be confirmed?	Repair the malfunction part in accordance with each diagnostic chart.	Go to step **3**.
3	**CHECK COMPARTMENT TEMPERATURE.** 1) Turn on the A/C switch. 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)-20, COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY., Diagnostics for A/C System Malfunction.>
4	**CHECK A/C SYSTEM RESPONSE.** 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)-20, COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY., Diagnostics for A/C System Malfunction.>

2. General Description

A: CAUTION

1) Never connect the battery in reverse polarity.
• Auto A/C control module may be destroyed instantly.
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 each sensor and the auto A/C control module, be sure to turn the ignition switch to OFF.
• 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:
• For airbag system, yellow-colored wiring harness and connectors are all used. Do not use the electrical test equipment on these 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.

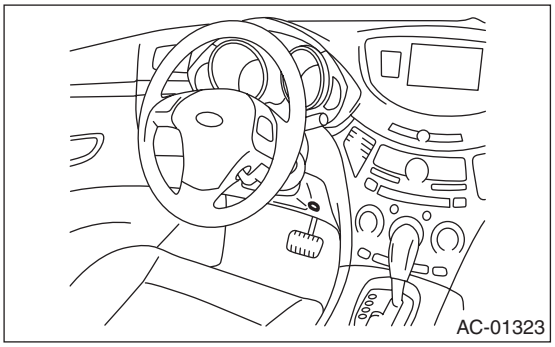
Standard voltage: 12 V

Specific gravity: 1.260 or more
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 4th 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.

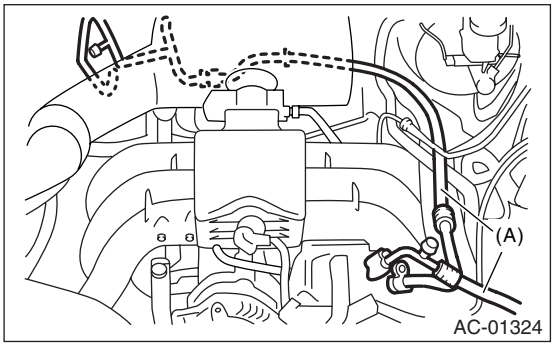
NOTE:
Be careful not to let the paper get sucked into the port.



6) If the paper does not move at all, remove the driver’s side console side panel <Ref. to EI-39, REMOVAL, Center Console.> 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.



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. • Blower fan: OFF • Inlet opening: FRESH • Compressor: OFF
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. • Outlet air temperature: COOL • Blower fan: HI (AUTO) • Outlet opening: FACE • Inlet opening: AUTO • Compressor: AUTO
		3) Turn the temperature control dial to the right slowly, and change the setting from 18°C (64°F) (maximum cool position) to 32°C (85°F).	• Outlet air temperature: COOL → HOT • Blower fan: AUTO • Outlet opening: FACE → B/L → FOOTHEAT • Inlet opening: AUTO • Compressor: AUTO
		4) Turn the temperature control dial to the right fully, and set to 32°C (85°F) (maximum hot position).	• Outlet air temperature: HOT • Blower fan: HI (AUTO) • Outlet opening: HEAT • Inlet opening: FRESH (AUTO) • Compressor: AUTO
3	Defroster switch	Press the defroster switch.	Defroster switch indicator illuminates. • Outlet air temperature: AUTO • Blower fan: AUTO • Outlet opening: DEF • Inlet opening: FRESH • Compressor: ON
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 FACE → B/L → HEAT → D/H each time pressing the switch.
6	FAN switch	Turn the FAN switch.	Blower fan switches OFF → LO → M1 → M2 → M3 → M4 → HI each time turning the switch and it switches in reverse order when turned backward.

2) Compressor operation inspection

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.	Blower fan switches OFF → LO → ML → MH → HI each time turning the switch and it switches in reverse order when turned backward.

5) Inspection of rear cooler

No.	Point to check	Switch operation	Judgment standard
1	Roof grill	Turn the FAN switch.	Front A/C ON (compressor operating): COOL Front A/C OFF (compressor not operating): Blower ON

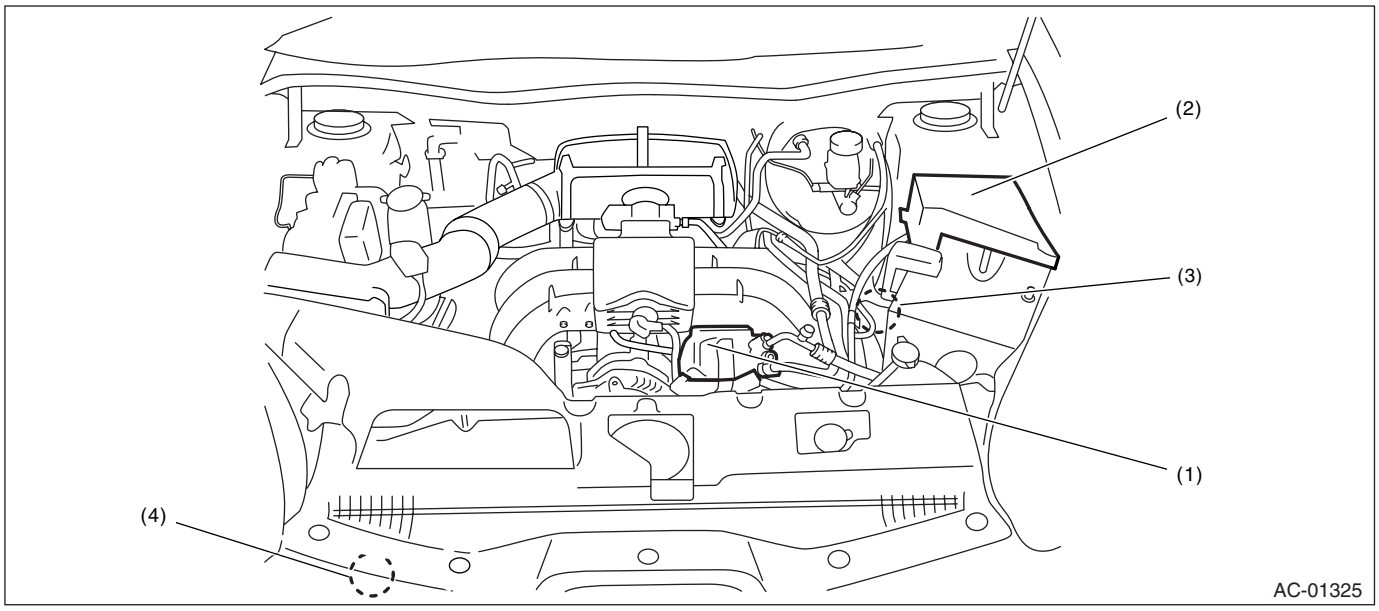
6) Inspection of illumination control

No.	Point to check	Switch operation	Judgment standard
1	Illumination	Turn the lighting switch to ON.	Illumination comes on.

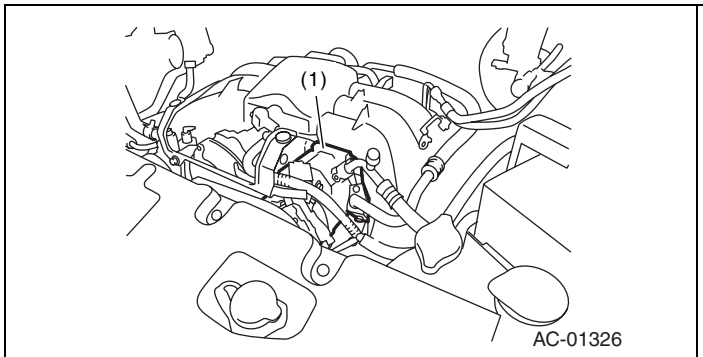
3. Electrical Component Location

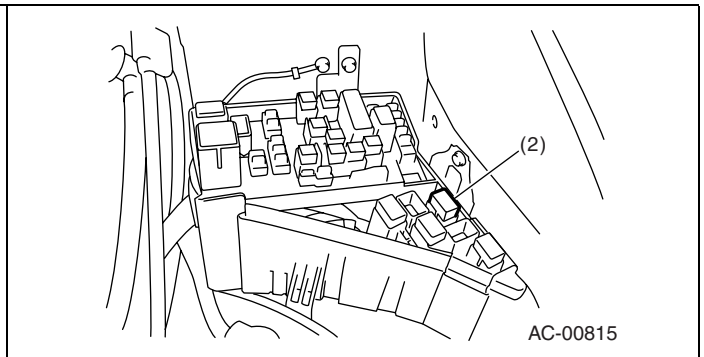
A: LOCATION

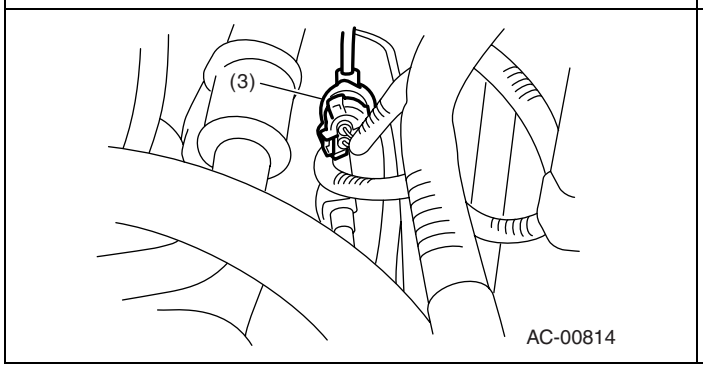
1. ENGINE COMPARTMENT

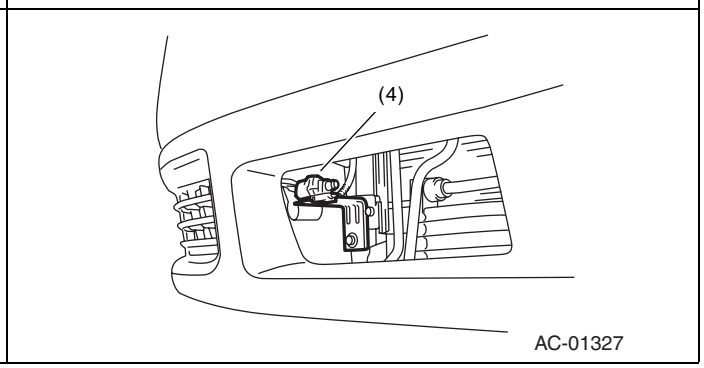


(1) A/C compressor
(2) A/C relay
(3) Pressure switch
(4) Ambient sensor

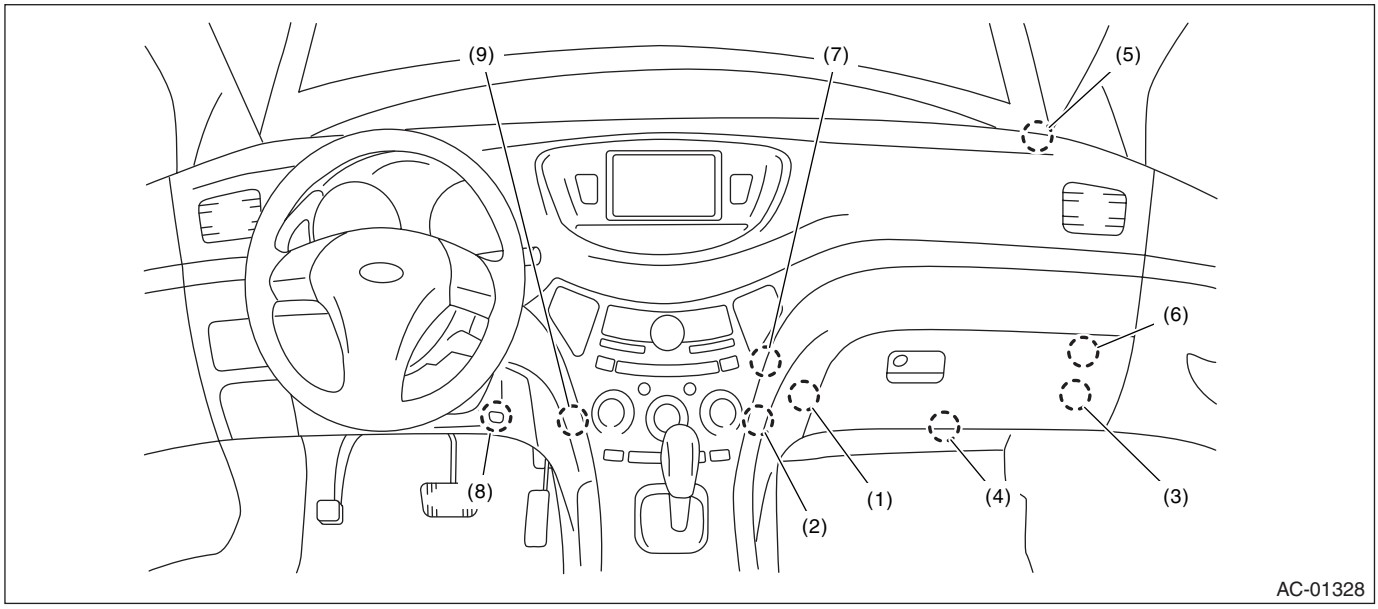




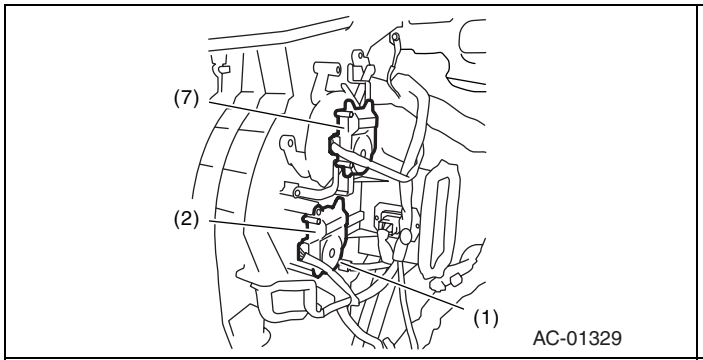


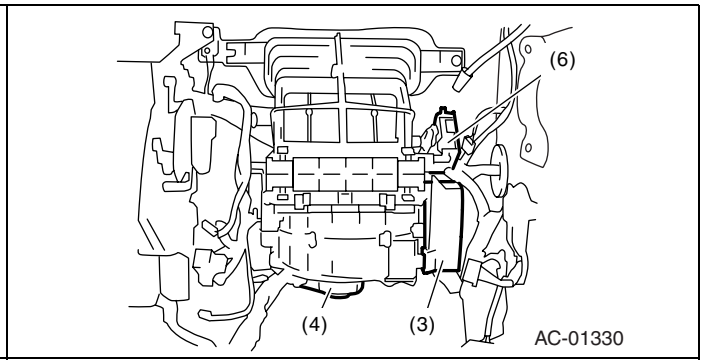


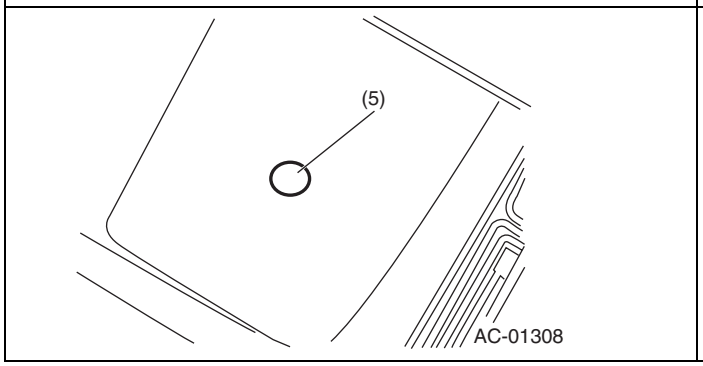
2. PASSENGER COMPARTMENT

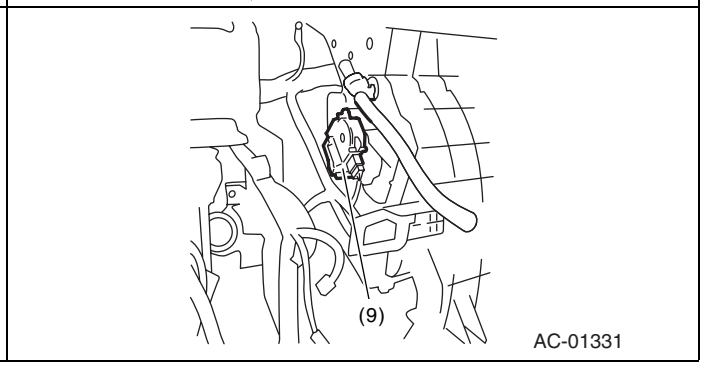


(1) Evaporator sensor
(2) Passenger's side air mix door actuator
(3) Auto A/C control module
(4) Blower motor
(5) Sunload sensor
(6) Intake door actuator
(7) Mode door actuator
(8) In-vehicle sensor
(9) Driver's side air mix door actuator



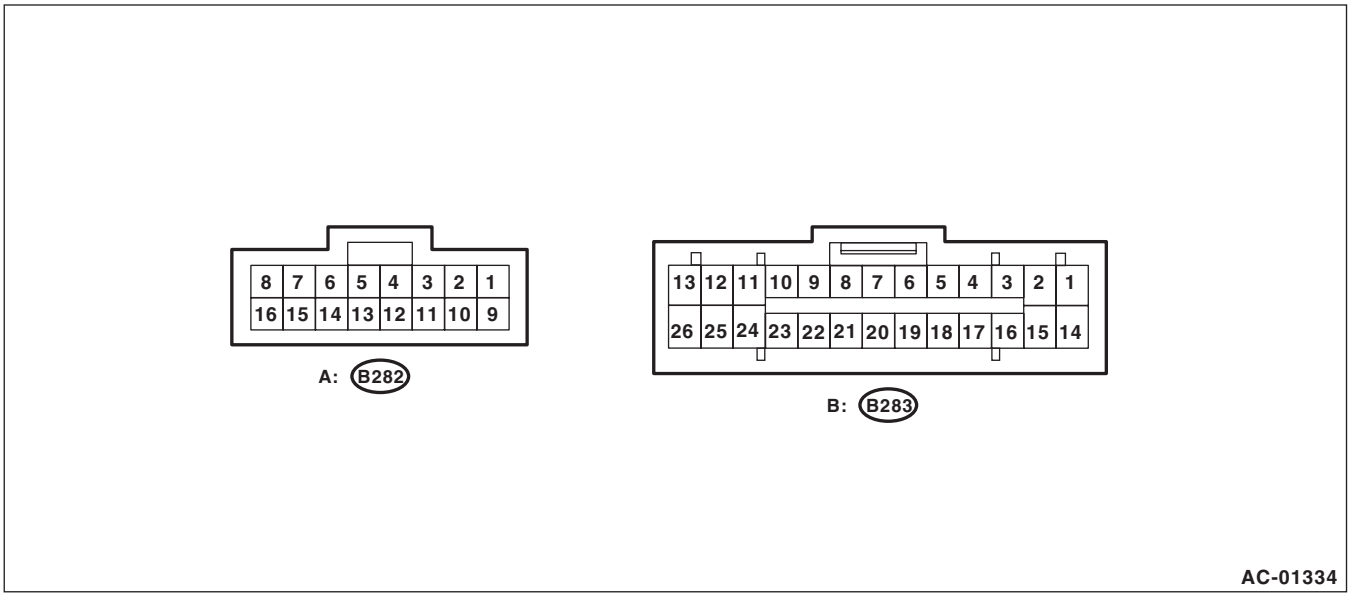






4. Auto A/C Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



Terminal No.	Description	Measuring condition	Specification
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	Less than 5 V
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	Less than 5 V
A8	Sensor power supply	Ignition switch: ON	5 V
A9	Ignition power supply	Ignition switch: ON	Battery voltage
A10	A/C cut 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	Less than 5 V
A14	Passenger's seat heater temperature sensor	Ignition switch: ON	Less than 5 V
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	Less than 1 V
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

Terminal No.	Description	Measuring condition	Specification
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	Less than 1 V *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	Less than 1 V *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	Less than 1 V *2
B10	Inlet opening motor (FRESH side)	FRESH	Less than 1 V
		RECIRC	Battery voltage
B11	Driver's seat heater	Driver's seat heater: ON (3 stages)	Less than 1 V *3
B13	Passenger's seat heater	Passenger's seat heater: ON (3 stages)	Less than 1 V *3
B14	CAN communication (Lo side)	Ignition switch: ON	Pulse signal *1
B16	Blower motor relay	Blower motor: Stopped	Battery voltage
		Blower motor: Operated	Less than 1 V
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	Less than 1 V
		Mode: FACE ⇒ DEF	Battery voltage — 2.5 V or more
B21	Passenger's side air mix door	Air mix: Maximum HOT ⇒ maximum COOL	Less than 1 V
		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	Less than 1 V
		Air mix: Maximum COOL ⇒ maximum HOT	Battery voltage — 2.5 V or more
B23	Inlet opening motor (RECIRC side)	RECIRC	Less than 1 V
		FRESH	Battery voltage
B24	Driver's seat heater ground	Continuity to chassis ground	0 Ω
B25	Passenger's seat heater ground	Continuity to chassis ground	0 Ω

*1: Unable to measure the voltage for digital signal.
*2: Voltage immediately after switching FACE ⇔ DEF or maximum COOL ⇔ maximum HOT (when the damper door is operating.) for mode door and air mix door
*3: Voltage immediately after the operation for the seat heater (Always measure the voltage immediately after turning the seat heater to ON because once reached to the target value, it switches to ON/OFF action.)

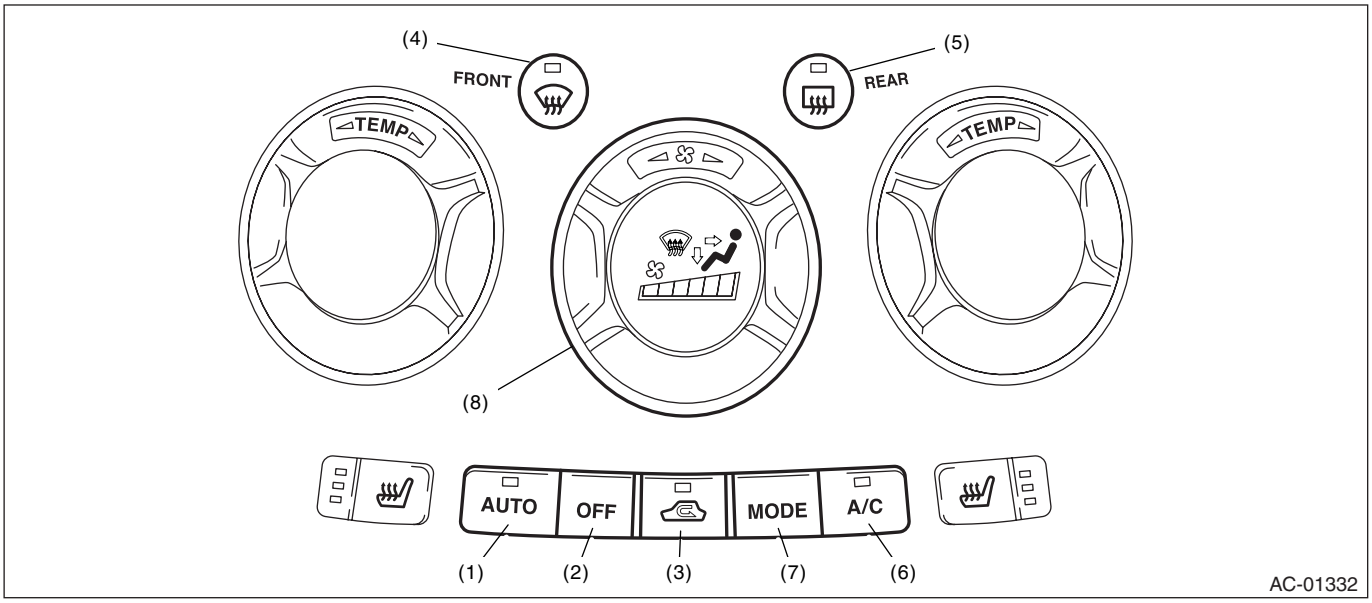
B: WIRING DIAGRAM

1. AIR CONDITIONER AUTO A/C MODEL

<Ref. to WI-63, WIRING DIAGRAM, Air Conditioning System.>

5. Diagnostic Chart for Self-diagnosis

A: OPERATION



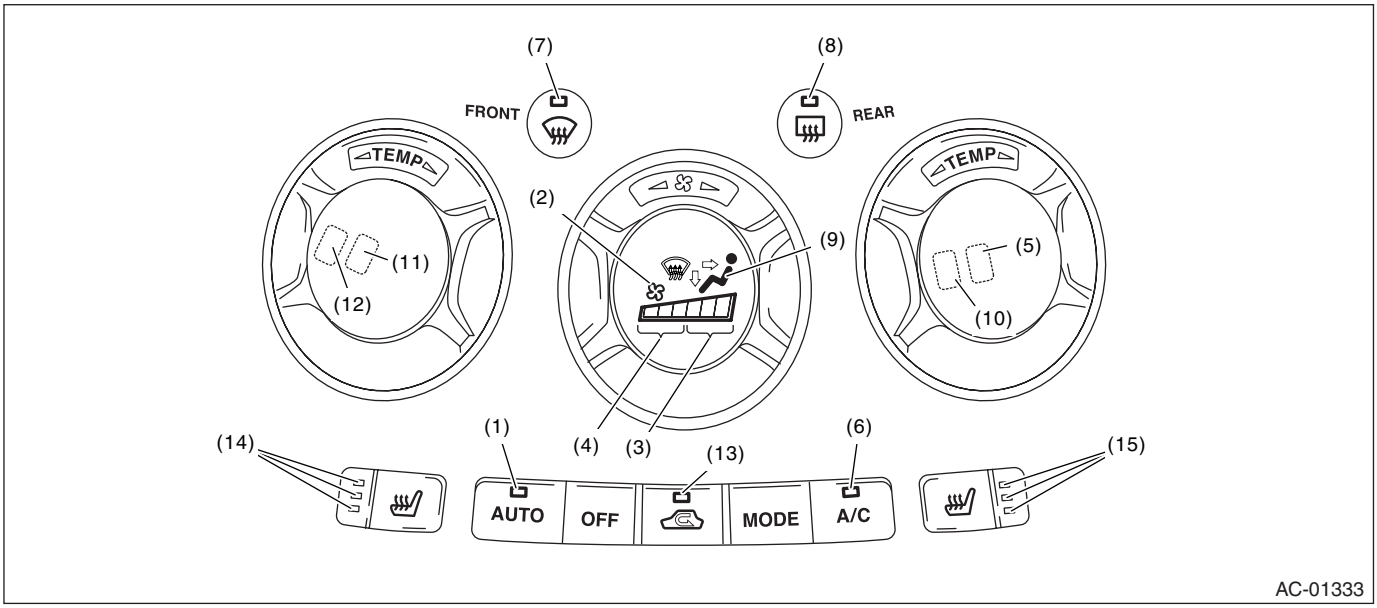
(1) AUTO switch
(2) OFF switch
(3) FRESH/RECIRC switch
(4) Defroster switch
(5) Rear window defogger switch
(6) A/C switch
(7) Air flow control switch
(8) FAN switch

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
1	**SET SELF-DIAGNOSIS MODE BY OPERATING A/C CONTROL PANEL.** 1) Turn the ignition switch from OFF to ACC, and wait for 2 seconds. 2) Turn the ignition switch to ON with the AUTO switch and MODE switch pressed. 3) The status of communication with the A/C ECM is displayed in the left TEMP display field.	Does the self-diagnosis function operate?	Go to step **2**.	<Ref. to AC(diag)-15, A/C OR SELF-DIAGNOSIS SYSTEMS DOES NOT OPERATE, Diagnostics for A/C System Malfunction.>
2	**CHECK DISPLAY AND INDICATOR.** 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.
3	**CHECK SWITCH AND TEMPERATURE CONTROL DIAL INPUT.** 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)-12, 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.
4	**CHECK A/C CONTROL PANEL COMMUNICATION.** 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 while pressing the AUTO switch and A/C switch. 6) When no malfunction occurs in the control panel communication, "CL" (no open line) is displayed in the left side TEMP display field on the screen; and when a malfunction occurs, "OP" (open line exists) 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



Switch	Display screen	Switch	Display screen
A/C switch	(6)	FAN switch (+)	(4)
AUTO switch	(1)	FAN switch (–)	(3)
Air flow control switch	(9)	Driver's side temperature control dial	Right rotation (11) Left rotation (12)
FRESH/RECIRC	(13)	Passenger's side temperature control dial	Right rotation (5) Left rotation (10)
Defroster switch	(7)	OFF switch	(2)
Rear defogger switch	(8)	Driver's seat heater switch	(14)
Passenger's seat heater switch	(15)		

3. A/C CONTROL SYSTEM SELF-DIAGNOSIS

	Step	Check	Yes	No
1	**SET SELF-DIAGNOSIS MODE BY OPERATING A/C CONTROL PANEL.** 1) Turn the ignition switch from OFF to ACC, and wait for 2 seconds. 2) Start the engine with the auto switch and FRESH/RECIRC switch pressed. NOTE: Self-diagnosis can also be performed with ignition switch ON, but start the engine because observing the magnet clutch operation is difficult. 3) All the indicators blink four times.	Does the self-diagnosis function operate?	Go to step **2**.	<Ref. to AC(diag)-15, A/C OR SELF-DIAGNOSIS SYSTEMS DOES NOT OPERATE, Diagnostics for A/C System Malfunction.>
2	**CHECK EACH SENSOR AND POTENTIOMETER** 1) After the indicators stop blinking, automatically change to the inspection mode of sensor and potentiometer. NOTE: Display items can be changed each time the A/C switch is pressed. (Step Operation) 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. 3) Identify the defective sensor according to the sensor check table. <Ref. to AC(diag)-14, SENSOR CHECK TABLE, OPERATION, Diagnostic Chart for Self-diagnosis.>	Are other codes except “20” displayed?	Repair the defective sensor. <Ref. to AC(diag)-31, Diagnostic Procedure for Sensors.>	Go to step **3**.
3	**CHECK EACH ACTUATOR, BLOWER FAN AND MAGNET CLUTCH.** 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. 2) Each mode will change and operate automatically every four seconds. NOTE: Operation mode items can be changed each time the A/C switch is pressed. (Step Operation) 3) Check the operation of actuator, blower fan and magnet clutch in each mode according to the operating mode table. <Ref. to AC(diag)-14, OPERATING MODE TABLE, OPERATION, Diagnostic Chart for Self-diagnosis.>	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 the defective part in accordance with each diagnostic chart. <Ref. to AC(diag)-15, Diagnostics for A/C System Malfunction.> or <Ref. to AC(diag)-24, Diagnostic Procedure for Actuators.>

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 malfunction
23/AUTO Blink	Evaporator sensor	Open
–23/AUTO Blink		Short
24/AUTO Blink	Engine coolant temperature sensor	Sensor trouble or communication malfunction
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

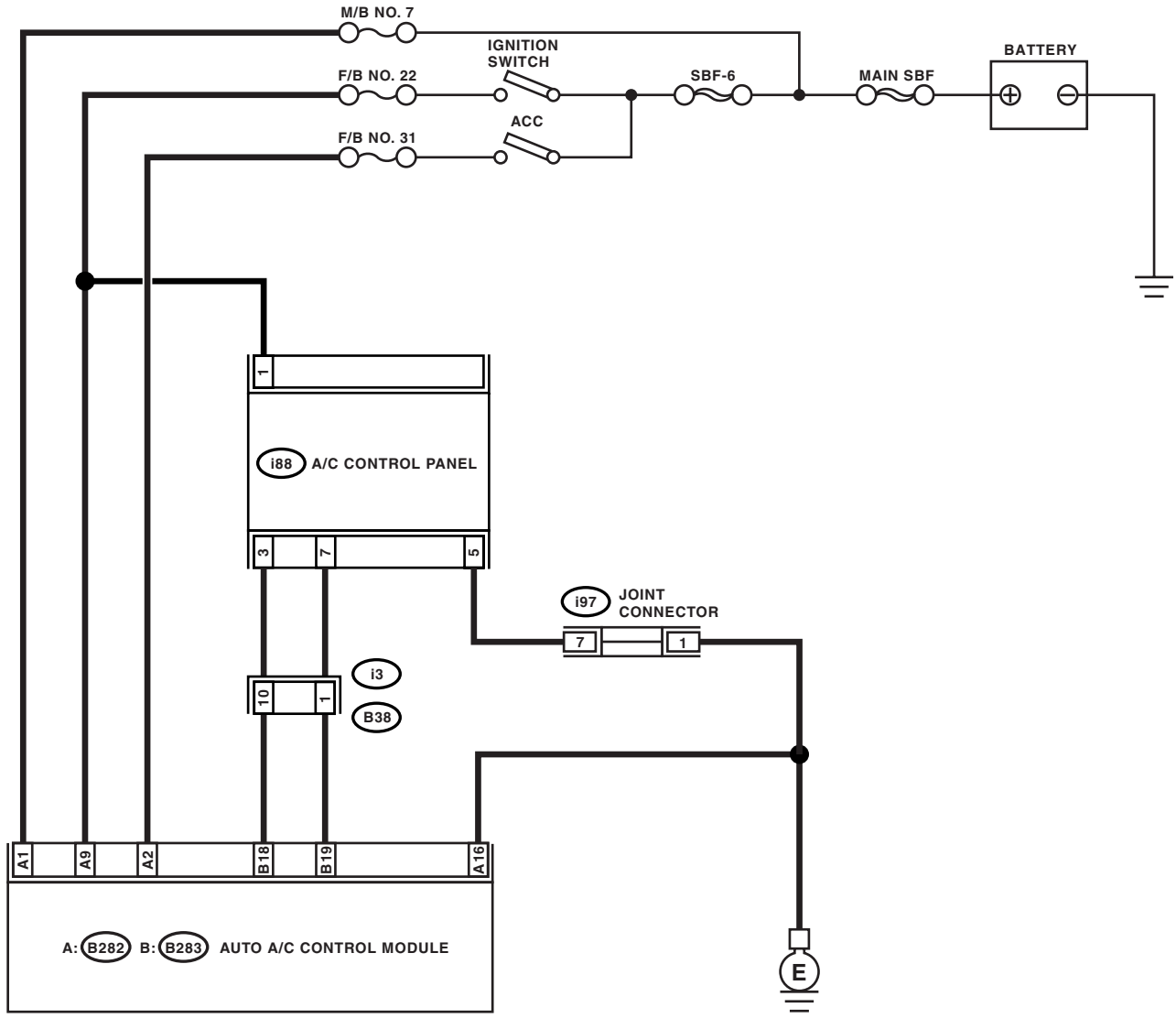
6. Diagnostics for A/C System Malfunction

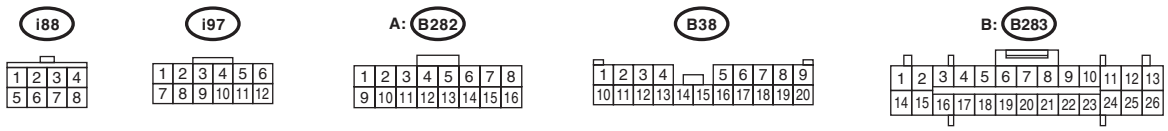
A: A/C OR SELF-DIAGNOSIS SYSTEMS DOES NOT OPERATE

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-01335

	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 7 from main fuse box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step **2**.
2	**CHECK FUSE.** 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.	Is the fuse blown out?	Replace the fuse.	Go to step **3**.
3	**CHECK A/C CONTROL PANEL POWER CIRCUIT.** Measure the voltage between A/C control panel harness connector terminal and chassis ground after turning the ignition switch to ON. ***Connector & terminal*** ***(i88) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Check for open or short circuit in the harness between A/C control panel and fuse.
4	**CHECK A/C CONTROL PANEL GROUND POWER CIRCUIT.** Measure the resistance of harness between A/C control panel and chassis ground after turning the ignition switch to OFF. ***Connector & terminal*** ***(i88) No. 5 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **5**.	Repair the harness for ground line.
5	**CHECK AUTO A/C CONTROL MODULE POWER CIRCUIT.** Measure the voltage between auto A/C control module connector terminal and chassis ground after turning the ignition switch to OFF. ***Connector & terminal*** ***(B282) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Check open or short circuit of harness between auto A/C control module and fuse.
6	**CHECK AUTO A/C CONTROL MODULE POWER CIRCUIT.** Measure the voltage between auto A/C control module connector terminal and chassis ground after turning the ignition switch to ACC. ***Connector & terminal*** ***(B282) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Check open or short circuit of harness between auto A/C control module and fuse.
7	**CHECK AUTO A/C CONTROL MODULE POWER CIRCUIT.** Measure the voltage between auto A/C control module connector terminal and chassis ground after turning the ignition switch to ON. ***Connector & terminal*** ***(B282) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8**.	Check open or short circuit of harness between auto A/C control module and fuse.
8	**CHECK AUTO A/C CONTROL MODULE GROUND CIRCUIT.** Measure the resistance of harness between auto A/C control module and chassis ground. ***Connector & terminal*** ***(B282) No. 16 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **9**.	Repair the harness for ground line.

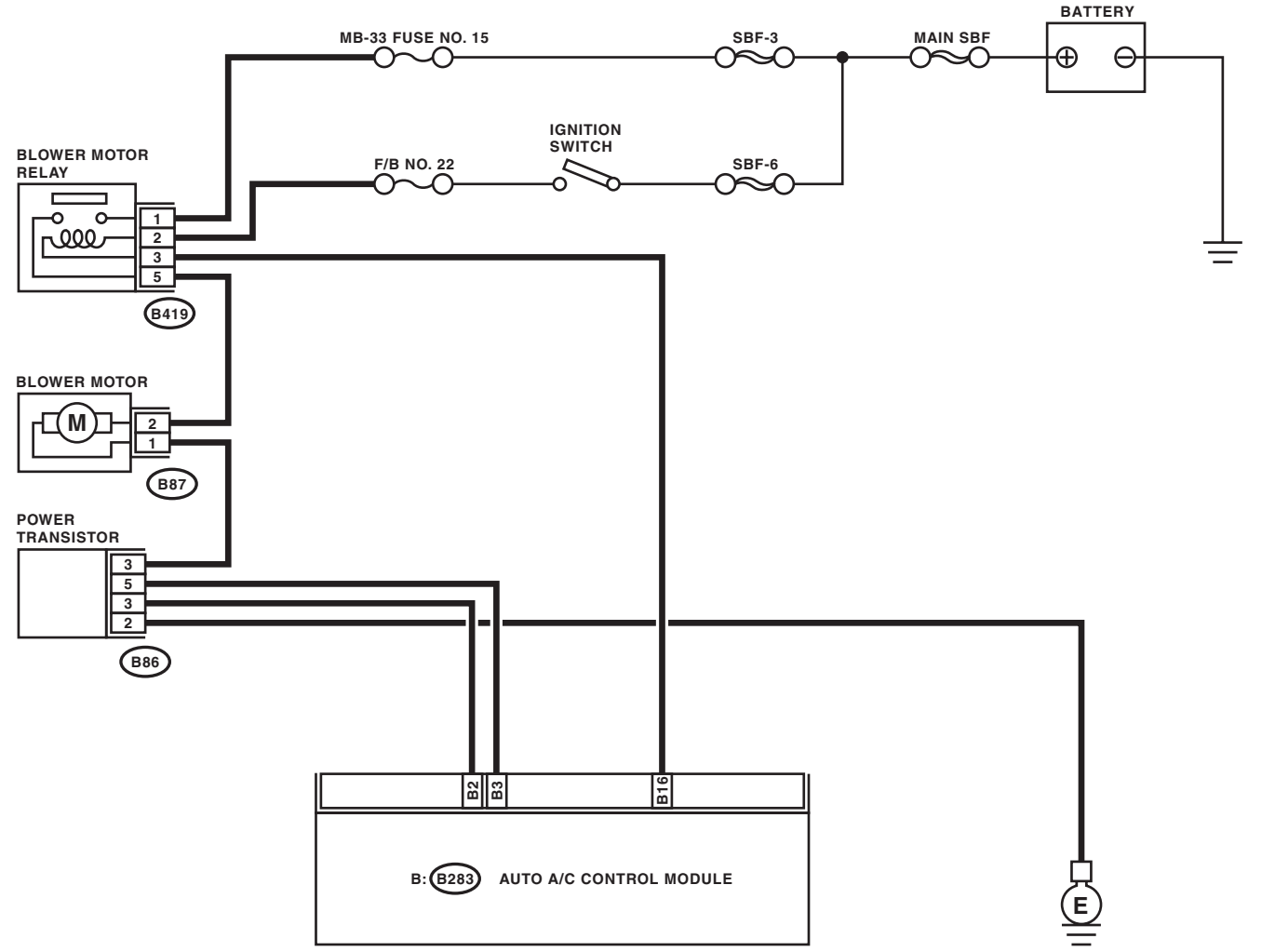
Step		Check	Yes	No
9	**CHECK COMMUNICATION CIRCUIT.** Measure the resistance of harness between A/C control panel and auto A/C control module. ***Connector & terminal*** ***(i88) No. 3 — (B283) No. 19:*** ***(i88) No. 7 — (B283) No. 18:***	Is the resistance less than 1 Ω?	Go to step **10**.	Repair the harness.
10	**CHECK POOR CONTACT.** 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-32, REMOVAL, Control Unit (Auto A/C Model).>

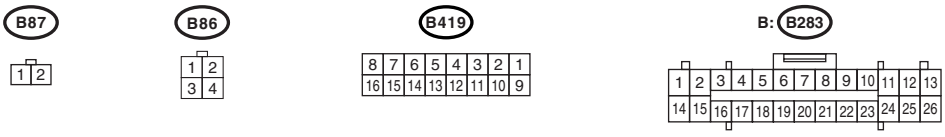
B: BLOWER MOTOR DOES NOT ROTATE.

TROUBLE SYMPTOM:

- Blower motor does not rotate.
- Blower motor does not rotate in “HI”.

WIRING DIAGRAM:



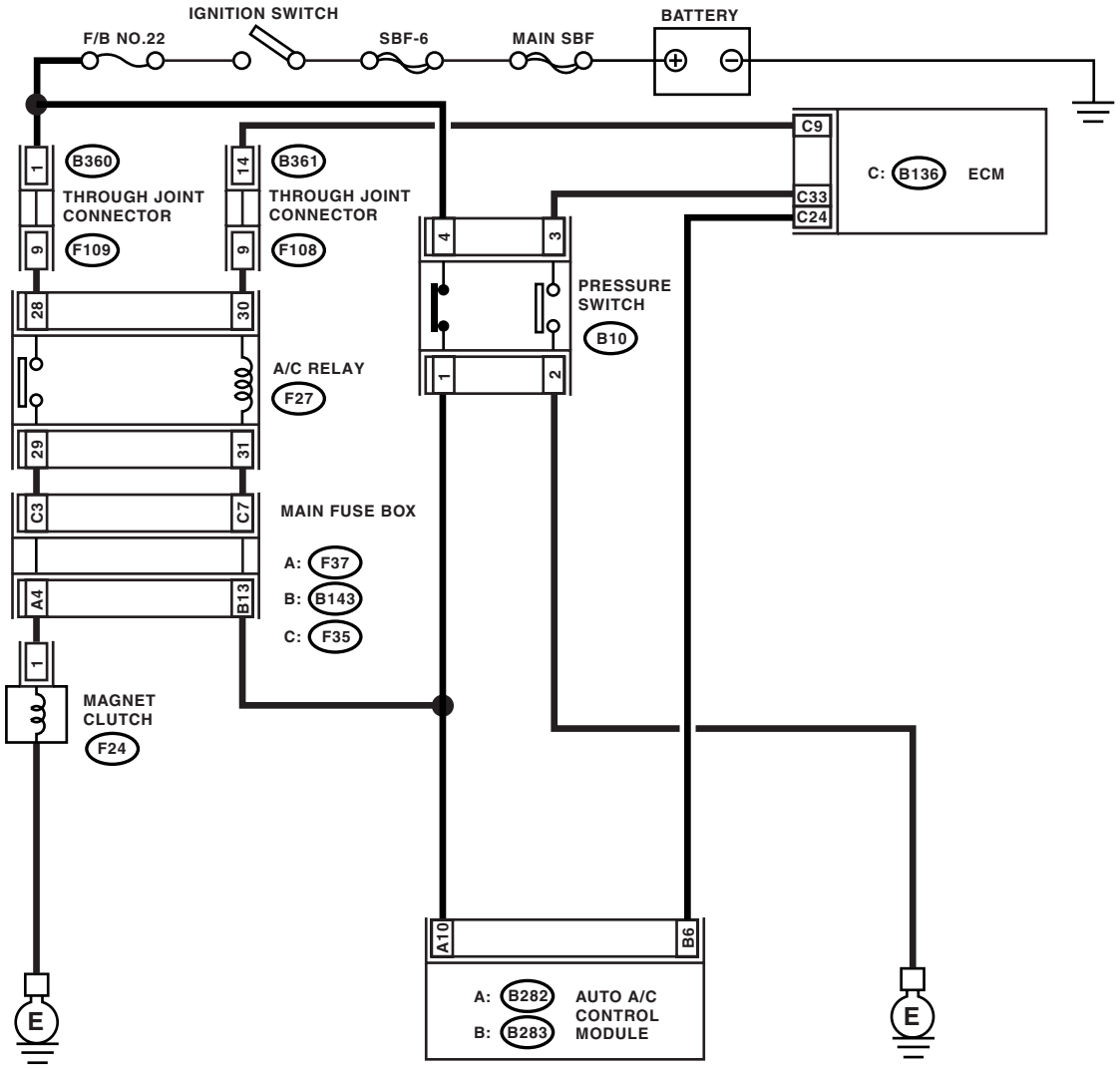


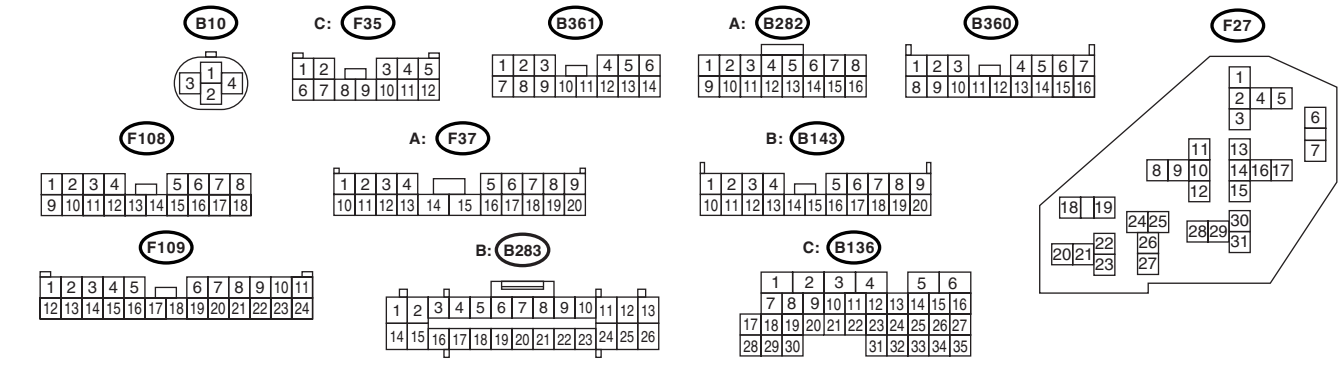
AC-01336

	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Remove the fuse No. 22 in fuse & relay box, and the fuse No. 15 in main fuse box. 2) Check the condition of fuse.	Is any fuse blown out?	Replace the fuse.	Go to step **2**.
2	**CHECK POWER SUPPLY FOR BLOWER MOTOR.** 1) Turn the ignition switch to ON. 2) Turn the blower switch to ON. 3) Measure the voltage between blower motor and chassis ground. ***Connector & terminal*** ***(B87) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Repair the open circuit of blower motor power supply line harness.
3	**CHECK BLOWER MOTOR RELAY.** 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. ***Terminals*** ***(B419) No. 1 — (B419) No. 5:***	Is the resistance less than 1 Ω?	Go to step **4**.	Replace the blower motor relay.
4	**CHECK BLOWER MOTOR.** 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-27, REMOVAL, Blower Motor.>
5	**CHECK POOR CONTACT.** 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-32, REMOVAL, Control Unit (Auto A/C Model).>

C: COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY.

WIRING DIAGRAM:





AC-01337

	Step	Check	Yes	No
1	**CHECK FUSE.** 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**.
2	**CHECK SIGNAL TO A/C RELAY AND A/C CONTROL MODULE.** 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. ***Connector & terminal*** ***(F27) No. 31 (+) — Chassis ground (–):*** ***(B282) No. 10 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5**.	Go to step **3**.
3	**CHECK POWER SUPPLY FOR PRESSURE SWITCH** 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. ***Connector & terminal*** ***(B10) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Check for open or short circuit in the harness between fuse and pressure switch.
4	**CHECK HARNESS BETWEEN PRESSURE SWITCH AND A/C RELAY, AUTO A/C CONTROL MODULE.** 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. ***Connector & terminal*** ***(B10) No. 1 — (F27) No. 31:*** ***(B10) No. 1 — (B282) No. 10:***	Is the resistance less than 1 Ω?	Check the pressure switch. <Ref. to AC-41, INSPECTION, Pressure Switch (Triple Pressure Switch).>	Repair the harness.
5	**CHECK POWER SUPPLY FOR A/C RELAY.** Measure the voltage between A/C relay connector terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 28 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Check open or short circuit of harness between fuse and A/C relay.
6	**CHECK A/C RELAY.** Check the A/C relay. <Ref. to AC-40, INSPECTION, Relay and Fuse.>	Is there a malfunction in the A/C relay?	Replace the A/C relay.	Go to step **7**.

	Step	Check	Yes	No
7	**CHECK A/C ON SIGNAL.** 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. ***Connector & terminal*** ***(B283) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **9**.	Go to step **8**.
8	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND ECM.** 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. ***Connector & terminal*** ***(B283) No. 6 — (B136) No. 24:***	Is the resistance less than 1 Ω?	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>	Repair the harness.
9	**CHECK MAGNET CLUTCH ON SIGNAL.** 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. ***Connector & terminal*** ***(B136) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **10**.	Check for open or short circuit in the harness between A/C relay and ECM.
10	**CHECK MAGNET CLUTCH ON SIGNAL.** 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. ***Connector & terminal*** ***(B136) No. 9 (+) — Chassis ground (–):***	Is the voltage 0 V?	Go to step **11**.	Replace the ECM. <Ref. to FU(H6DO)-32, REMOVAL, Engine Control Module (ECM).>
11	**CHECK POWER SUPPLY FOR MAGNET CLUTCH.** 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. ***Connector & terminal*** ***(F24) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **12**.	Check for open or short circuit in the harness between A/C relay and magnet clutch.

	Step	Check	Yes	No
12	**CHECK THE MAGNET CLUTCH** 1) Stop the engine, and turn the AUTO switch to OFF. 2) Disconnect the harness connector of magnet clutch. ***Connector & terminal*** ***(F24) No. 2 — Chassis ground:*** 3) Connect the battery positive (+) terminal to terminal No. 1 of the magnet clutch, and negative (–) terminal to the compressor body.	Is the magnetic clutch operating?	Magnetic clutch is normal.	Replace the compressor. <Ref. to AC-33, REMOVAL, Compressor.>

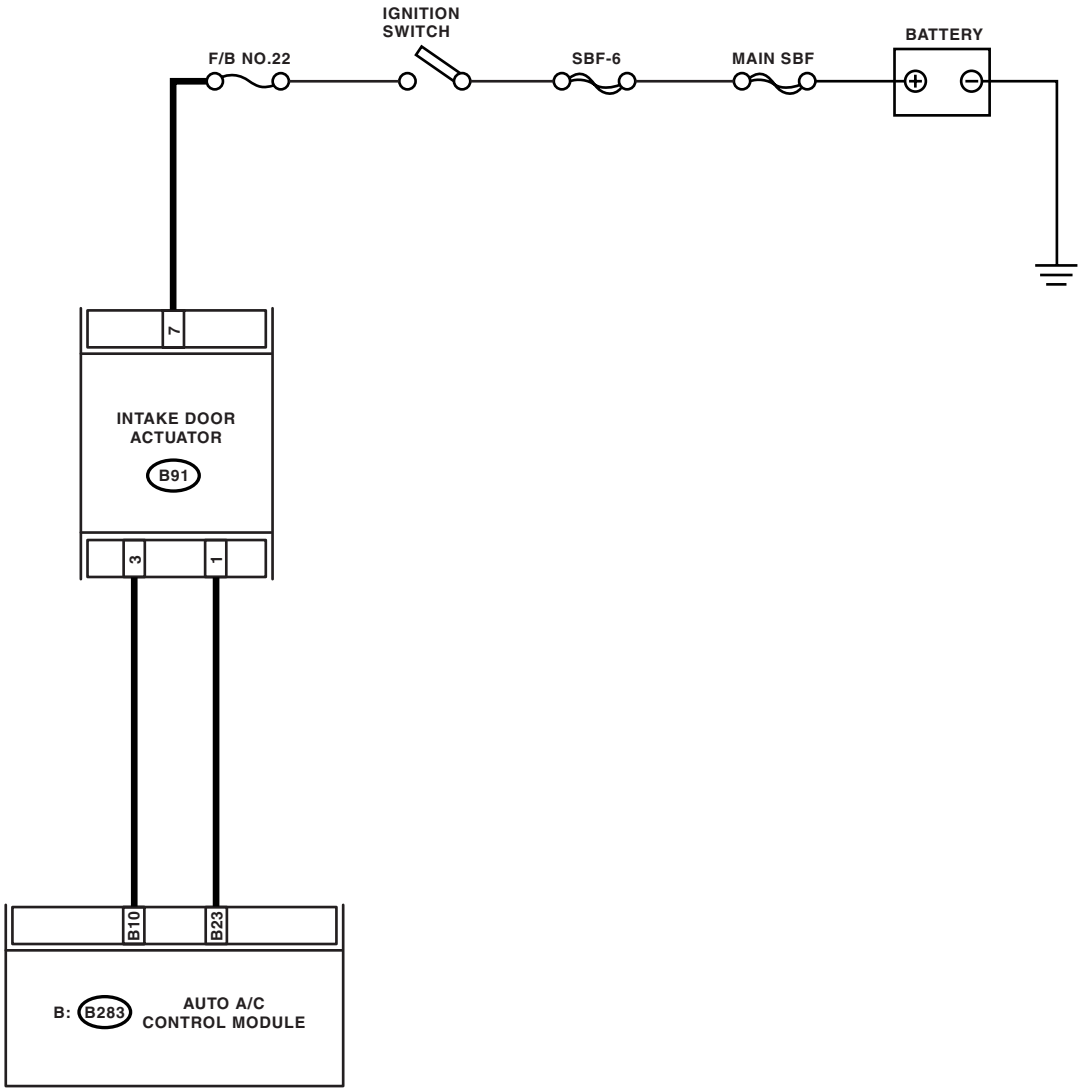
7. Diagnostic Procedure for Actuators

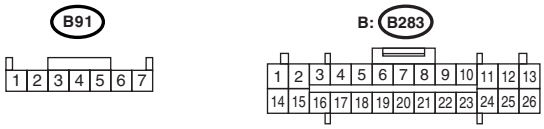
A: INTAKE DOOR ACTUATOR

TROUBLE SYMPTOM:

FRESH/RECIRC mode is not changed.

WIRING DIAGRAM:





AC-01338

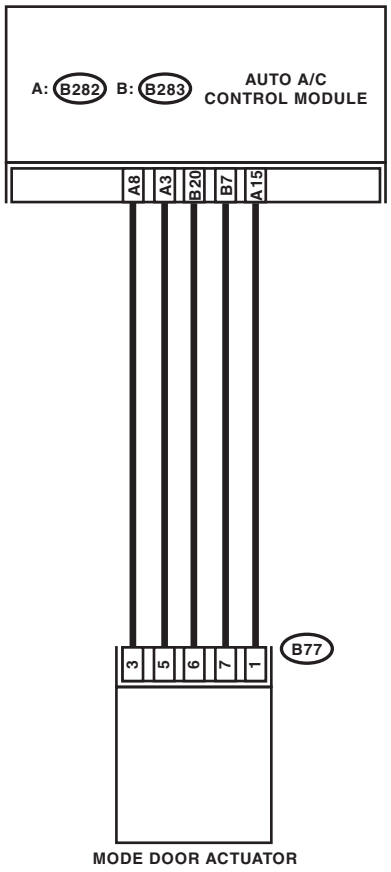
	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR INTAKE DOOR ACTUATOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the intake door actuator connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between intake door actuator connector and chassis ground. ***Connector & terminal*** ***(B91) No. 7 (+) — Chassis ground (–):***	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.
2	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND INTAKE DOOR ACTUATOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the auto A/C control module connector. 3) Measure the resistance between intake door actuator connector and auto A/C control module connector. ***Connector & terminal*** ***(B283) No. 10 — (B91) No. 1:*** ***(B283) No. 23 — (B91) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness between auto A/C control module and intake door actuator.
3	**CHECK OPERATION OF INTAKE DOOR ACTUATOR.** 1) Connect the intake door actuator connector. 2) Ground the auto A/C control module connector with a suitable wire. 3) Turn the ignition switch to ON, and check the operation of intake door actuator. ***Connector & terminal*** ***(B283) No. 10 — Chassis ground:***	Does the actuator move to the FRESH side?	Go to step **4**.	Replace the intake door actuator. <Ref. to AC-42, REMOVAL, Actuator.>
4	**CHECK OPERATION OF INTAKE DOOR ACTUATOR.** 1) Turn the ignition switch to OFF. 2) Ground the auto A/C control module connector with a suitable wire. 3) Turn the ignition switch to ON, and check the operation of intake door actuator. ***Connector & terminal:*** ***(B283) No. 23 — Chassis ground:***	Does the actuator move to the RECIRC side?	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>	Replace the intake door actuator. <Ref. to AC-42, REMOVAL, Actuator.>

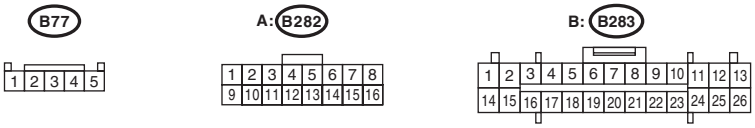
B: MODE DOOR ACTUATOR

TROUBLE SYMPTOM:

Air flow outlet is not changed.

WIRING DIAGRAM:





AC-01339

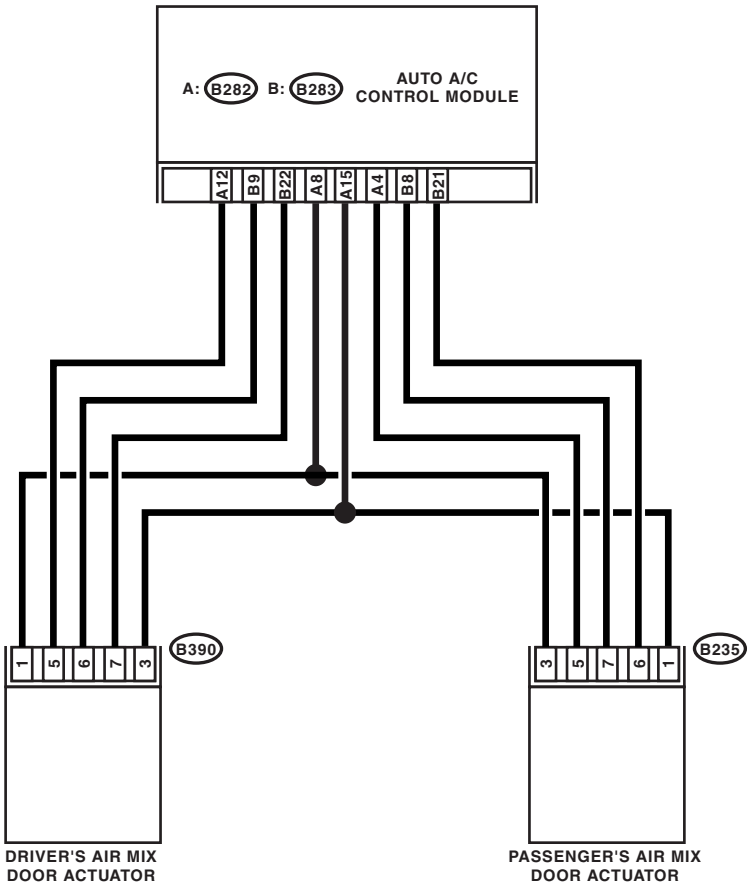
	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR MODE DOOR ACTUATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the mode door actuator connector. 3) Turn the ignition switch and AUTO switch to ON. 4) Measure the voltage between auto A/C control module connector terminals. ***Connector & terminal*** ***(B282) No. 8 (+) — (B282) No. 15 (–):***	Is the voltage approx. 5 V?	Go to step **2**.	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>
2	**CHECK POWER SUPPLY FOR MODE DOOR ACTUATOR.** Measure the voltage between auto A/C control module connector and chassis ground after turning the air flow control switch to FACE position. ***Connector & terminal*** ***(B283) No. 7 (+) — Chassis ground (–):***	Is the voltage 8 V (at normal temperature)?	Go to step **3**.	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>
3	**CHECK POWER SUPPLY FOR MODE DOOR ACTUATOR.** Measure the voltage between auto A/C control module connector and chassis ground after turning the air flow control switch to DEF position. ***Connector & terminal*** ***(B283) No. 20 (+) — Chassis ground (–):***	Is the voltage 8 V (at normal temperature)?	Go to step **4**.	Replace the auto A/C control module.
4	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND MODE DOOR ACTUATOR.** 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. ***Connector & terminal*** ***(B77) No. 1 — (B282) No. 15:*** ***(B77) No. 3 — (B282) No. 8:*** ***(B77) No. 5 — (B282) No. 3:*** ***(B77) No. 6 — (B283) No. 20:*** ***(B77) No. 7 — (B283) No. 7:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the harness between auto A/C control module and mode door actuator.
5	**CHECK MODE DOOR ACTUATOR POSITION SWITCH SIGNAL.** 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. ***Connector & terminal*** ***(B282) No. 3 (+) — (B282) No. 15 (–):***	Does the voltage change between 1 V (DEF) and 4 V (FACE)?	Go to step **6**.	Replace the mode door actuator. <Ref. to AC-42, REMOVAL, Actuator.>
6	**CHECK POOR CONTACT.** Check poor contact of auto A/C control module and connector.	Is there poor contact in connector?	Repair the connector.	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>

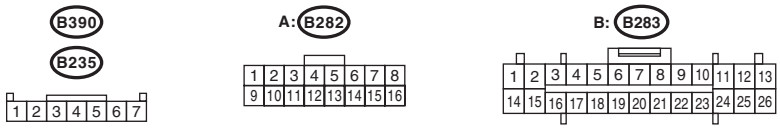
C: AIR MIX DOOR ACTUATOR

TROUBLE SYMPTOM:

Outlet air temperature does not change.

WIRING DIAGRAM:





AC-01340

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR AIR MIX DOOR ACTUATOR POSITION SWITCH.** 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. ***Connector & terminal*** ***(B282) No. 8 (+) — (B282) No. 15 (–):***	Is the voltage approx. 5 V?	Go to step **2**.	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>
2	**CHECK POWER SUPPLY FOR AIR MIX DOOR ACTUATOR.** Measure the voltage between auto A/C control module connector and chassis ground after turning the temperature control dial to maximum COOL position. ***Connector & terminal*** ***Driver's side*** ***(B283) No. 22 (+) — Chassis ground (–):*** ***Passenger's side*** ***(B283) No. 21 (+) — Chassis ground (–):***	Is the voltage 8 V (at normal temperature)?	Go to step **3**.	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>
3	**CHECK POWER SUPPLY FOR AIR MIX DOOR ACTUATOR.** Measure the voltage between auto A/C control module connector and chassis ground after turning the temperature control dial to maximum HOT position. ***Connector & terminal*** ***Driver's side*** ***(B283) No. 9 (+) — Chassis ground (–):*** ***Passenger's side*** ***(B283) No. 4 (+) — Chassis ground (–):***	Is the voltage 8 V (at normal temperature)?	Go to step **4**.	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>
4	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND AIR MIX DOOR ACTUATOR.** 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. ***Connector & terminal*** ***Driver's side*** ***(B390) No. 1 — (B282) No. 15:*** ***(B390) No. 3 — (B282) No. 8:*** ***(B390) No. 5 — (B282) No. 12:*** ***(B390) No. 6 — (B283) No. 9:*** ***(B390) No. 7 — (B283) No. 22:*** ***Passenger's side*** ***(B235) No. 1 — (B282) No. 8:*** ***(B235) No. 3 — (B282) No. 15:*** ***(B235) No. 5 — (B282) No. 4:*** ***(B235) No. 7 — (B283) No. 8:*** ***(B235) No. 6 — (B283) No. 21:***	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.

	Step	Check	Yes	No
5	**CHECK AIR MIX DOOR ACTUATOR POSITION SWITCH SIGNAL.** 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. ***Connector & terminal*** ***Driver's side*** ***(B282) No. 12 (+) — (B282) No. 15 (–):*** ***Passenger's side*** ***(B282) No. 4 (+) — (B282) No. 15 (–):***	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-42, REMOVAL, Actuator.>
6	**CHECK POOR CONTACT.** Check poor contact of auto A/C control module and connector.	Is there poor contact in connector?	Repair the connector.	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>

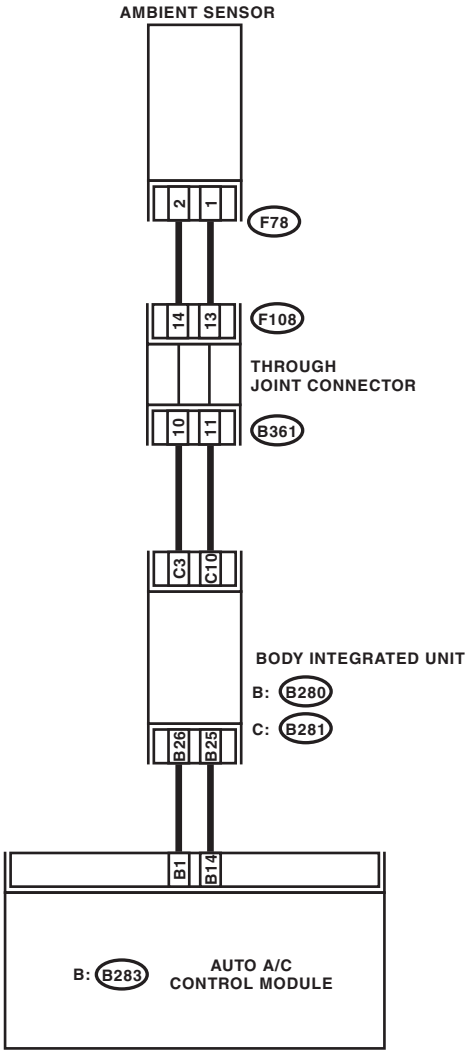
8. Diagnostic Procedure for Sensors

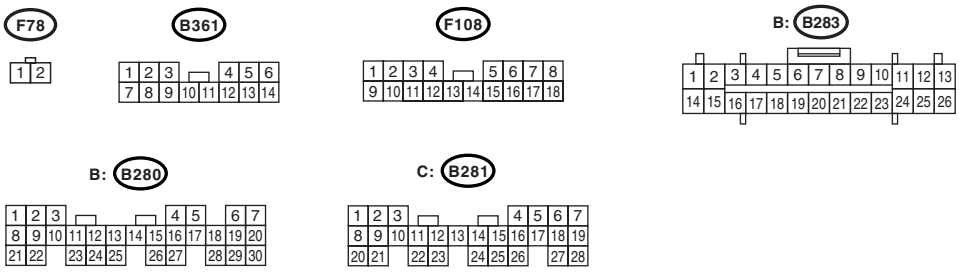
A: AMBIENT SENSOR

TROUBLE SYMPTOM:

Fan speed is not switched when the fan speed control dial is in AUTO position.

WIRING DIAGRAM:





AC-01341

Diagnostic Procedure for Sensors

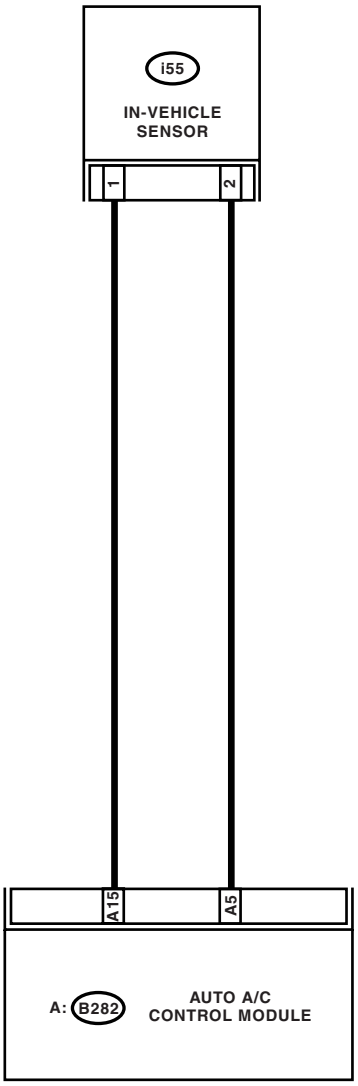
	Step	Check	Yes	No
1	**CHECK AMBIENT SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ambient sensor. 3) Measure the resistance between connector terminals of ambient sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance approximately 1.7 kΩ at 25°C (77°F)?	Go to step **2**.	Replace the ambient sensor.
2	**CHECK INPUT SIGNAL FOR AMBIENT SENSOR.** 1) Turn the ignition to ON. 2) Measure the voltage between connector (F78) terminals. ***Connector & terminal*** ***(F78) No. 1 (+) — No. 2 (–):***	Is the voltage approx. 5 V?	Go to step **6**.	Go to step **3**.
3	**CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT.** 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. ***Connector & terminal*** ***(B281) No. 3 (+) — No. 10 (–):***	Is the voltage approx. 5 V?	Go to step **4**.	Go to step **6**.
4	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND AMBIENT SENSOR.** 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. ***Connector & terminal*** ***(F78) No. 1 — (B281) No. 10:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between body integrated unit and ambient sensor.
5	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND AMBIENT SENSOR.** Measure the resistance of harness between body integrated unit and ambient sensor. ***Connector & terminal*** ***(F78) No. 2 — (B281) No. 3:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between body integrated unit and ambient sensor.
6	**CHECK COMMUNICATION ERROR DISPLAY.** 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**.
7	**CHECK POOR CONTACT.** 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-32, REMOVAL, Control Unit (Auto A/C Model).>

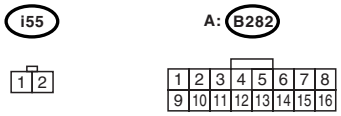
B: IN-VEHICLE SENSOR

TROUBLE SYMPTOM:

Blower fan speed, outlet port and inlet port do not change after turning the AUTO switch to ON

WIRING DIAGRAM:





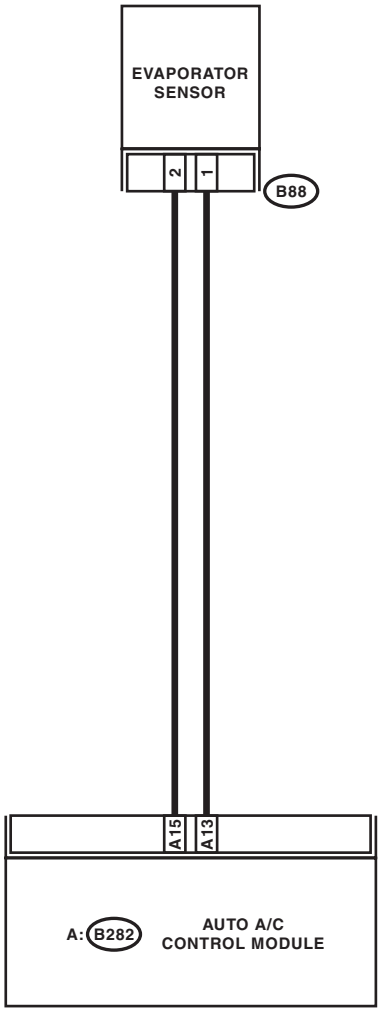
AC-01342

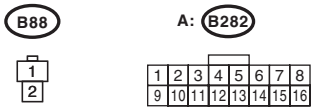
Diagnostic Procedure for Sensors

	Step	Check	Yes	No
1	**CHECK IN-VEHICLE SENSOR.** 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. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance approximately 1.7 kΩ at 20°C (68°F)?	Go to step **2**.	Replace the in-vehicle sensor.
2	**CHECK INPUT SIGNAL FOR IN-VEHICLE SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between in-vehicle sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(i55) No. 2 (+) — No. 1 (–):***	Is the voltage approx. 5 V?	Go to step **6**.	Go to step **3**.
3	**CHECK AUTO A/C CONTROL MODULE OUTPUT SIGNAL.** 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. ***Connector & terminal*** ***(B282) No. 5 (+) — (B282) No. 15 (–):***	Is the voltage approx. 5 V?	Go to step **4**.	Go to step **6**.
4	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND IN-VEHICLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from auto A/C control module. 3) Measure the resistance of harness between auto A/C control module and in-vehicle sensor. ***Connector & terminal*** ***(i55) No. 2 — (B282) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the harness between auto A/C control module and in-vehicle sensor.
5	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND IN-VEHICLE SENSOR.** Measure the resistance of harness between auto A/C control module and in-vehicle sensor. ***Connector & terminal*** ***(i55) No. 1 — (B282) No. 15:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the harness between auto A/C control module and in-vehicle sensor.
6	**CHECK POOR CONTACT.** 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-32, REMOVAL, Control Unit (Auto A/C Model).>

C: EVAPORATOR SENSOR

WIRING DIAGRAM:





AC-00831

Diagnostic Procedure for Sensors

	Step	Check	Yes	No
1	**CHECK EVAPORATOR SENSOR** 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 evaporator sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance approximately 1.9 kΩ at 20°C (68°F)?	Go to step **2**.	Replace the evaporator sensor. <Ref. to AC-36, REMOVAL, Evaporator.>
2	**CHECK INPUT SIGNAL FOR EVAPORATOR SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between connector (B88) terminal and chassis ground. ***Connector & terminal*** ***(B88) No. 1 (+) — No. 2 (–):***	Is the voltage approx. 5 V?	Go to step **6**.	Go to step **3**.
3	**CHECK AUTO A/C CONTROL MODULE OUTPUT SIGNAL.** 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. ***Connector & terminal*** ***(B282) No. 13 (+) — No. 15 (–):***	Is the voltage approx. 5 V?	Go to step **4**.	Go to step **6**.
4	**CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND EVAPORATOR SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from auto A/C control module. 3) Measure the resistance of harness between auto A/C control module and evaporator sensor. ***Connector & terminal*** ***(B88) No. 2 — (B282) No. 15:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between auto A/C control module and evaporator sensor.
5	**CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND EVAPORATOR SENSOR.** Measure the resistance of harness between auto A/C control module and evaporator sensor. ***Connector & terminal*** ***(B88) No. 1 — (B282) No. 13:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between auto A/C control module and evaporator sensor.
6	**CHECK POOR CONTACT.** 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-32, REMOVAL, Control Unit (Auto A/C Model).>

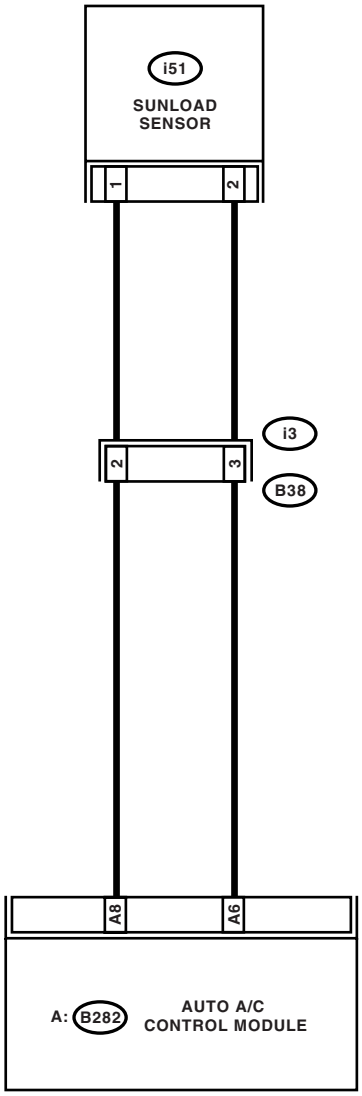
D: SUNLOAD SENSOR

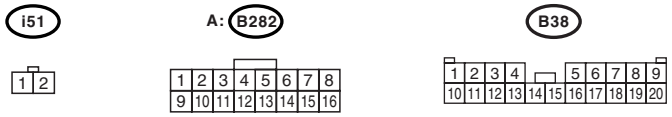
TROUBLE SYMPTOM:

- 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-00832

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY VOLTAGE FOR SUNLOAD SENSOR.** 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. ***Connector & terminal*** ***(i51) No. 1 (+) — No. 2 (–):***	Is the voltage approx. 5 V?	Go to step **4**.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND SUNLOAD SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from auto A/C control module. 3) Measure the resistance of harness between auto A/C control module and sunload sensor. ***Connector & terminal*** ***(i51) No. 2 — (B282) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the harness between auto A/C control module and sunload sensor.
3	**CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND SUNLOAD SENSOR.** Measure the resistance of harness between auto A/C control module and sunload sensor. ***Connector & terminal*** ***(i51) No. 1 — (B282) No. 8:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the harness between auto A/C control module and sunload sensor.
4	**CHECK INPUT VOLTAGE FOR AUTO A/C CONTROL MODULE.** 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. ***Connector & terminal*** ***(B282) No. 8 (+) — (B282) No. 6 (–):***	Is the voltage approx. 3.0 V?	Go to step **5**.	Replace the sunload sensor. <Ref. to AC-44, REMOVAL, Sunload Sensor (Auto A/C Model).>
5	**CHECK POOR CONTACT.** 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-32, REMOVAL, Control Unit (Auto A/C Model).>

9. Diagnostics with Phenomenon

A: INSPECTION

Symptom	Problem parts
A/C system fails to operate.	• Fuse (M/B No. 15, F/B No. 7, 22, 31) • Connector (Poor contact) • Ground • Auto A/C control module • Blower fan motor • Blower fan relay • A/C relay • Compressor (Magnet clutch) • Evaporator sensor
Fuse is blown out.	• Fuse (M/B No. 8, F/B No. 22, 31) • Connector (Poor contact)
Illumination cannot dim.	• Fuse (M/B No. 8, F/B No. 22, 31) • Connector (Poor contact) • Illumination control switch • Auto A/C control module • Body integrated unit
Blower fan does not rotate or fan speed cannot be controlled.	• Fuse (F/B No. 22, 27, 28) • Connector (Poor contact) • Ground • Auto A/C control module • Blower fan motor • Blower fan relay • Power transistor or blower resistor
Unable to switch suction vents.	• Connector (Poor contact) • Auto A/C control module • Intake door actuator
Unable to switch blow vents.	• Connector (Poor contact) • Auto A/C control module • Mode door actuator
The compartment temperature does not rise. (Warm air not emitted.)	• Connector (Poor contact) • Auto A/C control module • Air mix door actuator • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose • Aspirator body
The compartment temperature does not lower. (Cold air not emitted.)	• Connector (Poor contact) • Auto A/C control module • Air mix door actuator • A/C relay • Compressor (Magnet clutch) • Radiator fan motor • Radiator fan relay • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose • Aspirator body
Compartment temperature is higher or lower than setting temperature.	• Auto A/C control module • Air mix door actuator • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose • Aspirator body

Symptom	Problem parts
Compartment temperature does not quickly respond to setting temperature.	• Air mix door actuator • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose • Aspirator body
Radiator fan does not rotate during A/C operation.	• Radiator fan motor • Radiator fan relay
Seat heater does not run.	• Seat thermistor • Seat heater relay • Seat heater • Auto A/C control module • Front control panel

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK SECURITY INDICATOR LIGHT.** 1) Turn the ignition switch to “OFF” or “ACC”. 2) Wait for 60 seconds or more.	Does the security indicator light blink?	Go to step **2**.	Check the security indicator light circuit. <Ref. to IM (diag)-10, CHECK SECURITY INDICATOR LIGHT CIRCUIT, INSPECTION, Diagnostics Chart for Security Indicator Light.>
2	**CHECK KEY SWITCH.** Remove the key from ignition switch.	Does the security indicator light blink within 1 second after removing the key?	Go to step **3**.	Check the key switch circuit. <Ref. to IM (diag)-12, CHECK KEY SWITCH CIRCUIT, INSPECTION, Diagnostics Chart for Security Indicator Light.>
3	**CHECK SECURITY INDICATOR LIGHT.** Turn the ignition switch to ON.	Does the security indicator light go off?	Go to step **5**.	Go to step **4**.
4	**CHECK ENGINE START.** Turn the ignition switch to START.	Does the starter operate?	Check the LAN communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Check the DTC display (body integrated unit). Go to step **7**.
5	**CHECK ENGINE START.** Turn the ignition switch to START.	Does the starter operate?	Go to step **6**.	Check the LAN communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
6	**CHECK ENGINE START.** Turn the ignition switch to START.	Does the engine start?	Immobilizer system is OK.	Check the DTC display (ECM). Go to step **7**.
7	**CHECK ANY OTHER DTC ON DISPLAY.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. <Ref. to IM (diag)-7, Subaru Select Monitor.> 3) Turn the ignition switch and Subaru Select Monitor switch to ON. 4) Read DTC on display.	Is the DTC displayed on screen?	Go to step **8**.	Repair the related parts.
8	**PERFORM THE DIAGNOSIS.** 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 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.

2. General Description

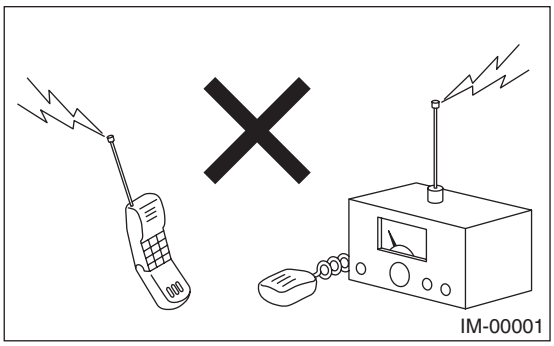
A: CAUTION

CAUTION:

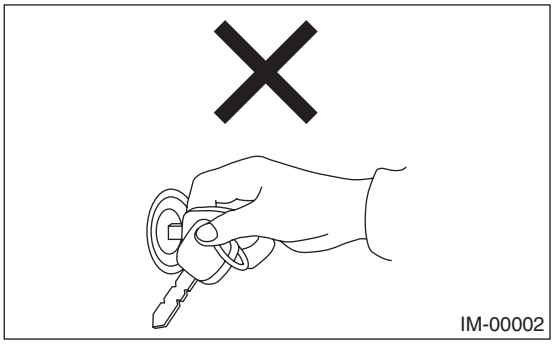
• The airbag system wiring harnesses and connectors are yellow. Do not use electrical test equipment on these circuits.

• Be careful not to damage the airbag system wiring harness.

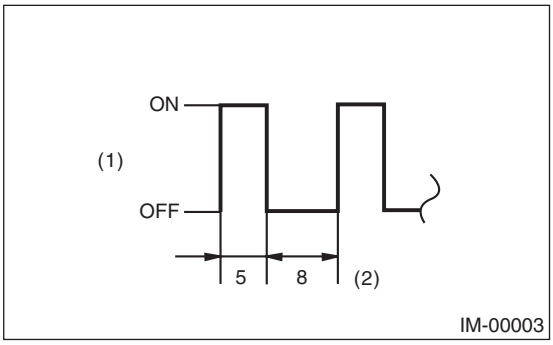
• While diagnostic items are being checked, do not operate radios, portable telephones, etc. which emit electromagnetic waves near or inside the vehicle.



• 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 in a key holder, remove it from the holder before carrying out diagnosis.



• 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.

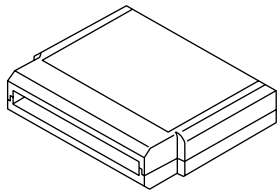
• If the engine fails to start with a registered ignition key, detach the ignition key from ignition switch and wait for approx. 1 second until security indicator light begins to flash. And then start the engine again.

• Before checking the diagnostic items, obtain all keys for the vehicle to be checked possessed by owner.

• Do not install or register a body integrated unit of another registered vehicle to diagnose failures or inspect functions.

B: PREPARATION TOOL

1. SPECIAL TOOL

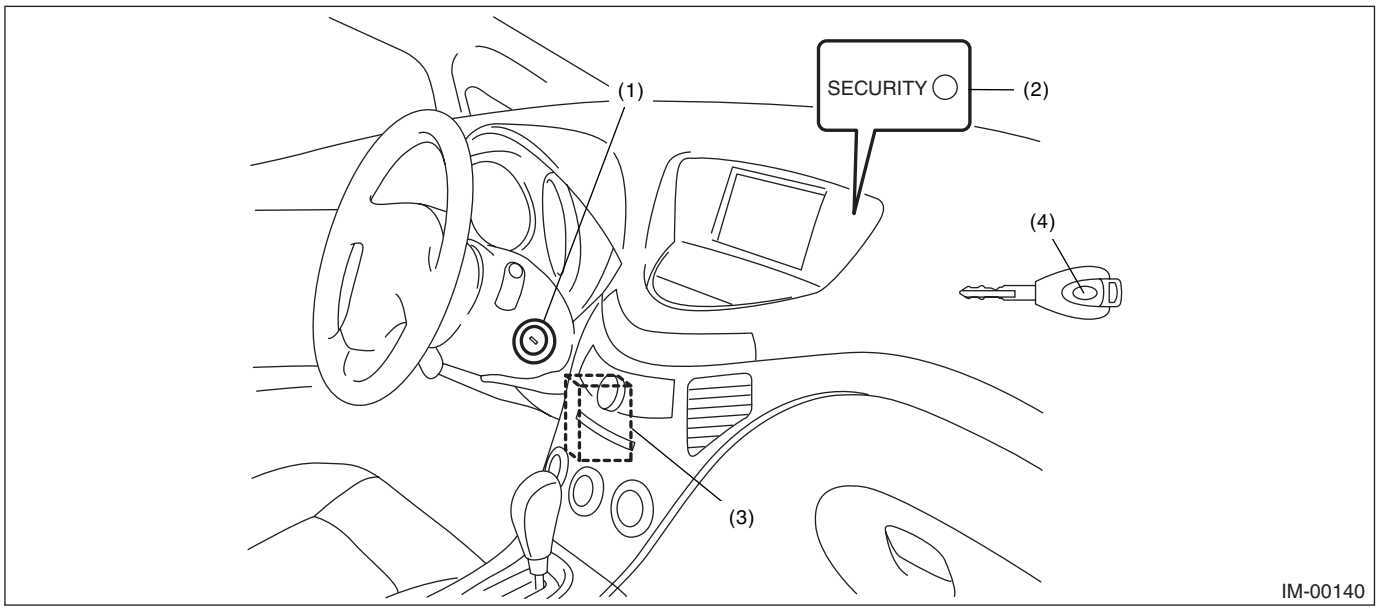
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.

3. Electrical Component Location

A: LOCATION



(1) Antenna
(2) Security indicator light (LED bulb)
(3) Body integrated unit
(4) Transponder

4. Immobilizer Control Module I/O Signal

A: WIRING DIAGRAM

1. IMMOBILIZER

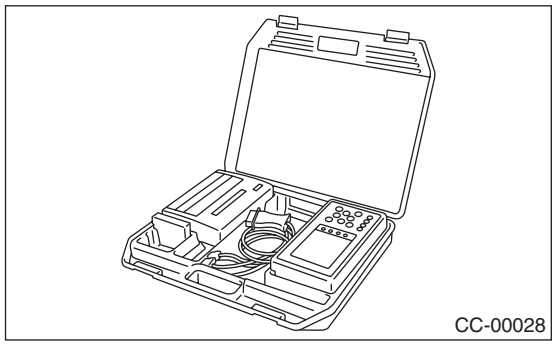
<Ref. to WI-74, WIRING DIAGRAM, Immobilizer System.>

5. Subaru Select Monitor

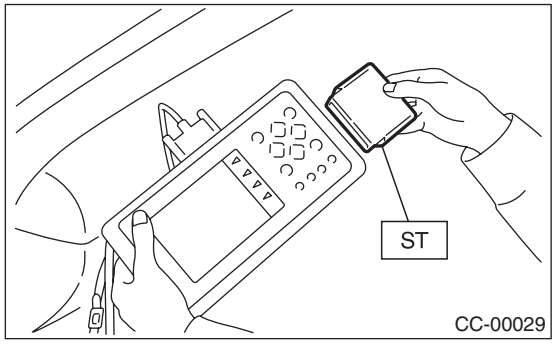
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit.

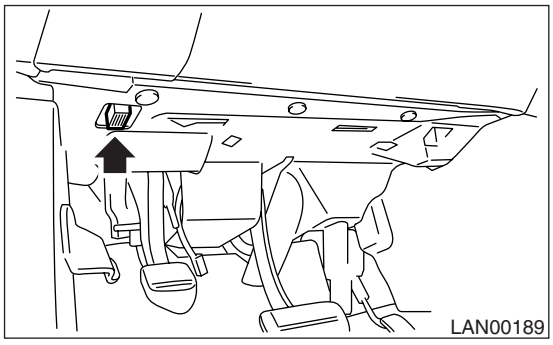


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor.



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

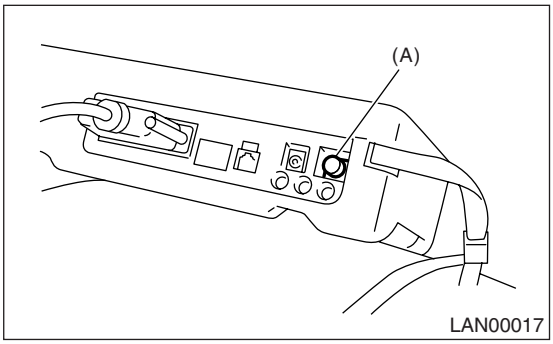
(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF), and the Subaru Select Monitor switch to ON.



(1) Power switch

6) Using the Subaru Select Monitor, call up DTC 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)-8, 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 screen, select the {Each System Check} and press the [YES] key.
3) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
4) Press the [YES] key after the information of engine type is displayed.
5) On the «Engine Diagnosis» display screen, select the {System Operation Check Mode} and press the [YES] key.
6) On the «System operation check mode» display, select the {security system}.
7) Start the communication line check.
8) Is «OK» displayed on screen?
If displayed, go to step 9).
If «NO», 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 screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» screen, select the {DTC Display}, and then press the [YES] key.
5) On the «Diagnostic Code(s) Display» screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)}, and then press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For detailed concerning DTC, refer to the List of DTC. <Ref. to IM (diag)-14, LIST, List of Diagnostic Trouble Code (DTC).>

2. BODY INTEGRATED UNIT

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. unit mode} and press the [YES] key.
3) Press the [YES] key after the {Integ. unit mode} is displayed.
4) On the «Integ. unit failure diag» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For detailed concerning DTC, refer to the List of 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 screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {Memory Clear} and press the [YES] key.
5) When the 'Done' are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
• After the memory has been cleared, the idle air control solenoid valve must be initialized. To execute this procedure, turn the ignition switch to ON. Wait for 3 seconds before starting the engine.
• For detailed operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".

2. BODY INTEGRATED UNIT

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. unit mode} and press the [YES] key.
3) Press the [YES] key after the {Integ. unit mode} is displayed.
4) On the «Integ. unit mode failure diag» display screen, select the {Clear Memory} and press the [YES] key.
5) When the 'Done' are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

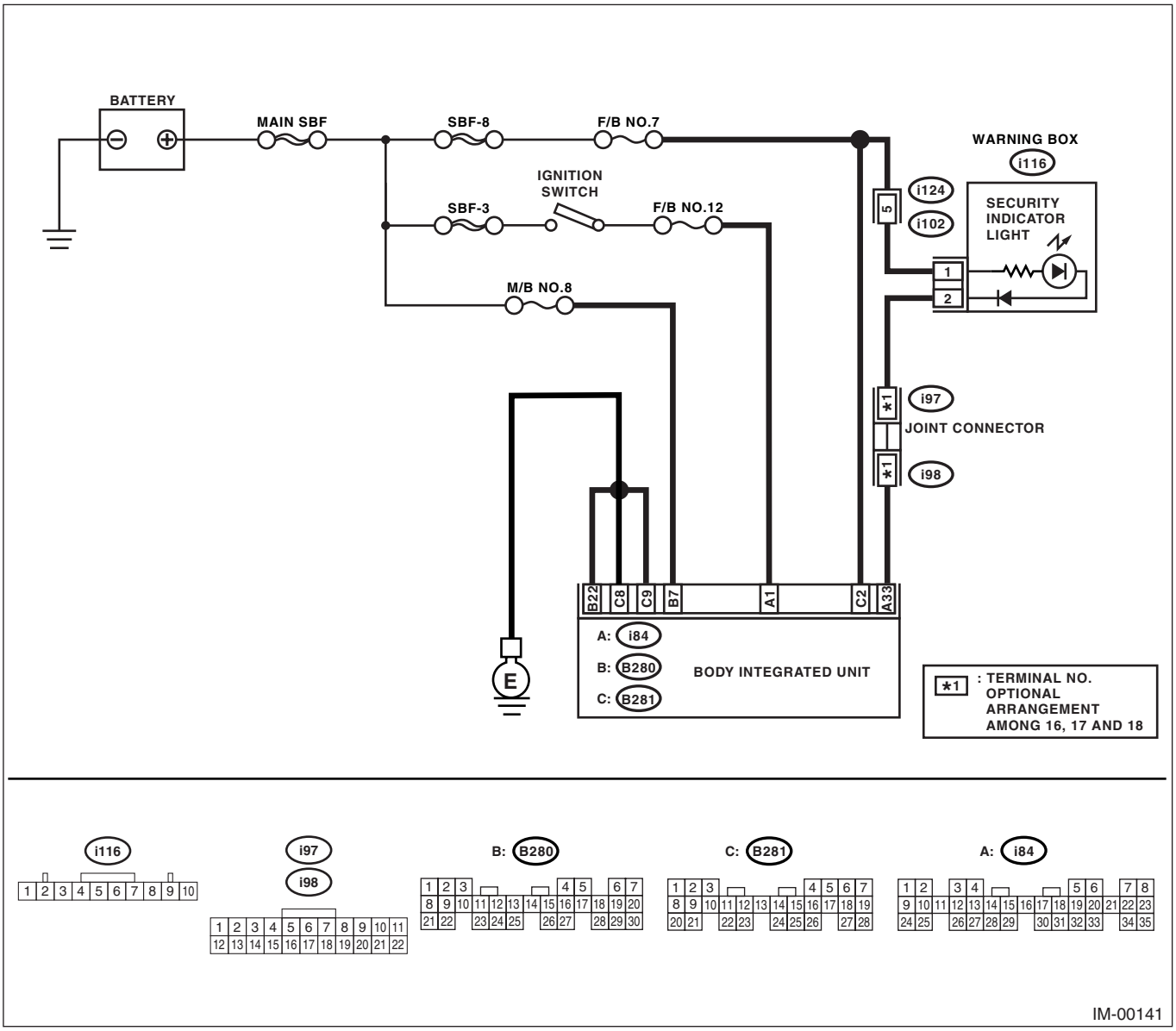
NOTE:
For detailed operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".

8. Diagnostics Chart for Security Indicator Light

A: INSPECTION

1. CHECK SECURITY INDICATOR LIGHT CIRCUIT

WIRING DIAGRAM:

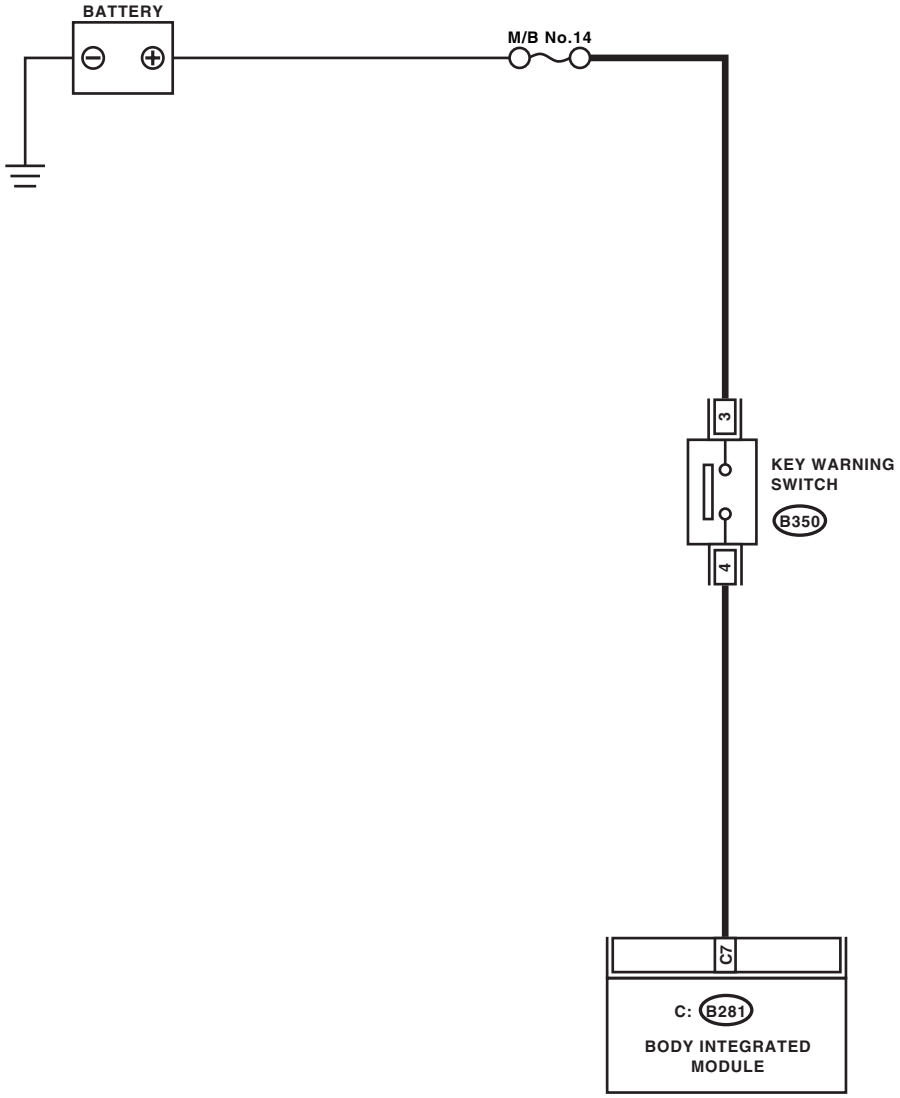


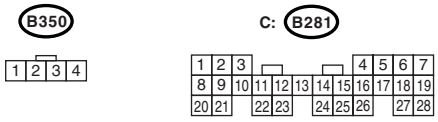
Step		Check	Yes	No
1	**CHECK SECURITY INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from body integrated unit. 3) Connect the resistor (100 Ω) between body integrated unit harness connector terminal (i84) No. 33 and chassis ground.	Does the security indicator light illuminate?	Go to step **2**.	Go to step **5**.

	Step	Check	Yes	No
2	**CHECK BODY INTEGRATED UNIT GROUND CIRCUIT.** Measure the resistance between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 22 — Chassis ground:*** ***(B281) No. 8, No. 9 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair the open circuit of body integrated unit ground circuit.
3	**CHECK BODY INTEGRATED UNIT IGNITION CIRCUIT.** 1) Turn the ignition switch to ON.(Engine OFF) 2) Measure the voltage between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(i84) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Check the harness for open or short circuit between body integrated unit and ignition switch.
4	**CHECK BODY INTEGRATED UNIT POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 7 (+) — Chassis ground (–):*** ***(B281) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the body integrated unit <Ref. to SL-52, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.	Check the harness for open or short circuit between body integrated unit and fuse.
5	**INSPECT WARNING BOX CIRCUIT.** 1) Remove the warning box. <Ref. to IDI-17, REMOVAL, Warning Box.> 2) Measure the voltage between the warning box harness connector terminal and chassis ground. ***Connector & terminal*** ***(i116) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Check the harness for open or short circuit between warning box and fuse.
6	**INSPECT WARNING BOX CIRCUIT.** Measure the resistance between body integrated unit harness connector terminal and warning box harness connector terminal. ***Connector & terminal*** ***(i84) No. 33 — (i116) No. 2:***	Is the resistance less than 10 Ω?	LED bulb malfunction. Replace the warning box. <Ref. to IDI-17, REMOVAL, Warning Box.>	Repair the harness or connector.

2. CHECK KEY SWITCH CIRCUIT

WIRING DIAGRAM:





IM-00078

Diagnostics Chart for Security Indicator Light

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT.** 1) Disconnect the harness connector from key warning switch. 2) Turn the ignition switch to “ACC” or “LOCK” (with key inserted). 3) Measure the voltage between key warning switch harness connector terminal and chassis ground. ***Connector & terminal*** ***(B350) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check the harness for open or short circuit between key warning switch and fuse.
2	**CHECK KEY WARNING SWITCH.** 1) Insert the ignition key to ignition switch.(OFF or ACC) 2) Measure the resistance between key warning switch terminals. ***Connector & terminal*** ***No. 3 — No. 4:***	Is the resistance less than 1 Ω?	Go to step **3**.	Replace the key warning switch.
3	**CHECK KEY WARNING SWITCH.** 1) Remove the ignition key from ignition switch. 2) Measure the resistance between key warning switch terminals. ***Connector & terminal*** ***No. 3 — No. 4:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace the key warning switch.
4	**CHECK HARNESS BETWEEN KEY WARNING SWITCH AND BODY INTEGRATED UNIT.** 1) Disconnect the harness connector from key warning switch. 2) Disconnect the harness connector from body integrated unit. 3) Measure the resistance between key warning switch harness connector terminal and body integrated unit harness connector terminal. ***Connector & terminal*** ***(B350) No. 4 — (B281) No. 7:***	Is the resistance less than 10 Ω?	Replace the body integrated unit <Ref. to SL-52, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.	Repair the harness between key warning switch and body integrated unit.

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	EGI — Immobilizer Communication (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 — Immobilizer Communication	Failure of body integrated unit to verify key (transponder) ID code	<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 malfunctioning	Reference code incompatibility between body integrated unit and combination meter	<Ref. to IM (diag)-24, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

NOTE:
Perform the diagnosis of engine DTC when the DTC except for immobilizer DTC is detected. <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>

2. BODY INTEGRATED UNIT

DTC	Item	Contents of diagnosis	Index No.	Relation between ECM and DTC
B0401	M collation NG	Reference code incompatibility between body integrated unit and combination meter	<Ref. to IM (diag)-24, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	P1578
B0402	Immobilizer Key collation NG	• Incorrect immobilizer key (Use of unregistered key in body integrated unit) • Faulty antenna	<Ref. to IM (diag)-16, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> <Ref. to IM (diag)-17, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>or <Ref. to IM (diag)-22, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	• P0513 • P1570 • P1574
B0403	E/G request NG	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).>	P1572

NOTE:
In immobilizer system, performing the starter relay control. When the body integrated unit detect the inconformity of reference code, immediately out put the starter relay cut signal to ECM, and then ECM stop 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.

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)

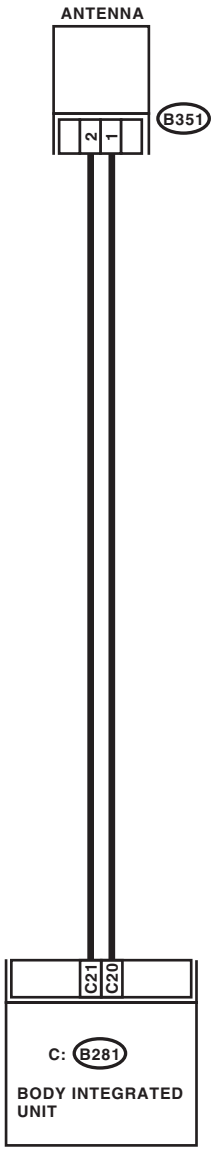
	Step	Check	Yes	No
1	**PERFORM TEACHING OPERATION OF IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.	Is the teaching operation for all keys completed?	END.	Replace the ignition keys (including transponder) which cannot be registered. Go to step **2**.
2	**PERFORM TEACHING OPERATION OF IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.	Is the teaching operation for all keys completed?	END.	Replace the body integrated unit <Ref. to SL-52, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.

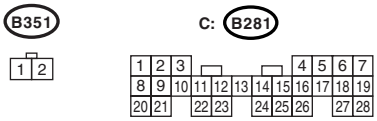
B: DTC P1570 ANTENNA

DTC DETECTING CONDITION:

Faulty antenna

WIRING DIAGRAM:





IM-00110

	Step	Check	Yes	No
1	**CHECK ANTENNA CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from antenna. <Ref. to SL-55, Immobilizer Antenna.> 3) Measure the resistance of antenna circuit. ***Connector & terminal*** ***(B351) No. 1 — No. 2:***	Is the resistance less than 10 Ω?	Go to step **2**.	Replace the antenna. <Ref. to SL-55, Immobilizer Antenna.>
2	**CHECK ANTENNA CIRCUIT.** 1) Disconnect the harness connector from body integrated unit. 2) Measure the resistance between harness connector and chassis ground. ***Connector & terminal*** ***(B281) No. 21 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the harness.	Go to step **3**.
3	**CHECK ANTENNA CIRCUIT.** Measure the resistance between harness connector and chassis ground. ***Connector & terminal*** ***(B281) No. 20 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the harness.	Go to step **4**.
4	**CHECK ANTENNA CIRCUIT.** 1) Turn the ignition switch to ON.(Engine OFF) 2) Measure the voltage between harness connector and chassis ground. ***Connector & terminal*** ***(B281) No. 21 (+) — Chassis ground (–):***	Is the voltage 0 V?	Go to step **5**.	Repair the harness.
5	**CHECK ANTENNA CIRCUIT.** Measure the voltage between harness connector and chassis ground. ***Connector & terminal*** ***(B281) No. 20 (+) — Chassis ground (–):***	Is the voltage 0 V?	Go to step **6**.	Repair the harness between body integrated unit and antenna, because there is short circuit with battery voltage line or ignition switch “ON” line.
6	**CHECK BODY INTEGRATED UNIT FUNCTION.** 1) Turn the ignition switch to OFF. 2) Connect the harness connector to body integrated unit. 3) Insert the key to ignition switch, and measure the changes in voltage between antenna harness connectors. ***Connector & terminal*** ***(B281) No. 20 (+) — No. 21 (–):***	Is the voltage –30 to 30 V? (Approx. 0.1 second after inserting the key) Is the voltage 0 V? (Approx. 1 second after inserting the key)	Go to step **7**.	Replace the body integrated unit <Ref. to SL-52, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.

	Step	Check	Yes	No
7	**CHECK IGNITION KEY (TRANSPONDER).** 1) Remove the key from ignition switch. 2) Start the engine using other key which is already registered.	Does the engine start?	Replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to the "REGISTRATION MANUAL FOR IMMOBILIZER".	Replace the body integrated unit <Ref. to SL-52, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to the "REGISTRATION MANUAL FOR IMMOBILIZER".

C: DTC P1571 REFERENCE CODE INCOMPATIBILITY

DTC DETECTING CONDITION:

Reference code incompatibility between body integrated unit and ECM

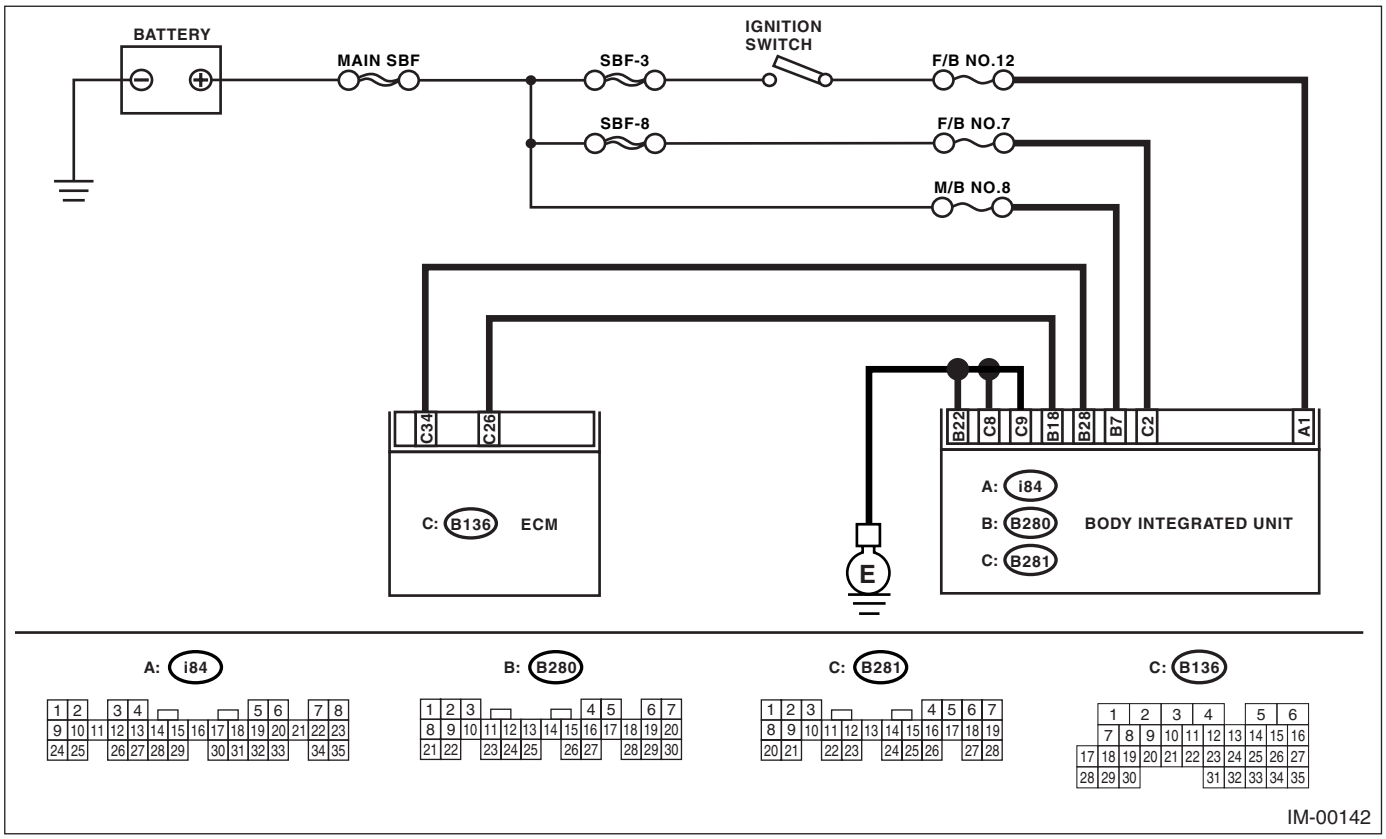
	Step	Check	Yes	No
1	**PERFORM TEACHING OPERATION OF IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to the "REGISTRATION MANUAL FOR IMMOBILIZER".	Is the teaching operation for all keys completed?	END.	Go to step **2**.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other immobilizer 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 "REGISTRATION MANUAL FOR IMMOBILIZER".	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>Replace the body integrated unit <Ref. to SL-52, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to the "REGISTRATION MANUAL FOR IMMOBILIZER".

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	**CHECK BODY INTEGRATED UNIT POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from body integrated unit. 3) Measure the voltage between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 7 (+) — Chassis ground (–):*** ***(B281) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check the harness for open or short circuit between body integrated unit and fuse.
2	**CHECK BODY INTEGRATED UNIT POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON.(Engine OFF) 2) Measure the voltage between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(i84) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Check the harness for open or short circuit between body integrated unit and ignition switch.

	Step	Check	Yes	No
3	**CHECK BODY INTEGRATED UNIT GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 22 — Chassis ground:*** ***(B281) No. 8, No. 9 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair the open circuit of body integrated unit ground circuit.
4	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND ECM.** 1) Disconnect the harness connector from body integrated unit and ECM. 2) Measure the resistance between body integrated unit harness connector terminal and ECM harness connector terminal. ***Connector & terminal*** ***(B280) No. 18 — (B136) No. 26:***	Is the resistance less than 10 Ω?	Go to step **5**.	Repair the open circuit of harness between body integrated unit and ECM.
5	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND ECM.** Measure the resistance between body integrated unit harness connector terminal and ECM harness connector terminal. ***Connector & terminal*** ***(B280) No. 28 — (B136) No. 34:***	Is the resistance less than 10 Ω?	Go to step **6**.	Repair the open circuit of harness between body integrated unit and ECM.
6	**CHECK HARNESS OF COMMUNICATION LINE.** 1) Turn the ignition switch to ON.(Engine OFF) 2) Measure the voltage between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 18, No. 28 (+) — Chassis ground (–):***	Is the voltage 0 V?	Go to step **7**.	Repair the harness between body integrated unit and ECM, because there is short circuit with battery voltage line or ignition switch "ON" line.
7	**CHECK HARNESS OF COMMUNICATION LINE.** Measure the voltage between harness connector terminal and engine ground. ***Connector & terminal*** ***(B136) No. 26, No. 34 (+) — Engine ground (–):***	Is the voltage 0 V?	Go to step **8**.	Repair the harness between body integrated unit and ECM, because there is short circuit with battery voltage line or ignition switch "ON" line.
8	**CHECK ECM BY COMMUNICATION LINE CHECK.** 1) Connect the harness connector to ECM. 2) Disconnect the harness connector from body integrated unit. 3) Start the communication line check. <Ref. to IM (diag)-7, COMMUNICATION LINE CHECK, OPERATION, Subaru Select Monitor.>	Does "Communication Line not Shorted" appear on the screen?	Replace the body integrated unit <Ref. to SL-52, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to the "REGISTRATION MANUAL FOR IMMOBILIZER".	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).> Perform the registration procedure next. Refer to the "REGISTRATION MANUAL FOR IMMOBILIZER".

E: DTC P1574 KEY COMMUNICATION FAILURE

DTC DETECTING CONDITION:

Failure of body integrated unit to verify key (transponder) ID code

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT FUNCTION.** Insert the key to ignition switch (LOCK position), and measure the changes in voltage between antenna connectors. ***Connector & terminal*** ***(B142) No. 1 (+) — No. 2 (–):***	Is the voltage –30 to 30 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-52, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.
2	**CHECK IGNITION KEY (TRANSPONDER).** 1) Remove the key from ignition switch. 2) Start the engine using other key which is already registered.	Does the engine start?	Replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.	Replace the body integrated unit <Ref. to SL-52, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.

F: DTC P1576 EGI CONTROL MODULE EEPROM

DTC DETECTING CONDITION:

- ECM malfunctioning
- Failed to access ROM inside ECM, while performing teaching operation on the keys.

	Step	Check	Yes	No
1	**PERFORM TEACHING OPERATION OF IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.	Is the teaching operation for all keys completed?	Make sure it is possible to start the engine with all keys that have been taught. This completes the work.	Go to step **2**.
2	**PERFORM TEACHING OPERATION OF IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.	Is the teaching operation for all keys completed?	Make sure it is possible to start the engine with all keys that have been taught. This completes the work.	Go to step **3**.
3	**PERFORM TEACHING OPERATION OF IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to the REGISTRATION MANUAL FOR IMMOBILIZER.	Is the teaching operation for all keys completed?	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)-32, INSTALLATION, 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
1	**PERFORM TEACHING OPERATION OF IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.	Is the teaching operation for all keys completed?	Make sure it is possible to start the engine with all keys that have been taught. This completes the work.	Go to step **2**.
2	**PERFORM TEACHING OPERATION OF IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.	Is the teaching operation for all keys completed?	Make sure it is possible to start the engine with all keys that have been taught. This completes the work.	Go to step **3**.
3	**PERFORM TEACHING OPERATION OF IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to the REGISTRATION MANUAL FOR IMMOBILIZER.	Is the teaching operation for all keys completed?	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-52, INSPECTION, Body Integrated Unit.>

H: DTC P1578 METER FAILURE

DTC DETECTING CONDITION:

Reference code incompatibility between body integrated unit and combination meter

1. CHECK LAN COMMUNICATION SYSTEM.

Inspect LAN communication system in the following situation. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

- DTC of body integrated unit B0300, B0301, B0302, B0111 or B0321 is displayed.
- “Er IU” or “Er LC” is displayed in combination meter odo/trip meter.

2. REPLACE COMBINATION METER.

Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.> Execute the registration procedure of all immobilizer part (combination meter and etc.) next. Refer to the “REGISTRATION MANUAL FOR IMMOBILIZER”.

NOTE:
When the combination meter has been replaced, be sure to perform the registration procedure of immobilizer.

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	
	Low fuel warning light	
	Charge warning light	
	ATF temperature 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	
	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 lamp, sports shift indicator	
	Odo/Trip indicator	
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.

2. Combination Meter System

A: WIRING DIAGRAM

1. COMBINATION METER

<Ref. to WI-131, 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) Step 1) Turn the small light switch to ON within 3 seconds after step 1), then press the odo/tripmeter 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 are checked, then every press of the odo/trip meter knob will initiate the operation checks in the order of meter, illumination and buzzer. <Ref. to IDI-5, 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 indicator	SPORT shift indicator	Illumination (indicator needle, plate, ring, LCD)	Buzzer (SPORT shift buzzer)
Step 0. Processing to self-diagnosis function						
Operating initial operation	Initial illuminating	Normal	Normal	Initial illuminating	Initial illuminating	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						
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, Water 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						

Speedometer, tachometer, fuel gauge, engine coolant temperature gauge	Microcomputer running type warning light, indicator light	AT select lever position indicator light	Odo/Trip indicator	SPORT shift indicator	Illumination (indicator needle, plate, ring, LCD)	Buzzer (SPORT shift buzzer)
Keep the position that specified at step 2-2.	Light OFF	Varying from the highest brightness (ILL6) to the lowest luminescence (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 luminescence (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.	Displays the brightness at the time when the trip knob is released 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 4-2. Press the trip knob: Check the VDC indicator light (Model with VDC)						
All meter indicator needle returns to lowest position.	VDC warning light and VDC operation indicator light blink.	Light at the highest brightness. Keep the position indicated that set in step 1-2.	Illumination brightness is displayed in the trip meter.	"4" is displayed.	Light at the highest brightness.	Not beep.
Step5. 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.						

- Illuminating order table

Illuminating order	1	2	3	4	5	6	7	8	9	10	11	
Trip meter A/B	AB	A	B	A	B	A	B	A	B	A	B	
Odo/trip meter	8888.888888	0000000000	1111.111111	22222.22222	3333.333333	44444.44444	5555.555555	66666.66666	7777.777777	88888.88888	9999.999999	
SPORT shift indicator	8	1	2	3	4	5	E	P	R	N	D	Go back to 1 and repeat
▲ ▼	▲ ▼	▲	▼	▲	▼	▲	▼	▲	▼	▲	▼	
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-8, 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-9, 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-10, 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).

4. CHECK POWER SUPPLY AND GROUND CIRCUIT

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR COMBINATION METER.** 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. ***Connector & terminal*** ***(i10) No. 3, 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check the harness for open or short between the ignition switch and combination meter.
2	**CHECK POWER SUPPLY FOR COMBINATION METER.** Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 1, 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Check the harness for open or short between the fuse and combination meter.
3	**CHECK GROUND CIRCUIT OF COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 15, 16 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the meter case assembly.	Repair the wiring harness.

5. CHECK VDCCM.

	Step	Check	Yes	No
1	**CHECK VEHICLE SPEED SIGNAL.** 1) Lift up the vehicle and support it with rigid racks. 2) Drive the vehicle faster than 10 km/h (6 MPH). **WARNING:** **Be careful not to get caught in the running wheels.** 3) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 27 (+) — Chassis ground (–):***	Is the voltage less than 1 V ⟷ 5 V or more?	Replace the meter case assembly.	Go to step **2**.
2	**CHECK HARNESS BETWEEN VDCCM AND COMBINATION METER.** 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. ***Connector & terminal*** ***(B310) No. 33 — (i10) No. 27:***	Is the resistance less than 10 Ω?	Check the VDCCM. <Ref. to VDC(diag)-2, Basic Diagnostic Procedure.>	Repair the wiring harness.

6. CHECK ENGINE CONTROL MODULE (ECM)

	Step	Check	Yes	No
1	**CHECK ECM SIGNAL.** 1) Start the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 11 (+) — Chassis ground (–):***	Is the voltage 0 ⟷ 14 V or more?	Go to step **2**.	Inspect the ECM. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM.** 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. ***Connector & terminal*** ***(B136) No. 11 — (i10) No. 28:***	Is the resistance less than 10 Ω?	Replace the meter case assembly.	Repair the wiring harness.

7. CHECK FUEL LEVEL SENSOR.

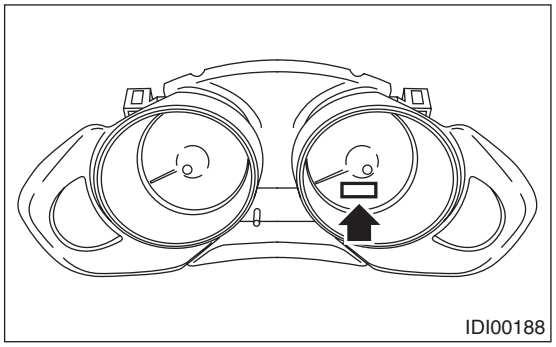
	Step	Check	Yes	No
1	**CHECK COMMUNICATION ERROR DISPLAY.** 1) Turn the ignition switch to ON. 2) Check that the error code is displayed in odo/trip meter.	Is the error code “Er xx” displayed in odo/trip meter?	Check the communication circuit. <Ref. to IDI-10, COMMUNICATION ERROR DISPLAY, INSPECTION, Combination Meter System.>	Go to step **2**.
2	**CHECK FUEL LEVEL SENSOR.** 1) Remove the fuel level sensor. <Ref. to FU(H6DO)-45, REMOVAL, Fuel Level Sensor.> 2) Measure the resistance between fuel level sensor terminals when the float is in FULL or EMPTY position. ***Terminals*** ***No. 1 — No. 4:***	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.
3	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove the fuel sub level sensor. <Ref. to FU(H6DO)-46, REMOVAL, Fuel Sub Level Sensor.> 2) Measure the resistance between fuel sub level sensor terminals when the float is in FULL or EMPTY position. ***Terminals*** ***No. 1 — No. 2:***	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.
4	**CHECK HARNESS BETWEEN FUEL SUB-LEVEL SENSOR AND BODY INTEGRATED MODULE.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance between fuel sub level sensor harness connector terminal and body integrated unit harness connector terminal. ***Connector & terminal*** ***(R59) No. 1 — (B281) No. 19:***	Is the resistance less than 10 Ω?	Go to step **5**.	Repair the wiring harness.
5	**CHECK HARNESS BETWEEN FUEL LEVEL SENSOR AND FUEL SUB LEVEL SENSOR.** Measure the resistance between fuel level sensor harness connector terminal and fuel sub level sensor harness connector terminal. ***Connector & terminal*** ***(R58) No. 1 — (R59) No. 2:***	Is the resistance less than 10 Ω?	Go to step **6**.	Repair the wiring harness.
6	**CHECK FUEL LEVEL SENSOR GROUND CIRCUIT.** Measure the resistance between fuel level sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(R58) No. 4 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the meter case assembly.	Repair the wiring harness.

8. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

	Step	Check	Yes	No
1	**CHECK COMMUNICATION ERROR DISPLAY.** 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 in odo/trip meter?	Check the communication circuit. <Ref. to IDI-10, COMMUNICATION ERROR DISPLAY, INSPECTION, Combination Meter System.>	Go to step **2**.
2	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 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.

9. COMMUNICATION ERROR DISPLAY

When the following error code is displayed in the odo/trip meter, inspect the communication circuit since the communication malfunction is generated between each control module. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>



Error code	Description
Er IU	Malfunction in integrated module
Er —	Simultaneous malfunction of high/low speed CAN communication
Er HC	High speed CAN communication malfunction
Er LC	Malfunction of low-speed CAN communication
Er EG	EGI Communication malfunction
Er TC	TCM Communication malfunction
Er Ab	VDCCM communication malfunction
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

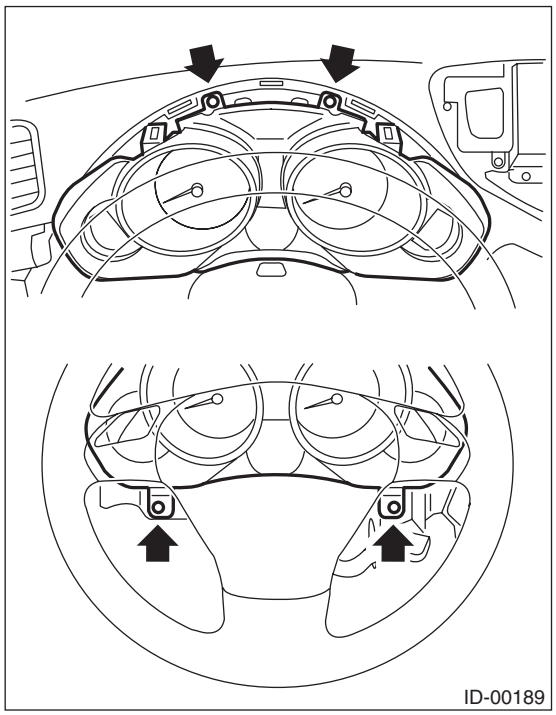
When DTC display mode is operated, {ECM}, {TCM} is displayed repeatedly in this order by pressing the trip knob. DTC is displayed in the following table according to type of control module, receiving DTC, DTC detected, No DTC. If CAN communication has some trouble, “-----” is displayed.

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 ----”
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-38, REMOVAL, Console Box.>
4) Remove the control panel. <Ref. to AC-31, REMOVAL, Control Panel.>
5) Remove the instrument panel lower cover. <Ref. to EI-36, REMOVAL, Instrument Panel Lower Cover.>
6) Remove the console side panel. <Ref. to EI-39, REMOVAL, Center Console.>
7) Remove the meter hood.
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

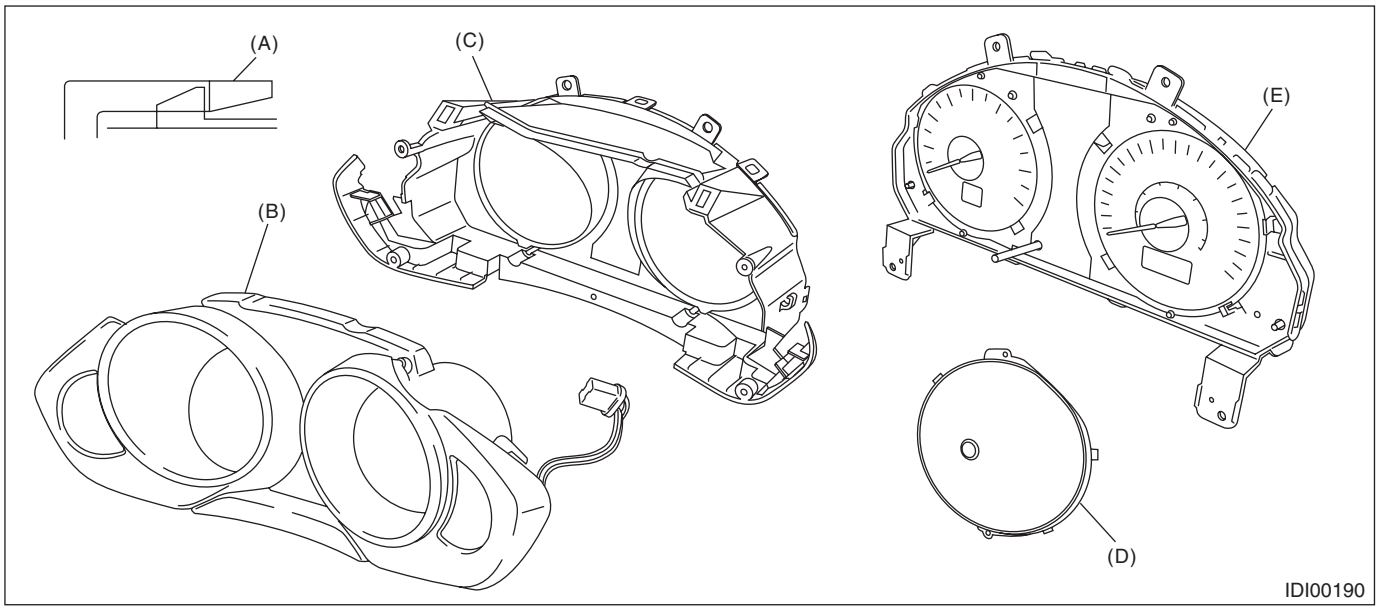
Install in the reverse order of removal.

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.

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 (B), meter case cover (C), and cover glass (D) from the meter panel assembly (E).



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 side.)

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 side.)

6. Fuel Gauge

A: SPECIFICATION

Since the meter case assembly cannot be disassembled, do not remove or inspect the fuel gauge as alone. (Do not remove the cover on the back side.)

7. Engine Coolant Temperature Gauge

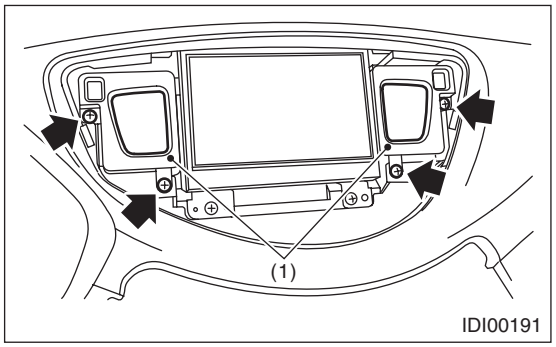
A: SPECIFICATION

Since the meter case assembly cannot be disassembled, do not remove or inspect the temperature gauge alone. (Do not remove the cover on the back side.)

8. Warning Box

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the upper grille. <Ref. to AC-46, 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

Install in the reverse order of removal.

CAUTION:
• Make sure the electrical connector is connected securely.
• Make sure that each indicator operates normally.

1. Basic Diagnostic Procedure

A: PROCEDURE

1. WITH SUBARU SELECT MONITOR

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 detailed procedure, refer to the REGISTRATION MANUAL FOR IMMOBILIZER.

NOTE:
• To check harness for broken wires or short circuits, shake trouble spot or connector.
• Check List for Interview. <Ref. to LAN(diag)-3, Check List for Interview.>

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using interview check list. <Ref. to LAN(diag)-3, Check List for Interview.> 2) Check the display of communication error display. (Combination meter, odo/trip meter)	Is the communication error displayed?	Go to step **3**.	Go to step **2**.
2	**BASIC INSPECTION** Check the 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.
3	**CHECK INDICATION OF DTC.** 1) Read DTC of all systems. <Ref. to LAN(diag)-12, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> NOTE: • The LAN system is for the overall vehicle, so read the DTC of all systems. • If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to LAN(diag)-32, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> 2) Record all DTC.	Is a DTC other than CAN communication displayed in the output code? ECU: P0600 TCU: P1718 VDC CU: C0047 or C0057, etc.	Refer to the DTC related table. <Ref. to LAN(diag)-31, FUNCTION CHECK, DTC TABLE, List of Diagnostic Trouble Code (DTC).> Go to step **5**.	Go to step **4**.
4	**PERFORM GENERAL DIAGNOSTICS.** Inspect using “General Diagnostics Table”. <Ref. to LAN(diag)-76, General Diagnostic Table.>	Is result of inspection OK?	LAN system is normal.	Go to step **5**.
5	**PERFORM DIAGNOSIS.** 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.

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? ❑ Always ❑ Sometimes ❑ Only once
	Which communication error is displayed? (Record them all) ❑ Er IU (Fail in the body integrated unit) ❑ Er HC (Fail of high-speed CAN) ❑ Er LC (Fail of low-speed CAN) ❑ Er — (Fails of both high-speed and low-speed CAN) ❑ Er EG (Fail of EGI communication data) ❑ Er TC (fail of TCM communication data) ❑ Er Ab (Fail of vehicle dynamics control (VDC)/ABS communication data) ❑ Er bb (Fail of brake vacuum system)
Ignition key position	❑ OFF ❑ ACC ❑ ON (Before starting engine) ❑ START ❑ ON (After starting Engine, engine is running) ❑ ON (After starting Engine, engine is at a standstill)
Timing	❑ Immediately after turning the ignition to ON. ❑ Immediately after turning the ignition to START.

2. DISPLAY IN COMBINATION METER

Display in combination meter	a) Display of engine coolant temperature gauge	❑ OK / ❑ NG
	b) Display of fuel gauge	❑ OK / ❑ NG
Display of other indicators	c) Malfunction indicator light	❑ ON / ❑ OFF
	d) SPORT indicator light (AT warning light)	❑ ON / ❑ OFF
	e) ABS warning light/Vehicle dynamics control (VDC) warning light	❑ ON / ❑ OFF
	f) Security indicator light	❑ ON / ❑ Blink / ❑ OFF
	g) Seat belt warning light (Driver's seat)	❑ ON / ❑ OFF
	h) Seat belt warning light (Passenger's seat)	❑ ON / ❑ OFF

3. SYMPTOMS

Behavior of vehicle	a) Illumination volume control is not available.	❑ Yes / ❑ No
	b) Rear wiper does not operate.	❑ Yes / ❑ No
	c) Wiper deicer does not operate.	❑ Yes / ❑ No
	d) Rear defogger does not operate.	❑ Yes / ❑ No
	e) Door lock does not operate.	❑ Yes / ❑ No
	f) Trunk/rear gate lock does not operate.	❑ Yes / ❑ No
	g) Driver's door lock does not operate.	❑ Yes / ❑ No
	h) Shift lock does not operate.	❑ Yes / ❑ No
	i) Key illumination blinks.	❑ Yes / ❑ No

4. CONDITIONS UNDER WHICH TROUBLE OCCURS

Driving condition	❑ At standstill (While idling)	
	❑ When the vehicle is running	Vehicle speed km/h (MPH)
	❑ Accelerating	Acceleration km/h (MPH) to km/h (MPH)
	❑ Decelerating (With braking)	Deceleration km/h (MPH) to km/h (MPH)
	❑ Decelerating (Without braking)	Deceleration km/h (MPH) to km/h (MPH)
	❑ Flat road ❑ Uphill ❑ Downhill ❑ Gravel road ❑ Bumpy road ❑ 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

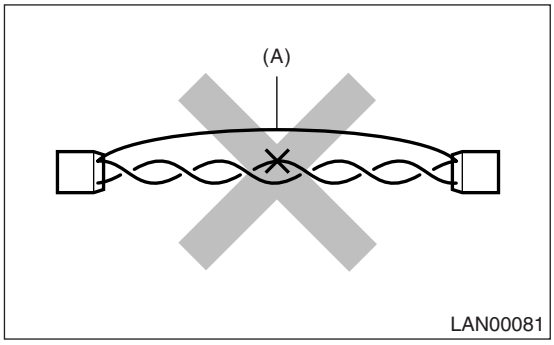
1. SRS AIRBAG SYSTEM

Airbag system wiring harness is routed near the body integrated unit and twisted pair line.

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 body integrated unit and LAN system.
• Refer to "Airbag System" when disconnecting the air bag system connector. <Ref. to AB-4, CAUTION, General Description.>

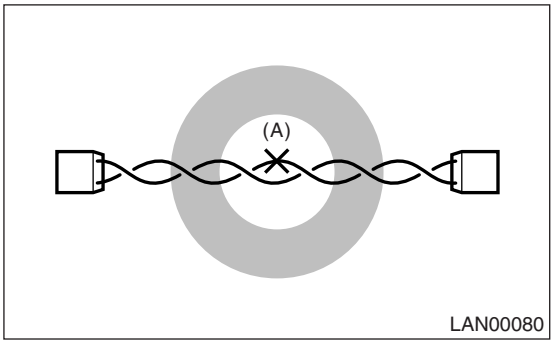
2. LAN SYSTEM

• 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.

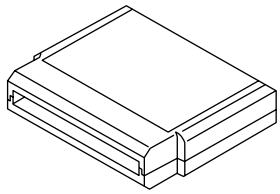
Standard voltage: 12 V or more

Specific gravity: Above 1.260

2) Check the fuse condition.
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 settings of body integrated unit are corresponded to vehicle equipment. <Ref. to LAN(diag)-19, REGISTRATION BODY INTEGRATED UNIT (EQUIPMENT SETTING), OPERATION, Subaru Select Monitor.>
5) Confirm setting are corresponded to vehicle equipment by function setting (ECM customizing) of body integrated unit. <Ref. to LAN(diag)-22, FUNCTION SETTING (ECM CUSTOMIZING), OPERATION, Subaru Select Monitor.>
6) Confirm "Factory initial setting" of body integrated unit registrations is "Market".
7) Confirm key illumination does not blink with ignition switch turned to ON.

C: PREPARATION TOOL

1. SPECIAL TOOL

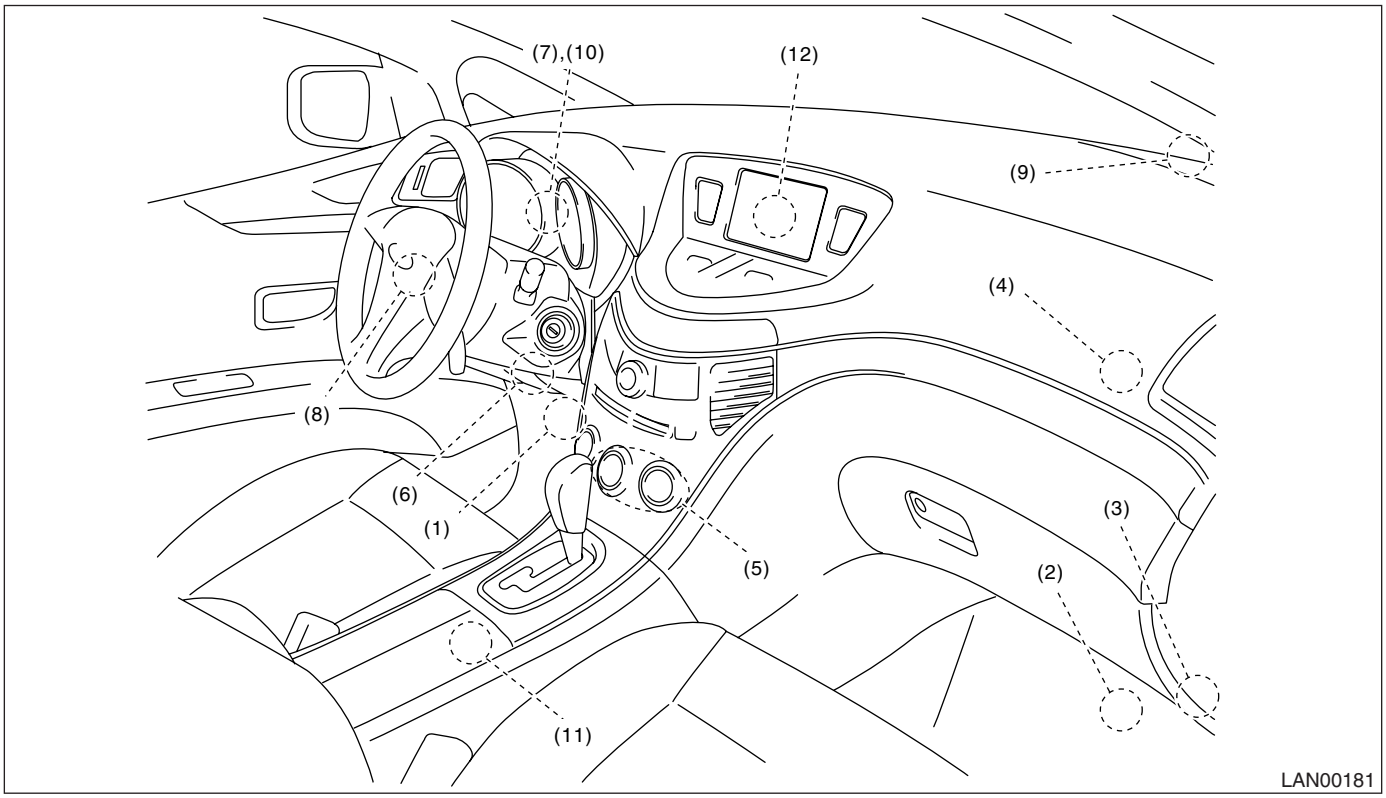
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.

2. GENERAL TOOL

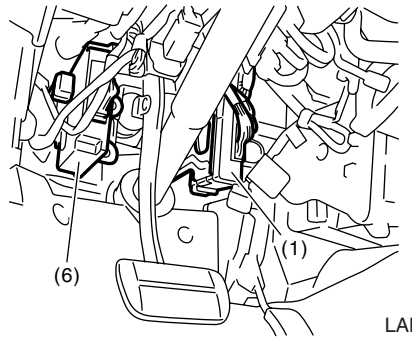
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.

4. Electrical Component Location

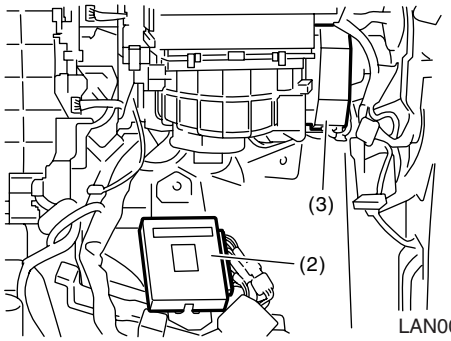
A: LOCATION



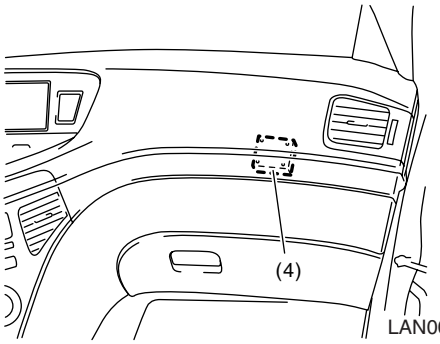
(1) Body integrated unit
(2) Engine Control Module (ECM)
(3) Auto A/C control module
(4) Keyless entry control module (Antenna)
(5) A/C control panel
(6) Transmission Control Module (TCM)
(7) Combination meter
(8) Steering angle sensor
(9) VDCCM&H/U (In engine compartment)
(10) Odo/trip meter
(11) Yaw rate sensor
(12) Center monitor (navigation monitor or MFD)



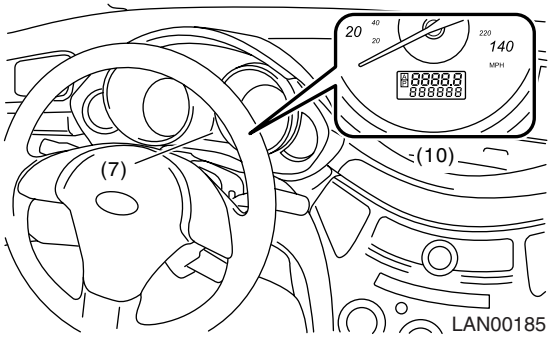
LAN00182



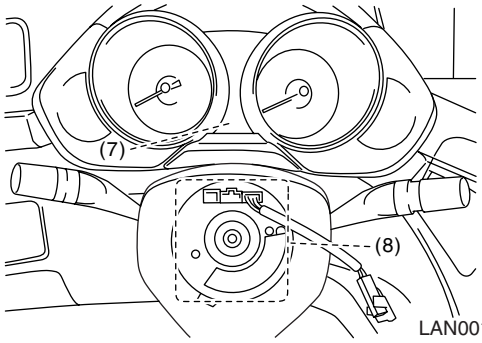
LAN00183



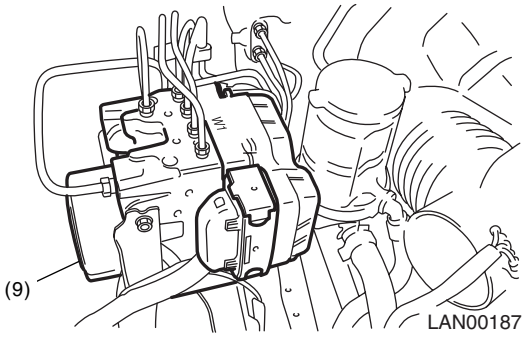
LAN00184



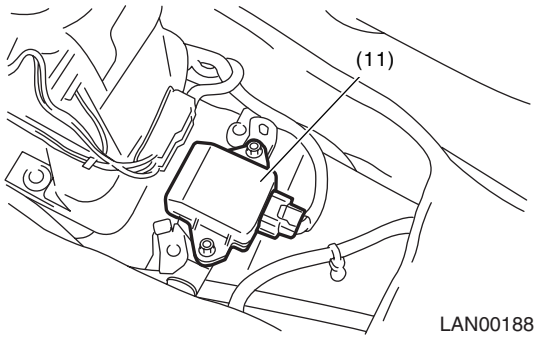
LAN00185



LAN00186



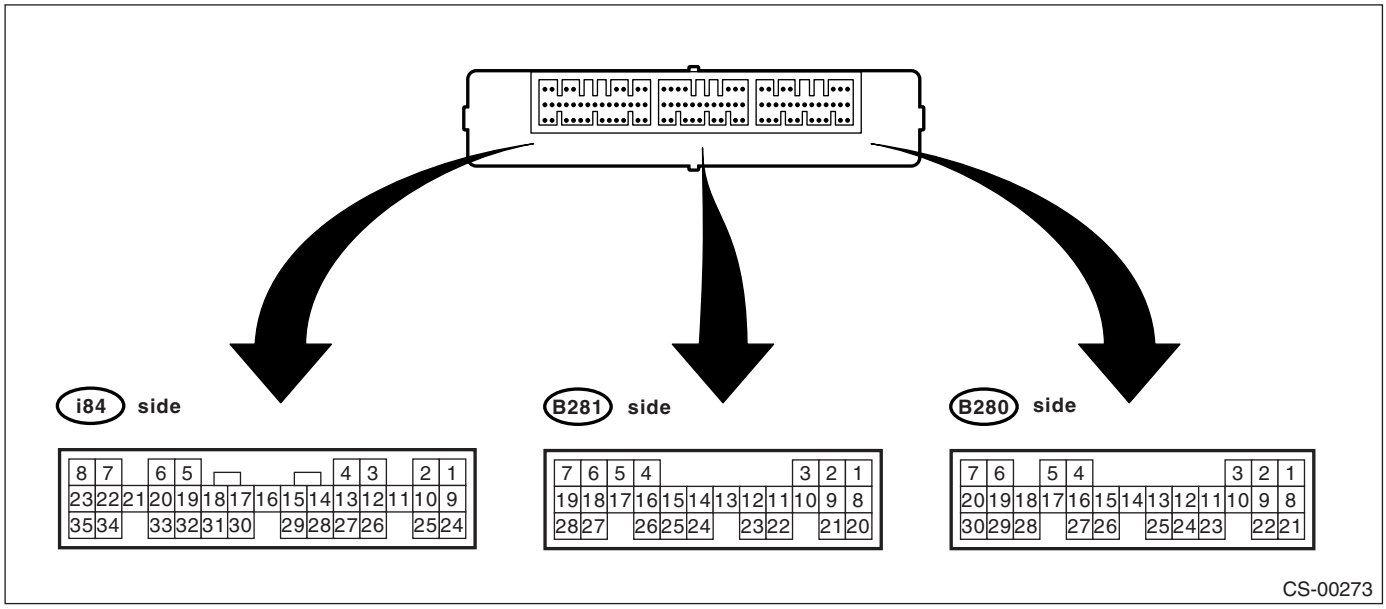
LAN00187



LAN00188

5. Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



Description	Connector No.	Terminal No.	Signal (V) Ignition switch ON (Engine OFF)	Note
System control power supply	B281	C2	10 — 13 V	Always
Backup power supply	B280	B7	10 — 13 V	Always
Ignition power supply	i84	A1	10 — 13 V	Ignition ON
ACC power supply	i84	A24	10 — 13 V	ACC ON
Ground	i84	A21	0 V	Always
	B281	C9		
	B281	C8		
	B280	B22		
Key warning switch	B281	C7	10 — 13 V	When ignition key inserted
Stop light switch	B281	C23	10 — 13 V	When brake pedal depressed
Illumination control switch (Bright switch)	i84	A30	10 — 13 V (at dimmer ON)	Cancel the extinction of the clock and audio illumination
Illumination control switch	i84	A30	10 — 13 V (at dimmer ON)	Extinct the clock and audio illumination
Illumination volume (Vi1)	i84	A10	4.5 — 5.5 V	Small light ON
Illumination volume (Vi2)	i84	A2	0.5 — 4.5 V	—
Illumination volume (Vi3)	i84	A25	0 V	Ground circuit
Illumination output	i84	A5	10 — 13 V	Small light ON
Front fog light input	B281	C17	10 — 13 V	Front fog light ON
Door switch input Driver's seat	i84	A19	Less than 1 V (10 — 13 V at OFF)	Driver's door open (ON)
Door switch input Passenger's seat	i84	A32	Less than 1 V (10 — 13 V at OFF)	Passenger's door open (ON)
Door switch input Rear RH seat	i84	A18	Less than 1 V (10 — 13 V at OFF)	Rear RH door open (ON)
Door switch input Rear LH seat	i84	A31	Less than 1 V (10 — 13 V at OFF)	Rear LH door open (ON)
Door switch Trunk/Rear gate	i84	A17	Less than 1 V (10 — 13 V at OFF)	Trunk/Rear gate open (ON)
Manual switch (LOCK)	i84	A15	Less than 1 Ω	Door lock switch ON

Control Module I/O Signal

Description	Connector No.	Terminal No.	Signal (V) Ignition switch ON (Engine OFF)	Note
Manual switch (UNLOCK)	i84	A29	Less than 1 Ω	Door unlock switch ON
Door lock power supply	i84	A34	10 — 13 V	Always
All door lock output	i84	A7	10 — 13 V	Manual lock switch, door key switch ON
Driver's door UNLOCK output	i84	A23	10 — 13 V	Driver's seat unlock signal ON
All door UNLOCK output	i84	A8	10 — 13 V	ALL door unlock signals ON
Rear gate UNLOCK output	i84	A22	10 — 13 V	When rear gate release switch ON with all seats unlocked
Rear gate release switch	B281	C22	0 V	Rear gate release switch ON
Key/shift lock power supply	B281	C1	10 — 13 V	Always
Shift lock output	B280	B6	10 — 13 V	Ignition switch ON, shift position "P" range, foot brake ON (Only AT)
Key locking output	B280	B5	10 — 13 V	Other than "P" range, ignition switch ON
Wiper deicer switch	i84	A14	0 V	Wiper deicer switch ON
Wiper deicer relay output	B280	B14	0 V	Wiper deicer relay ON
Rear defogger switch	i84	A28	0 V	Rear defogger switch ON
Rear defogger relay output	B281	B16	0 V	Rear defogger relay ON
Shift switch (ON)	B281	C26	0 V	At Manual mode
Shift switch (UP)	B281	C15	0 V	At Manual mode UP
Shift switch (DOWN)	B281	C25	0 V	At Manual mode DOWN
Shift button switch	B281	C24	0 V	When shift lever release button is operated
P range switch	B281	C13	0 V	Shift range P position
Impact sensor	B281	C5	8 V or more	Impact sensor ON (Model with impact sensor)
Fuel level sensor	B281	C19	0 — 102.3 Ω	Resistance differs according to the fuel level (displays resistance combining level gauge main and sub)
Ambient temperature sensor	B281	C3	0.5 — 4.5 V	SIG
	B281	C10	0 V	GND
Seat belt switch (driver's seat)	i84	A4	0 V	When driver's seat belt is worn
Seat belt switch (Passenger's seat)	i84	A13	0 V	When passenger's seat belt is worn
Seat belt warning light (driver's seat)	i84	A20	0 V	When driver's seat belt is worn
Seat belt warning light (Passenger's seat)	B280	C27	0 V	When passenger's seat belt is worn
Rear wiper switch (ON)	B281	C6	0 V	Rear wiper switch ON
Rear wiper switch (INT)	B281	C18	0 V	Rear wiper switch ON
Rear washer switch	B281	C27	0 V	Rear washer switch ON
Rear wiper power supply	B280	B21	10 — 13 V	Ignition switch ON
Rear wiper ON output	B280	B1	10 — 13 V	Rear wiper switch ON
Rear wiper return	B280	B8	0 V	At wiper reversing
		B1 — B8	0 V	
Room lamp output	B280	B3	0 V	When LOCK, UNLOCK with keyless entry
Map lamp output	B280	D2	0 V	When using map lamp
		D9	0 V	When using map lamp

Description	Connector No.	Terminal No.	Signal (V)	Note
			Ignition switch ON (Engine OFF)	
Key ring illumination output	B280	B4	0 V	Ignition key removed, driver's door open
Turn hazard output	B280	B12	0 V	When operating keyless entry answer back
Keyless Buzzer Output	i84	A6	10 — 13 V	When operating keyless entry answer back
Security horn output	B280	B11	0 V	When operating security horn
Security indicator light	i84	A33	0 V	At ignition key removed, immobilizer operating
TPMS registration check signal input	B281	C4	0 V	When inputting registration check signal
Keyless communication	i84	A9	Serial communication	At keyless entry signal received
High-speed CAN circuit (Hi)	B280	B20	Between B20 — B30 Serial communication	At communicating (sending and receiving)
High-speed CAN circuit (Lo)	B280	B30		
Low-speed CAN circuit 1 (Hi)	i84	A27	Between A25 — A26 Serial communication	At communicating (sending and receiving)
Low-speed CAN circuit 1 (Lo)	i84	A26		
Low-speed CAN circuit 2 (Hi)	B280	B26	Between B25 — B27 Serial communication	At communicating (sending and receiving) (Model with auto A/C)
Low-speed CAN circuit 2 (Lo)	B280	B25		
Immobilizer antenna	B281	C20 — C21	Serial communication	
Immobilizer communication (Main)	B280	B18 (Back-up B28)	Serial communication	
Subaru Select Monitor communication	B280	B19	Serial communication	

B: WIRING DIAGRAM

Refer to the electrical wiring diagram. <Ref. to WI-78, WIRING DIAGRAM, CAN Communication System.>

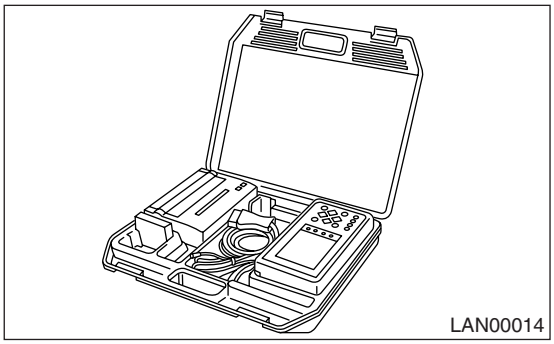
6. Subaru Select Monitor

A: OPERATION

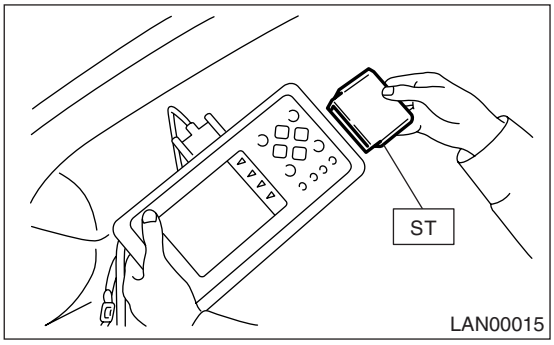
1. READ DIAGNOSTIC TROUBLE CODE (DTC)

NOTE:
• DTC is displayed in the sequence of inputting. (When inputting two DTCs or more simultaneously, they are displayed in the sequence of priority.)
• When more than two DTCs are displayed, perform the diagnosis of top of them.

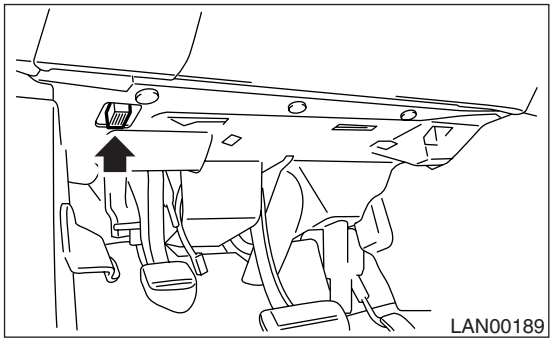
1) Prepare the Subaru Select Monitor kit.



2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to the Subaru Select Monitor. <Ref. to LAN(diag)-6, SPECIAL TOOL, PREPARATION TOOL, General Description.>

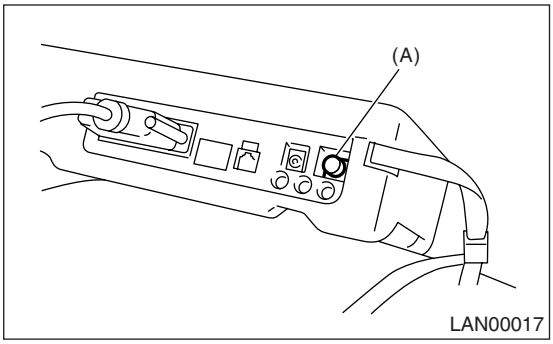


4) Connect the Subaru Select Monitor to data link connector.
Data link connector is located in the lower portion of instrument panel (on the driver's side).



CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON.



(A) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
8) On the «Integ. unit mode failure diag» screen, select the {Diagnostic Code(s) Display} and press the [YES] key.

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)-31, DTC TABLE, List of Diagnostic Trouble Code (DTC).>

NOTE:
• For details concerning operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".
• For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to LAN(diag)-29, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) On the «Integ. unit mode failure diag» display screen, select the {Current Data Display & Save} and press the [YES] key.
4) On the «Current Data Display & Save» display screen, select the {12 Data Display} and press the [YES] key.
5) 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 ANALOG DATA

Items to be displayed	Unit of measure	Description	Note
BATT Voltage (Control)	10 — 15 V	Body integrated unit input value	Always
BATT Voltage (BACK UP)	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	Small light switch ON
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 output 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	Other than parking range Ignition ON
number of regist.	0 — 4	Key No. to register	
Front Wheel Speed	km/h	CAN data input value	Reception from VDC unit
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 ECM
Fuel level resistance2	0 — 102.3 Ω	CAN data output value	Reception from body integrated unit
Fuel consumption	cc/s	CAN data input value	Reception from ECM and transmission to center monitor
Coolant Temp.	40 — 130°C	CAN data input value	Reception from ECM
Vehicle lateral G	m/s^2	CAN data input value	Reception from VDC unit
SPORT Shift Stages	0 — 7 levels	CAN data input value	(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 (There is no 8 input.) Reception from TCM
Off delay time	OFF, Short, Normal, Long	Body integrated unit setting items	Customize setting
Auto lock time	20, 30, 40, 50, 60 seconds	Body integrated unit setting items	Customize setting

4. DISPLAY OF ON/OFF DATA

Items to be displayed	Unit of measure	Description	Note
key-lock warning SW	ON/OFF	Body integrated unit input value	On when ignition key is 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 is illuminated
Rear fog lamp SW input	ON/OFF	Body integrated unit input value	Not supported by North American specifications
TPMS Input	ON/OFF	Body integrated unit input value	On when TPMS registration completed
lighting SW input	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Door key-lock SW input	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Door unlock SW input	ON/OFF	Body integrated unit input value	Not supported by North American specifications
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
R Gate SW input	ON/OFF	Body integrated unit input value	On when trunk/rear gate is open
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
Lock SW (front hood)	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Bright SW input	ON/OFF	Body integrated unit input value	Except automatic A/C
Tiptronic Mode Switch	ON/OFF	Body integrated unit input value	SPORT shift mode ON
TIP UP SW input	ON/OFF	Body integrated unit input value	SPORT shift on and On at up operation
TIP DOWN SW input	ON/OFF	Body integrated unit input value	SPORT shift on and On at down operation
P SW	ON/OFF	Body integrated unit input value	On when shift range is in parking
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	On when rear wiper switch is in INT
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 belt SW input	ON/OFF	Body integrated unit input value	Driver's seat buckle switch ON

Items to be displayed	Unit of measure	Description	Note
P seatbelt SW input	ON/OFF	Body integrated unit input value	Passenger's seat buckle switch ON
Fr wiper input	ON/OFF	Body integrated unit input value	On when front wiper is operating
Registration SW input	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Identification SW input	ON/OFF	Body integrated unit input value	Not supported by North American specifications
R defogger output	ON/OFF	Body integrated unit output value	On when rear defogger relay is operating
Door lock actuator 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/trunk unlock signal is output
Double lock output	ON/OFF	Body integrated unit output value	Not supported by North American specifications
R wiper output	ON/OFF	Body integrated unit output value	On when rear wiper 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	On when key lock solenoid is operating
wiper deicer SW input	ON/OFF	Body integrated unit output value	On when wiper deicer is operating
Starter cutting output	ON/OFF	Body integrated unit output value	Not supported by North American specifications
Hazard Output	ON/OFF	Body integrated unit output value	On when keyless lock/unlock signal is received (when keyless switch connector is removed)
Keyless Buzzer Output	ON/OFF	Body integrated unit output value	On when keyless lock/unlock signal is received (when keyless switch connector is removed)
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 is installed, customize settings are enabled, and security warning is operating
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
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
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 keyless switch connector is removed)
key illumi. lamp o/p	ON/OFF	Body integrated unit output value	On when key illumination light is illuminated
R fog light output	ON/OFF	Body integrated unit output value	Not supported by North American specifications
R fog lamp monitor	ON/OFF	Body integrated unit output value	Not supported by North American specifications

Items to be displayed	Unit of measure	Description	Note
Immobilizer lamp output	ON/OFF	Body integrated unit output value	On when immobilizer pilot light blinks
Keyless operation 1	Registration/Normal	Body integrated unit input value	Not supported by North American specifications
Keyless operation 2	Clear/Normal	Body integrated unit input value	Not supported by North American specifications
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 error signal reception ON Reception from TCM and transmission to combination meter
ATF Temperature Lamp	On/Off	CAN data input value	ATF oil temperature rise ON Reception from TCM and transmission to combination meter
ATF Blink	Blink/Off	CAN data input value	Not supported by North American specifications
Tire diameter abnormal 1	On/Off	CAN data input value	Not supported by North American specifications
Tire diameter abnormal 2	Blink/Off	CAN data input value	ON when difference in rotation between front and rear wheels is 4% or more Reception from TCM and transmission to combination meter
SPORT Shift (UP)	UP/OFF	Body integrated unit input value	ON when shift lever can be operated up
SPORT Shift (DOWN)	DOWN/OFF	Body integrated unit input value	ON when shift lever can be operated down
SPORT Shift (buzzer 1)	ON/OFF	CAN data input value	Reception from TCM and transmission to combination meter
SPORT Shift (buzzer 2)	ON/OFF	CAN data input value	Not supported by North American specifications
ABS/VDC Judging	ABS/VDC	CAN data input value	Transmission from vehicle dynamic control (VDC) to high speed control module
ADA Existence Judging	Yes/No	CAN data input value	Not supported by North American specifications
Small light SW	ON/OFF	Body integrated unit input value	On when small light is illuminated
Headlight	ON/OFF	Body integrated unit output value	Not supported by North American specifications
Headlight HI	ON/OFF	Body integrated unit output value	Not supported by North American specifications
Turn signal LH	ON/OFF	Body integrated unit output value	Not supported by North American specifications
Turn signal RH	ON/OFF	Body integrated unit output value	Not supported by North American specifications
R defogger SW	ON/OFF	Body integrated unit output value	Rear defogger switch ON
Australia Judging Flag	Australia/Others	Body integrated unit output value	North American specifications have others
Large diameter tires	Large diameter/others	Body integrated unit output value	Reception from combination meter

Items to be displayed	Unit of measure	Description	Note
Number of cylinders	4 cylinders/6 cylinders	CAN data input value	6 cylinders
E/G cam shaft specification	SOHC/DOHC	CAN data input value	DOHC
E/G Turbo	Turbo/Non-turbo	CAN data input value	OFF
E/G displacement (2.5 L)	2.5 L/ OFF	CAN data input value	OFF
E/G displacement (3.0 L)	3.0 L/ OFF	CAN data input value	3.0 L
AT/MT identification terminal	AT model / MT model	CAN data input value	AT
E/G cooling fan	ON/OFF	CAN data input value	Not supported by North American specifications
Heater cock valve output	ON/OFF	Body integrated unit output value	Not supported by North American specifications
Power window (Up)	ON/OFF	Body integrated unit output value	Not supported by North American specifications
Power window (Down)	ON/OFF	Body integrated unit output value	Not supported by North American specifications
Keyless buzzer	ON/OFF	Body integrated unit output value	On when keyless answer-back buzzer operates (when keyless switch connector is removed)
P/W ECM Failure	NG/OK	CAN data input value	Not supported by North American specifications
Keyless Hook SW	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Door lock SW (Open)	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Door lock SW (Close)	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Door Key SW (Open)	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Door Key SW (Close)	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Under hook registration	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Hook registration end	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Unlock request	ON/OFF	Body integrated unit input value	Not supported by North American specifications
Center display failure	OK/NG	CAN data input value	Reception from center display (NAVI monitor and MFD)
NAVI Failure	OK/NG	CAN data input value	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	Reception from auto A/C module
EBD Warning Light	OK/OFF	CAN data input value	Reception from VDC/ABS and transmission to combination meter
ABS Warning Light	OK/OFF	CAN data input value	Reception from VDC/ABS and transmission to combination meter
VDC OFF flag	ON/OFF	CAN data input value	Reception from VDC/ABS and transmission to combination meter
VDC/ABS OK B	OK/NG	CAN data input value	Reception from VDC/ABS (When an error is detected in either of the yaw rate, G sensor, steering sensor, or pressure sensor)
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	Reception from monitor (except MFD)

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

5. CONFIRMATION OF CURRENT SETTING

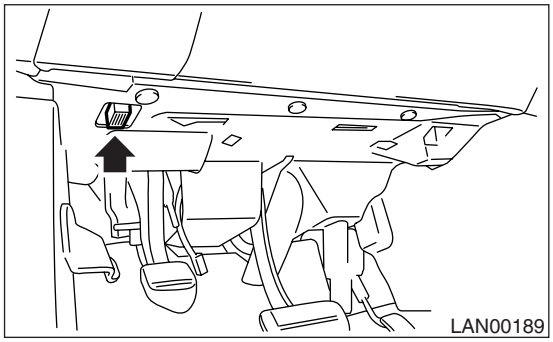
1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) On the «Integ. unit mode failure diag» display screen, select the {Current Data Display & Save} and press the [YES] key.
4) On the «Current Data Display & Save» display screen, select the {12 Data Display} and press the [YES] key.
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
Key No. to register	1	2	3	4	Registered ID type
Off delay	OFF	Long	Normal	Short	Setting for lighting off time
Auto-lock	60, 50 40, 30, 20		OFF		Not supported by North American specifications (Unit sec.)
Rr defogger op. mode	Normal		Continuous		Normal: Off at 15 minutes of operation Continuous: Operations from switch on to off
Wiper deicer op. mode	Normal		Continuous		Normal: Off at 15 minutes of operation Continuous: Operations from switch ON to OFF, repeats ON for 15 minutes, OFF for 2 minutes
Security Alarm Setup	ON		OFF		ON: Warning device operation possible OFF: Warning device does not operate
Impact Sensor Setup	ON		OFF		ON: Impact sensor operation possible OFF: Impact sensor does not operate Turn OFF for vehicles not equipped with an Impact Sensor
Alarm monitor delay setting	ON		OFF		ON: Monitor after a fixed period of time from reception of the keyless lock signal OFF: Monitor after reception of the keyless lock signal
Lockout prevention	ON		OFF		ON: Lockout prevention operation OFF: Lockout prevention not operated
Impact Sensor	Yes		No		Yes: Impact sensor equipped No: Impact sensor not equipped Always set to no for vehicles not equipped with the impact sensor.
Siren setting	Yes		No		Yes: Vehicle equipped with siren No: Vehicle not equipped with siren The horn does not honk when the warning operates if the vehicle not equipped with a siren is set to 'Yes'.
Answer-back buzzer setup	ON		OFF		ON: Answer-back buzzer operation possible OFF: Answer-back buzzer not operated
Hazard answer-back setup	ON		OFF		ON: Hazard answer-back buzzer operation possible OFF: Hazard answer-back buzzer not operated
Automatic locking setup	ON		OFF		Not supported by North American specifications
Ans.-back Buzzer	Yes		No		Yes: Vehicle equipped with answer-back buzzer No: Vehicle not equipped with answer-back buzzer
Auto locking	Yes		No		Not supported by North American specifications
Door open warning (prevention of battery run-out)	Yes		No		Yes: Door interlocked room light goes off when on for 10 minutes consecutively when door is open. No: Room light remains illuminated until door is closed.
A/C ECM setting	Yes		No		Model with auto A/C (Set to 'Yes')
P/W ECM setting	Yes		No		Not supported by North American specifications
Center display failure	Yes		No		Yes: Vehicle equipped with MFD and navigation display No: Vehicle not equipped with MFD nor navigation display
Wiper deicer	Yes		No		Yes: Vehicle equipped with wiper deicer No: Vehicle not equipped with wiper deicer
Rear fog light setting	Yes		No		Not supported by North American specifications
Factory initial setting	Factory		Market		Do not change to the factory mode. Set to market when using normally.

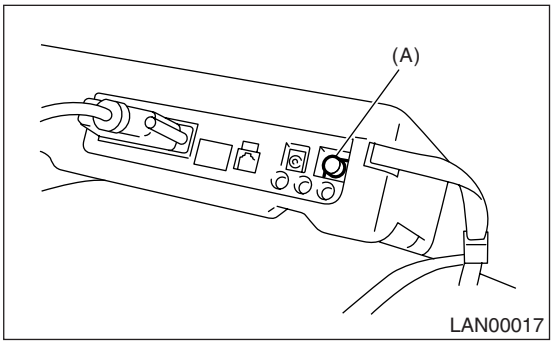
6. REGISTRATION BODY INTEGRATED UNIT (EQUIPMENT SETTING)

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 initial setting" of body integrated unit registrations is "Market." If "Factory initial setting" is set to "Factory," key illumination blinks with ignition key turned to ON to give warning of unconfirmed settings.
• 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 one. (Model with immobilizer)
• Make a registration of immobilizer when the parts related to immobilizer have been replaced. Refer to the "REGISTRATION MANUAL FOR IMMOBILIZER".
• Do not install or register an immobilizer related module of other registered vehicles 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 Subaru Select Monitor to ON.



(A) Power switch

4) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
5) On the «Each System Check» display screen, select the {Integ. Unit mode} and then select the «ECM customizing».
6) Change the setting with UP/DOWN key and press the [YES] key.
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.

NOTE:
Center display yes/no can be set only by the select monitor.

- List of body integrated unit registration item

NOTE:
Setting is different depending on grade of vehicle and what is equipped.

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.
P/W ECM setting	OFF	ON	Set to “OFF”.
		OFF	
Center display failure	OFF	ON	If center display failure is set to “OFF”, diagnosis for MFD and navigation display cannot be performed.
		OFF	
Wiper deicer setting	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 initial setting (Reset of body integrated unit)	Factory	Factory (Reset)	If Factory initial setting is set to “Factory”, registrations of items above is changed to “OFF”. After setting, be sure to set to “Market”.
		Market (Settlement)	

CAUTION:
- **It is possible to control the original functions of vehicle when registrations of body integrated unit and function setting are corresponded to vehicle equipment.**
- **When body integrated unit is a new one or “Factory” mode, key illumination blinks to show equipment settings have not been completed.**
- **Be sure not to change Factory initial setting except installation of 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 body integrated units as part for repair 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 setting. On the «ECM customizing” display screen of Subaru Select Monitor, select the {Factory initial setting} and press the [YES] key.
8) Change the mode from Factory to Market.
9) Register the immobilizer key.
10) Perform the registration according to the procedures of the “IMMOBILIZER REGISTRATION OPERATION MANUAL”.
11) When key registration is completed, “Do you want to register remote engine start?” is displayed. Select NO.
12) Perform the function setting (ECM customizing).
<Ref. to LAN(diag)-22, FUNCTION SETTING (ECM CUSTOMIZING), OPERATION, Subaru Select Monitor.>

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

7. CLEAR MEMORY MODE

1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) Press the [YES] key after the information of body integrated unit type is displayed.
4) On the «Integ. Unit mode failure diag» display screen, select the {Clear Memory} and press the [YES] key.

Display	Contents to be monitored
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 operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

8. FREEZE FRAME DATA

NOTE:
• Data stored at the time of trouble occurrence is shown on display.
• Freeze frame data will be memorized maximum to 20.
• If freeze frame data is not stored in memory correctly (caused by low power supply of body integrated unit), DTC will be displayed with “?” on the head of it in the Subaru Select Monitor display. This shows it may be an unreliable reading.

9. FUNCTION SETTING (ECM CUSTOMIZING)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) On the «Integ. Unit mode failure diag» display screen, select the {ECM customizing} and press the [YES] key.
4) Change the setting with UP/DOWN key and press the [YES] key.

- List of function setting item (ECM customizing)

NOTE:
Even if changes are made to items that are not equipped, the contents are not confirmed and do 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 key unlock	
		OFF	0 sec.	0 sec.	
		Short	3 sec.	10 sec.	
		Normal	5 sec.	20 sec.	
		Long	8 sec.	30 sec.	
Auto lock time	30 sec.	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 supported by North American specifications
Rr defogger op. mode	15 min.	15 min.	Rear defogger stops in 15 minutes automatically after switch is turned to ON.		
		Continuous	Rear defogger 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.	Wiper deicer stops in 15 minutes automatically after switch is turned to ON.		
		Continuous	Wiper deicer 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 in active condition		
		OFF	Impact sensor in inactive condition (Set Impact Sensor Setup of model without impact sensor to “OFF”.)		
Alarm monitor delay setting	ON		After doors are locked by keyless entry system operated, Alarm monitor starts in following time.		
		ON	Delay time is 30 seconds.		
		OFF	Delay time is 0 seconds.		
Lockout prevention	ON	ON	Lockout prevention in inactive condition (Lockout prevention 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. (Set impact sensor to “OFF” in model without impact sensor. If impact sensor is set to “ON”, hazard, horn or siren operate after doors are locked by keyless entry system operated (Alarm monitor starting).		Set to “ON” when an optional impact sensor is installed.
		OFF	Vehicle is controlled in impact sensor no-equipped mode.		
Siren setting	OFF	ON	Siren sounds when alarm operates. (Set siren setting to “OFF” in model without siren. Horn does not sound if siren setting is set to “ON”.)		Set to “ON” when an optional siren is installed.
		OFF	Horn sounds when alarm operates.		
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 operated, hazard answer-back buzzer operates.		
		OFF	When lock/unlock is selected by keyless entry system operated, answer-back buzzer does not sound.		

Data	Initial setting value	Customize setting	Remarks	Destination Specifications
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 operated, hazard answer-back buzzer operates.	
		OFF	When lock/unlock is selected by keyless entry system operated, hazard answer-back does not operate.	
Automatic locking setup	ON	ON	Workable when Automatic locking setup is set to “ON” Automatic locking operates.	Not supported by North American specifications
		OFF	Automatic locking does not operate.	
Ans.-back Buzzer	ON	ON	Vehicle is controlled in answer-back buzzer equipped mode.	Not supported by North American specifications
		OFF	Vehicle is controlled in answer-back buzzer non-equipped mode. (Set Ans.-back Buzzer to “OFF” in model without answer back buzzer.)	
Auto locking	ON	ON	Vehicle is controlled in auto locking equipped mode.	Not supported by North American specifications
		OFF	Vehicle is controlled in auto locking non-equipped mode. (Set Auto locking to “OFF” in model without auto locking.)	
Initial Keyless Setting	—	—	—	
		Execution	Settings of keyless entry system are initialized. (Auto-lock time: 30 sec., Answer-back buzzer setup: ON, Hazard answer-back setup: ON, Automatic locking setup: ON, Ans.-back Buzzer: ON)	
Initial button setting	—	—	—	
		Execution	Settings of each function are initialized. (Off delay time: Normal, Rr defogger op. mode: 15 min., Wiper deicer op. mode: 15 min., Lockout prevention: ON)	
Initial Security setting	—	—	—	Not supported by North American specifications
		Execution	Settings of security system are initialized. (Security Alarm Setup: OFF, Impact Sensor Setup: OFF, Alarm monitor delay setting: ON, Siren setting: OFF)	
Passive Alarm (Not used)	OFF	ON	Workable when passive arming is set to “ON.”	
		OFF		
Door open warning (prevention of battery run-out)	OFF	ON	If detecting door open for 30 minutes, room light, key illumination and door warning light are turned off to prevent battery run-out.	
		OFF	Room light, key illumination and door warning light is not turned off.	
Alarm interlocked room light switch	OFF	ON	The room light lights by being interlocked with the activation of the alarm.	
		OFF	Room light does not illuminate even if the alarm is activated.	

5) After setting, make sure that vehicle equipment is same as the setting changed in the {Current Data Display & Save}.

CAUTION:

- **It is possible to control the original functions of vehicle when settings above are corresponded to vehicle equipment.**
- **Do not change the settings except for setting above during operation of equipment setting.**
- **Be sure not to change Factory initial setting except installation of new body integrated unit.**

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

10.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 the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) On the «Integ. Unit mode failure diag» display screen, select the {Function Check} and press the [YES] key.
4) Select the item to be operated on the «Function Check» display screen with «UP/Down key» and press the [YES] key.
5) Pressing [YES] starts, [NO] cancels the operation and [YES] returns to the System Operation Check Mode display screen.

NOTE:
If not equipped (based on area or condition), process will not go on.

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 the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) On the «Integ. unit mode failure diag» display screen, select the {Current Data Display & Save} and press the [YES] key.
4) On the «Data Display Menu» screen, select the {12 Data Display} and press the [YES] key.
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 ANALOG DATA, OPERATION, Subaru Select Monitor.> <Ref. to LAN(diag)-14, DISPLAY OF ON/OFF 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)-22, FUNCTION SETTING (ECM CUSTOMIZING), OPERATION, Subaru Select Monitor.>

11.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Note
None	Communication for initializing impossible	Open or short in Subaru Select Monitor communication line	<Ref. to LAN(diag)-32, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
None	Diagnostic trouble code (DTC) is not stored	Internal error of combination meter	<Ref. to LAN(diag)-35, DIAGNOSTIC TROUBLE CODE (DTC) IS NOT STORED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0100	Integ. unit system error	Body integrated unit internal error	<Ref. to LAN(diag)-35, DTC B0100 INTEG. UNIT SYSTEM ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0101	BATT power supply (Control) error	Open or short in battery power supply control circuit	<Ref. to LAN(diag)-36, DTC B0101 BATT P/SUPPLY MALFUNCTION CONT., Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0102	BATT p/supply malfunction cont.	Open or short of battery power supply backup circuit	<Ref. to LAN(diag)-38, DTC B0102 BATT P/SUPPLY MALFUNCTION CONT., Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0103	Ignition power failure	Open or short in IGN power supply circuit	<Ref. to LAN(diag)-40, DTC B0103 IGNITION POWER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0104	ACC power failure	Open or short in ACC power supply circuit	<Ref. to LAN(diag)-42, DTC B0104 ACC POWER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0106	Shift lock circuit failure	Ground short of shift lock circuit	<Ref. to LAN(diag)-44, DTC B0106 SHIFT LOCK CIRCUIT FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0201	CAN-HS counter abnormal	Malfunction of high-speed CAN communication	<Ref. to LAN(diag)-46, DTC B0201 CAN-HS COUNTER ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0202	CAN-HS bus off	Any unit is cut communication.	<Ref. to LAN(diag)-50, DTC B0202 CAN-HS BUS OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0211	CAN-HS ECM data abnormal	Received error data from ECM.	<Ref. to LAN(diag)-53, DTC B0211 CAN-HS ECM DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0212	CAN-HS TCM data abnormal	Received error data from TCM.	<Ref. to LAN(diag)-54, DTC B0212 CAN-HS TCM DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0213	CAN-HS VDC/ABS data abnormal	Received error data from VDC/ABS unit.	<Ref. to LAN(diag)-55, DTC B0213 CAN-HS VDC/ABS DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0221	CAN-HS ECM no-receive data	Not received error data from ECM.	<Ref. to LAN(diag)-56, DTC B0221 CAN-HS ECM NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0222	CAN-HS TCM no-receive data	Not received error data from TCM.	<Ref. to LAN(diag)-59, DTC B0222 CAN-HS TCM NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0223	CAN-HS VDC/ABS no-receive data	Not received error data from VDC/ABS unit.	<Ref. to LAN(diag)-61, DTC B0223 CAN-HS VDC/ABS NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0300	CAN-LS malfunction	Open or short in CAN-LS circuit, on each side or both sides.	<Ref. to LAN(diag)-63, DTC B0300 CAN-LS MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0301	CAN-LS counter abnormal	Malfunction of CAN-LS communication	<Ref. to LAN(diag)-65, DTC B0301 CAN-LS COUNTER ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Note
B0302	CAN-LS bus off	Any unit is cut communication.	<Ref. to LAN(diag)-67, DTC B0302 CAN-LS BUS OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0311	CAN-LS meter unit data abnormal	Received error data from meter.	<Ref. to LAN(diag)-69, DTC B0311 CAN-LS METER UNIT DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0313	CAN-LS monitor data abnormal	Received error data from monitor.	<Ref. to LAN(diag)-70, DTC B0313 CAN-LS MONITOR DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0321	CAN-LS meter no-receive data	Not received error data from meter.	<Ref. to LAN(diag)-72, DTC B0321 CAN-LS METER NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0401	M collation NG	Malfunction related immobilizer	<Ref. to IM (diag)-14, List of Diagnostic Trouble Code (DTC).>
B0402	Immobilizer Key collation NG	Malfunction related immobilizer	<Ref. to IM (diag)-14, List of Diagnostic Trouble Code (DTC).>
B0403	E/G request NG	Malfunction related immobilizer	<Ref. to IM (diag)-14, List of Diagnostic Trouble Code (DTC).>
B0500	Keyless UART com. malfunction	Open or short circuit in keyless UART circuit	<Ref. to LAN(diag)-74, DTC B0500 KEYLESS UART COM. MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

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.

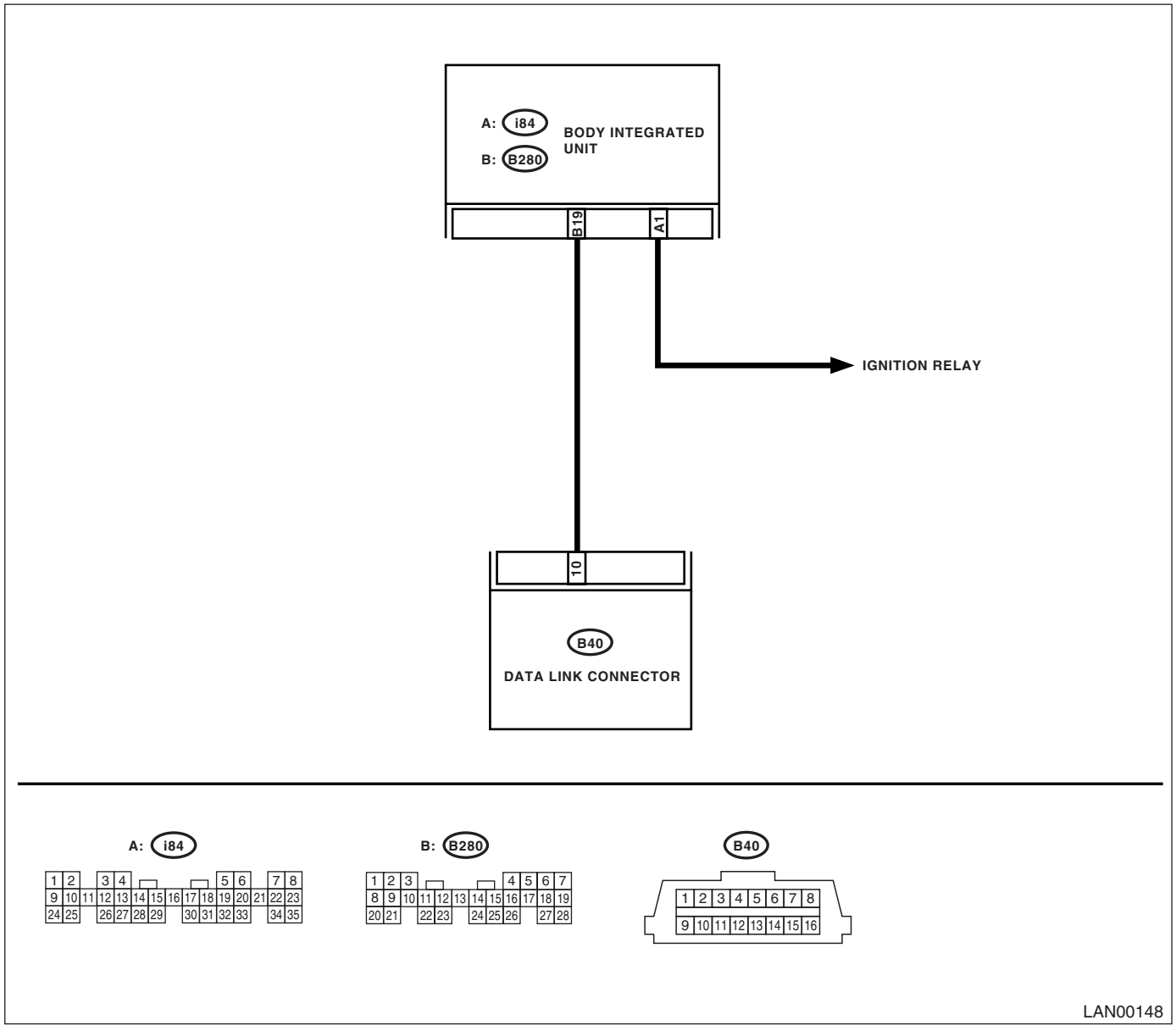
DTC to Check	Diagnostic Code that was displayed.					Probable cause
	Body integrated unit	ECM	TCM	VDC/ABS CM	Combination meter display	
B0100 <Ref. to LAN(diag)-35, DTC B0100 INTEG. UNIT SYSTEM ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B0100	P0600	P1718	—	Er IU	There could be a problem in the body integrated unit.
B0221 <Ref. to LAN(diag)-53, DTC B0211 CAN-HS ECM DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B0221	—	P1718	C0057	Er HC	It is possible that the ECM is faulty.
B0222 <Ref. to LAN(diag)-54, DTC B0212 CAN-HS TCM DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B0222	P0600	—	C0057	Er HC	It is possible that the TCM is faulty.
B0223 <Ref. to LAN(diag)-55, DTC B0213 CAN-HS VDC/ABS DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B0223	P0600	P1718	—	Er HC	It is possible that the VDC/ABS CM is faulty.
B0321 <Ref. to LAN(diag)-72, DTC B0321 CAN-LS METER NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B0321	—	—	—	—	It is possible that the combination meter is faulty.
B0313 <Ref. to LAN(diag)-70, DTC B0313 CAN-LS MONITOR DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B0313	—	—	—	—	It is possible that the navigation monitor or MFD is faulty.
B0500 <Ref. to LAN(diag)-74, DTC B0500 KEYLESS UART COM. MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	B0500	—	—	—	—	It is possible that the keyless entry module is faulty.

12.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

NOTE:
- DTC is displayed in the sequence of the amount of counter numbers.
- When more than two DTCs are displayed, perform the diagnosis of top one.

DIAGNOSIS:
Subaru Select Monitor communication line is open or shorted.
TROUBLE SYMPTOM:
Not communicable with Subaru Select Monitor.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	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	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage more than 11 V?	Go to step **3**.	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4**.
4	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other systems can be executed normally.	Are system and model year displayed?	Go to step **7**.	Go to step **5**.
5	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 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.	Are system and model year displayed?	Go to step **7**.	Go to step **6**.
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL UNIT AND SUBARU SELECT MONITOR.** 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. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair the harness and connector between each control unit and Subaru Select Monitor.
7	**CHECK OUTPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Turn the ignition switch to ON. 2) Measure the voltage between body integrated unit and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **8**.	Repair the harness and connector between each control unit and Subaru Select Monitor.
8	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND DATA LINK CONNECTOR.** Measure the resistance between body integrated unit and data link connector. ***Connector & terminal*** ***(B40) No. 10 — (B280) No. 19:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the harness and connector between body integrated unit and Subaru Select Monitor.
9	**CHECK INSTALLATION OF BODY INTEGRATED UNIT CONNECTOR.** 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.

	Step	Check	Yes	No
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(i84) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **11**.	Repair the open circuit of harness between body integrated unit and battery.
11	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND CHASSIS GROUND.** 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. ***Connector & terminal*** ***(B280) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12**.	Repair the poor contact of harness between body integrated unit and ground.
12	**CHECK POOR CONTACT OF CONNECTORS.**	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-52, Body Integrated Unit.>

CAUTION:
When replacing body integrated unit on the model with immobilizer system, refer to the "REGISTRATION MANUAL FOR IMMOBILIZER".

B: DIAGNOSTIC TROUBLE CODE (DTC) IS NOT STORED

DIAGNOSIS:
Defective combination meter
TROUBLE SYMPTOM:
- Communication error display in odo/trip meter is not cleared.
- "No trouble code" is displayed on Subaru Select Monitor.

NOTE:
If DTC is not displayed on Subaru Select Monitor, LAN communication System should be OK.

	Step	Check	Yes	No
1	**CHECK COMMUNICATION ERROR DISPLAY WITH COMBINATION METER.** Turn the ignition switch to ON.	Is communication error displayed?	Inspect the DTC.	Go to step **2**.
2	**CHECK COMBINATION METER.** Perform the self-diagnosis of combination meter.	Is combination meter OK?	Go to step **3**.	Replace the combination meter. <Ref. to IDI-11, Combination Meter.>
3	**CHECK THE BODY INTEGRATED UNIT.** 1) Display the current data of ECM using Subaru Select Monitor. 2) Check data of "body integrated unit data received".	Is "Yes" displayed?	Go to step **4**.	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>
4	**CHECK THE BODY INTEGRATED UNIT.** 1) Display the current data of ECM using Subaru Select Monitor. 2) Check data of "body Integrated unit counter update".	Is "Yes" displayed?	Repair the poor contact of connector.	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>

C: DTC B0100 INTEG. UNIT SYSTEM ERROR

DTC DETECTING CONDITION:
System error in body integrated unit
TROUBLE SYMPTOM:
- Check light comes on in the combination meter, and displays communication error display "Er IU".
- LAN communication immobilizer function may not be executed normally.

	Step	Check	Yes	No
1	**CHECK ALL DTCS.**	Is DTC concerning ECM displayed?	Go to step **2**.	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>
2	**CHECK DTC CONCERNING ECM.**	Is output DTC on ECM concerning CAN communication error?	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>	Perform the diagnosis according to DTC concerning ECM.

D: DTC B0101 BATT P/SUPPLY MALFUNCTION CONT.

DTC DETECTING CONDITION:

Battery power supply control circuit is open or shorted.

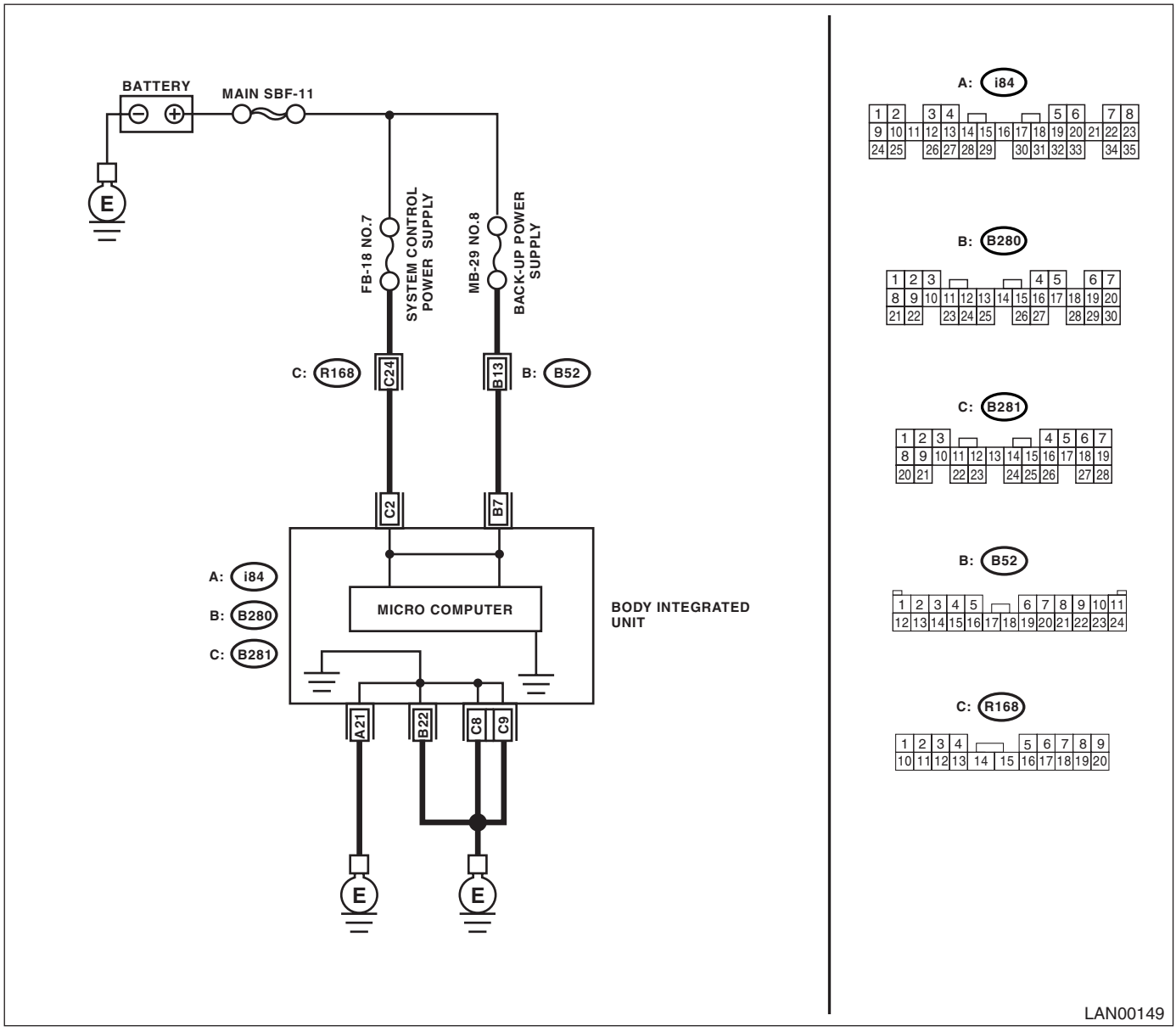
TROUBLE SYMPTOM:

No malfunction occurs because the back-up power supply is activated.

NOTE:

When B0102 BATT p/supply (backup) malfunction is output at the same time, all the function of body integrated unit may not operate.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 7).	Is the fuse blown out?	Replace the fuse (No. 7). If the replaced fuse has blown out easily, repair the short circuit of harness between fuse (No. 7) and body integrated unit.	Go to step **2**.
2	**CONTINUITY CHECK OF WIRING HARNESS.** 1) Disconnect the connector (B281) from body integrated unit. 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal (B281) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Repair the harness for open or shorted circuit between body integrated unit and fuse.
3	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in body integrated unit connector?	Repair the poor contact of connector.	Go to step **4**.
4	**CHECK BODY INTEGRATED UNIT HARNESS.** 1) Connect all the connectors. 2) Perform the clear memory mode. 3) Read DTC.	Is the same DTC displayed?	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>	Temporary poor contact occurs.

E: DTC B0102 BATT P/SUPPLY MALFUNCTION CONT.

DTC DETECTING CONDITION:

Battery power supply backup circuit is open or shorted.

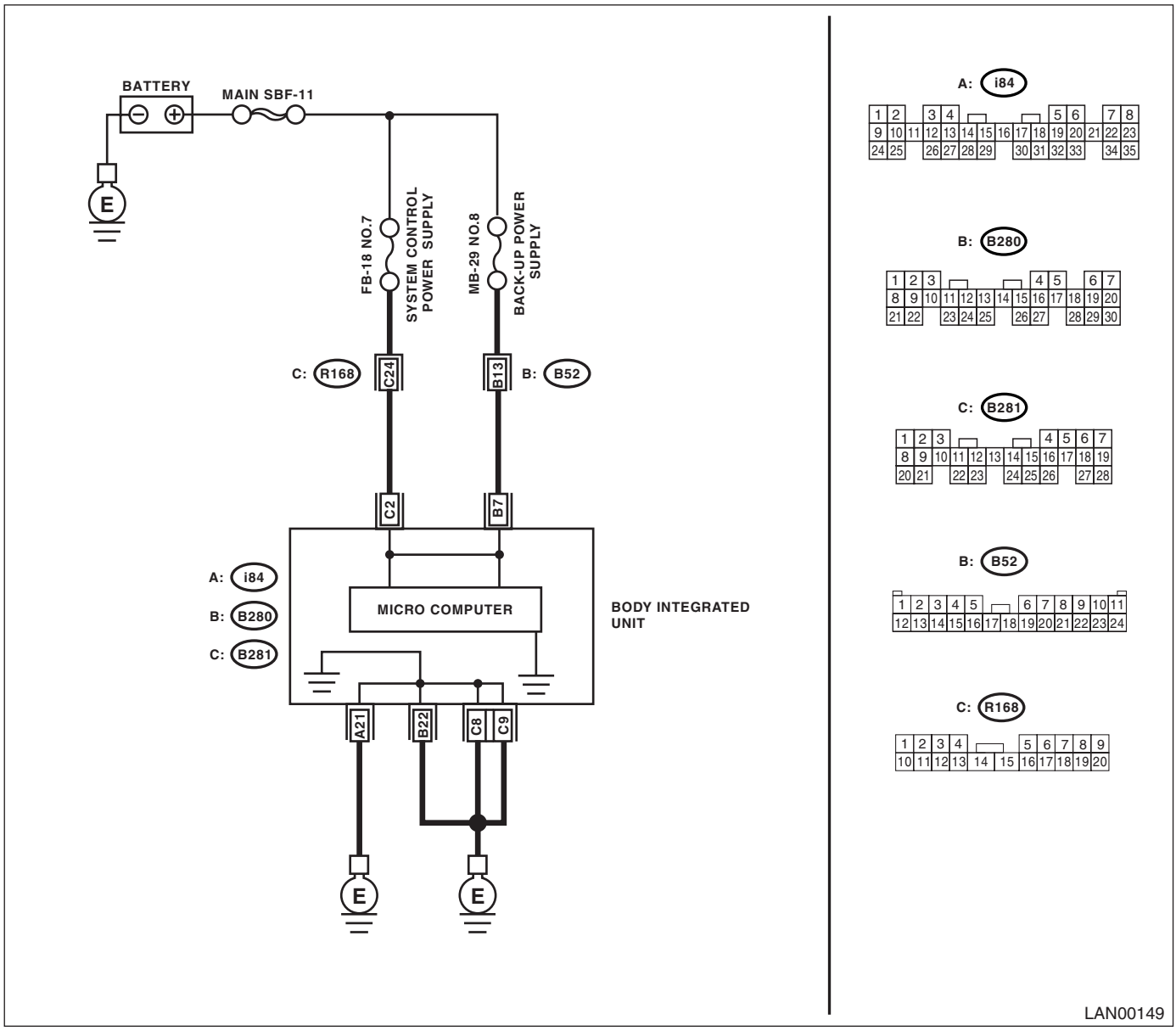
TROUBLE SYMPTOM:

- Engine malfunction indicator light may illuminates.
- Keyless entry, room light and key illumination do not operate.
- “En IU” may display in combination meter.

NOTE:

When some B0101 BATT p/supply malfunction cont. are output at the same time, all function of body integrated unit may not function.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 8).	Is the fuse blown out?	Replace the fuse (No. 8). If the replaced fuse has blown out easily, repair the short circuit of harness between fuse (No. 8) and body integrated unit.	Go to step **2**.
2	**CONTINUITY CHECK OF WIRING HARNESS.** 1) Disconnect the connector (B280) from body integrated unit. 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal (B280) No. 7 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Repair the harness for open or shorted circuit between body integrated unit and fuse.
3	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in body integrated unit connector?	Repair the poor contact of connector.	Go to step **4**.
4	**CHECK BODY INTEGRATED UNIT HARNESS.** 1) Connect all the connectors. 2) Perform the clear memory mode. 3) Read DTC.	Is the same DTC displayed?	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>	Temporary poor contact occurs.

F: DTC B0103 IGNITION POWER FAILURE

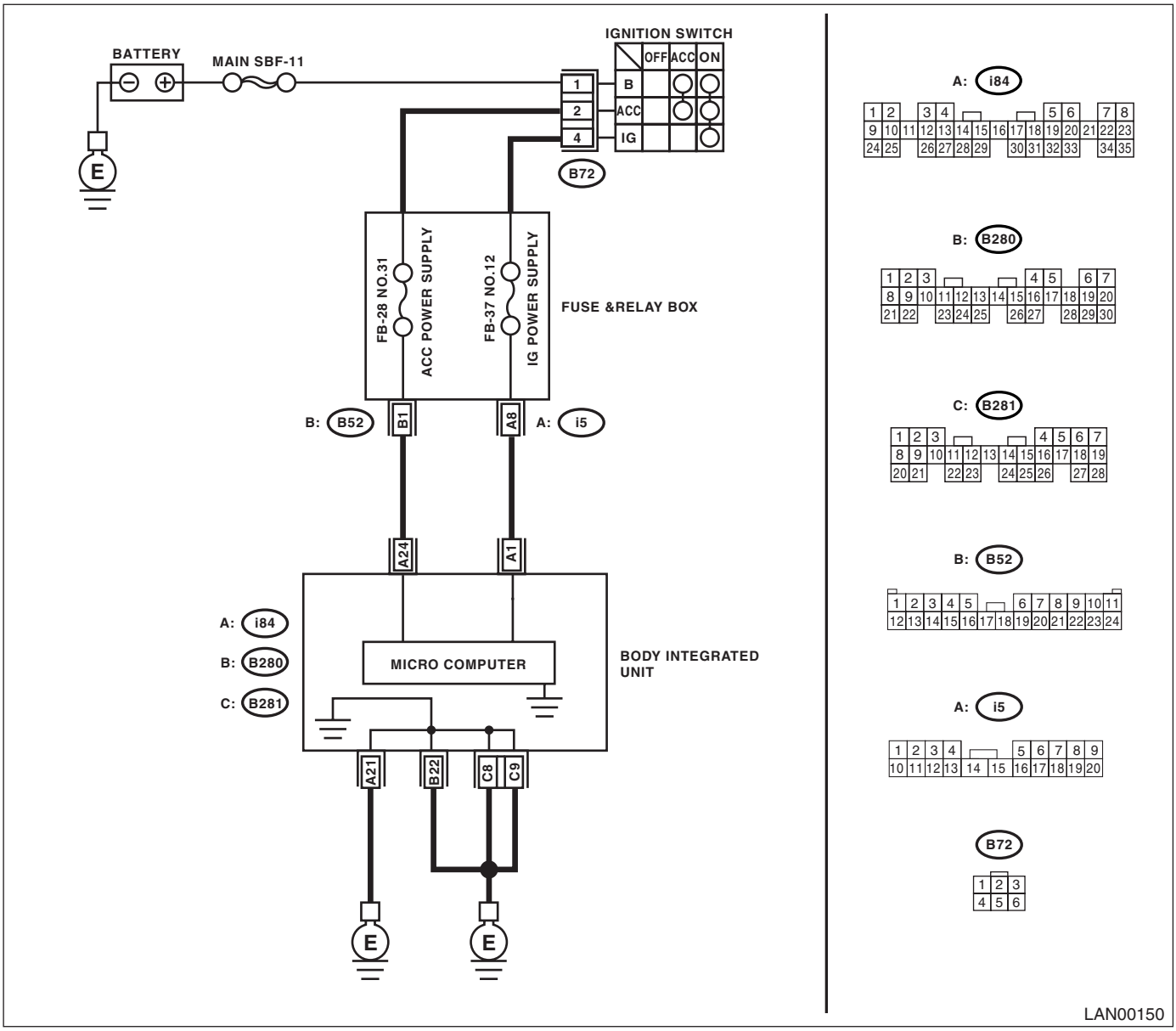
DTC DETECTING CONDITION:

IGN power supply circuit is open or shorted.

TROUBLE SYMPTOM:

Symptoms such as illuminating the malfunction indicator light or high speed CAN error display “Er HC” may occur.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 12).	Is the fuse blown out?	Replace the fuse (No. 12). If the replaced fuse has blown out easily, repair the short circuit of harness between fuse (No. 12) and body integrated unit.	Go to step **2**.

	Step	Check	Yes	No
2	**CONTINUITY CHECK OF WIRING HARNESS.** 1) Disconnect the connector (i84) from body integrated unit. 2) Turn the ignition switch to ON. 3) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(i84) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Repair the harness for open or shorted circuit between body integrated unit and fuse.
3	**CHECK POOR CONTACT OF CONNECTOR.**	Is there poor contact in body integrated unit connector?	Repair the poor contact of connector.	Go to step **4**.
4	**CHECK BODY INTEGRATED UNIT HARNESS.** 1) Connect all the connectors. 2) Perform the clear memory mode. 3) Read DTC.	Is the same DTC displayed?	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>	Temporary poor contact occurs.

G: DTC B0104 ACC POWER FAILURE

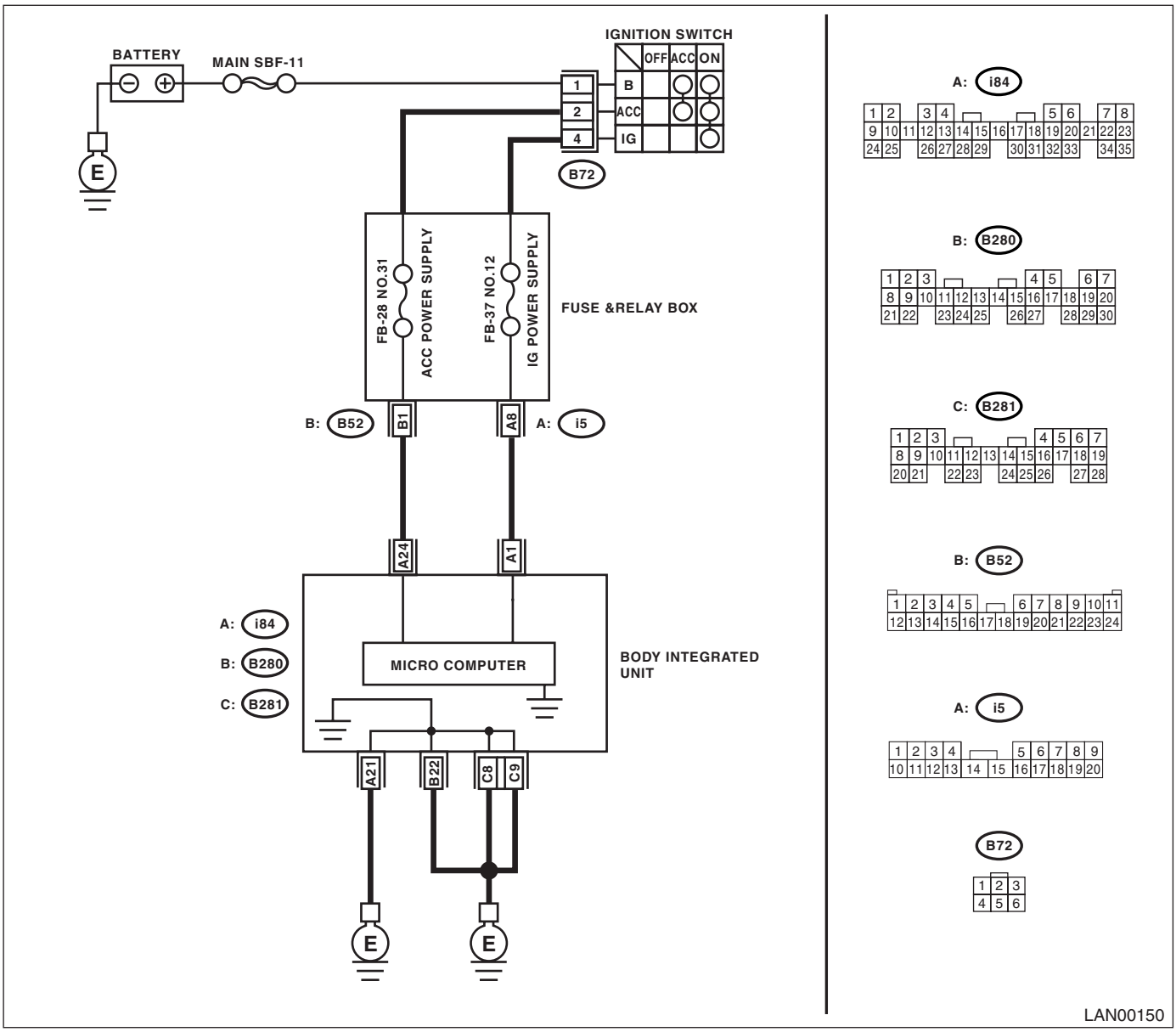
DTC DETECTING CONDITION:

ACC power supply circuit is open or shorted.

TROUBLE SYMPTOM:

Rear wiper may not operate at ACC position.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 31).	Is the fuse blown out?	Replace the fuse (No. 31). If the replaced fuse has blown out easily, repair the short circuit of harness between fuse (No. 31) and body integrated unit.	Go to step **2**.

	Step	Check	Yes	No
2	**CONTINUITY CHECK OF WIRING HARNESS.** 1) Disconnect the connector (i84) from body integrated unit. 2) Turn the ignition switch to ON. 3) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(i84) No. 24 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Repair the harness for open or shorted circuit between body integrated unit and fuse.
3	**CHECK POOR CONTACT OF CONNECTOR.**	Is there poor contact in body integrated unit connector?	Repair the poor contact of connector.	Go to step **4**.
4	**CHECK BODY INTEGRATED UNIT HARNESS.** 1) Connect all the connectors. 2) Perform the clear memory mode. 3) Read DTC.	Is DTC displayed?	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>	Temporary poor contact occurs.

H: DTC B0106 SHIFT LOCK CIRCUIT FAILURE

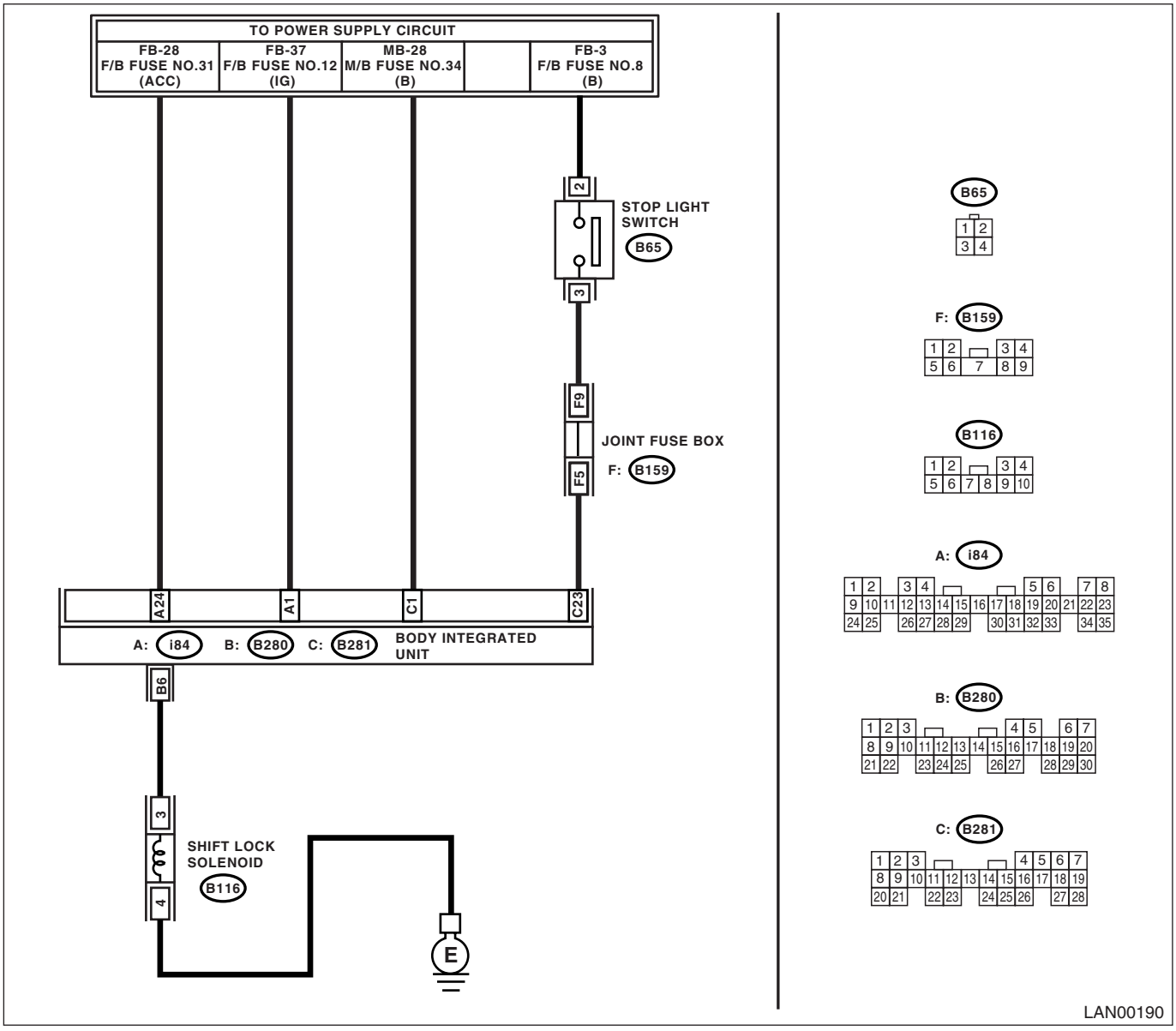
DTC DETECTING CONDITION:

Shift lock circuit is shorted to ground.

TROUBLE SYMPTOM:

Shift lock does not be released or remain locked.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 6 — Chassis ground:***	Is the resistance between 10 — 30 Ω?	Go to step **5**.	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Disconnect the shift lock solenoid connector (B116). 3) Measure the resistance between body integrated unit connector and shift lock solenoid connector. ***Connector & terminal*** ***(B280) No. 6 — (B116) No. 3:***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair or replace the open or short circuit of harness.
3	**CHECK SHIFT LOCK SOLENOID.** 1) Disconnect the shift lock solenoid connector. 2) Measure the internal resistance of shift lock solenoid. ***Connector & terminal*** ***(B116) No. 3 — No. 4:***	Is the resistance between 10 — 30 Ω?	Go to step **4**.	Replace the shift lock solenoid.
4	**CHECK GROUND CIRCUIT.** 1) Disconnect the shift lock solenoid connector. 2) Measure the resistance between shift lock solenoid connector (B116) and chassis ground. ***Connector & terminal*** ***(B116) No. 4 — Chassis ground:***	Is the resistance less than 10 Ω?	Temporary poor contact occurs. Check the connection of each terminal and repair when necessary.	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>
5	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280) and the shift lock solenoid connector (B116). 2) Measure the resistance between body integrated unit connector (B280) and chassis ground. ***Connector & terminal*** ***(B280) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>	Repair the short circuit of harness or replace harness.

I: DTC B0201 CAN-HS COUNTER ABNORMAL

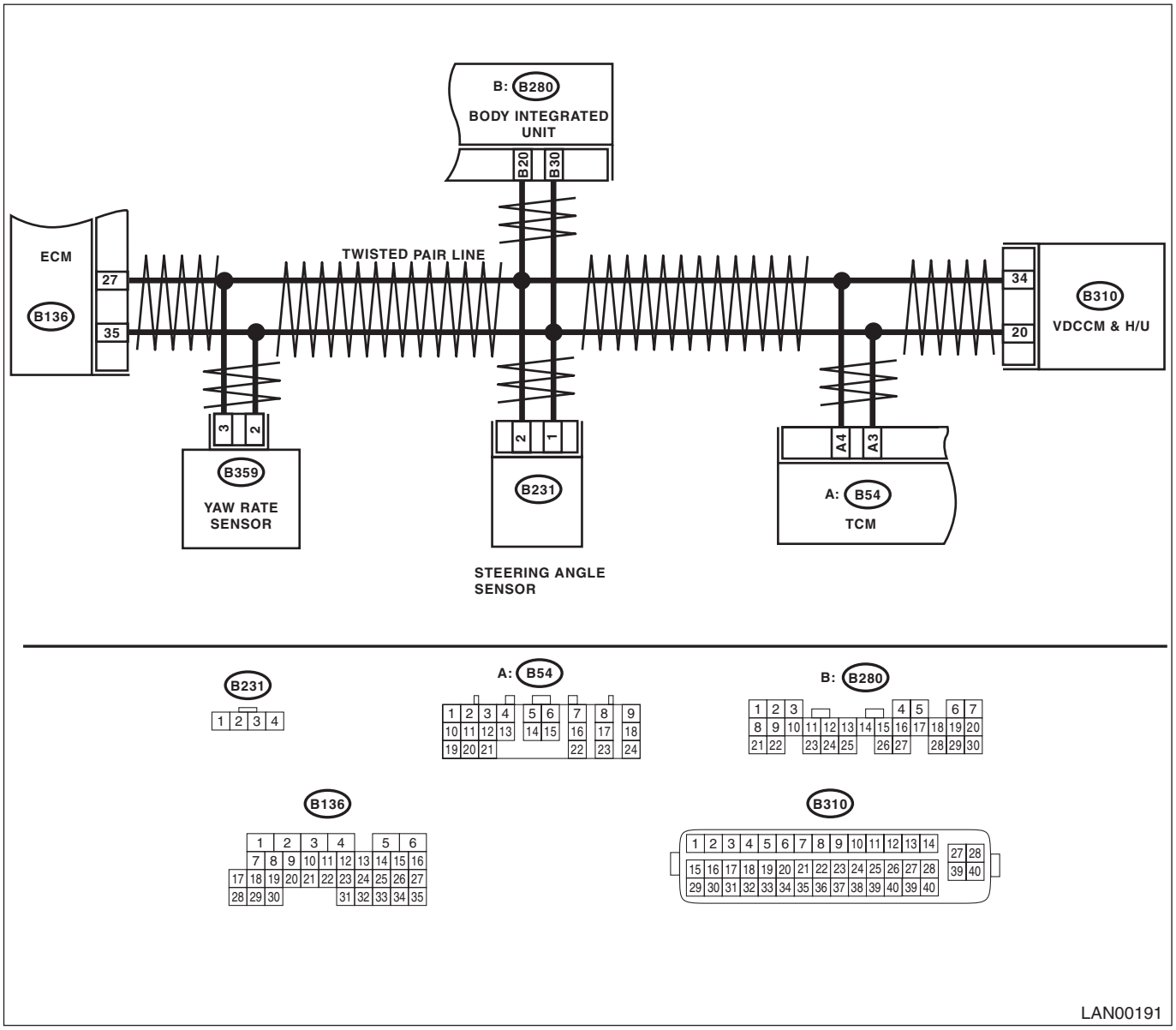
DTC DETECTING CONDITION:

High speed CAN communication of body integrated unit which monitor the error data and non-received data are faulty.

TROUBLE SYMPTOM:

- "Er HC" is displayed in odo/trip meter.
- Malfunction indicator light illuminates.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Connect the tester to vehicle side connector, and measure the resistance. ***Connector & terminal (B280) No. 20 — No. 30:***	Is the resistance between 55 — 65 Ω?	Go to step **2**.	Go to step **5**.

	Step	Check	Yes	No
2	**CHECK HARNESS.** 1) Disconnect the TCM connector (B54). 2) Connect the tester to vehicle side connector, and measure the resistance. ***Connector & terminal*** ***(B54) No. 3 — No. 4:***	Is the resistance between 55 — 65 Ω?	Go to step **3**.	Go to step **5**.
3	**CHECK HARNESS.** 1) Disconnect the yaw rate sensor connector (B359). 2) Connect the tester to vehicle side connector, and measure the resistance. ***Connector & terminal*** ***(B359) No. 2 — No. 3:***	Is the resistance between 55 — 65 Ω?	Go to step **4**.	Go to step **5**.
4	**CHECK HARNESS.** 1) Disconnect the steering angle sensor connector (B231). 2) Connect the tester to vehicle side connector, and measure the resistance. ***Connector & terminal*** ***(B231) No. 1 — No. 2:***	Is the resistance between 55 — 65 Ω?	Go to step **12**.	Go to step **5**.
5	**CHECK HARNESS.**	Is the measured resistance 115 — 125 Ω when connecting the tester to vehicle side connector?	Go to step **8**.	Go to step **6**.
6	**CHECK HARNESS.**	Is the measured resistance less than 10 Ω when connecting the tester to vehicle side connector?	Repair or replace the short circuit of measured related harness.	Go to step **7**.
7	**CHECK HARNESS.**	Is the measured resistance more than 30 MΩ when connecting the tester to vehicle side connector?	Repair or replace the open circuit of measured related harness.	Go to step **12**.
8	**CHECK HARNESS.** 1) Disconnect the VDC CM connector. 2) Connect the tester to vehicle side harness, and measure the resistance. ***Connector & terminal*** ***(B310) No. 20 — No. 34:***	Is the resistance between 115 — 125 Ω?	Go to step **9**.	Go to step **10**.
9	**CHECK CONTROL MODULE.** 1) Connect the VDC CM connector. 2) Disconnect the connector from ECM. 3) Connect the tester to vehicle side harness, and measure the resistance between terminals.	Is the resistance between 115 — 125 Ω?	Go to step **16**.	Replace the VDC CM. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
10	**CHECK HARNESS.** 1) Connect the VDC CM connector. 2) Disconnect the connector from ECM. 3) Connect the tester to vehicle side harness, and measure the resistance between terminals. ***Connector & terminal*** ***(B136) No. 27 — No. 35:***	Is the resistance between 115 — 125 Ω?	Go to step **11**.	Repair or replace the open circuit of main wiring harness.
11	**CHECK CONTROL MODULE.** Connect the tester to ECM terminal, and measure the resistance.	Is the resistance between 115 — 125 Ω?	Go to step **12**.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

	Step	Check	Yes	No
12	**CHECK HARNESS.** 1) Connect the control module connectors except body integrated unit. 2) Connect the tester to vehicle side harness. 3) Turn the ignition switch to ON, and measure the terminal voltage. ***Connector & terminal*** ***(B280) No. 20 — Chassis ground:***	Is the voltage more than 6 V?	Go to step **13**.	Go to step **14**.
13	**CHECK CONTROL MODULE.** Disconnect each control module connector one by one with the tester connected to vehicle side harness.	Is there any module which its voltage changes to less than 6 V?	Replace the module which its voltage changes.	Repair or replace the short circuit of the harness.
14	**CHECK HARNESS.** 1) Connect the control module connectors except body integrated unit connector. 2) Connect the tester between vehicle side harness and chassis ground, and measure the resistance. ***Connector & terminal*** ***(B280) No. 20 — Chassis ground:*** ***(B280) No. 30 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **15**.	Repair or replace the short circuit of the harness.
15	**CHECK CONTROL MODULE.** Disconnect each control module connector one by one with the tester connected to vehicle side harness.	Is there any module which its resistance changes to more than 10 Ω?	Replace the module which its resistance changes to more than 10 Ω.	Repair or replace the short circuit of the harness.
16	**CHECK CONTROL MODULE.** 1) Connect all the control module connectors. 2) Connect the Subaru Select Monitor and perform the clear memory. 3) Disconnect the TCM connector (B54). 4) Turn the ignition switch to ON and read the DTC of body integrated unit. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is DTC B0201 displayed?	Go to step **17**.	Replace the TCM. <Ref. to 5AT-56, REMOVAL, Transmission Control Module (TCM).>
17	**CHECK CONTROL MODULE.** 1) Connect the TCM control module connector. 2) Using the Subaru Select Monitor, perform the clear memory. 3) Disconnect the steering angle sensor connector (B231). 4) Turn the ignition switch to ON and read the DTC of body integrated unit. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is DTC B0201 displayed?	Go to step **18**.	Replace the steering angle sensor. <Ref. to VDC-19, REPLACEMENT, Steering Angle Sensor.>
18	**CHECK CONTROL MODULE.** 1) Connect the steering angle sensor connector. 2) Using the Subaru Select Monitor, perform the clear memory. 3) Disconnect the yaw rate sensor connector (B359). 4) Turn the ignition switch to ON and read the DTC of body integrated unit. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is DTC B0201 displayed?	Go to step **19**.	Replace the yaw rate sensor. <Ref. to VDC-18, REMOVAL, Yaw Rate & Lateral G Sensor.>

	Step	Check	Yes	No
19	**CHECK CONTROL MODULE.** 1) Connect all the control module connectors. 2) Check the data of “body integrated unit data received” on the current data display of ECM using Subaru Select Monitor.	Is the “Yes” displayed?	Go to step **20**.	Replace the body integrated unit. <Ref. to SL-52, REMOVAL, Body Integrated Unit.>
20	**CHECK CONTROL MODULE.** Check the data of “body integrated unit counter update” on the data display of ECM.	Is the “Yes” displayed?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Replace the body integrated unit. <Ref. to SL-52, REMOVAL, Body Integrated Unit.>

J: DTC B0202 CAN-HS BUS OFF

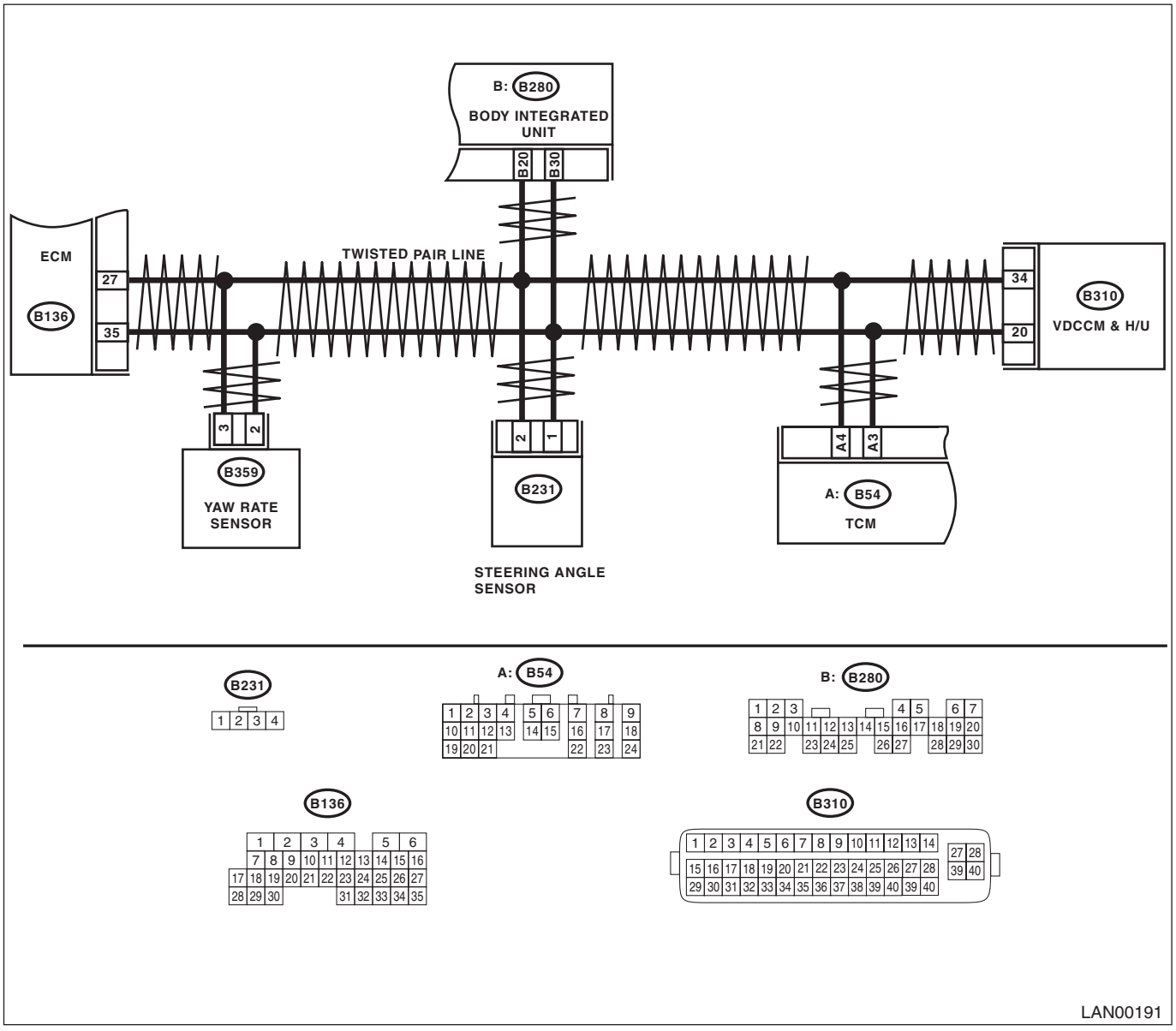
DTC DETECTING CONDITION:

- Find the unit or CAN line in which trouble occurs, and repair and replace it.
- Not received data and error data may be detected at the same time.

TROUBLE SYMPTOM:

"Er HC" is displayed in odo/trip meter.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK TCM.** 1) Disconnect the TCM connector (B54). 2) Clear the memory of the body integrated unit. <Ref. to LAN(diag)-21, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 3) Read DTC of body integrated unit.	Is DTC (B0202) displayed?	Go to step **2**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

	Step	Check	Yes	No
2	**CHECK STEERING ANGLE SENSOR.** 1) Disconnect the steering angle sensor connector (B231). 2) Perform the clear memory mode of body integrated unit. <Ref. to LAN(diag)-21, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 3) Read DTC of body integrated unit.	Is DTC (B0202) displayed?	Go to step **3**.	Replace the steering angle sensor. <Ref. to VDC-19, REPLACEMENT, Steering Angle Sensor.>
3	**CHECK YAW RATE SENSOR** 1) Disconnect the yaw rate sensor connector (B359). 2) Perform the clear memory mode of body integrated unit. 3) Read DTC of body integrated unit.	Is DTC (B0202) displayed?	Go to step **4**.	Replace the yaw rate sensor. <Ref. to VDC-18, REMOVAL, Yaw Rate & Lateral G Sensor.>
4	**CHECK THE BODY INTEGRATED UNIT.** 1) Disconnect the body integrated unit connector (B280). 2) Read the data between VDC/ABSCM and ECM. Check item: • Engine speed • Average front wheel speed (value on constant driving)	Engine speed and front wheel speed are correctly communicated. (Appears same value)	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>	Go to step **5**.
5	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance between 55 — 65 Ω?	Go to step **11**.	Go to step **6**.
6	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance between 115 — 125 Ω?	Go to step **8**.	Go to step **7**.
7	**CHECK HARNESS.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance more than 30 MΩ?	Open circuit in related line of body integrated unit. Repair the open circuit of harness or replace harness.	Go to step **8**.
8	**CHECK HARNESS.** 1) Disconnect the VDC CM (B310) connector. 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B310) No. 13 — No. 29:***	Is the resistance between 115 — 125 Ω?	Go to step **9**.	Go to step **10**.
9	**CHECK VDC CM.** 1) Disconnect the VDC CM (B310) connector. 2) Measure the resistance between VDC CM terminals. ***Connector & terminal*** ***(B310) No. 20 — No. 34:***	Is the resistance between 115 — 125 Ω?	Go to step **10**.	Open circuit in end resistance of VDC CM. Replace the VDC CM. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>

	Step	Check	Yes	No
10	**CHECK ECM.** 1) Disconnect the ECM connector (B136). 2) Measure the resistance between ECM connector terminals. ***Connector & terminal*** ***(B136) No. 27 — No. 35:***	Is the resistance between 115 — 125 Ω?	Repair or replace the open circuit of harness connector.	Open circuit in end resistance of ECM. Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
11	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 20 — Chassis ground:*** ***(B280) No. 30 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair or replace the ground short circuit of the harness.	Go to step **12**.
12	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 20 (+) — Chassis ground (–):*** ***(B280) No. 30 (+) — Chassis ground (–):***	Is the voltage more than 6 V?	Repair the short circuit of harness or replace harness.	Go to step **13**.
13	**CHECK DTC.** Read the DTC of ECM using Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-34, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC.	Go to step **14**.
14	**CHECK DTC.** Read the DTC of VDC CM using Subaru Select Monitor. <Ref. to VDC(diag)-16, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC other than “CAN communication” or “C0057” displayed?	Perform the diagnosis according to DTC.	Go to step **15**.
15	**CHECK DTC.** Read the DTC of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC.	Replace the body integrated unit. <Ref. to SL-52, REMOVAL, Body Integrated Unit.>

K: DTC B0211 CAN-HS ECM DATA ABNORMAL

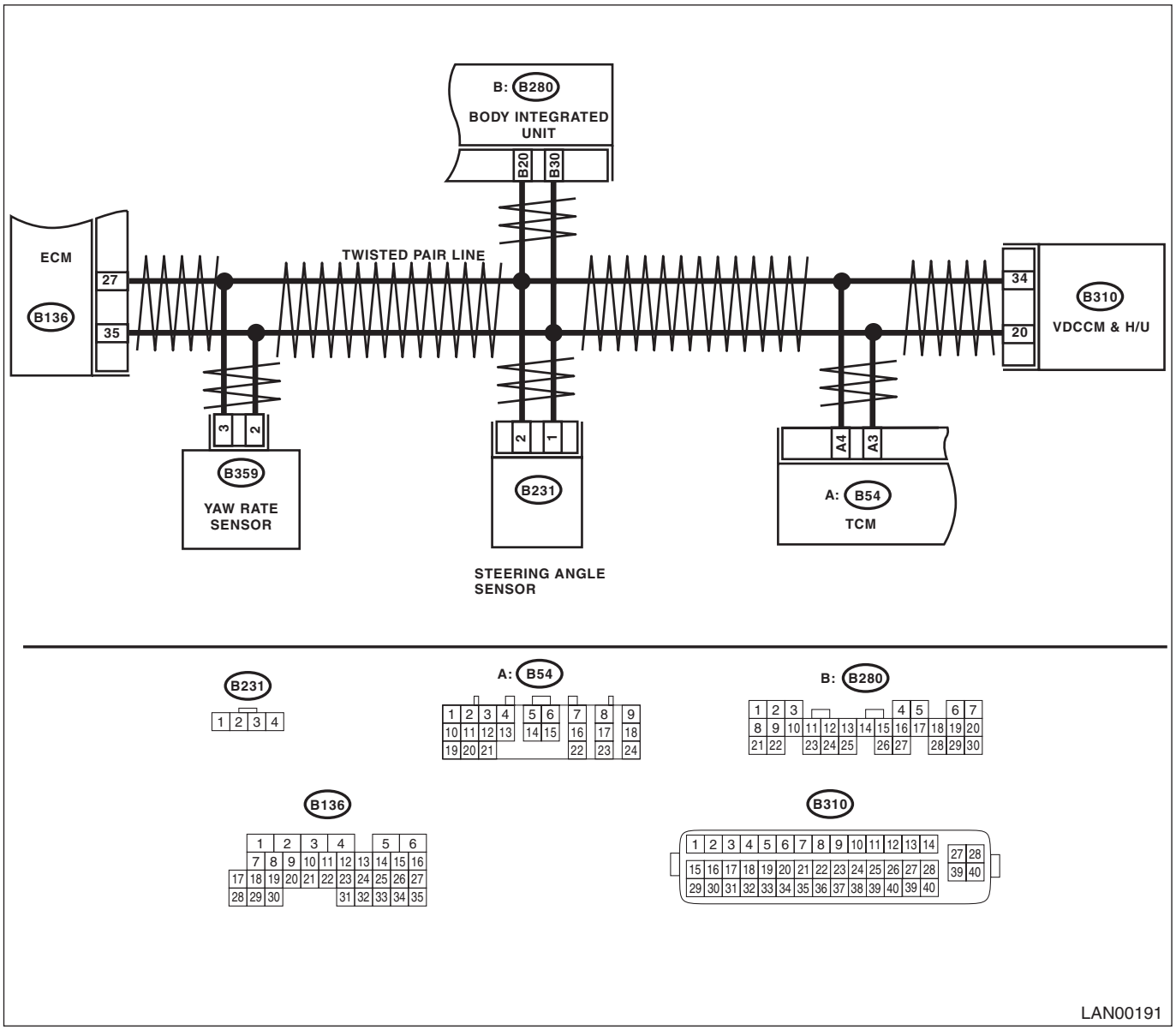
DTC DETECTING CONDITION:

Defective data from ECM.

TROUBLE SYMPTOM:

“Er HC” or “Er EG” is displayed in odo/trip meter.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ECM.** Read the DTC of ECM using Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-34, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

L: DTC B0212 CAN-HS TCM DATA ABNORMAL

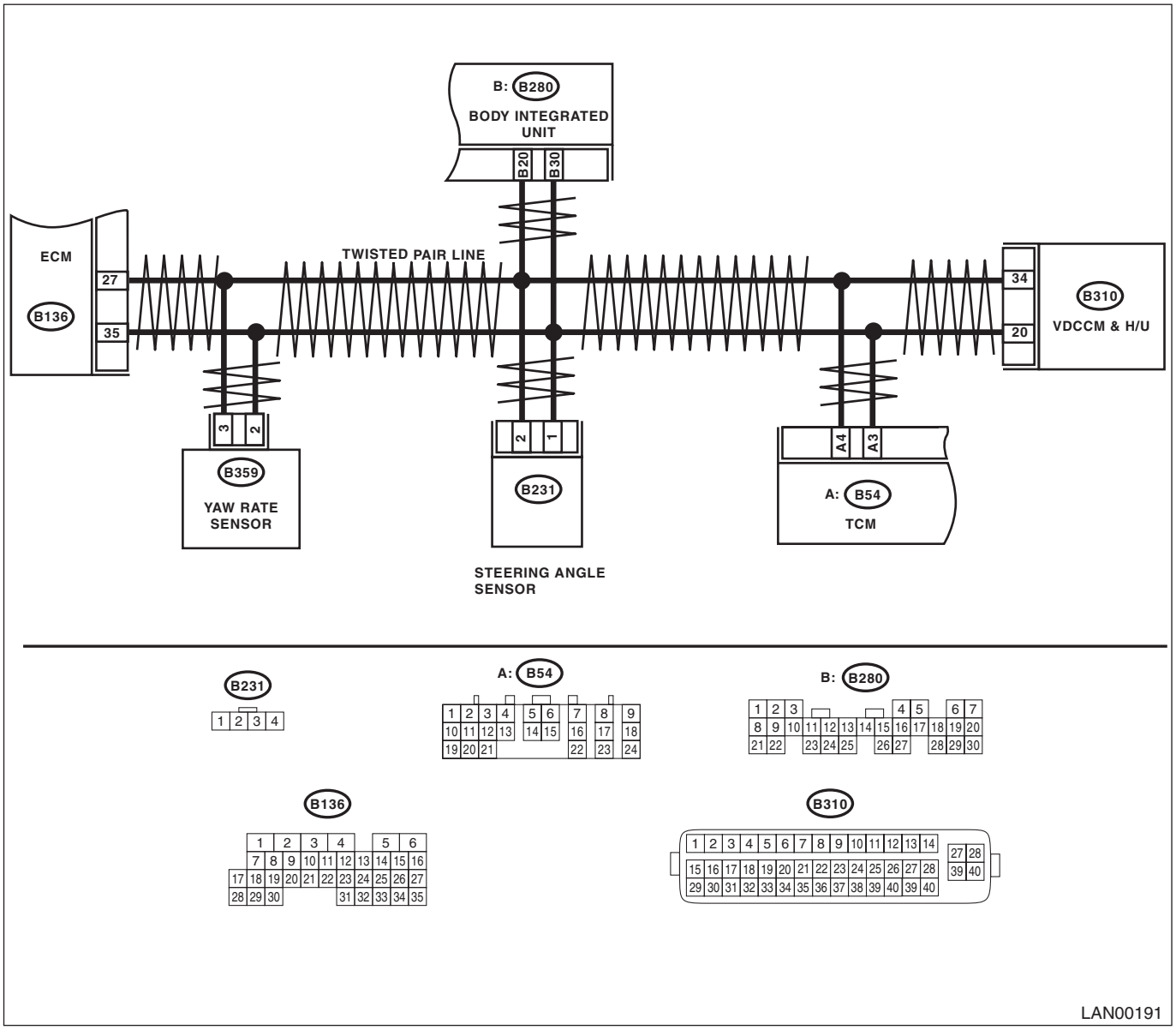
DTC DETECTING CONDITION:

TCM has error, harness between the main harness splice and TCM is open or shorted, connectors are not connected securely, or the terminal has poor caulking.

TROUBLE SYMPTOM:

- SPORT indicator light blinks.
- "Er HC" or "Er tC" is displayed in odo/trip meter.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK TCM.** Read the DTC of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is DTC other than "CAN communication" displayed?	Perform the diagnosis according to DTC.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

M: DTC B0213 CAN-HS VDC/ABS DATA ABNORMAL

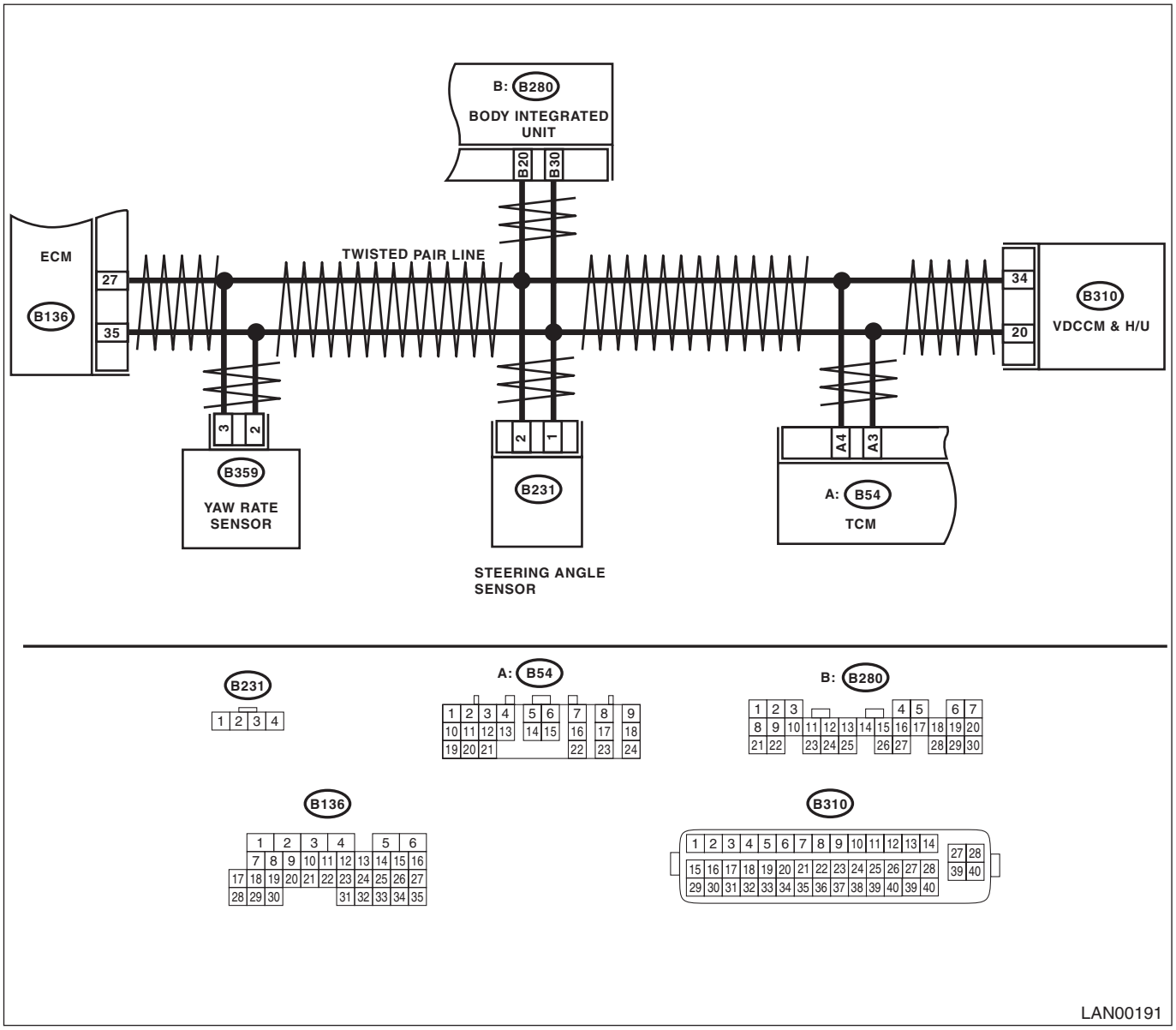
DTC DETECTING CONDITION:

VDC CM body has error, the main harness is open or shorted, the connector is not connected properly, or the terminal has poor caulking.

TROUBLE SYMPTOM:

- ABS warning light and VDC warning light come on.
- “Er HC” or “Er Ab” is displayed in odo/trip meter.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK VDC CM.** Read the DTC of VDC CM using Subaru Select Monitor.	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC.	Replace the VDC CM. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>

N: DTC B0221 CAN-HS ECM NO-RECEIVE DATA

DTC DETECTING CONDITION:

Defective ECM. (If error is in the main harness, DTC P0600 CAN communication link is input simultaneously.)

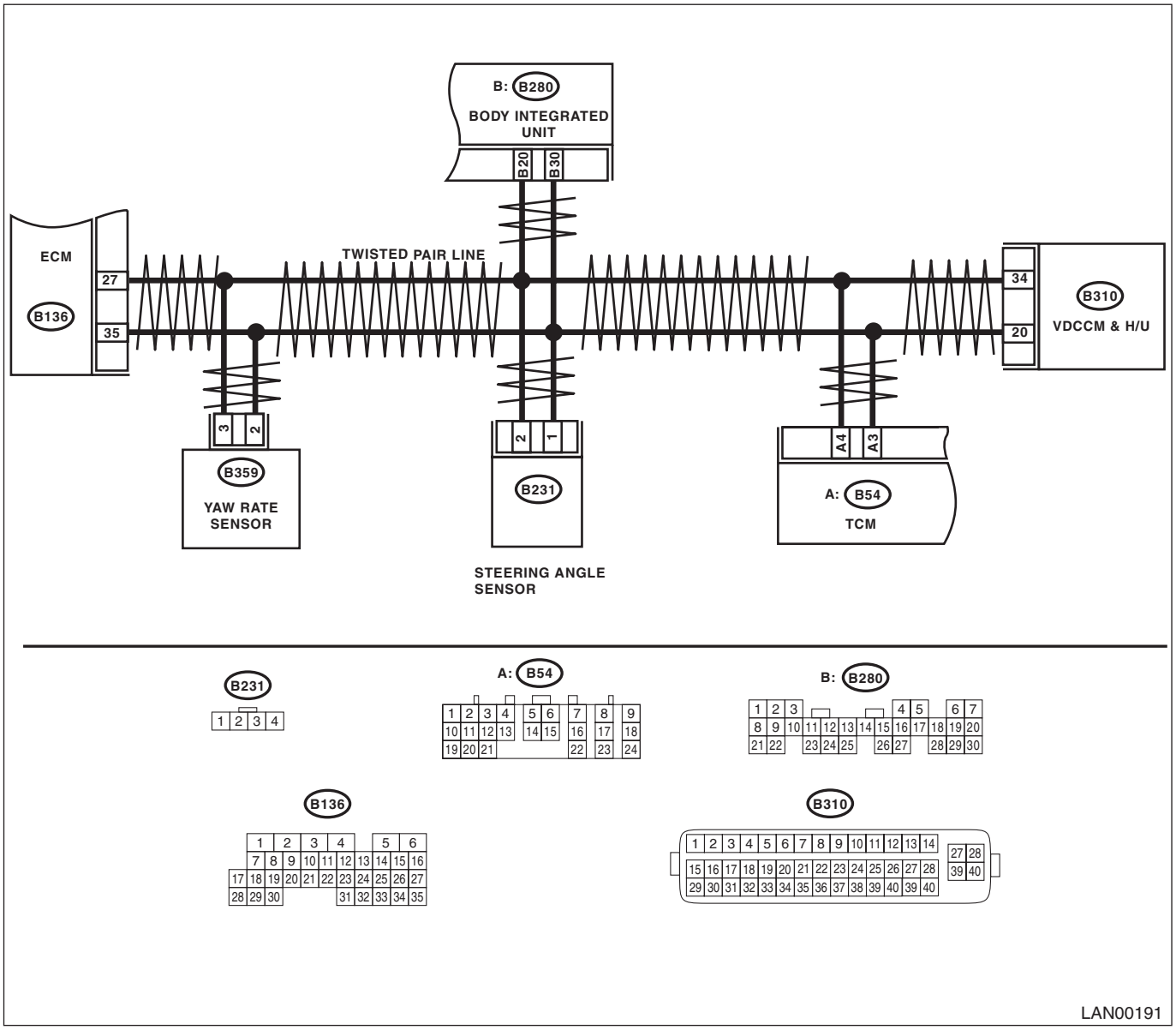
NOTE:

When more than two DTCs are displayed. <Ref. to LAN(diag)-31, DTC TABLE, List of Diagnostic Trouble Code (DTC).>

TROUBLE SYMPTOM:

- Malfunction indicator light illuminates.
- “Er HC” is displayed in odo/trip meter.
- P1718 (TCM) and C0057 (VDC CU) are output.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between harness connectors. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance 55 — 65 Ω? (Specification 60 Ω)	Read the DTC of ECM. Perform the diagnosis according to DTC. <Ref. to EN(H6DO)(diag)-26, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>	Go to step **2**.
2	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between harness connectors. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance 115 — 125Ω? (End resistance or main wiring harness is open.)	Go to step **3**.	Related line of body integrated unit is open when ∞ Ω. Repair the open circuit of harness or replace harness.
3	**CHECK HARNESS.** 1) Disconnect the ECM connector (B136). 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B136) No. 27 — No. 35:***	Is the resistance 115 — 125 Ω? (End resistance specification 120 Ω)	Go to step **4**.	Go to step **5**.
4	**CHECK ECM.** 1) Disconnect the ECM connector (B136). 2) Measure the resistance between ECM terminals. ***Connector & terminal*** ***(B136) No. 27 — No. 35:***	Is the resistance between 115 — 125 Ω?	Read the DTC of ECM. Perform the diagnosis according to DTC. <Ref. to EN(H6DO)(diag)-26, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>	End resistance is open. Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
5	**CHECK HARNESS.** 1) Disconnect the ECM connector (B137). 2) Measure the resistance between harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 27 — Chassis ground:*** ***(B136) No. 35 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the short circuit of harness or replace harness.	Go to step **6**.

	Step	Check	Yes	No
6	**CHECK HARNESS.** 1) Disconnect the body integrated unit (B280), ECM (B136), TCM (B54), VDC CU (B310) and Yaw rate sensor (B359) connectors. 2) Measure the voltage between harness connector and chassis ground while turning the ignition switch to ON. ***Connector & terminal*** ***(B280) No. 20 (+) — Chassis ground (–):*** ***(B280) No. 30 (+) — Chassis ground (–):***	Is the voltage more than 6 V?	Repair or replace the short circuit of the harness.	Read the DTC of ECM. Perform the diagnosis according to DTC. <Ref. to EN(H6DO)(diag)-26, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>

O: DTC B0222 CAN-HS TCM NO-RECEIVE DATA

DTC DETECTING CONDITION:

TCM has error, harness between the main harness splice and TCM is open or shorted, connectors are not connected securely, or the terminal has poor caulking.

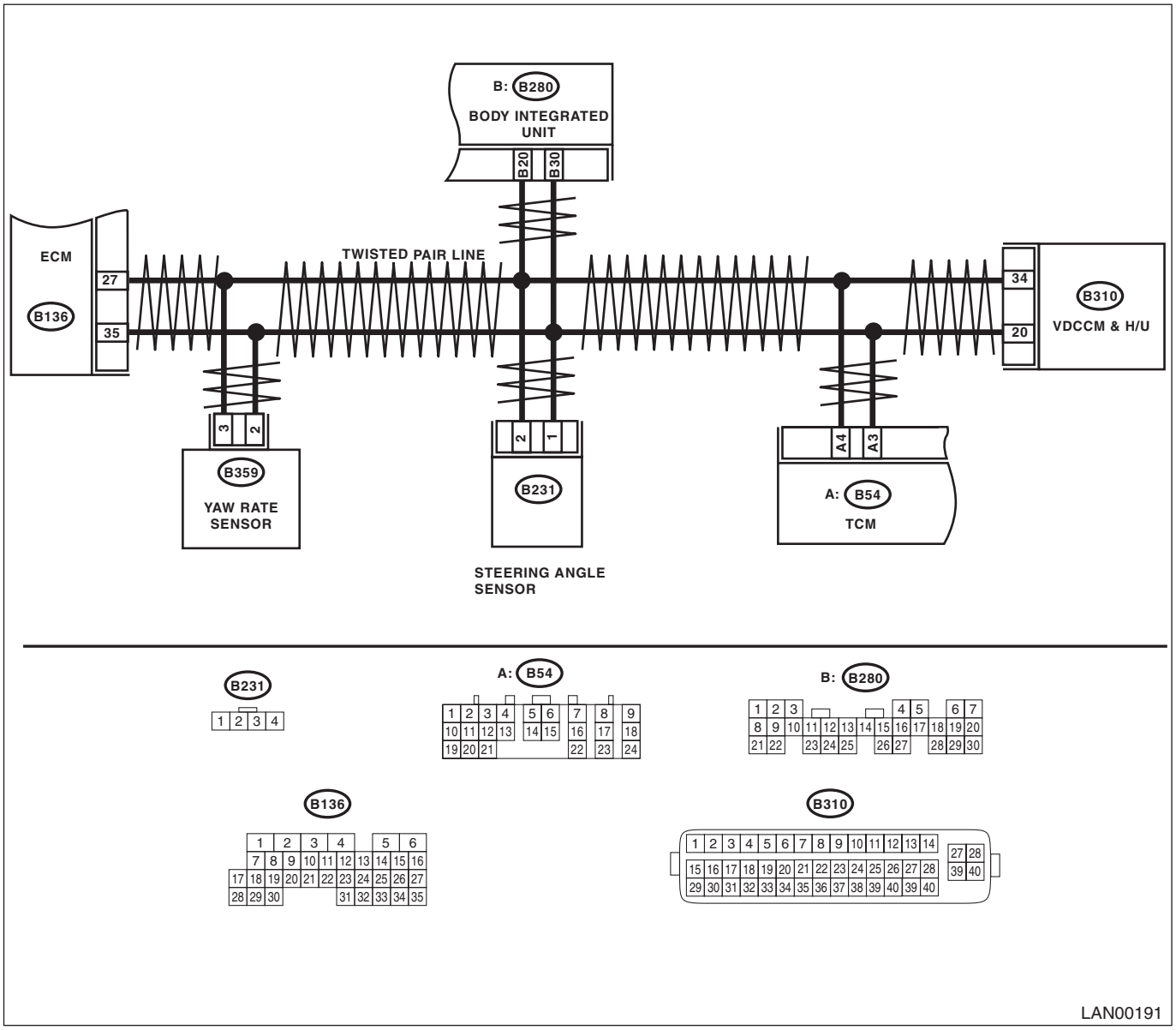
NOTE:

When more than two DTCs are displayed. <Ref. to LAN(diag)-31, DTC TABLE, List of Diagnostic Trouble Code (DTC).>

TROUBLE SYMPTOM:

- Malfunction indicator light illuminates.
- “Er HC” is displayed in odo/trip meter.
- P0600 (ECM) and C0057 (VDC CM) are output.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the TCM connector (B54). 2) Measure the resistance between harness connector terminals. ***Connector & terminal (B54) No. 3 — No. 4:***	Is the resistance ∞ Ω?	Open circuit in related lines of TCM. Repair the open circuit of harness or replace harness.	Go to step **2**.
2	**CHECK TCM.** Read the DTC of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

P: DTC B0223 CAN-HS VDC/ABS NO-RECEIVE DATA

DTC DETECTING CONDITION:

Defective VDC CM. (If error is in the main harness, DTC P0600 High-speed CAN circuit is input at the same time.)

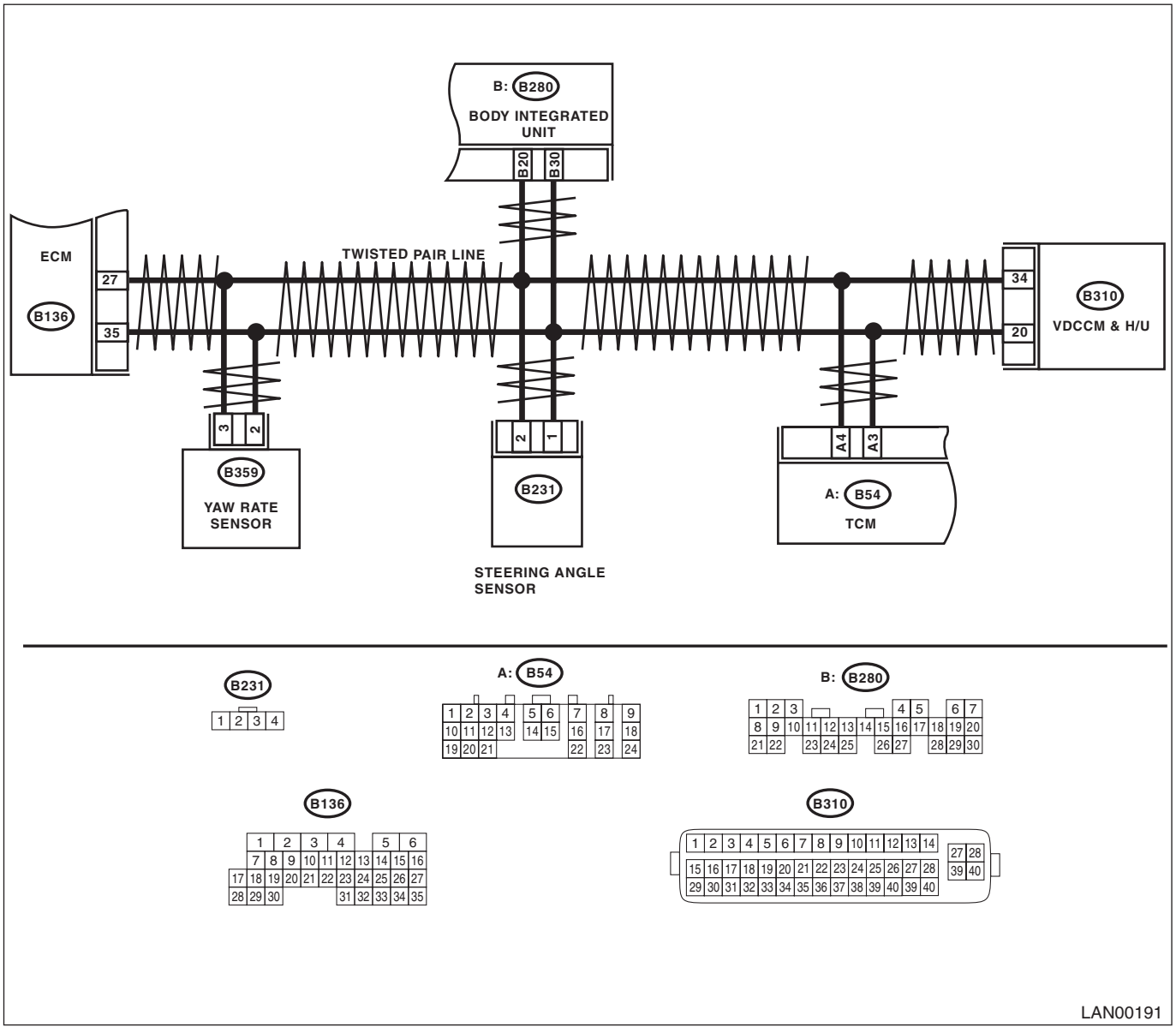
NOTE:

When more than two DTCs are displayed. <Ref. to LAN(diag)-31, DTC TABLE, List of Diagnostic Trouble Code (DTC).>

TROUBLE SYMPTOM:

- ABS warning light and VDC warning light come on.
- “Er HC” is displayed in odo/trip meter.
- P0600 (ECM) and C1718 (TCM) are output.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance between 55 — 65 Ω?	Read the DTC of VDC CM, and perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK HARNESS.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance between 115 — 125 Ω?	Go to step **5**.	Go to step **3**.
3	**CHECK HARNESS.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 20 — Chassis ground:*** ***(B280) No. 30 — Chassis ground:***	Is the resistance ∞ Ω?	Open circuit in related line of body integrated unit. Repair the open circuit of harness or replace harness.	Go to step **4**.
4	**CHECK HARNESS.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the voltage between harness connector terminal and chassis ground. (Ignition switch ON) ***Connector & terminal*** ***(B280) No. 20 (+) — Chassis ground (–):*** ***(B280) No. 30 (+) — Chassis ground (–):***	Is the voltage more than 6 V?	Repair the short circuit of harness or replace harness.	Go to step **5**.
5	**CHECK END RESISTANCE.** 1) Disconnect the VDC CM harness connector. 2) Measure the resistance between VDC CM connector terminals. ***Connector & terminal*** ***(B310) No. 20 — No. 34:***	Is the resistance between 115 — 125 Ω?	Go to step **6**.	End resistance is open. Replace the VDC CM. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
6	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280) and VDC CM connector (B310). 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B310) No. 13 — (B280) No. 20:*** ***(B310) No. 29 — (B280) No. 30:***	Is the resistance less than 10 Ω?	Go to step **7**.	Main wiring harness is open. Repair the open circuit of harness or replace harness.
7	**CHECK VDC CM.** 1) Connect all the connectors. 2) Read the DTC of VDC CM using Subaru Select Monitor.	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC concerning VDC CM.	Replace the VDC CM. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>

Q: DTC B0300 CAN-LS MALFUNCTION

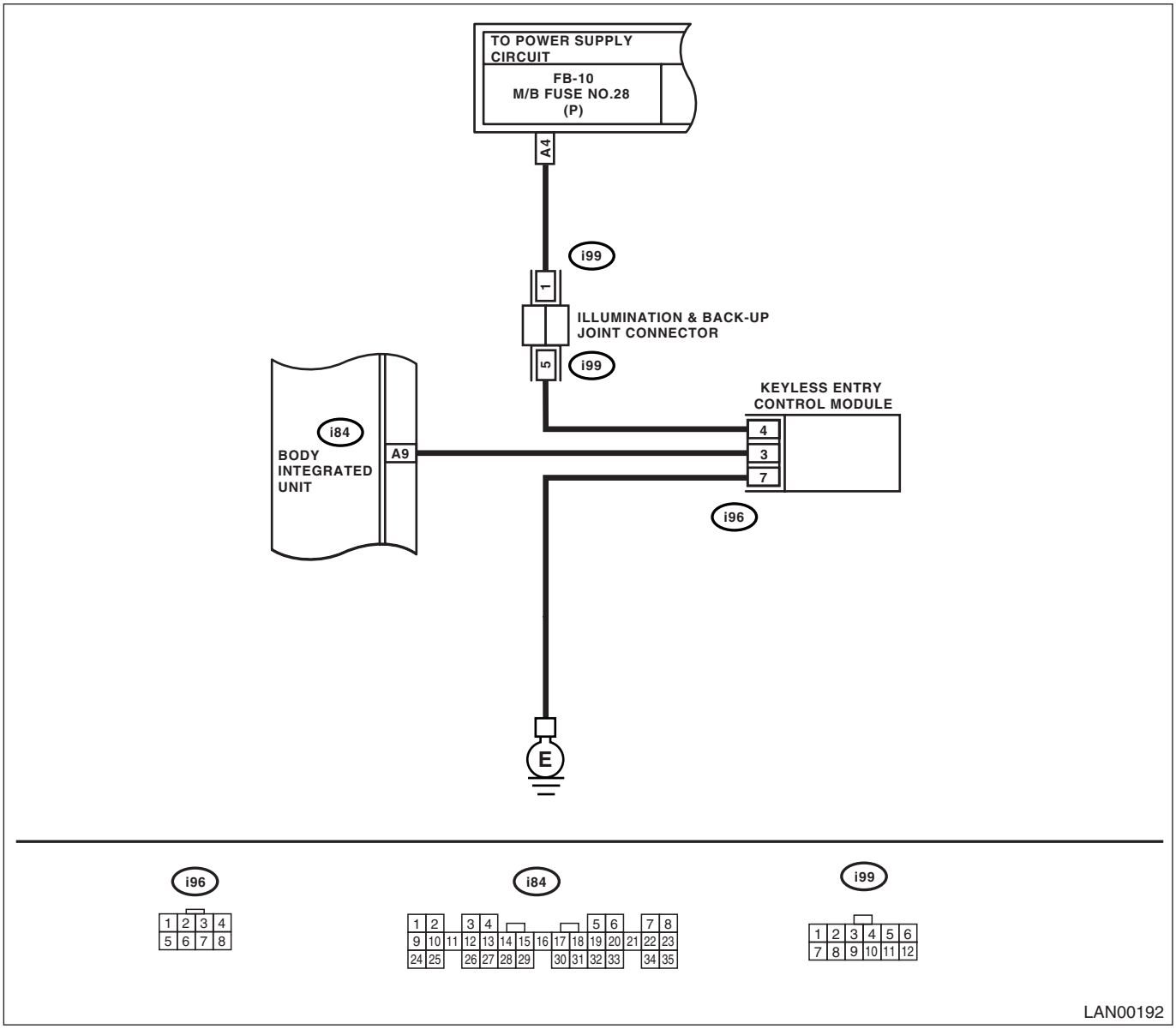
DTC DETECTING CONDITION:

Either end of low-speed CAN communication line is open or shorted, the connector is not connected properly, or the terminal has poor caulking.

TROUBLE SYMPTOM:

"Er LC" is displayed in odo/trip meter, but communicating function is OK.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the CAN junction connector (i128) and body integrated unit connector (i84). 2) Measure the resistance between connector terminals. ***Connector & terminal*** ***(i84) No. 26 — (i128) No. 7 to 12:*** ***(i84) No. 27 — (i128) No. 1 to 6:*** NOTE: The i128 junction connector is freely arranged.	Is the resistance less than 10 Ω?	Go to step **2**.	Repair the short circuit of harness or replace harness.

	Step	Check	Yes	No
2	**CHECK HARNESS.** 1) Disconnect the combination meter connector. 2) Measure the resistance between junction connector and combination meter connector. ***Connector & terminal*** ***(i10) No. A29 — (i77) No. 1 to 6:*** ***(i10) No. A30 — (i77) No. 7 to 12:***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair the open circuit of harness or replace harness.
3	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280) and Auto A/C control module connector (B283). 2) Measure the resistance between body integrated unit connector and auto A/C control module connector. ***Connector & terminal*** ***(B283) No. 1 — (B280) No. 26:*** ***(B283) No. 14 — (B280) No. 25:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair the open circuit of harness or replace harness.
4	**CHECK HARNESS.** 1) Connect the junction connector. 2) Measure the resistance between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 25 — Chassis ground:*** ***(B280) No. 26 — Chassis ground:*** ***(i84) No. 26 — Chassis ground:*** ***(i84) No. 27 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the short circuit of harness or replace harness.	Go to step **5**.
5	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 25 (+) — Chassis ground (–):*** ***(B280) No. 26 (+) — Chassis ground (–):*** ***(i84) No. 26 (+) — Chassis ground (–):*** ***(i84) No. 27 (+) — Chassis ground (–):***	Is the voltage more than 6 V?	Repair the short circuit of harness or replace harness.	Go to step **6**.
6	**CHECK AUTO A/C.** Perform the auto A/C self-diagnosis. <Ref. to AC(diag)-13, A/C CONTROL SYSTEM SELF-DIAGNOSIS, OPERATION, Diagnostic Chart for Self-diagnosis.>	Is the self-diagnosis OK?	Go to step **7**.	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>
7	**CHECK COMBINATION METER.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Check the display of combination meter, odo/trip.	Is “Er SS” and “Er SP” displayed?	Replace the body integrated unit. <Ref. to SL-52, REMOVAL, Body Integrated Unit.>	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>

R: DTC B0301 CAN-LS COUNTER ABNORMAL

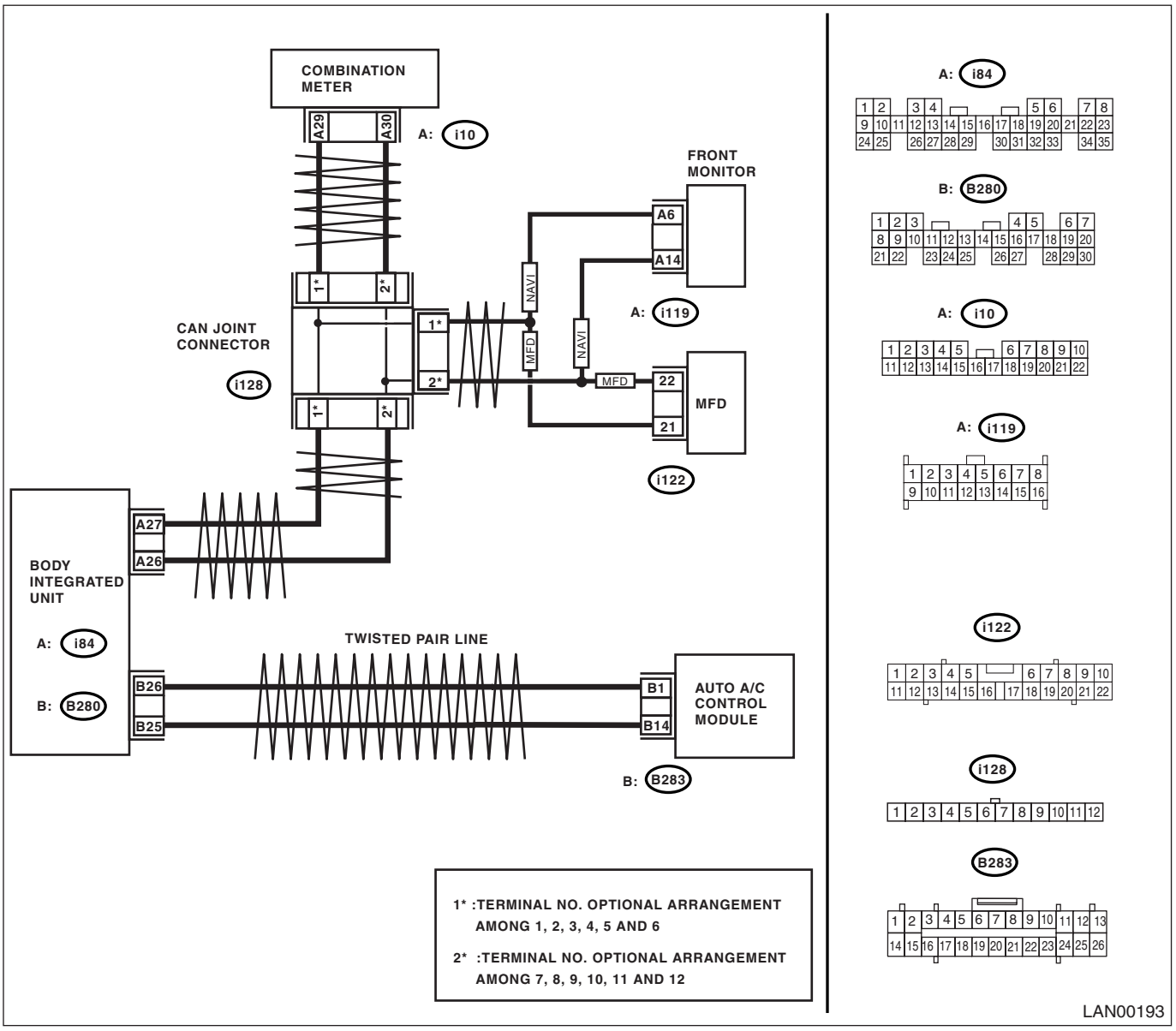
DTC DETECTING CONDITION:

Find the unit in which trouble occurs and open or short CAN line, and repair and replace them.
(Free running counter error may be detected at the same time from the unit in which malfunction occurs.)

TROUBLE SYMPTOM:

"Er LC" is displayed in odo/trip meter.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK AUTO A/C CONTROL MODULE.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Display the number of blower fan levels in the analog data. 3) Read the data display when the number of blower fan levels is changed on air conditioner control part.	Does the data display change?	Go to step **2**.	Go to step **3**.

	Step	Check	Yes	No
2	**CHECK COMBINATION METER.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Display the door switch in analog data. 3) Read the display of data and combination meter when each door is opened/closed.	Do the body integrated unit data indicator and combination meter indicator change according to operation?	Go to step **3**.	Go to step **4**.
3	**CHECK AUTO A/C CONTROL MODULE HARNESS.** 1) Disconnect the auto A/C control module connector. 2) Disconnect the body integrated unit connector. 3) Measure the resistance of harness between body integrated unit and auto A/C control module. ***Connector & terminal*** ***(B280) No. 26 — (D283) No. 1:*** ***(B280) No. 25 — (D283) No. 14:***	Is the resistance less than 10 Ω?	Go to step **5**.	Repair the open circuit of harness or replace harness.
4	**CHECK COMBINATION METER HARNESS.** 1) Disconnect the combination meter connector. 2) Disconnect the body integrated unit connector. 3) Measure the resistance between body integrated unit and combination meter connector. ***Connector & terminal*** ***(i84) No. 26 — (i10) No. 30:*** ***(i84) No. 27 — (i10) No. 29:***	Is the resistance less than 10 Ω?	Go to step **6**.	Repair the open circuit of harness or replace harness.
5	**CHECK AUTO A/C CONTROL MODULE.** Perform the auto A/C control module self-diagnosis. <Ref. to AC(diag)-13, A/C CONTROL SYSTEM SELF-DIAGNOSIS, OPERATION, Diagnostic Chart for Self-diagnosis.>	Is the self-diagnosis OK?	Go to step **6**.	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>
6	**CHECK COMBINATION METER.** Perform the self-diagnosis for combination meter system. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is the self-diagnosis OK?	Go to step **7**.	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>
7	**CHECK THE BODY INTEGRATED UNIT.** Read the data of “body integrated unit data received” on ECM data display using Subaru Select Monitor.	Is “Yes” displayed?	Go to step **8**.	Replace the body integrated unit. <Ref. to SL-52, REMOVAL, Body Integrated Unit.>
8	**CHECK THE BODY INTEGRATED UNIT.** Read the data of “body integrated unit counter update” on ECM data display using Subaru Select Monitor.	Is “Yes” displayed?	Temporary poor contact occurs. Check the connection of connector.	Replace the body integrated unit. <Ref. to SL-52, REMOVAL, Body Integrated Unit.>

S: DTC B0302 CAN-LS BUS OFF

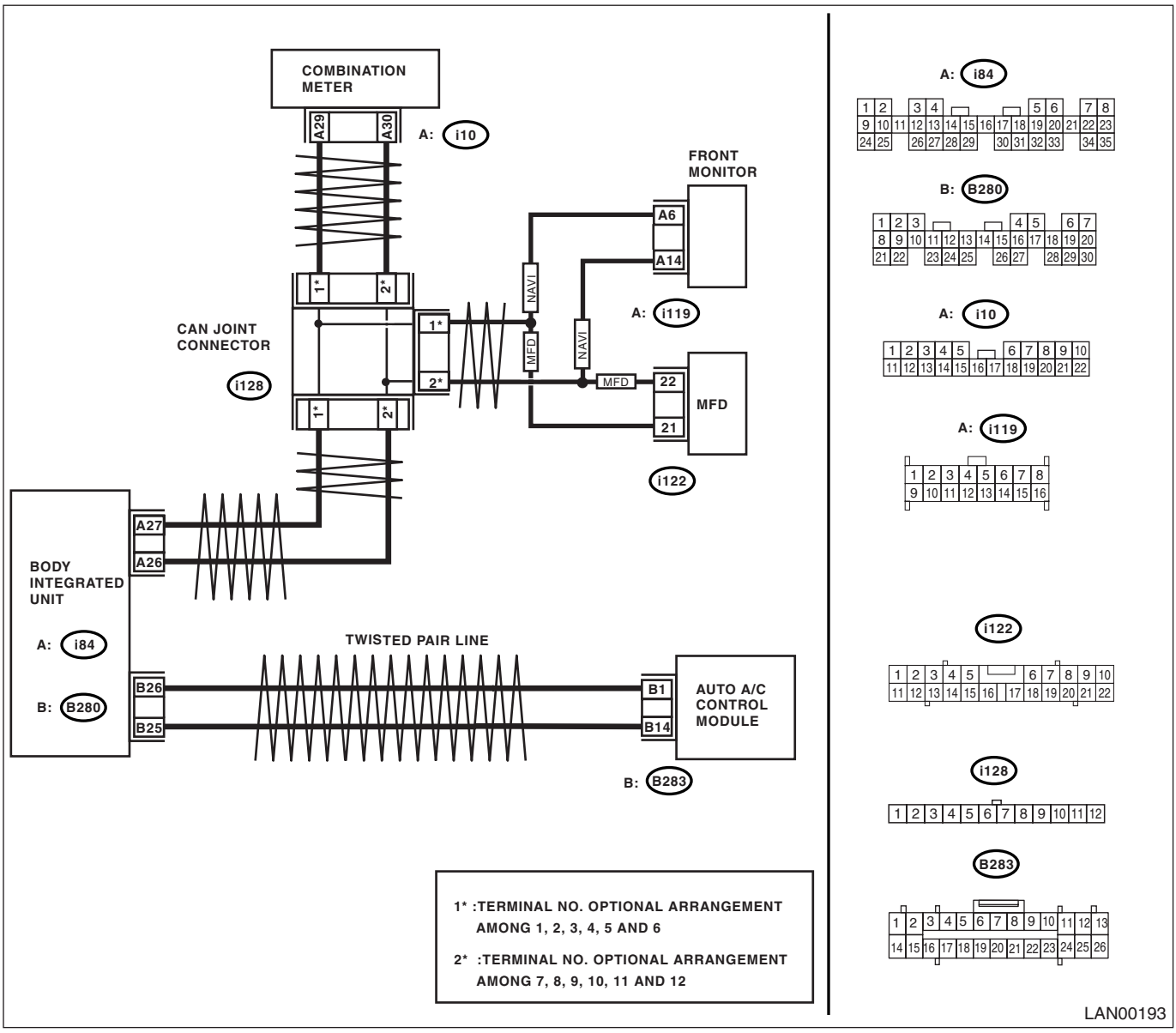
DTC DETECTING CONDITION:

Because of a lot of error data occurred, some units have been disconnected not to affect other units. Communication error from the unit in which error is occurred is input at the same time.

TROUBLE SYMPTOM:

“Er LC” is displayed in odo/trip meter.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK AUTO A/C CONTROL MODULE.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Display the number of blower fan levels in the analog data. 3) Read the data display when the number of blower fan levels is changed on air conditioner control part.	Does the data display change?	Go to step **2**.	Go to step **3**.

	Step	Check	Yes	No
2	**CHECK COMBINATION METER.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Display the door switch in analog data. 3) Read the display of data and combination meter when each door is opened/closed.	Do the body integrated unit data indicator and combination meter indicator change according to operation?	Go to step **3**.	Go to step **4**.
3	**CHECK AUTO A/C CONTROL MODULE HARNESS.** 1) Disconnect the auto A/C control module connector. 2) Disconnect the body integrated unit connector. 3) Measure the resistance of harness between body integrated unit and auto A/C control module. ***Connector & terminal*** ***(B280) No. 26 — (D283) No. 1:*** ***(B280) No. 25 — (D283) No. 14:***	Is the resistance less than 10 Ω?	Go to step **5**.	Repair the open circuit of harness or replace harness.
4	**CHECK COMBINATION METER HARNESS.** 1) Disconnect the combination meter connector. 2) Disconnect the body integrated unit connector. 3) Measure the resistance between body integrated unit and combination meter connector. ***Connector & terminal*** ***(i84) No. 26 — (i10) No. 29:*** ***(i84) No. 27 — (i10) No. 30:***	Is the resistance less than 10 Ω?	Go to step **6**.	Repair the open circuit of harness or replace harness.
5	**CHECK AUTO A/C CONTROL MODULE.** Perform the auto A/C control module self-diagnosis. <Ref. to AC(diag)-13, A/C CONTROL SYSTEM SELF-DIAGNOSIS, OPERATION, Diagnostic Chart for Self-diagnosis.>	Is the self-diagnosis OK?	Go to step **6**.	Replace the auto A/C control module. <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).>
6	**CHECK COMBINATION METER.** Perform the self-diagnosis for combination meter system. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is the self-diagnosis OK?	Go to step **7**.	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>
7	**CHECK THE BODY INTEGRATED UNIT.** Read the data of “body integrated unit data received” on ECM data display using Subaru Select Monitor.	Is “Yes” displayed?	Go to step **8**.	Replace the body integrated unit. <Ref. to SL-52, REMOVAL, Body Integrated Unit.>
8	**CHECK THE BODY INTEGRATED UNIT.** Read the data of “body integrated unit counter update” on ECM data display using Subaru Select Monitor.	Is “Yes” displayed?	Connect all the connectors, and make sure same DTC is not displayed.	Replace the body integrated unit. <Ref. to SL-52, REMOVAL, Body Integrated Unit.>

T: DTC B0311 CAN-LS METER UNIT DATA ABNORMAL

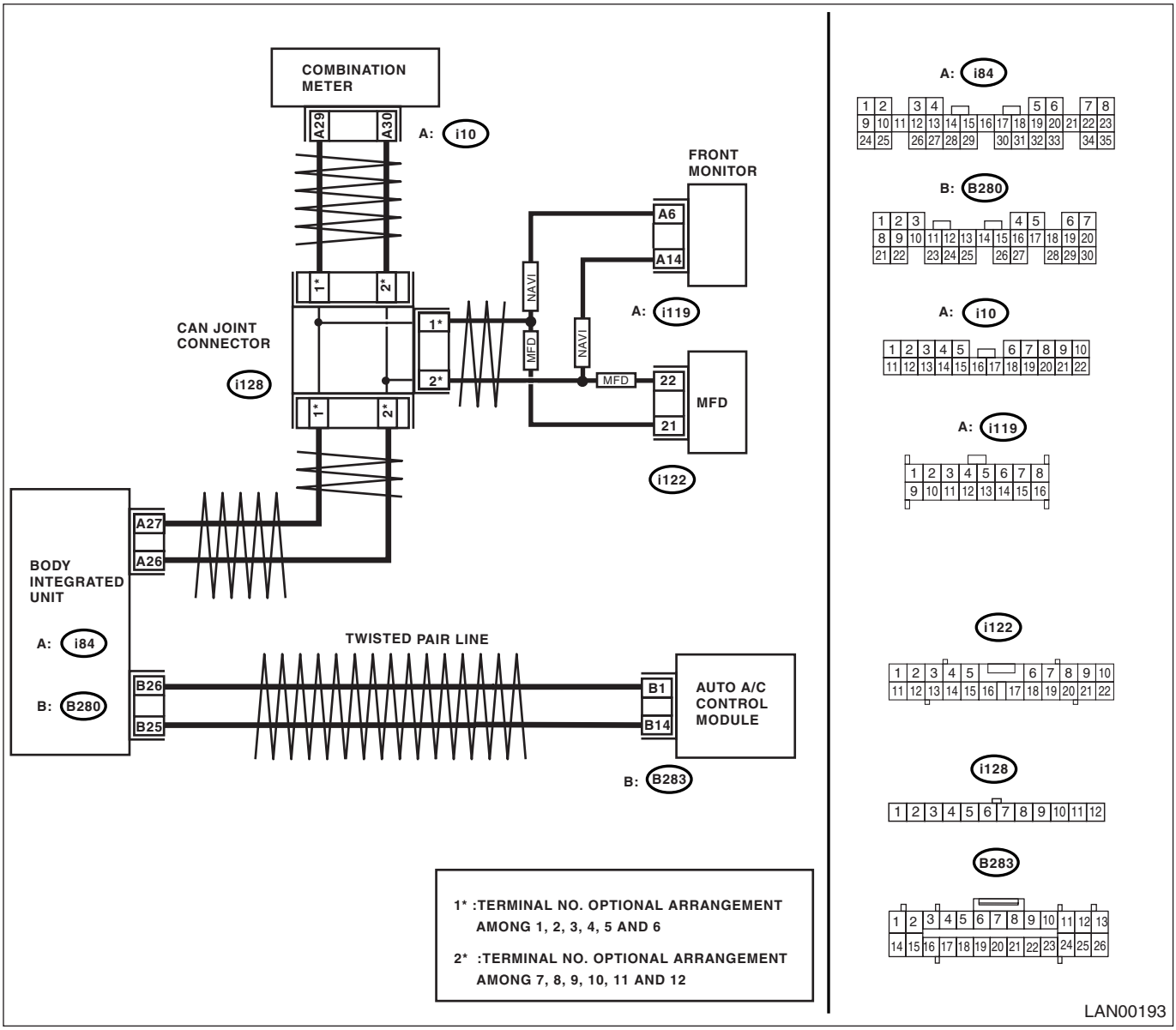
DTC DETECTING CONDITION:

Combination meter has error, the harness between main harness splice and combination meter is open or shorted, the connector is not connected properly, or the terminal has poor caulking.

TROUBLE SYMPTOM:

"Er Lc" is displayed in odo/trip meter.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK COMBINATION METER.** Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is the self-diagnosis OK?	Read the DTC again, and then perform the diagnosis according to DTC displayed on the top.	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>

U: DTC B0313 CAN-LS MONITOR DATA ABNORMAL

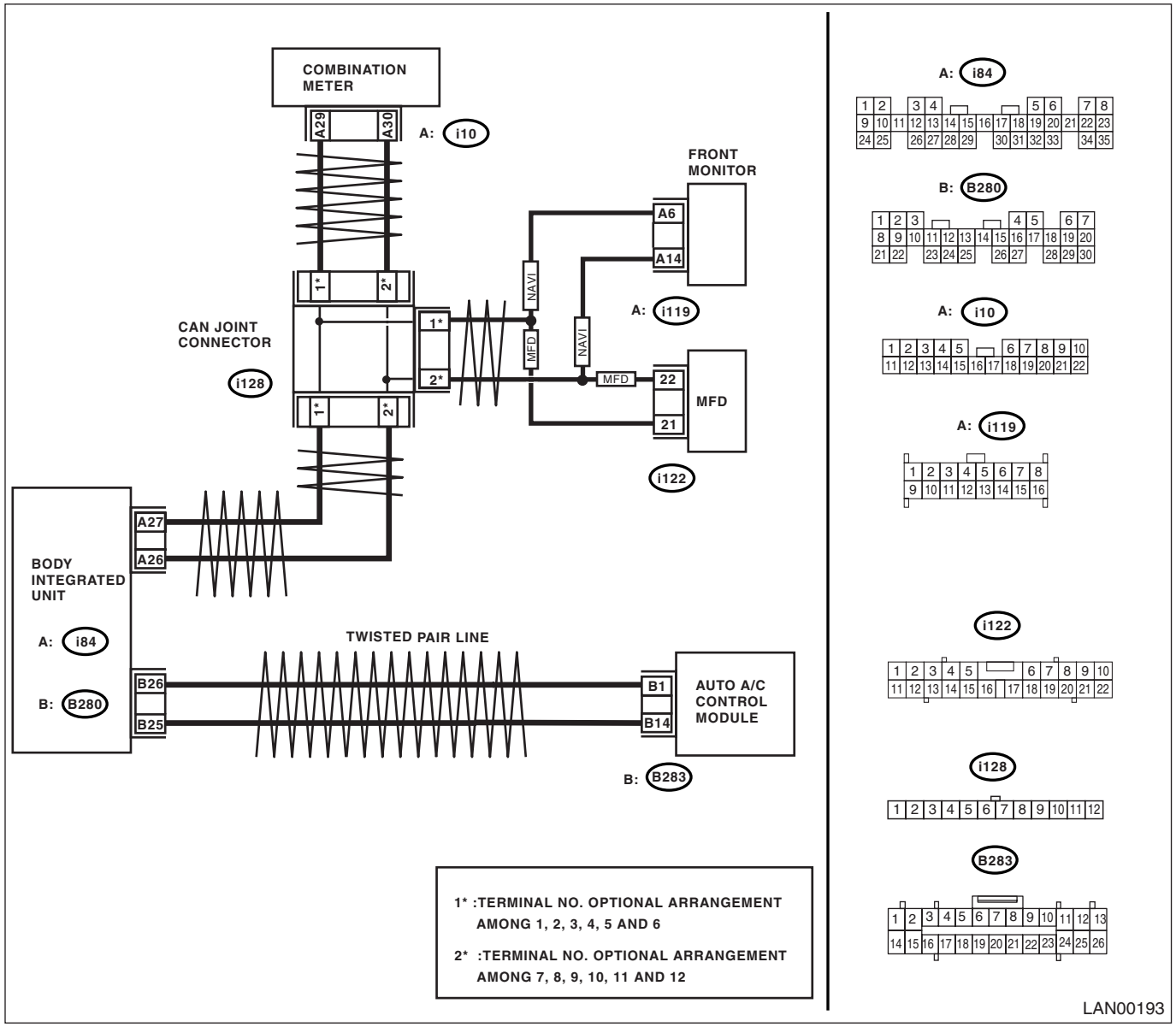
DTC DETECTING CONDITION:

Center display unit error, or harness between the main harness splice and center display unit is open or shorted, the connector is not connected securely and the terminal has poor caulking.

TROUBLE SYMPTOM:

“Er LC” is displayed in odo/trip meter.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK SUBARU SELECT MONITOR.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Display center monitor display fail.	Is OK displayed?	Go to step **2**.	Refer to MFD or navigation display. <Ref. to ET-22, REMOVAL, Navigation Display.> <Ref. to ET-26, REMOVAL, Multi Function Display (MFD).>
2	**CHECK NAVIGATION.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Display NAVI fail.	Is OK displayed?	Refer to MFD or navigation display. <Ref. to ET-22, REMOVAL, Navigation Display.> <Ref. to ET-26, REMOVAL, Multi Function Display (MFD).>	Refer to navigation body. <Ref. to ET-23, REMOVAL, Navigation Body.>

V: DTC B0321 CAN-LS METER NO-RECEIVE DATA

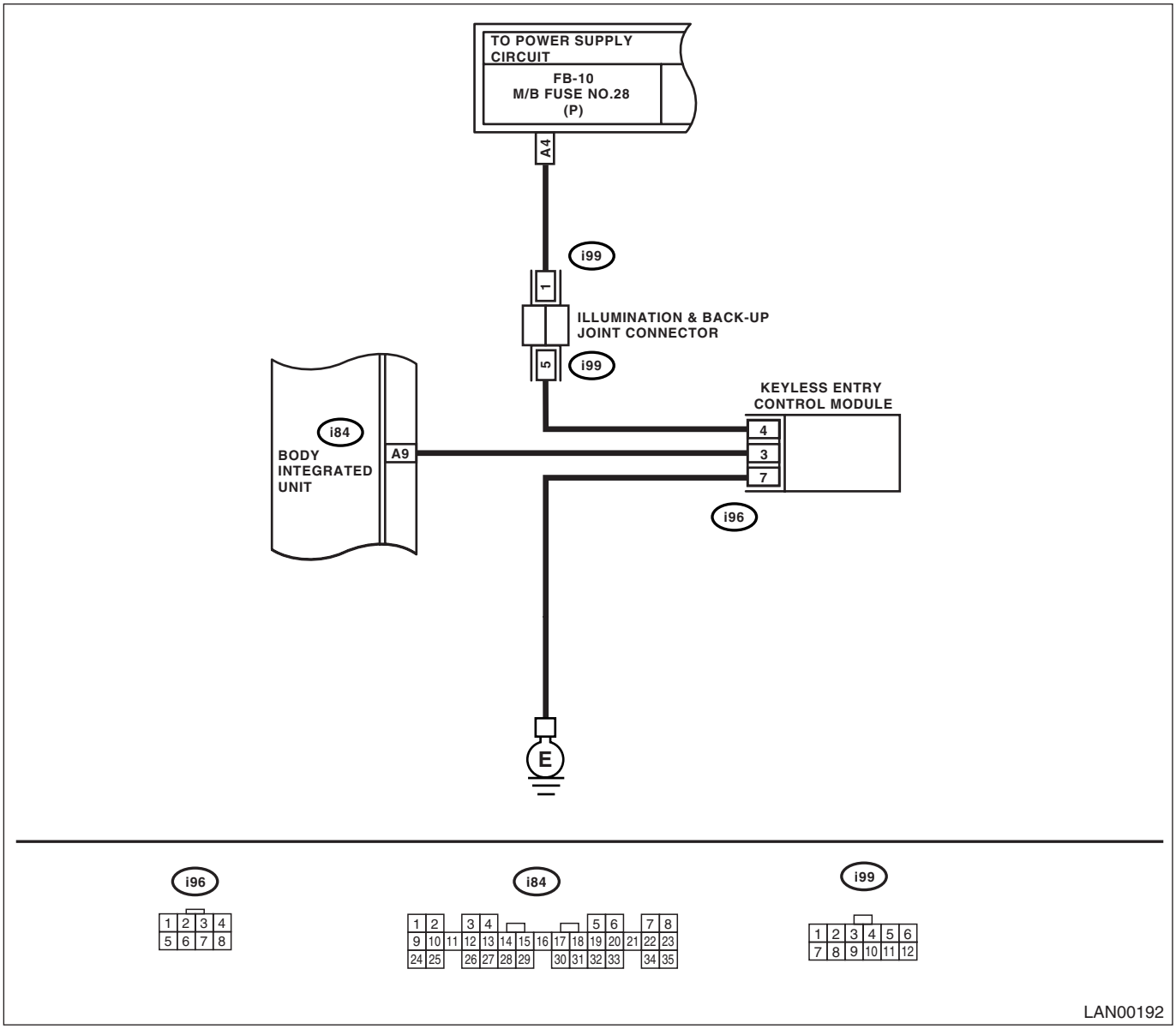
DTC DETECTING CONDITION:

Combination meter unit error, or harness between the main harness splice and combination meter unit is open or shorted, the connector is not connected properly and the terminal has poor caulking.

TROUBLE SYMPTOM:

Fail mode occurs because the data is not received from combination meter unit.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK COMMUNICATION LINE.** 1) Warm up the engine. 2) Compare the data of body integrated unit and combination meter using Subaru Select Monitor. Check item: • Engine speed • Shift range	Is the data displayed same?	Go to step **2**.	Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>

	Step	Check	Yes	No
2	**CHECK HARNESS.** 1) Disconnect the body integrated unit and combination meter connector. 2) Measure the resistance between harness connectors. ***Connector & terminal*** ***(i10) No. 29 — (i84) No. 27:*** ***(i10) No. 30 — (i84) No. 26:***	Is the resistance less than 10 Ω?	Go to step **4**.	Go to step **3**.
3	**CHECK HARNESS.** 1) Disconnect the CAN joint connector (i128) with connector of unit disconnected. 2) Measure the resistance between harness connectors. ***Connector & terminal*** ***(i10) No. 29 — (i128) No. 1 to 6:*** ***(i10) No. 30 — (i128) No. 7 to 12:*** ***(i84) No. 27 — (i128) No. 1 to 6:*** ***(i84) No. 26 — (i128) No. 7 to 12:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair or replace the open circuit of harness.
4	**CHECK HARNESS.** Measure the resistance between harness connector (i128) and chassis ground. ***Connector & terminal*** ***(i128) No. 1 to 6 — Chassis ground:*** ***(i128) No. 7 to 12 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the short circuit of harness or replace harness.	Go to step **5**.
5	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between harness connector (i77) and chassis ground. ***Connector & terminal*** ***(i128) No. 1 to 6 (+) — Chassis ground (–):*** ***(i128) No. 7 to 12 (+) — Chassis ground (–):***	Is the voltage more than 6 V?	Repair the short circuit of harness or replace harness.	Go to step **6**.
6	**CHECK COMBINATION METER.** Perform the self-diagnosis of combination meter. <Ref. to IDI-4, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is the self-diagnosis OK?	Temporary poor contact occurs.	Check the connection of connector. Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>

W: DTC B0500 KEYLESS UART COM. MALFUNCTION

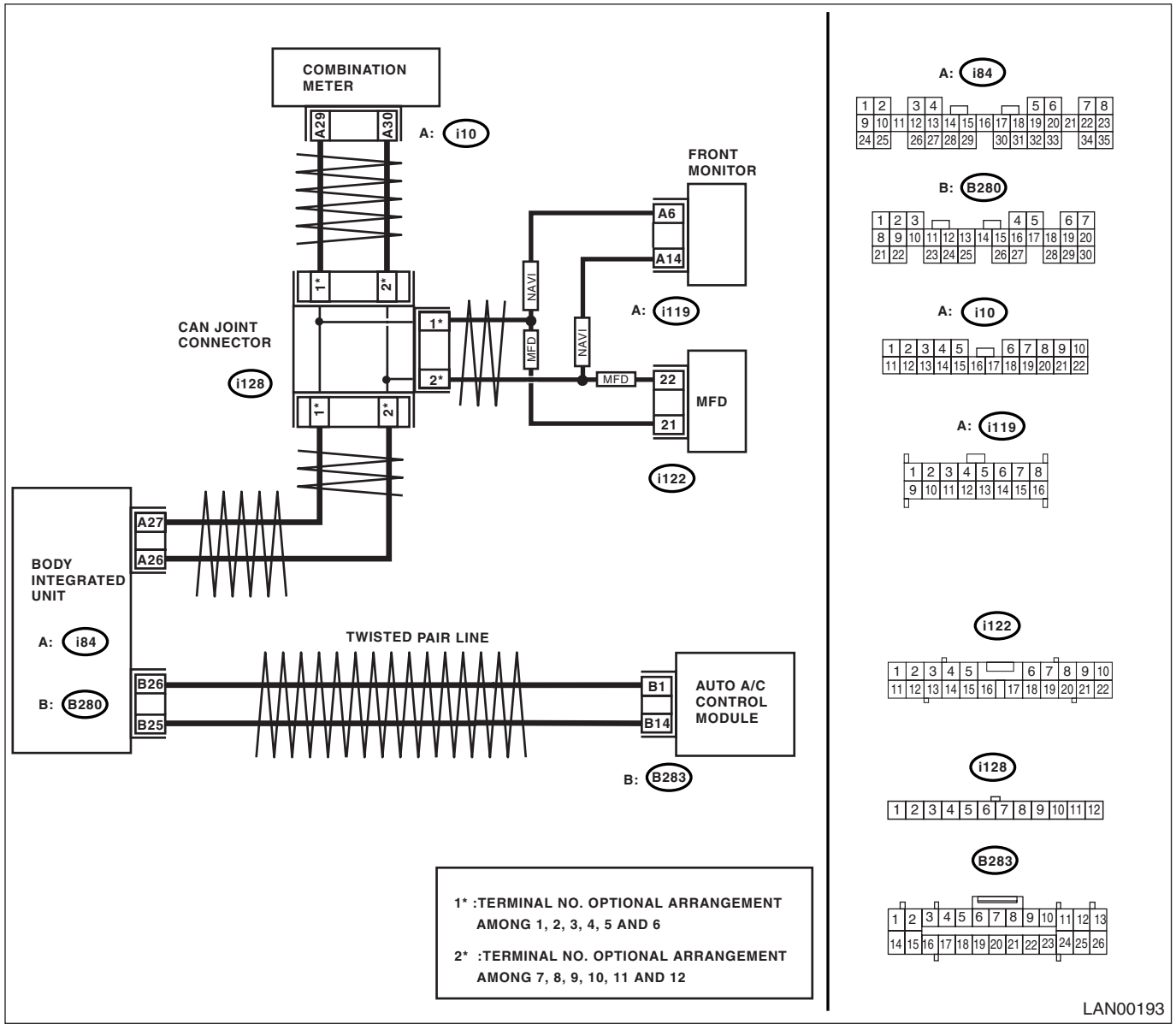
DTC DETECTING CONDITION:

UART between keyless control unit and body integrated unit is open or shorted, the connector is not connected properly, or the terminal has poor caulking.

TROUBLE SYMPTOM:

Door lock does not operate with keyless.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (i84) and keyless entry control unit connector (i96). 2) Measure the resistance between harnesses. ***Connector & terminal (i84) No. 9 — (i96) No. 3:***	Is the resistance less than 10 Ω?	Go to step **2**.	Repair the open circuit of harness or replace harness.

	Step	Check	Yes	No
2	**CHECK HARNESS.** Measure the resistance between harness connector and chassis ground. ***Connector & terminal*** ***(i84) No. 9 — Chassis ground:***	Is the resistance less than 1MΩ?	Repair the short circuit of harness or replace harness.	Go to step **3**.
3	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between harness connector and chassis ground. ***Connector & terminal*** ***(i84) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 6 V?	Repair the short circuit of harness or replace harness.	Go to step **4**.
4	**OPERATION CHECK.** Check the door lock operation when the doors LOCK/UNLOCK using manual LOCK switch.	Does it operate on switch operation?	Go to step **5**.	Replace the body integrated unit. <Ref. to SL-52, REMOVAL, Body Integrated Unit.>
5	**OPERATION CHECK.** 1) Disconnect the key warning switch connector (B350). 2) Close all the doors, and then perform the LOCK/UNLOCK operation on keyless entry operation.	Does it operate?	Check key warning switch.	Replace the keyless entry control module. <Ref. to SL-50, REMOVAL, Keyless Entry Control Module.>

13.General Diagnostic Table

A: INSPECTION

Read the DTC or inspect and diagnose the following data in the current data display using Subaru Select Monitor.

1. LAN SYSTEM

Item	Operation	Specifications		Note
		YES	NO	
Diagnostic code	DTC is not displayed when inspecting all DTCs.	DTC is not displayed.	Perform the diagnosis according to DTC.	Refer to the DTC table when there are trouble codes of the CAN communication system for a multiple of modules. <Ref. to LAN(diag)-31, FUNCTION CHECK, DTC TABLE, List of Diagnostic Trouble Code (DTC).>
Coolant Temp.	Check the current data display of ECM, TCM and body integrated unit. Three data value are the same.	Same values	Inspect LAN system.	If engine coolant temperature sensor is not OK, inspect the sensor circuit.
R defogger SW	It turns to ON when pressing switch. (Low-speed CAN is OK)	Turns to ON.	Inspect rear defogger switch.	Rear defogger switch is connected with Low-speed CAN.
R defogger output	When switch input, it is output.	Output	Replace the body integrated unit.	If not operating with output, check the rear defogger relay.
Door lock SW	When locked with door lock switch, it turns to ON.	Turns to ON.	Inspect door lock switch.	
Door lock actuator	When locked with door lock switch, it is output.	Output	Replace the body integrated unit.	—

2. BODY INTEGRATED UNIT

Item	Operation	Specifications		Note
		YES	NO	
Illumination VR power supply	Operate the illumination volume, illumination light is controlled according to the change of voltage on data display.	Illumination light is controlled with changing of data.	Inspect the illumination volume.	—
Fuel level resistance	Check the fuel level resistance and fuel level resistance 2. Both resistances are same.	Same values	Inspect the body integrated unit.	Compare the input and output values of body integrated unit.
R wiper SW input	When rear wiper SW to ON, data display turns to ON.	Turns to ON.	Inspect the rear wiper switch.	—
R wiper output	When rear wiper switch to ON, output signal turns to ON.	Turns to ON.	Replace the body integrated unit.	If not operate with output turned to ON, check the rear wiper motor.
Keyless Entry	Keyless entry LOCK/UNLOCK the doors.	Operate	Inspect the keyless antenna.	If the antenna is OK, replace the body integrated unit.
Brake SW	When brake pedal is depressed, it turns to ON.	Turns to ON.	Inspect the brake switch.	—
Shift Lock Solenoid	The shift lock releases when depressing the brake pedal.	Released	Inspect the shift lock.	—
Body integrated unit registration function setting	Does Vehicle equipment correspond to setting values?	Correspondence	Reconfigure the values according to vehicle equipment.	—
Customize	When changing customize setting, the registration completes correctly.	Registered	Inspect the body integrated unit.	Return to original state after making changes.
Manual mode	Switch the shift (UP/DOWN) on Manual mode. Indicator is changed in 1 — 2.	Change	Inspect the shift lever.	—
Function check	Each checking item operate correctly. (Except for not equipped)	Operate	Inspect for non-functional actuator.	Module is normal if output switches to ON.
Security	After locking with keyless entry system and open the door, the security system operates and the horn sounds.	Horn sounds. (Security system operates.)	Inspect the security system.	Horn does not activate if siren is set to ON by customizing.

1. General Description

A: SPECIFICATION

Headlight	Halogen type low beam	12 V — 55 W
	Halogen type high beam	12 V — 65 W
Front turn signal, parking		12 V — 27/8 W
Front side marker light		12 V — 5 W
Front fog light		12 V — 55 W
Side turn signal light		12 V — 2.7 W (LED)
Rear combination light	Stop/Tail light/Rear side marker light	12 V — 21/5 W
	Turn signal light	12 V — 21 W
Rear finisher light		12 V — 3.8 W
Back-up light		12 V — 16 W
License plate light		12 V — 5 W
High-mounted stop light		12 V — 1.3 W (LED)
Room light		12 V — 8 W
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 — 3.5 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 air bag system wiring harness is routed near electrical parts and switches. Airbag system wiring harnesses and connectors are yellow. Do not use electrical test equipment on these circuits.
• Be careful not to damage the air bag system wiring harness when servicing electrical parts and switches.

C: PREPARATION TOOL

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-86, WIRING DIAGRAM, Headlight System.>

2. CLEARANCE LIGHT AND ILLUMINATION LIGHT

<Ref. to WI-92, WIRING DIAGRAM, Clearance Light and Illumination Light System.>

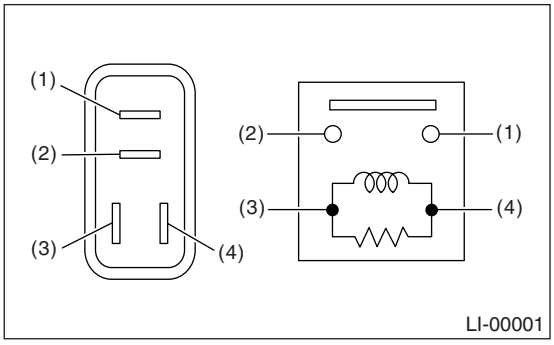
B: INSPECTION

1. HEADLIGHT SWITCH

<Ref. to LI-9, INSPECTION, Combination Switch (Light).>

2. HEADLIGHT RELAY

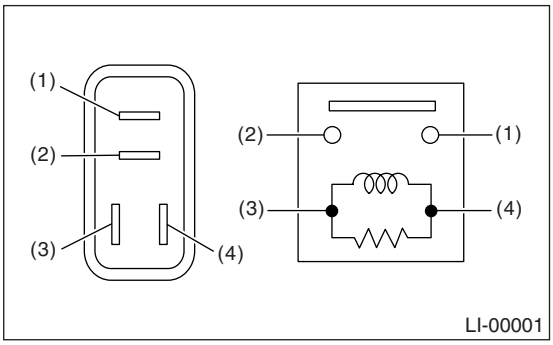
Connect terminal No. 4 to the battery positive terminal and terminal No. 3 to the battery ground terminal, and measure the headlight relay resistance between terminals.



Current	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.



Current	Terminal No.	Standard
Yes	1 and 2	Less than 1 Ω
No		1 MΩ or more

3. Front Fog Light System

A: WIRING DIAGRAM

1. FRONT FOG LIGHT

<Ref. to WI-89, WIRING DIAGRAM, Front Fog Light System.>

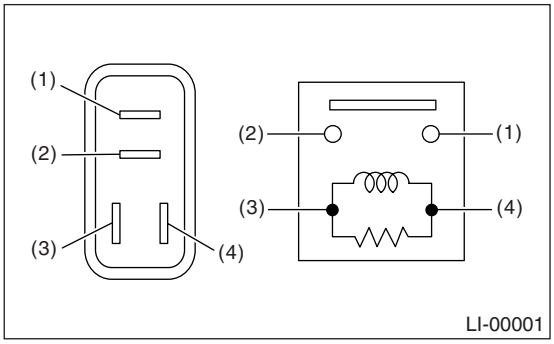
B: INSPECTION

1. FRONT FOG LIGHT SWITCH

Measure the resistance between front fog light switch terminals.
<Ref. to LI-9, 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.



Current	Terminal No.	Standard
Yes	1 and 2	Less than 1 Ω
No		1 MΩ or more

4. Turn Signal Light and Hazard Light System

A: WIRING DIAGRAM

1. TURN SIGNAL LIGHT AND HAZARD LIGHT

<Ref. to WI-96, WIRING DIAGRAM, Turn Signal and Hazard Light System.>

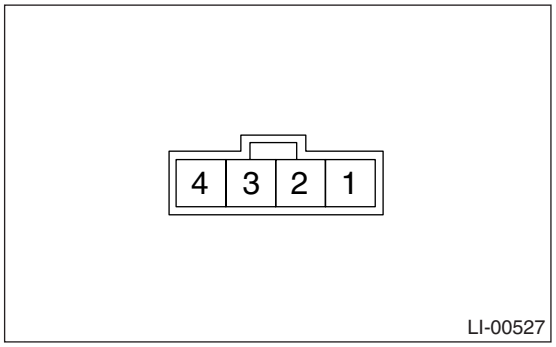
B: INSPECTION

1. TURN SIGNAL SWITCH

<Ref. to LI-9, INSPECTION, Combination Switch (Light).>

2. HAZARD SWITCH

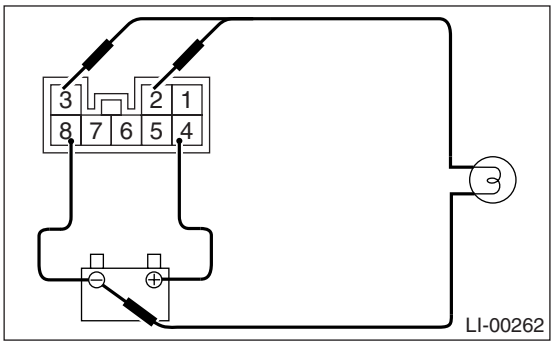
Measure the resistance between hazard switch terminals.



Switch position	Terminal No.	Standard
OFF	2 and 3	1 MΩ or more
ON		Less than 1 Ω

3. TURN SIGNAL LIGHT AND HAZARD LIGHT 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.



5. Back-up Light System

A: WIRING DIAGRAM

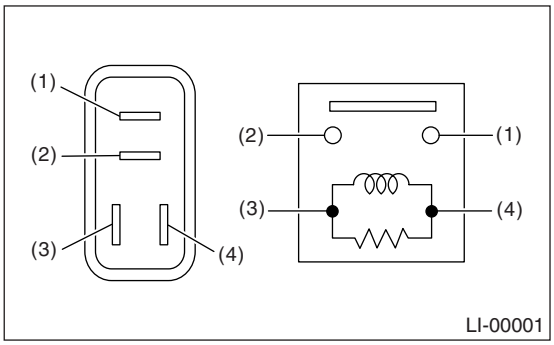
1. BACK-UP LIGHT

<Ref. to WI-90, 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.



Current	Terminal No.	Standard
Yes	1 and 2	Less than 1 Ω
No		1 MΩ or more

6. Stop Light System

A: WIRING DIAGRAM

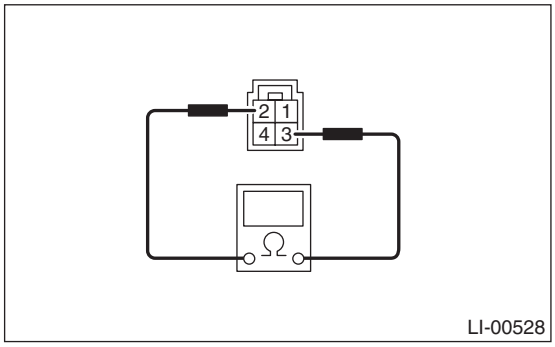
1. STOP LIGHT

<Ref. to WI-91, 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 Ω
When brake pedal is released		1 MΩ or more

7. Interior Light System

A: WIRING DIAGRAM

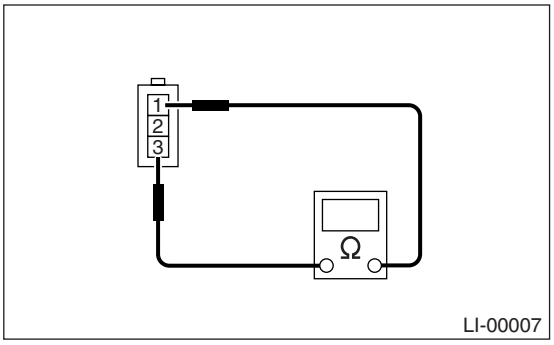
1. ROOM LIGHT

<Ref. to WI-98, WIRING DIAGRAM, Interior Light System.>

B: INSPECTION

1. DOOR SWITCH

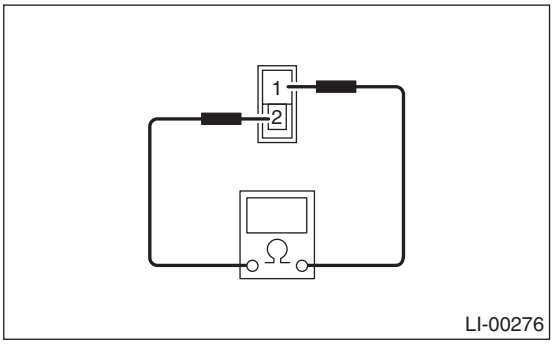
Measure the resistance between door switch terminals.



Switch position	Terminal No.	Standard
When door is opened	1 and 3	Less than 1 Ω
When door is closed		1 MΩ or more

2. REAR GATE LATCH SWITCH

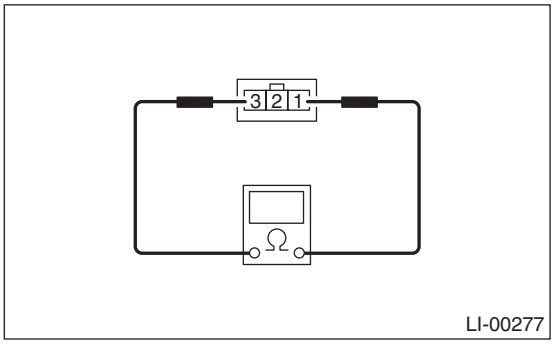
Measure the resistance between rear gate latch switch terminals.



Switch position	Terminal No.	Standard
When rear gate is opened	1 and 2	Less than 1 Ω
When rear gate is closed		1 MΩ or more

3. REAR GATE LIGHT SWITCH

Measure the resistance between rear gate light switch terminals.

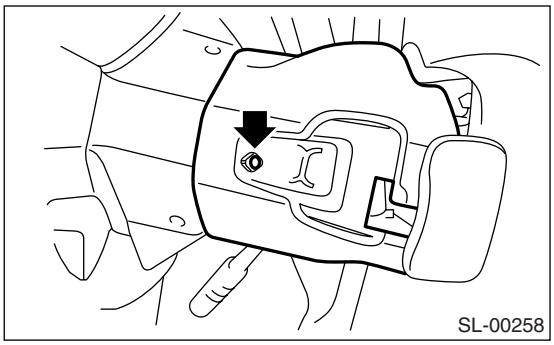


Switch position	Terminal No.	Standard
When rear gate is opened	1 and 3	Less than 1 Ω
When rear gate is closed		1 MΩ or more

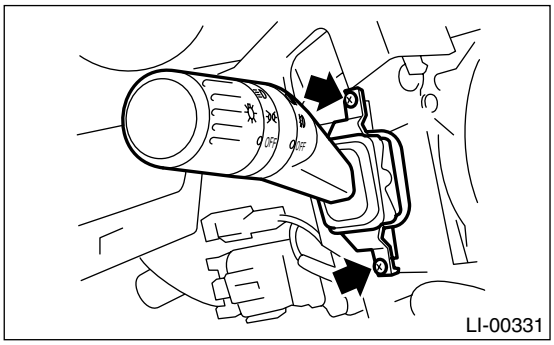
8. Combination Switch (Light)

A: REMOVAL

1) Disconnect the ground cable from 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.

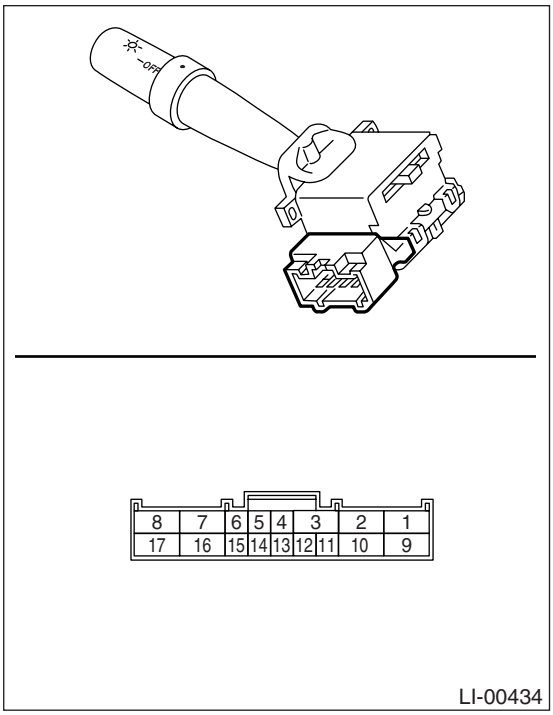


B: INSTALLATION

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

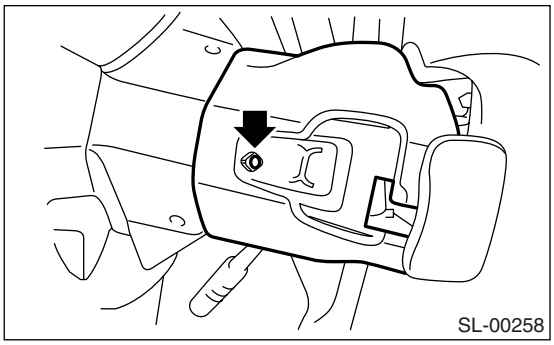
4. FRONT FOG LIGHT

Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
ON	10 and 11	Less than 1 Ω

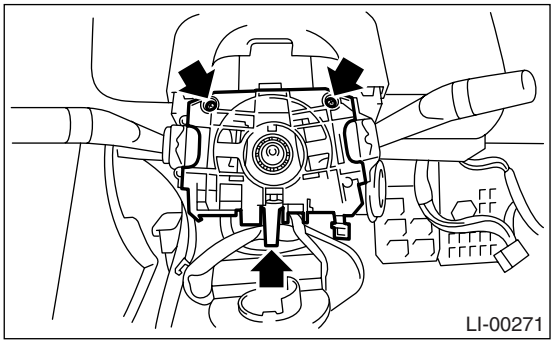
9. Combination Base Switch Assembly

A: REMOVAL

1) Remove the driver's airbag module. <Ref. to AB-15, 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-9, REMOVAL, Combination Switch (Light).> <Ref. to WW-6, 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 steering wheel, be sure to adjust the direction of roll connector with steering. <Ref. to AB-24, ADJUSTMENT, Roll Connector.>

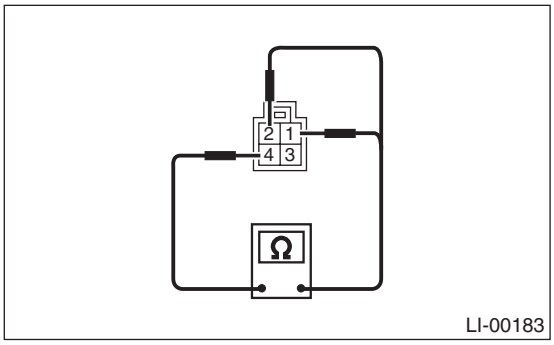
C: INSPECTION

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.

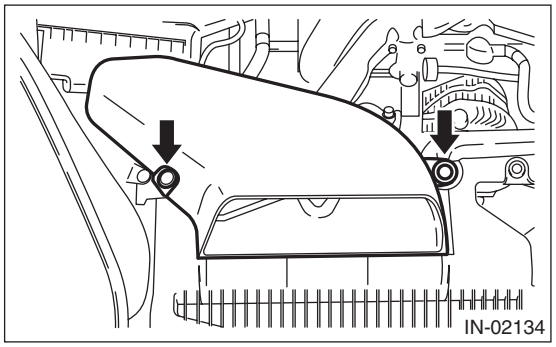


Switch position	Terminal No.	Standard
OFF	2 and 4	Less than 1 Ω
ON	1 and 4	Less than 1 Ω

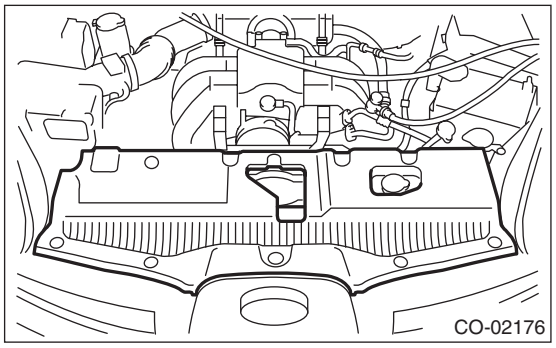
10.Headlight Assembly

A: REMOVAL

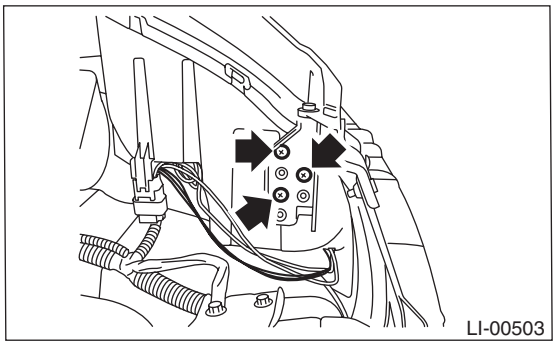
1) Disconnect the ground cable from battery.
2) Remove the air intake duct.



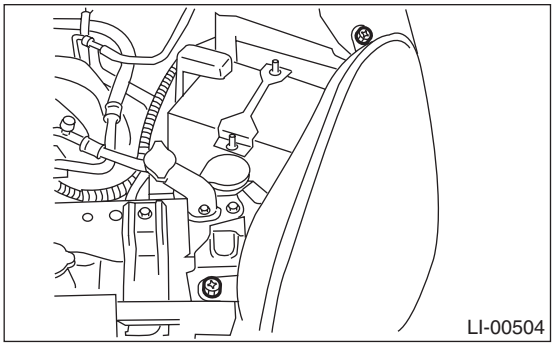
3) Remove the engine front cover.



4) Disengage the three clips, and then turn over the mud guard.
5) Remove the three bolts securing the headlight assembly from the lower side of vehicle.



6) Remove the two bolts and then remove the headlight assembly.



7) Disconnect the connector and then detach the rear headlight assembly.

B: INSTALLATION

Install in the reverse order of removal.

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.

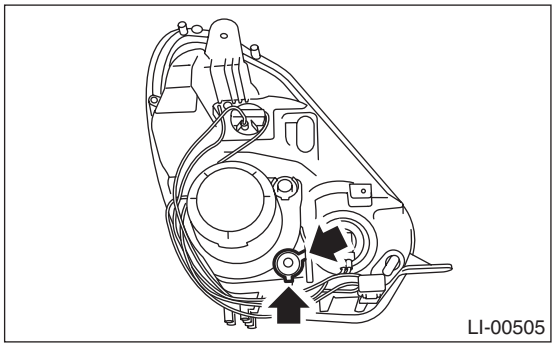
CAUTION:
Turn off the light before adjusting the headlight beam level. If it is necessary to inspect the beam level, do not turn on the lamp for more than two minutes.

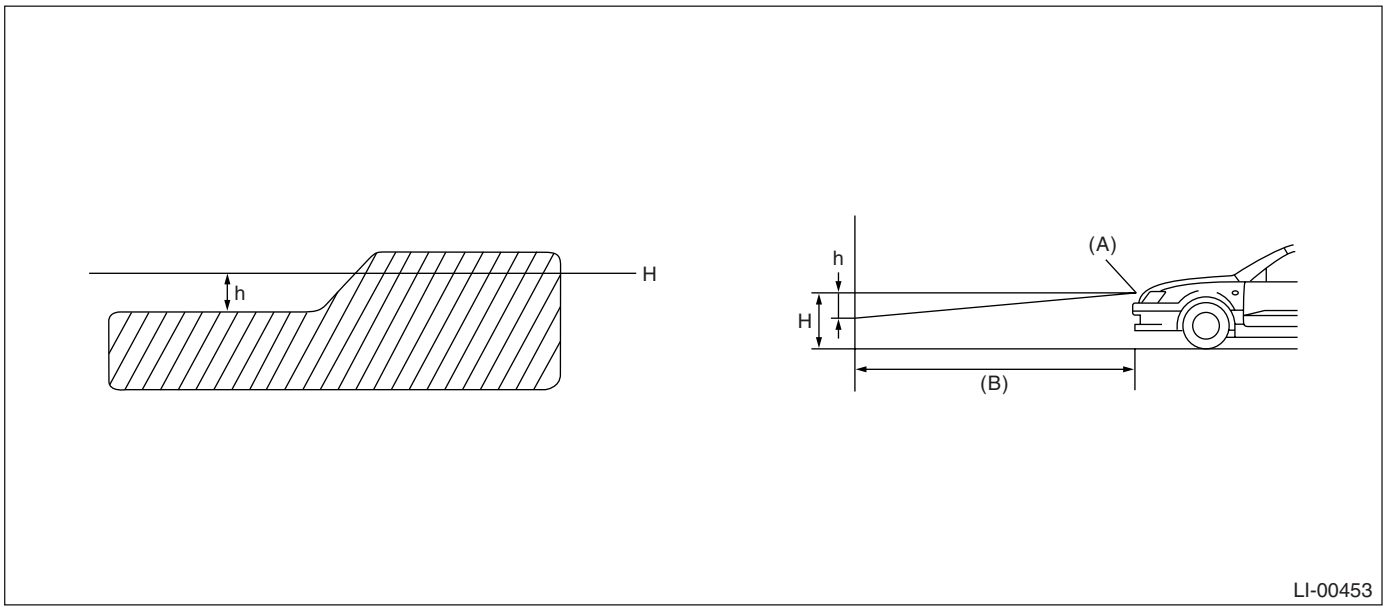
NOTE:
Before checking the headlight beam level, be sure of the following:
• Check the area around the headlight for any scratches, damage or other type of deformation.
• Make sure that the vehicle is parked on a level surface.
• Make sure that the inflation pressure of tires are correct.
• Check that the vehicle fuel tank is full.

1) Bounce the vehicle several times to normalize the suspension.
2) Make certain that someone is seated in the driver's seat.

3) 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 two directions described in the figure.


LI-00505



LI-00453

(A) Bulb center marking (B) 3 m (10 ft)

H mm (in)	h mm (in) at 3 m (10 ft)
707 (27.83)	21 (0.83)

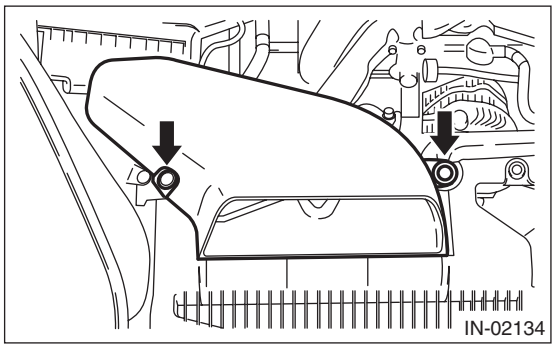
11.Headlight Bulb

A: REMOVAL

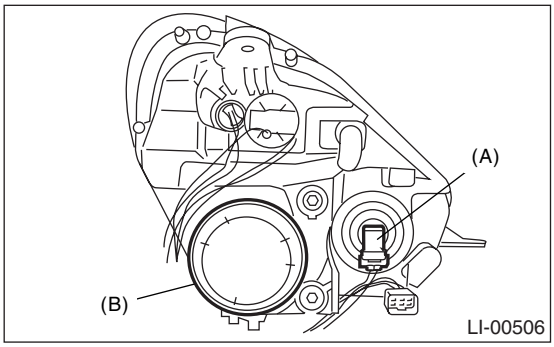
1. HIGH BEAM AND LOW BEAM

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.

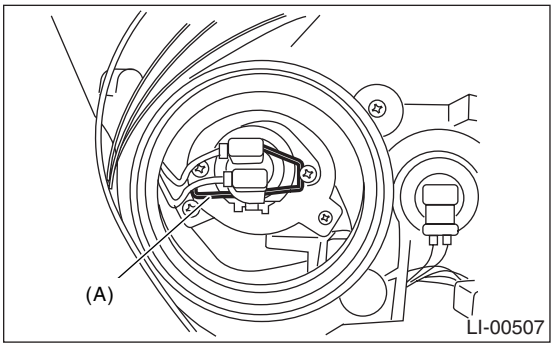
1) Disconnect the ground cable from battery.
2) Remove the air intake duct. (When removing the headlight bulb RH)



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 the next step.



6) Remove the light bulb retaining spring (A) to remove bulb.



B: INSTALLATION

Install in the reverse order of removal.

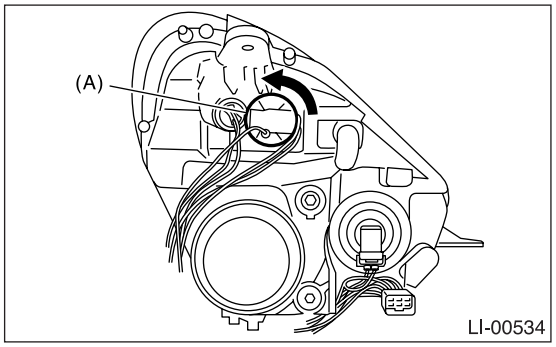
C: INSPECTION

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 one.

12.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 one.

13.Parking Light Bulb

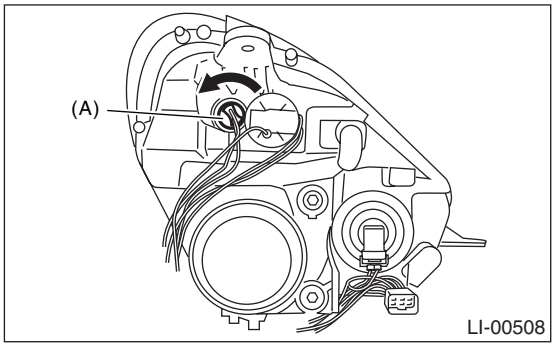
A: SPECIFICATION

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-14, REMOVAL, Front Turn Signal Light Bulb.>

14.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.

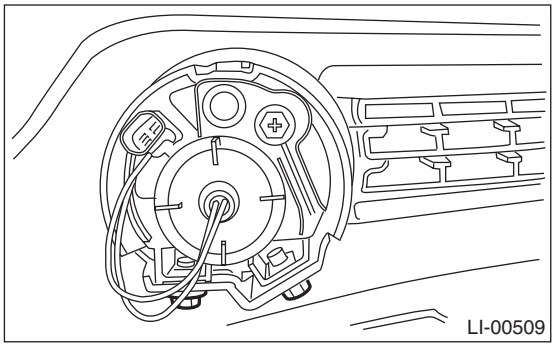
C: INSPECTION

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 one.

15.Front Fog Light Assembly

A: REMOVAL

1) Disconnect the ground cable from 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 then detach the fog light assembly by pulling it.



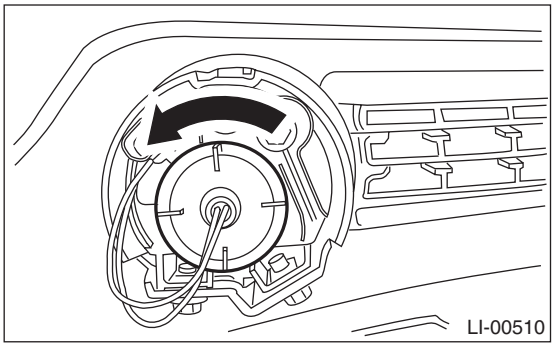
B: INSTALLATION

Install in the reverse order of removal.

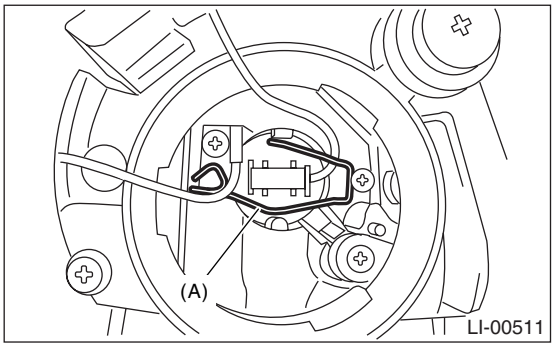
16.Front Fog Light Bulb

A: REMOVAL

1) Disconnect the ground cable from 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.

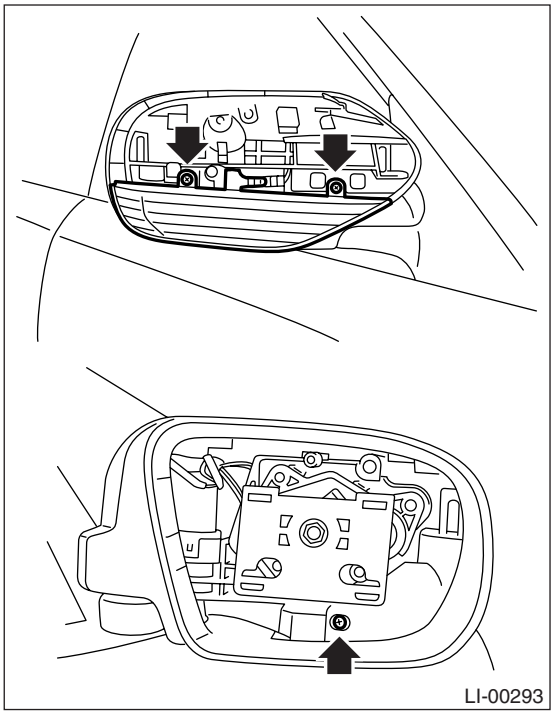
C: INSPECTION

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 one.

17.Side Turn Signal Light Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the mirror. <Ref. to GW-14, REPLACEMENT, Outer Mirror.>
3) Remove the scalp cap. <Ref. to GW-12, REPLACEMENT, Scalp Cap.>
4) Disconnect the harness connector, remove the 3 mounting screws and then remove the side turn signal light assembly.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

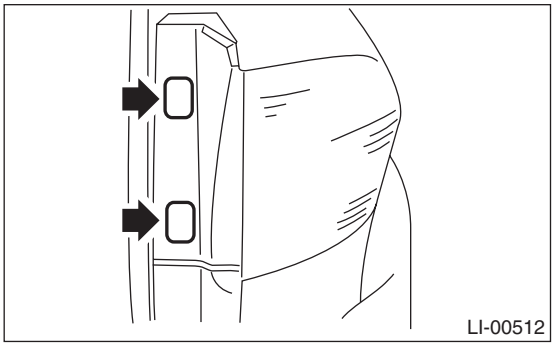
1) Install the side turn signal light assembly and check that it blinks normally.
2) If it does not blink normally, replace the side turn signal light assembly with a new one.

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 does not turn on.

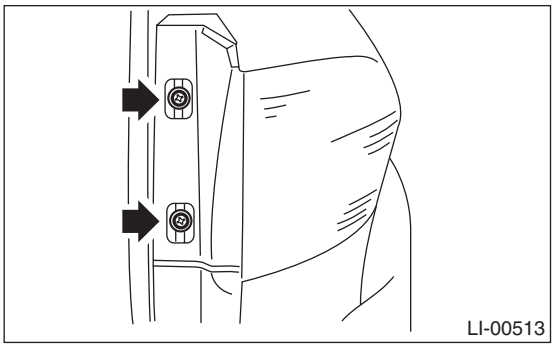
18. Rear Combination Light Assembly

A: REMOVAL

1) Disconnect the ground cable from 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

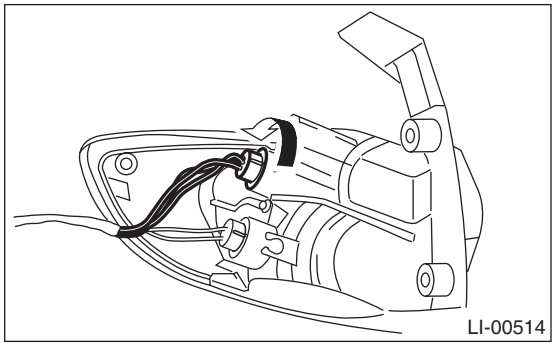
Install in the reverse order of removal.

19.Tail/Stop Light Bulb

A: REMOVAL

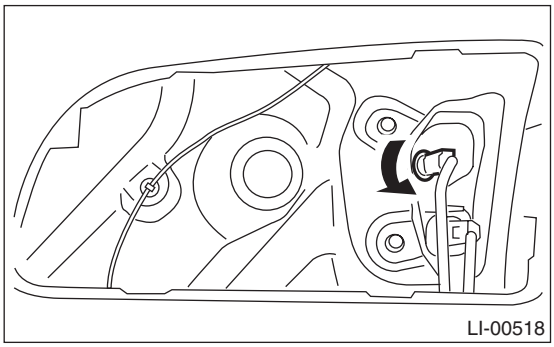
1. COMBINATION LIGHT

1) Remove the rear combination light assembly. <Ref. to LI-20, 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.

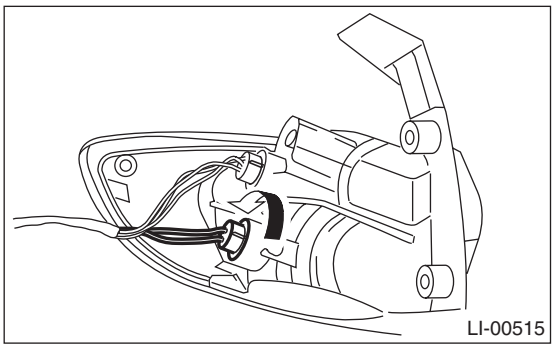
C: INSPECTION

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 one.

20.Rear Turn Signal Light Bulb

A: REMOVAL

1) Remove the rear combination light assembly. <Ref. to LI-20, 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 one.

21.Rear Side Marker Light Bulb

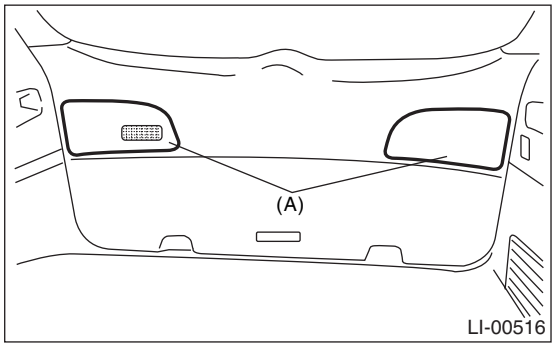
A: SPECIFICATION

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-21, REMOVAL, Tail/Stop Light Bulb.>

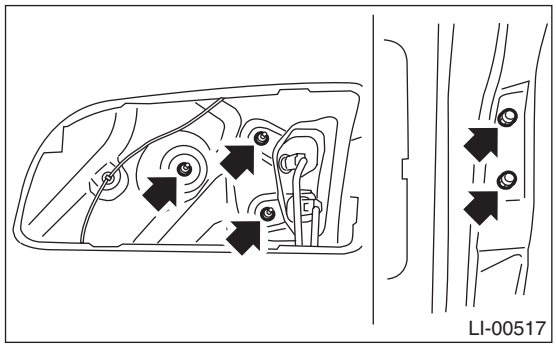
22.Rear Finisher Light Assembly

A: REMOVAL

1) Remove the bulb inspection cover of the rear gate trim.



2) Disconnect the harness connector.
3) Remove the mounting nuts and detach the rear finisher assembly.



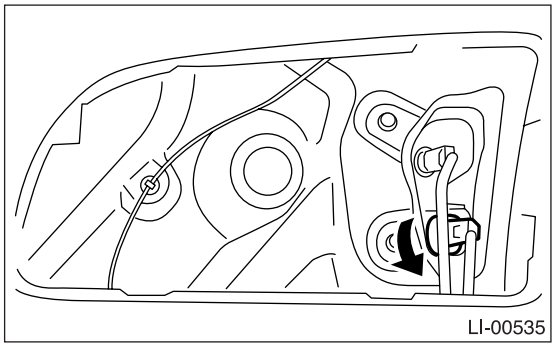
B: INSTALLATION

Install in the reverse order of removal.

23.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.

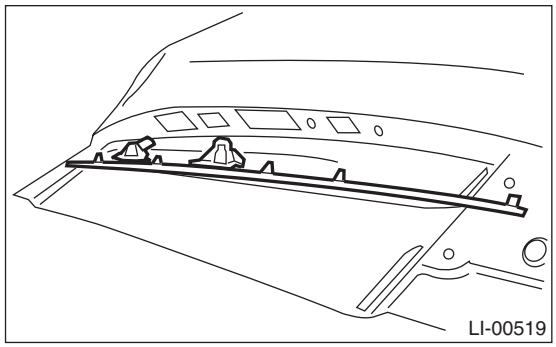
C: INSPECTION

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 one.

24.License Plate Light Assembly

A: REMOVAL

1) Remove the rear gate garnish. <Ref. to EI-52, REMOVAL, Rear Gate Garnish.>
2) Disengage the clips, and disconnect the connectors, and then detach the license lamp assembly.



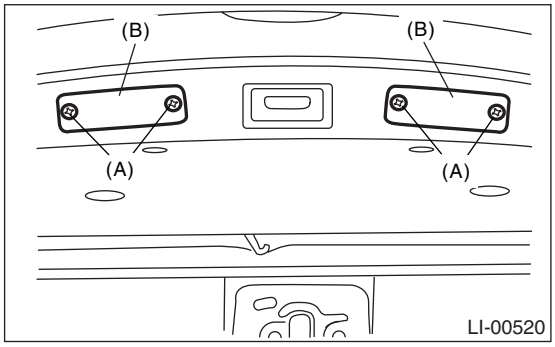
B: INSTALLATION

Install in the reverse order of removal.

25.License Plate Light

A: REMOVAL

1) Remove the license plate light mounting screw (A) and then remove the lens (B).



2) Remove the bulb.

B: INSTALLATION

Install in the reverse order of removal.

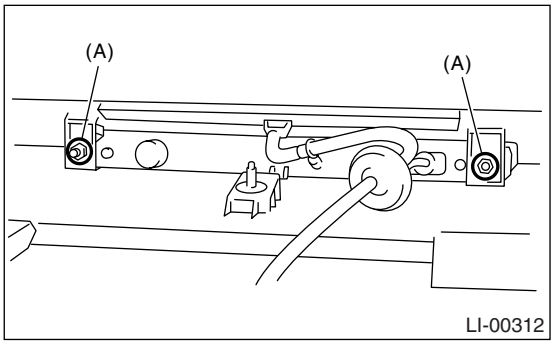
C: INSPECTION

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 one.

26.High-mounted Stop Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Detach the roof spoiler. <Ref. to EI-31, REMOVAL, Roof Spoiler.>
3) Remove the nuts (A), then detach the high-mounted stop light.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

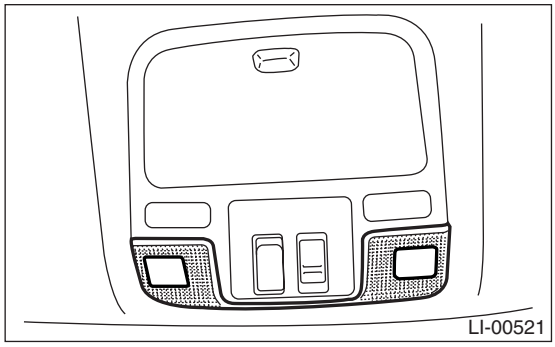
1) Install the high-mounted stop light to test if it illuminates normally.
2) If the high-mounted stop light does not illuminate, replace it with a new one.

NOTE:
Since LEDs (Light Emitting Diodes) are used for the high-mounted stop light, replace the high-mounted stop light assembly when the LEDs went out.

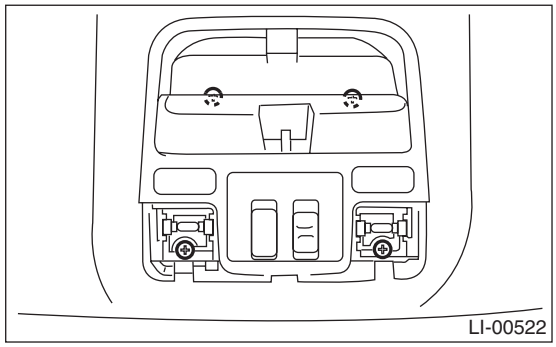
27.Spot Map Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the lens.



3) Remove the four bolts used for mounting the spot map light.



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 one.

2. SPOT MAP LIGHT SWITCH

Measure the resistance between spot map light switch terminals.

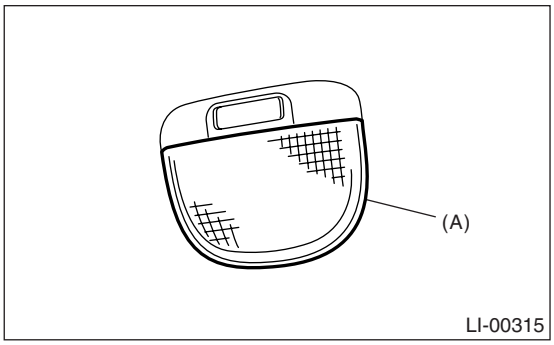
Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
ON	1 and 2	18±5.4 Ω

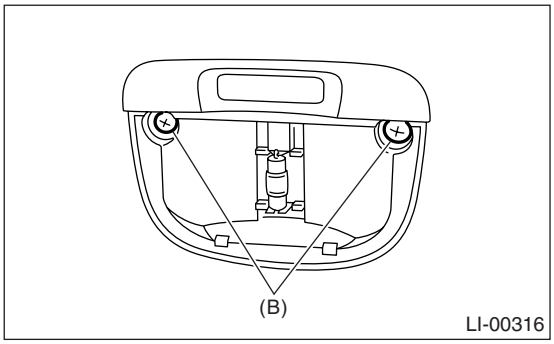
28.Room Light

A: REMOVAL

1. MODEL WITHOUT REAR ENTERTAINMENT SYSTEM

1) Disconnect the ground cable from 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-28, REMOVAL, Rear Entertainment.>

B: INSTALLATION

Install in the reverse order of removal.

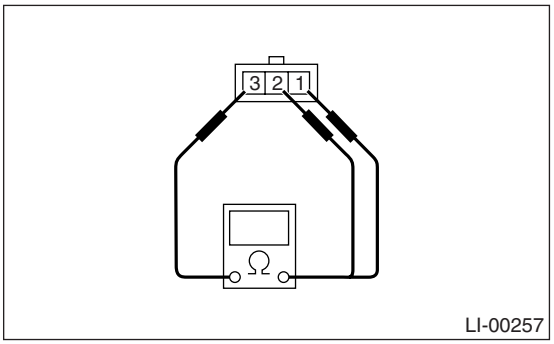
C: INSPECTION

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 one.

2. ROOM LIGHT SWITCH

Measure the resistance between room light switch terminals.

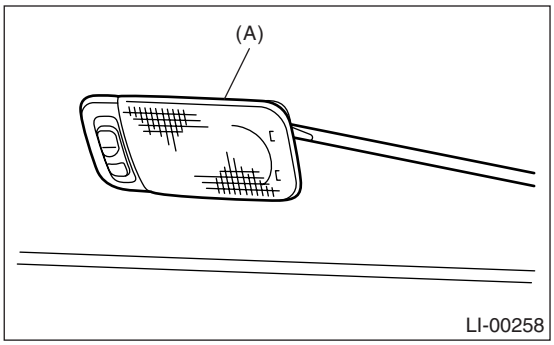


Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
ON	1 and 3	1.5±0.5 Ω
DOOR	2 and 3	1.5±0.5 Ω

29.Luggage Room Light

A: REMOVAL

1) Disconnect the ground cable from 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.

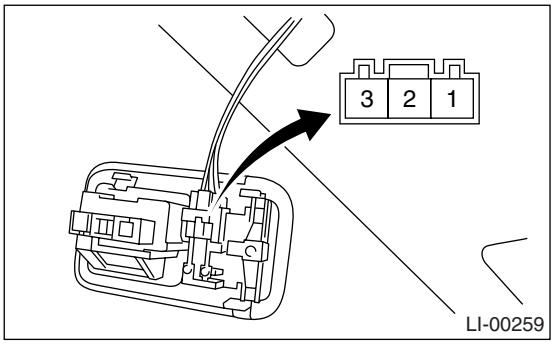
C: INSPECTION

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 one.

2. LUGGAGE ROOM LIGHT SWITCH

Measure the resistance between luggage room light switch terminals.

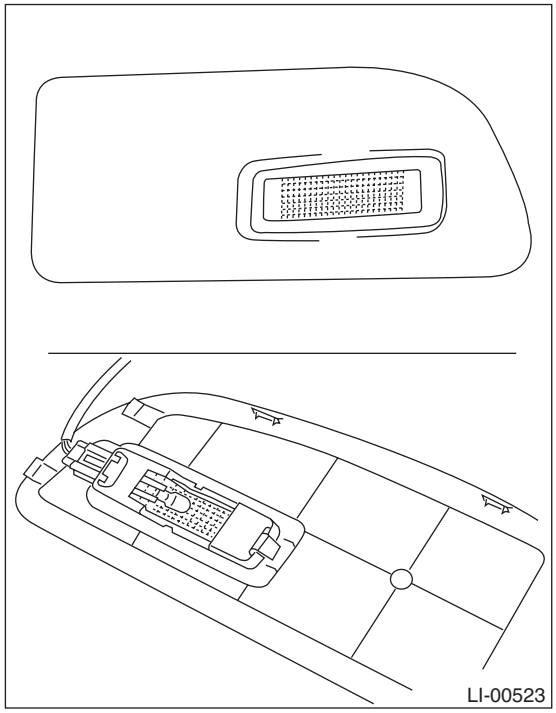


Switch position	Terminal No.	Standard
OFF	—	1 MΩ or more
ON	1 and 2	1.5±0.5 Ω
DOOR	2 and 3	1.5±0.5 Ω

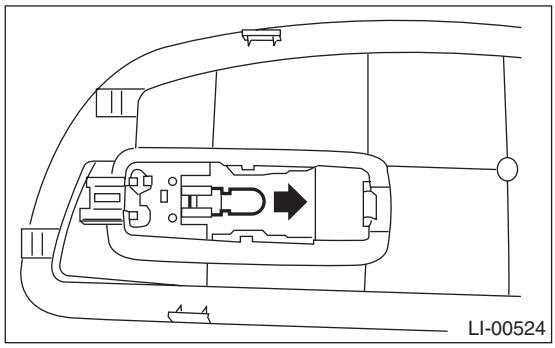
30.Rear Gate Light

A: REMOVAL

1) Disconnect the ground cable from 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.

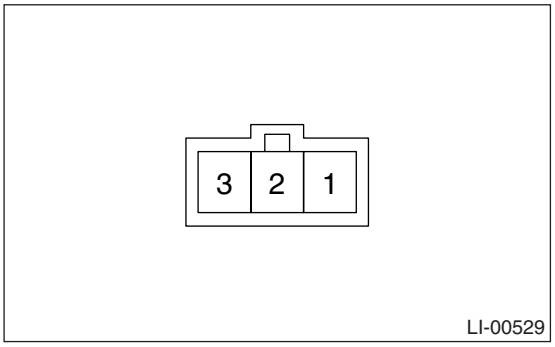
C: INSPECTION

1. REAR GATE 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 one.

2. REAR GATE LIGHT SWITCH

Measure the resistance between trunk lid switch terminals.

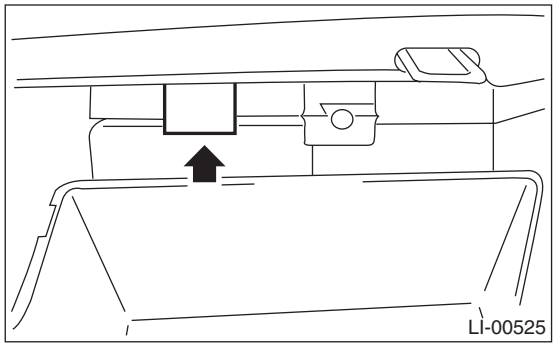


Trunk lid position	Terminal No.	Standard
Close	1 and 3	1 MΩ or more
Open		1.5±0.5 Ω

31.Glove Box Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-37, REMOVAL, Glove Box.>
3) Disconnect the harness connector.
4) Remove the glove box light.



B: INSTALLATION

Install in the reverse order of removal.

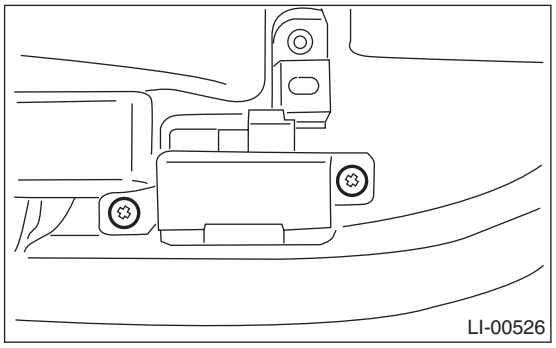
C: INSPECTION

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 one.

32.Door Step Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear door trim. <Ref. to EI-35, 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.

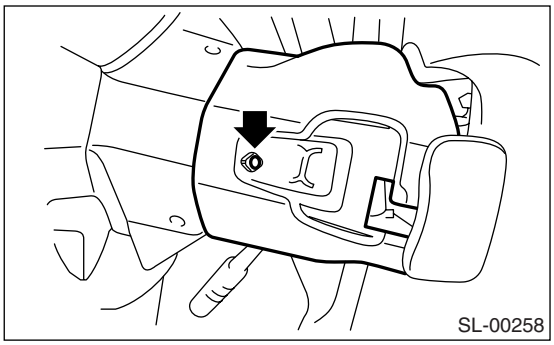
C: INSPECTION

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 one.

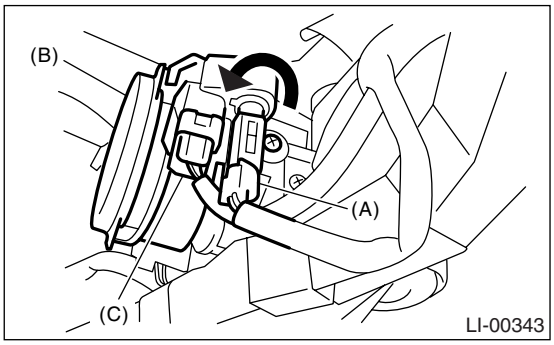
33.Ignition Switch Illumination

A: REMOVAL

1) Disconnect the ground cable from 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
1	**CHECK THE IGNITION SWITCH ILLUMINATION.** 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**.
2	**CHECK THE IGNITION SWITCH ILLUMINATION.** 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 body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Check the ignition switch illumination circuit. <Ref. to SL-23, CHECK IGNITION SWITCH ILLUMINATION., INSPECTION, Keyless Entry System.>

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK WARNING LIGHT.** 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	**READ DTC.** 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 the Subaru Select Monitor power switch to ON. 4) Read the DTC. <Ref. to OD(diag)-20, 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)-19, 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)-40, Airbag Warning Light Failure.>
3	**PERFORM DIAGNOSIS.** 1) Determine the possible cause from “List of Diagnostic Trouble Code.” <Ref. to OD(diag)-25, 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)-22, Clear Memory Mode.> 5) Perform the inspection mode. <Ref. to OD(diag)-21, Inspection Mode.> 6) Read any other DTCs displayed.	Is DTC displayed?	Perform the procedure 1) to 5) in step 3.	Finish the diagnosis.

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	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others:		
Temperature	°C (°F)		
Road condition	❑ Level road ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Vehicle operation	❑ Starting ❑ Idling ❑ Driving (❑ Constant speed ❑ Acceleration ❑ Deceleration ❑ Steering wheel turn ❑ Others:)		
Details of problem			
Airbag warning light operation	❑ Normal (After turning the ignition switch to ON, illuminates for 6 seconds then goes off.) ❑ Remains ON ❑ Remains OFF		
Passenger's airbag ON/OFF indicator does not operate.	❑ 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).) ❑ Both remain ON ❑ Both remain OFF		
DTC output	❑ Normal code ❑ DTC: (Code:)		

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)-18, 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 20 seconds or more.
• Occupant detection control module may be damaged.
6) Every A/C-related part is a precision part. Do not drop them.
7) Airbag system wiring harness is routed near the A/C control panel and junction box.

CAUTION:
• For airbag system, yellow-colored wiring harness and connectors are all used. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the occupant detection system.
• Refer to “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.

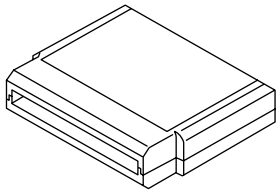
Standard voltage: 12 V

Specific gravity: Above 1.260

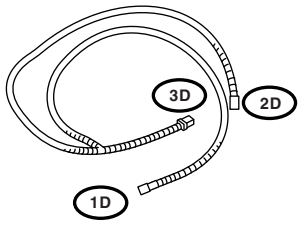
C: PREPARATION TOOL

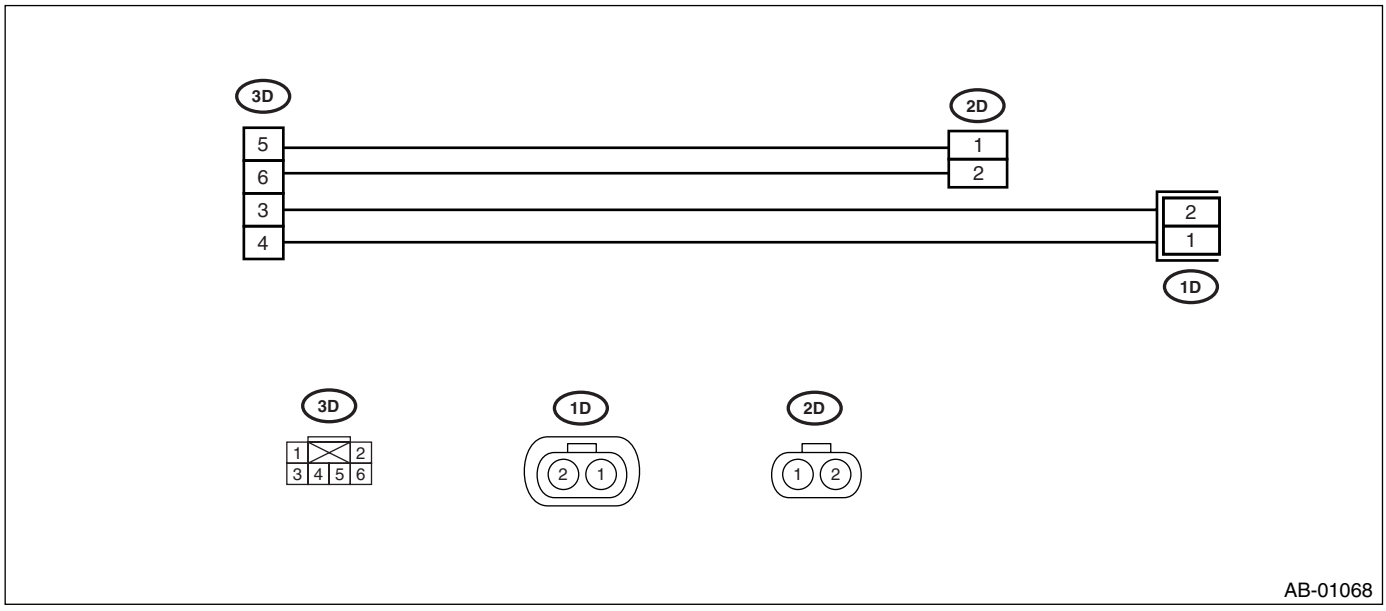
CAUTION:
To measure the voltage and resistance of airbag system and occupant detection system components, be sure to use the specified test harness.

1. SPECIAL TOOL

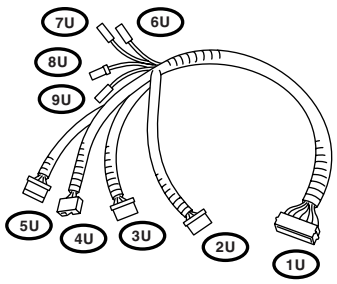
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA260	24082AA010	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.

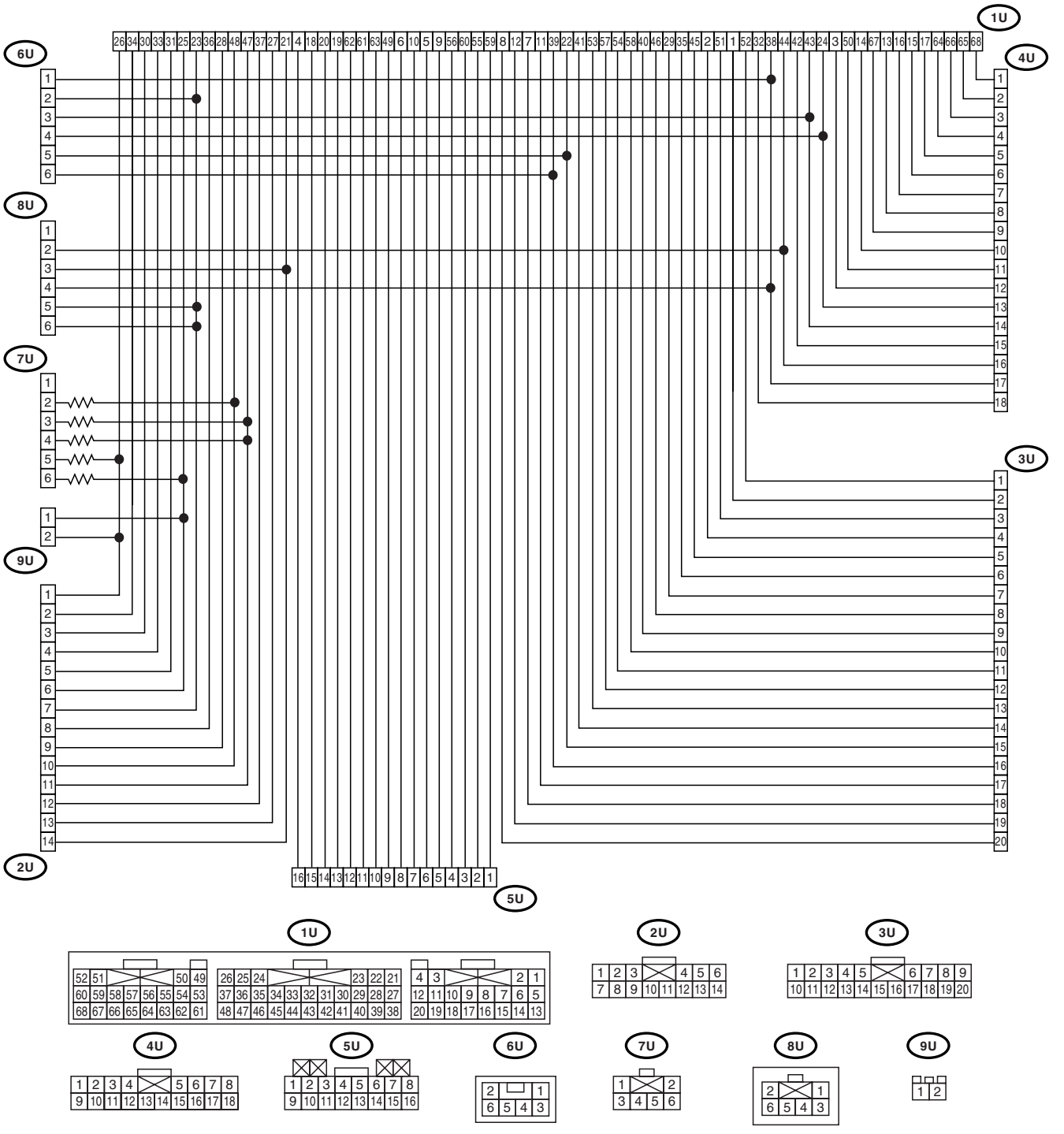
- TEST HARNESS D

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299AG060	98299AG060	TEST HARNESS D	Used when measuring voltage and resistance of the front seat belt buckle switch.

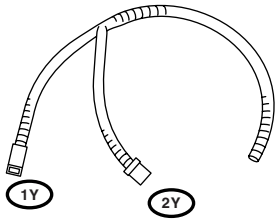


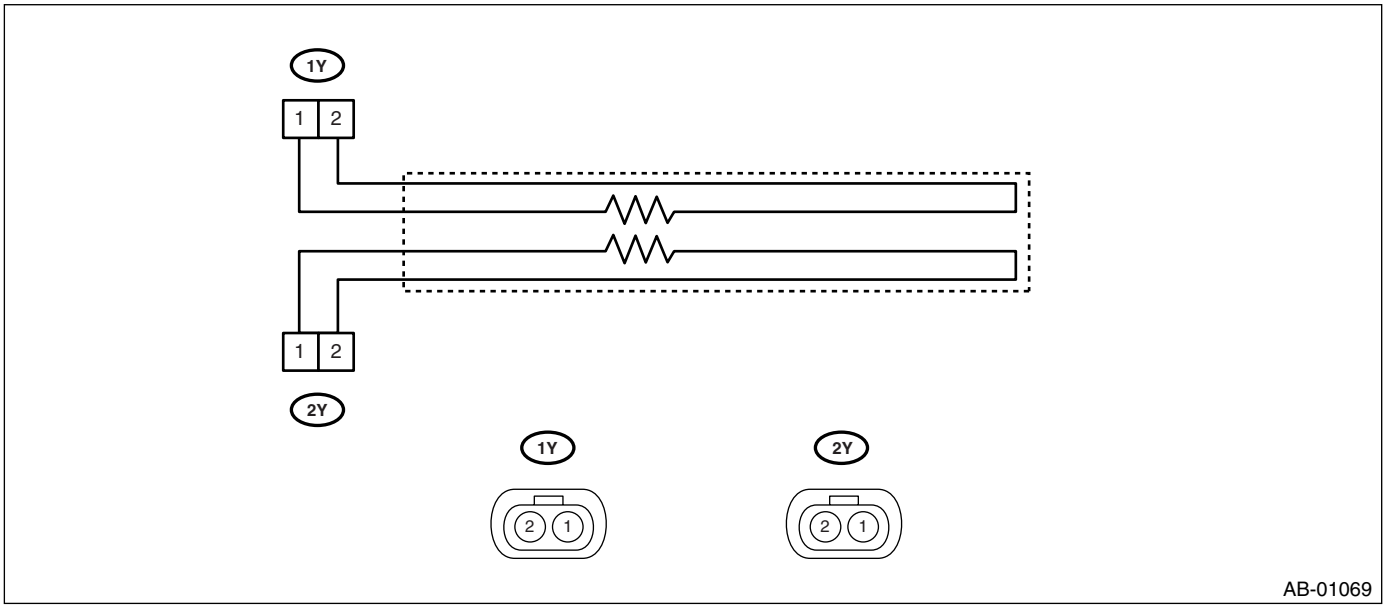
- TEST HARNESS U

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299AG000	98299AG000	TEST HARNESS U	Used when measuring voltage and resistance of airbag control module.


1U
6U
4U
8U
7U
3U
9U
2U
5U
AB-00930

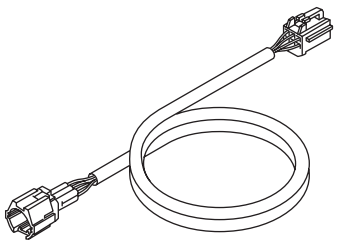
- TEST HARNESS Y

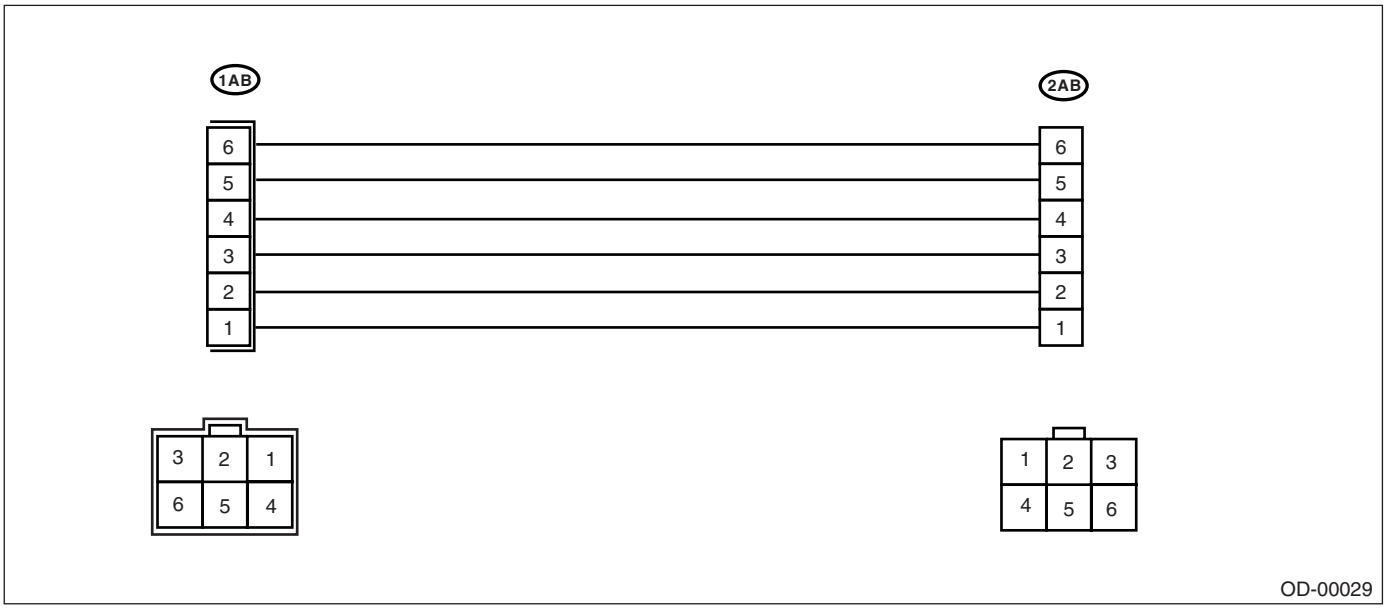
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299AG040	28299AG040	TEST HARNESS Y	Used for diagnosing a failure of the seat belt buckle switch.



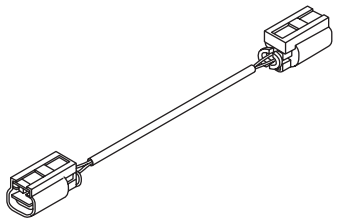
AB-01069

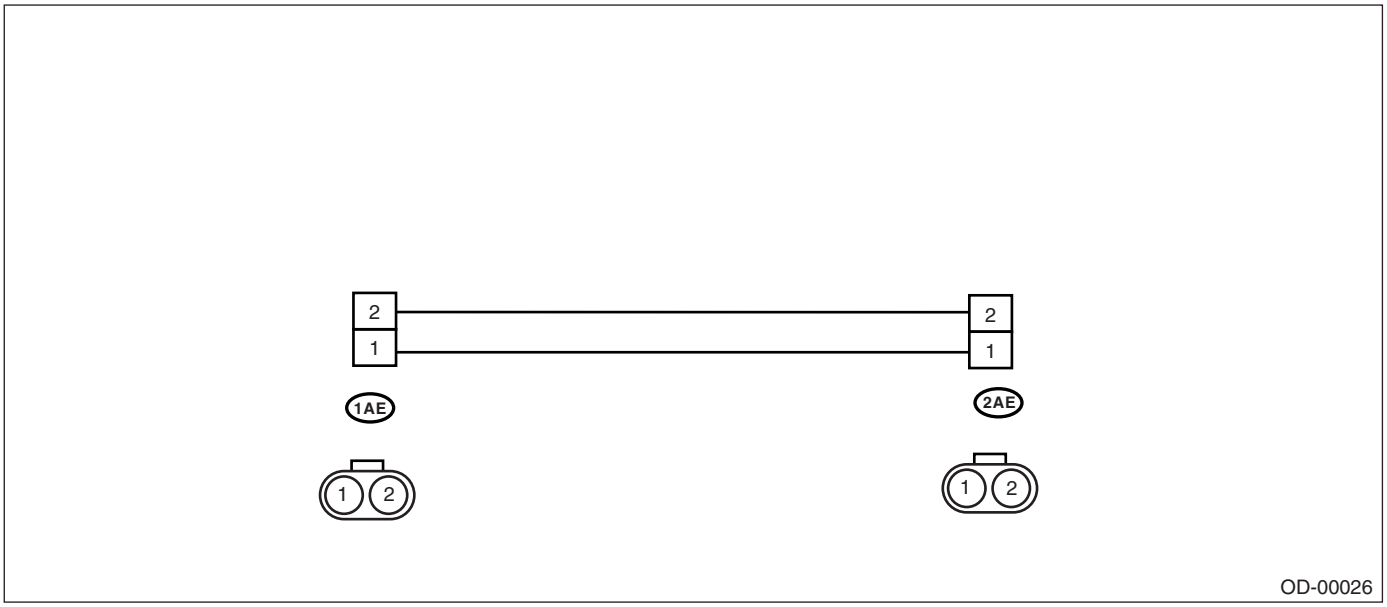
- TEST HARNESS AB

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299XA000	98299XA000	TEST HARNESS AB	Used when measuring voltage and resistance of occupant detection system.

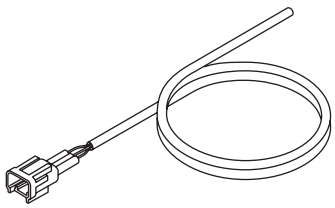


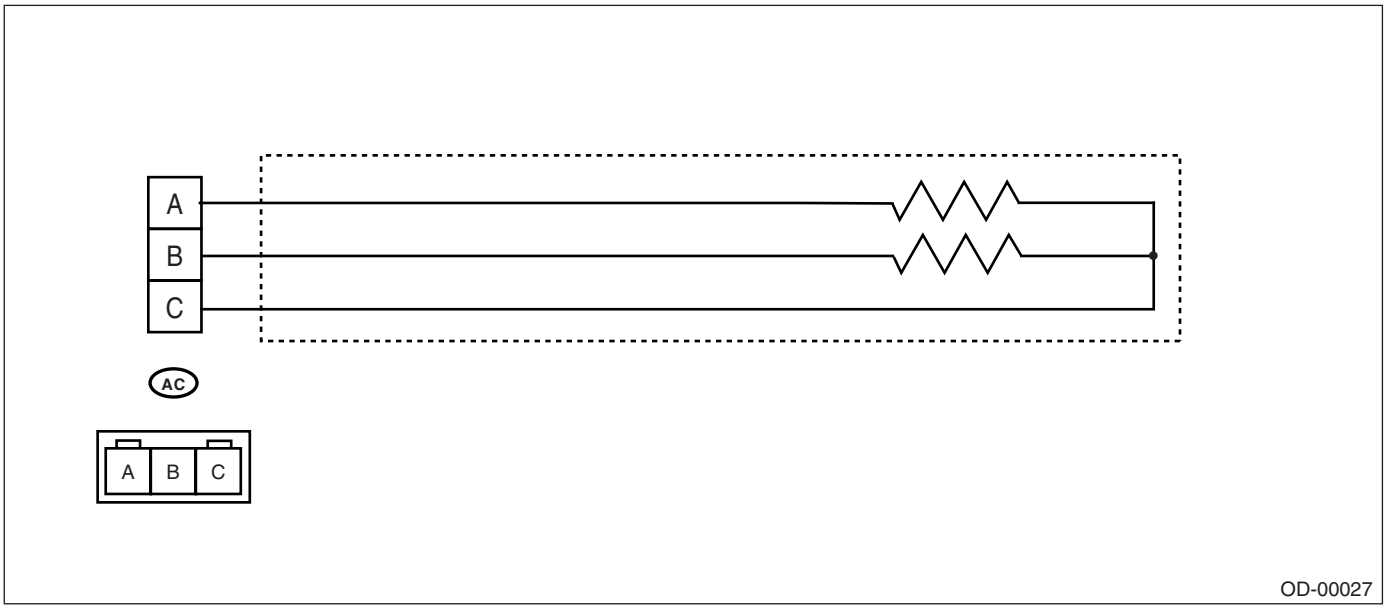
- TEST HARNESS AE

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299XA030	98299XA030	TEST HARNESS AE	TEST HARNESS Y ADAPTER HARNESS Used for diagnosing a failure of the seat belt buckle switch.

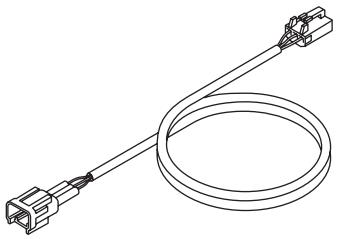


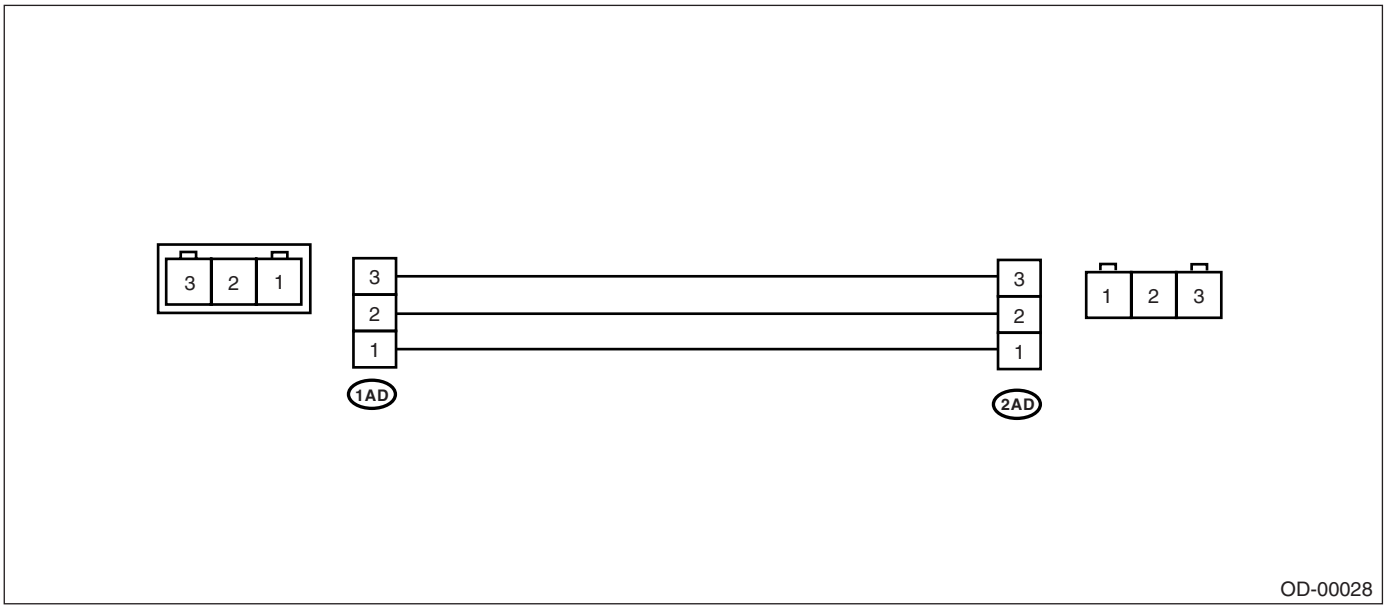
- TEST HARNESS AC

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299XA010	98299XA010	TEST HARNESS AC	Used for diagnosing a failure of the seat belt tension sensor.



- TEST HARNESS AD

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299XA020	98299XA020	TEST HARNESS AD	Used when measuring voltage and resistance of seat belt tension sensor.

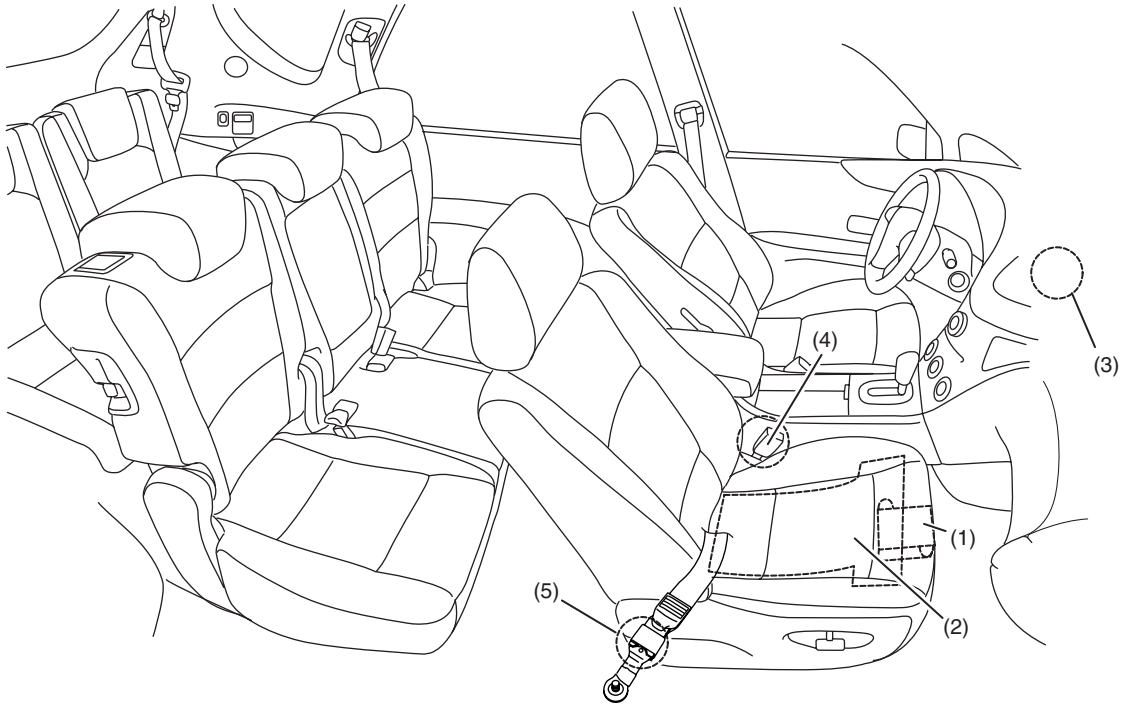


2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.

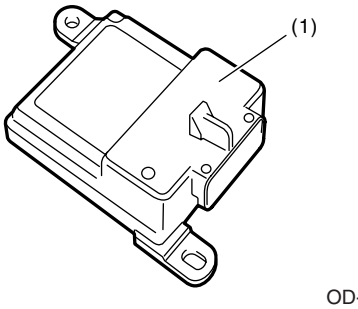
4. Electrical Component Location

A: LOCATION

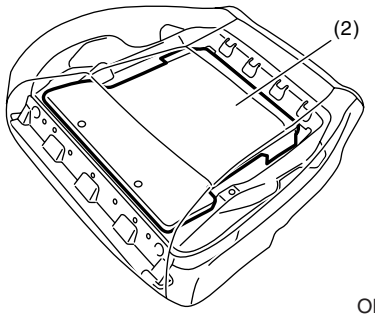


OD-00019

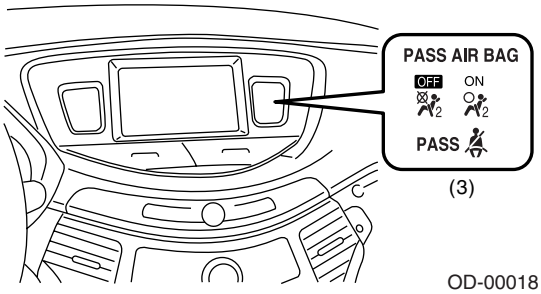
(1) Occupant detection control module
(2) Occupant detection sensor
(3) Airbag ON/OFF indicator light (Warning box)
(4) Buckle switch (Passenger's seat)
(5) Seat belt tension sensor



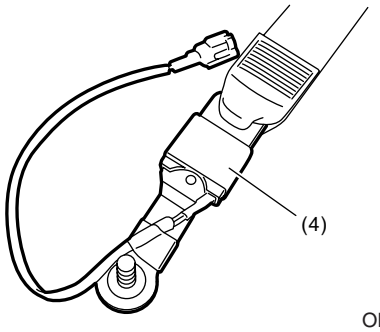
OD-00016



OD-00015



OD-00018



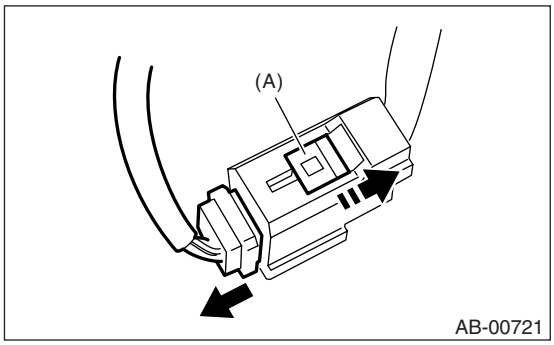
OD-00017

5. Airbag Connector

A: PROCEDURE

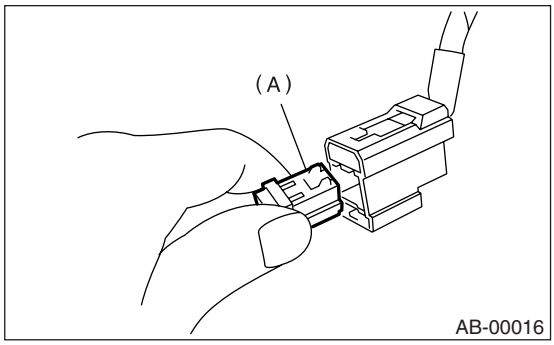
1. BUCKLE SWITCH

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 gently to make sure that it is locked.

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 tension sensor	(Vcc)	5	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 diagrams. <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 the DTC readout of the airbag system (diagnosis). <Ref. to AB(diag)-31, OPERATION, Subaru Select Monitor.>

NOTE:
• For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTCs, refer to the “List of Diagnostic Trouble Code (Airbag system, Occupant detection system).” <Ref. to AB(diag)-45, AIRBAG WARNING LIGHT REMAINS OFF, List of Diagnostic Trouble Code (DTC).> <Ref. to OD(diag)-25, List of Diagnostic Trouble Code (DTC).>

2. DISPLAY OF STATUS INFORMATION

Check the operating condition of each sensor in the event of malfunction in seat belt buckle switch and seat position sensor, or when the seat belt buckle switch and seat position sensor has been replaced.
1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Airbag System} and press the [YES] key.
3) On the «Airbag System» display screen, select the {Status Data} and press the [YES] key.
The following table is for support data.

Item	Display Contents
Seat position sensor LH	Front position *1/Rear position *2 /Other *3/Initial Setting *3 /— *5
Seat position sensor RH	— *5
Seat belt buckle switch LH	Buckled *6/Unbuckled *7 /Other *8/Initial Setting *4 /— *9
Seat belt buckle switch RH	Buckled *6/Unbuckled *7 /Other *8/Initial Setting *4 /— *9
Passenger’s airbag control status	ON *10/OFF *11 /Initial Setting *4

*1: The seat position is forward.
*2: The seat position is rearward.
*3: Displayed when data other than before and behind the seat, such as the breakdown etc, is input.
*4: Displayed when it is initial.
*5: Seat position sensor not supported
*6. Seat belt fastened
*7. Seat belt not fastened
*8: Displayed when data other than belt fastened or not fastened, such as breakdowns is input.
*9: Seat belt buckle switch not supported
*10: Passenger's seat air bag operating state
*11: Passenger's seat air bag non-operating state

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

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 the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Airbag System} and press the [YES] key.
3) On the {Airbag System} menu screen, select the {Clear Memory} and press the [YES] key.
4) When the "Clear Memory?" is shown on the screen, press the [YES] key.
5) When "Done" is displayed, turn the Subaru Select Monitor to OFF.

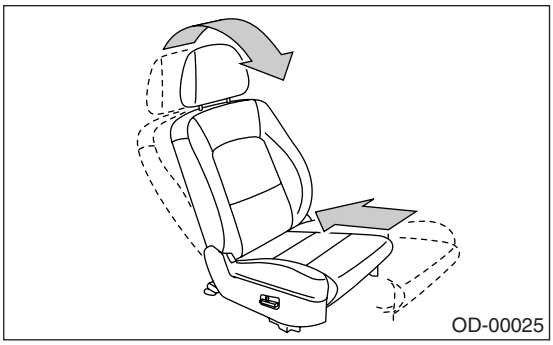
NOTE:
For details concerning operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".

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 the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
3) On the «System Selection Menu» display screen, select the {Occupant Detection System} and press the [YES] key.
4) On the Occupant Detection System display screen, select the {Zero Point Adjustment} and press the [YES] key.
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 press the [YES] key.



7) When the «Re-zeroing Unbelt the Passenger seatbelt Continue: YES, Quit: NO» is displayed, make sure the passenger's seatbelt is disconnected from the buckle and press the [YES] key.
8) When the «Re-zeroing Empty the passenger seat Continue: YES, Quit: NO» is displayed, make sure that the passenger's seat is empty, air bag OFF indicator illuminates and air bag ON indicator does not illuminate, and press the [YES] key.

NOTE:
• After pressing the [YES] key, «Now processing .... Wait for a while. Do not touch or give impact to vehicle and seat» 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 YES to END» is displayed, go to step 10).

9) When the re-zeroing is ended normally, the«Re-zeroing is successfully completed Press YES to END» is displayed. Press the [YES] key and turn the ignition switch to OFF to finish the diagnosis.

10) During the system calibration process, if the «Re-zeroing is unsuccessful See service manual Press YES to END» is displayed, turn the ignition switch to OFF once and turn it to ON again, and then read the DTC of airbag system. <Ref. to AB(diag)-31, 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)-18, 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 airbag system, and perform the diagnosis referring to “List of Diagnostic Trouble Code.” <Ref. to AB(diag)-31, OPERATION, Subaru Select Monitor.> <Ref. to AB(diag)-45, 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)-33, INSPECTION, Subaru Select Monitor.>

2. WITHOUT DTC

DETECTING CONDITION:
- Defective combination meter
- Open circuit of harness

TROUBLE SYMPTOM:
- Airbag warning light remains on.
- “NO TROUBLE CODE” will be displayed on the Subaru Select Monitor.

For detailed operation procedure, refer to “Airbag Warning Light Failure”. <Ref. to AB(diag)-40, Airbag Warning Light Failure.>

NOTE:
When the airbag warning light is OFF and “NO TROUBLE CODE” is displayed on Subaru Select Monitor, the system is in normal condition.

8. Read Diagnostic Trouble Code (DTC)

A: OPERATION

For details about reading of DTCs, refer to Airbag System (Diagnosis) Subaru Select Monitor. <Ref. to AB(diag)-31, Subaru Select Monitor.>

9. Inspection Mode

A: PROCEDURE

Recreate the circumstance by referring to the conditions described in the checklist.

10.Clear Memory Mode

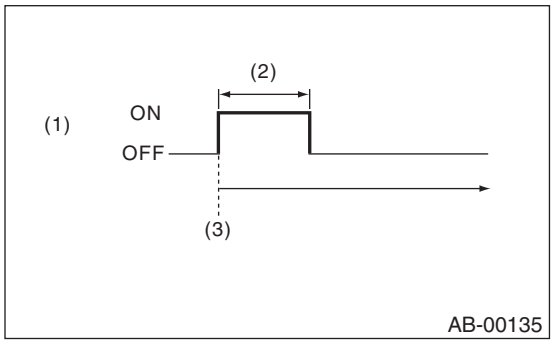
A: OPERATION

Clear the memory in the following steps after the malfunction is repaired.
For details to clear DTC, refer to Airbag System (Diagnosis) Subaru Select Monitor. <Ref. to AB(diag)-31, Subaru Select Monitor.>

11.Airbag Warning Light Illumination Pattern

A: INSPECTION

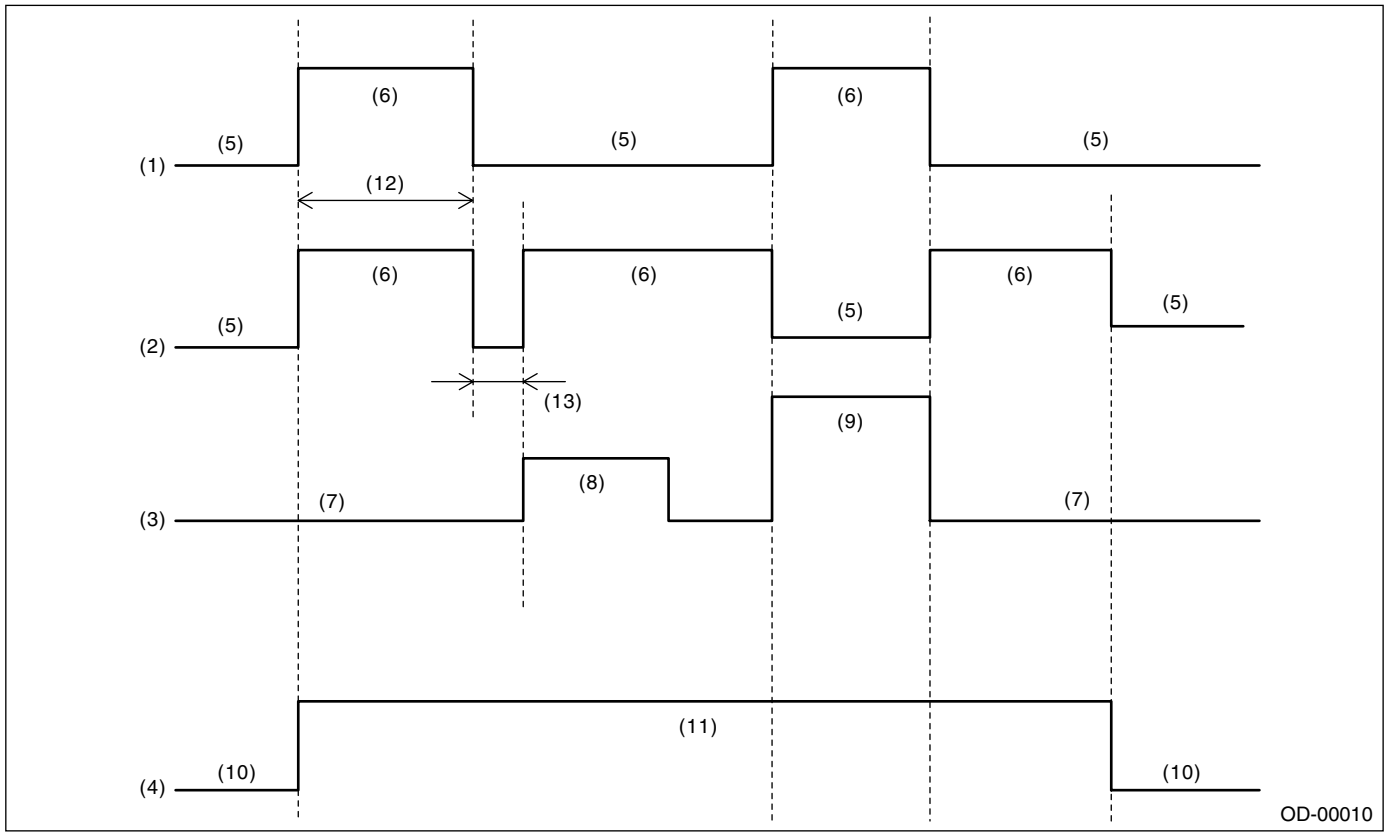
Turn the ignition switch to ON, and confirm that the airbag warning light remains on for approx. 6 seconds then go off afterwards.



(1) Airbag warning light
(2) Approx. 6 sec.
(3) Ignition switch ON

12.Passenger's Airbag ON/OFF Indicator Illumination Pattern

A: INSPECTION



(1) Passenger's airbag ON indicator light
(2) Passenger's airbag OFF indicator light
(3) Occupant seating
(4) Ignition switch
(5) Light OFF
(6) Light ON
(7) Empty
(8) Child
(9) Adult
(10) OFF
(11) ON
(12) Approx. 6 sec.
(13) Approx. 2 sec.

13.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Display	Content of diagnosis	Reference target
2A	Occupant Detection Calibration Failure	System calibration (Rezeroing) was not completed normally.	<Ref. to OD(diag)-26, DTC 2A OCCUPANT DETECTION CALIBRATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2B	ODS Erroneous Parts	• Wrong airbag control module was installed. • Wrong occupant detection system was installed. • Occupant detection system is faulty.	<Ref. to OD(diag)-26, DTC 2B ODS ERRONEOUS PARTS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2C	Belt Tension Sensor Failure	• Passenger's seat belt tension sensor is faulty. • Airbag main harness circuit is open or shorted. • Occupant detection system is faulty. • Occupant detection harness is faulty.	<Ref. to OD(diag)-27, DTC 2C BELT TENSION SENSOR FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
27	ODS Communication Error	• Occupant detection control module and airbag control module communication is faulty. • Airbag rear harness circuit is open, shorted, shorted to ground or shorted to power supply. • Occupant detection harness is faulty. • Occupant detection system is faulty. • Airbag control module is faulty.	<Ref. to OD(diag)-28, DTC 27 ODS COMMUNICATION ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
29	ODS Failure	• Occupant detection sensor is faulty. • Occupant detection control module is faulty. • Occupant detection harness is faulty. • Fuse No. 25 (in joint box) is blown.	<Ref. to OD(diag)-29, DTC 29 ODS FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
37	Buckle Switch RH Failure	• Passenger's seat buckle switch circuit is open, shorted or shorted to ground. • Occupant detection system is faulty. • Occupant detection harness is faulty.	<Ref. to OD(diag)-30, DTC 37 BUCKLE SWITCH RH FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

14.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 2A OCCUPANT DETECTION CALIBRATION FAILURE

DTC DETECTING CONDITION:

System calibration (Rezeroing) was not completed normally.

	Step	Check	Yes	No
1	**PERFORM RE-ZEROING.** Perform the system calibration using Subaru Select Monitor. <Ref. to OD(diag)-18, OPERATION, Subaru Select Monitor.>	Is the system calibration completed normally?	Finish the diagnosis.	Follow the system calibration procedures. <Ref. to OD(diag)-18, OPERATION, Subaru Select Monitor.>

B: DTC 2B ODS ERRONEOUS PARTS

DTC DETECTING CONDITION:

- Wrong airbag control module is installed.
- Wrong occupant detection system is installed.

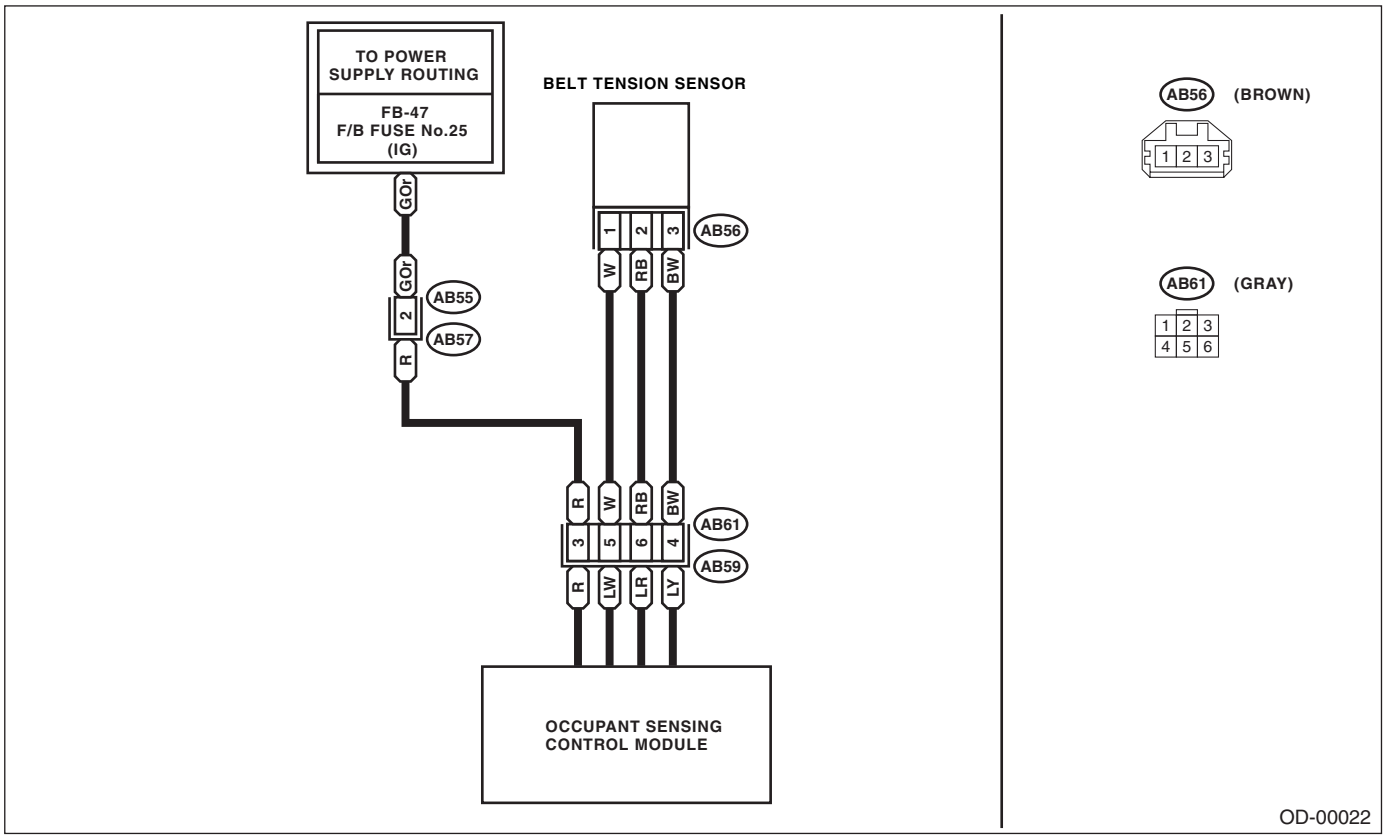
	Step	Check	Yes	No
1	**CHECK THE OCCUPANT DETECTION SYSTEM.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Replace the passenger's seat frame assembly. <Ref. to SE-7, REMOVAL, Front Seat.> <Ref. to SE-10, DISASSEMBLY, Front Seat.> 3) Connect the ground cable to battery. 4) Connect Subaru Select Monitor to the vehicle and perform the system calibration. <Ref. to OD(diag)-18, OPERATION, Subaru Select Monitor.>	Is the system calibration completed normally?	Finish the diagnosis.	Go to step **2**.
2	**CHECK AIRBAG CONTROL SYSTEM.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Replace the airbag control module. <Ref. to AB-17, REMOVAL, Side Airbag 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)-18, OPERATION, Subaru Select Monitor.>	Is the system calibration completed normally?	Finish the diagnosis.	Check between the occupant detection control module and airbag control module.

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
1	**CHECK POOR CONTACT OF CONNECTORS.** 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**.
2	**CHECK THE BELT TENSION SENSOR.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 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-10, REMOVAL, Front Seat Belt.>	Go to step **3**.

Step	Check	Yes	No
3 **CHECK THE AIRBAG HARNESS.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the test harness AC from the belt tension sensor connector (AB56). 3) Connect the test harness AD (1AD) to the connector (AB56). 4) Disconnect the airbag harness connector (AB61), and connect the connector (1AB) in test harness AB. 5) Measure the resistance between test harness terminals. ***Connector & terminal*** ***(2AB) No. 5 — (2AD) No. 1:*** ***(2AB) No. 4 — (2AD) No. 3:*** ***(2AB) No. 6 — (2AD) No. 2:***	Is the resistance less than 10 Ω?	Go to step **4**.	Replace the airbag harness with chassis harness.
4 **CHECK THE AIRBAG HARNESS.** Measure the resistance between test harness terminals, and between test harness terminal and chassis ground. ***Connector & terminal*** ***(2AB) No. 4 — (2AD) No. 1:*** ***(2AB) No. 4 — (2AD) No. 2:*** ***(2AB) No. 4 — chassis ground:*** ***(2AB) No. 5 — (2AD) No. 2:*** ***(2AB) No. 5 — chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace the airbag harness with chassis harness.
5 **CHECK THE AIRBAG HARNESS.** 1) Connect the battery ground terminal and turn the ignition switch to ON. 2) Measure the voltage between test harness and chassis ground. ***Connector & terminal*** ***(2AD) No. 1 — chassis ground:*** ***(2AD) No. 3 — chassis ground:***	Is the voltage less than 1 V?	Replace the airbag harness 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-10, DISASSEMBLY, Front Seat.>

D: DTC 27 ODS COMMUNICATION ERROR

Perform the diagnosis following diagnostic procedure for airbag system. <Ref. to AB(diag)-70, DTC 27 ODS COMMUNICATION ERROR, Diagnostic Chart with Trouble Code.>

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.

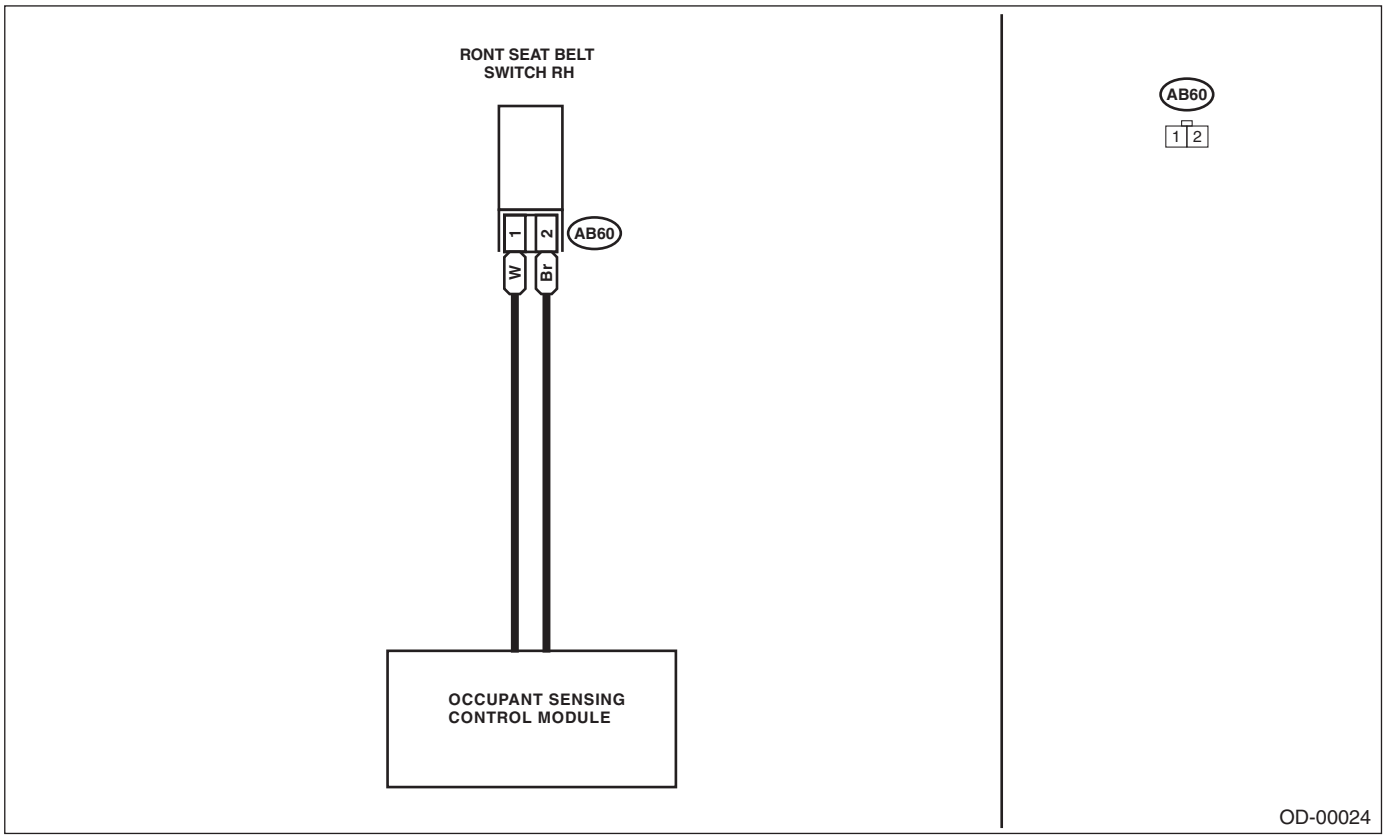
	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** Check for poor contact of the connectors between the occupant detection control module and airbag control module.	Is there poor contact?	Reconnect the connector. If the fault is not fixed, replace the airbag harness.	Go to step **2**.
2	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).** 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-10, DISASSEMBLY, Front Seat.>

F: DTC 37 BUCKLE SWITCH RH FAILURE

DTC DETECTING CONDITION:

- Passenger's seat 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:

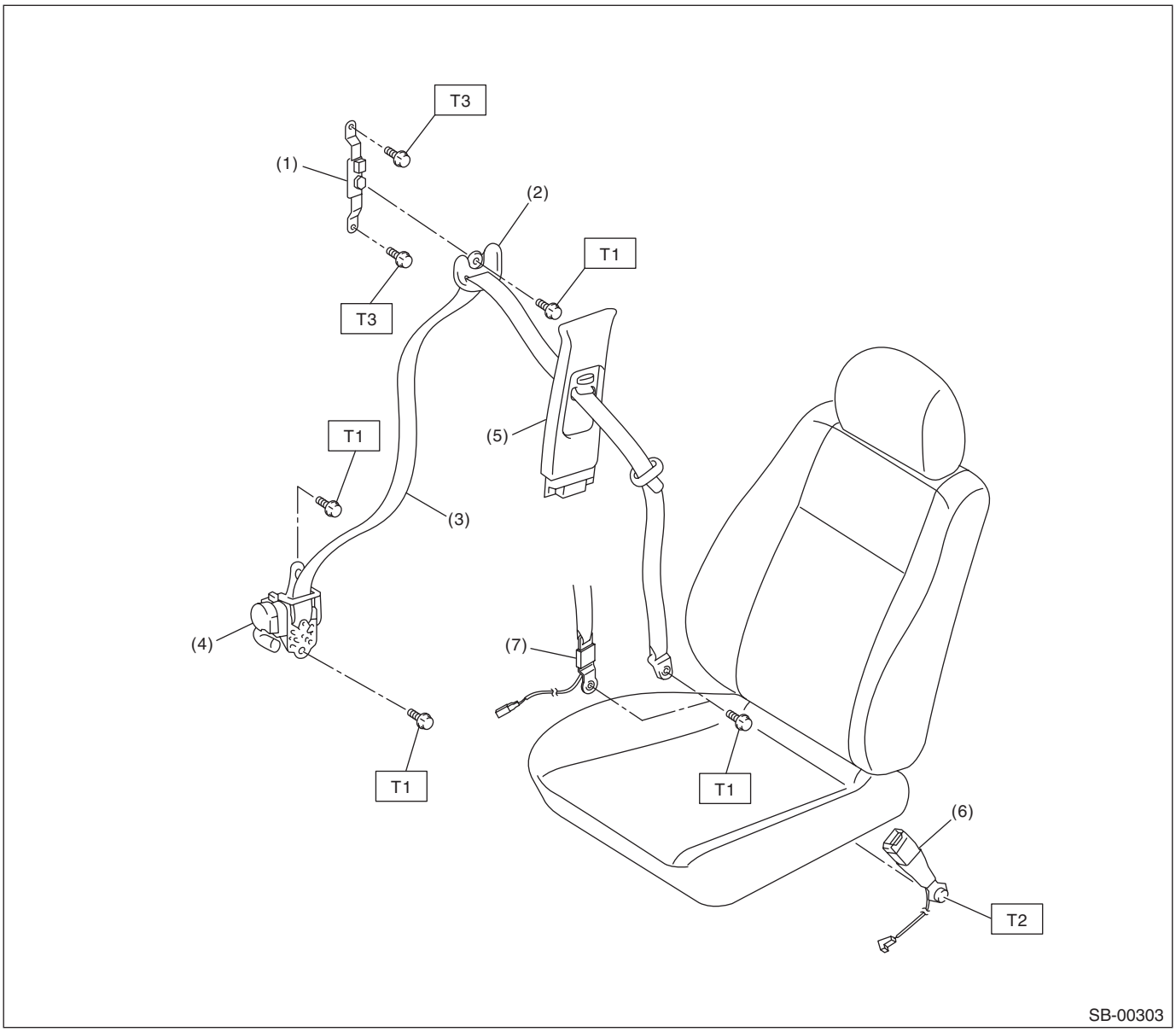


	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTORS.** Check for poor contact of the connectors between the occupant detection control module and buckle switch.	Is there poor contact?	Reconnect the connector. If the fault is not fixed, replace the airbag harness.	Go to step **2**.
2	**CHECK THE BUCKLE SWITCH.** 1) Turn the ignition switch to OFF, disconnect the battery ground terminal, and wait for 20 seconds. 2) Disconnect the buckle switch connector (AB60). 3) Connect the test harness AE1 and test harness connector Y to the 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-10, 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.

1. General Description

A: COMPONENT

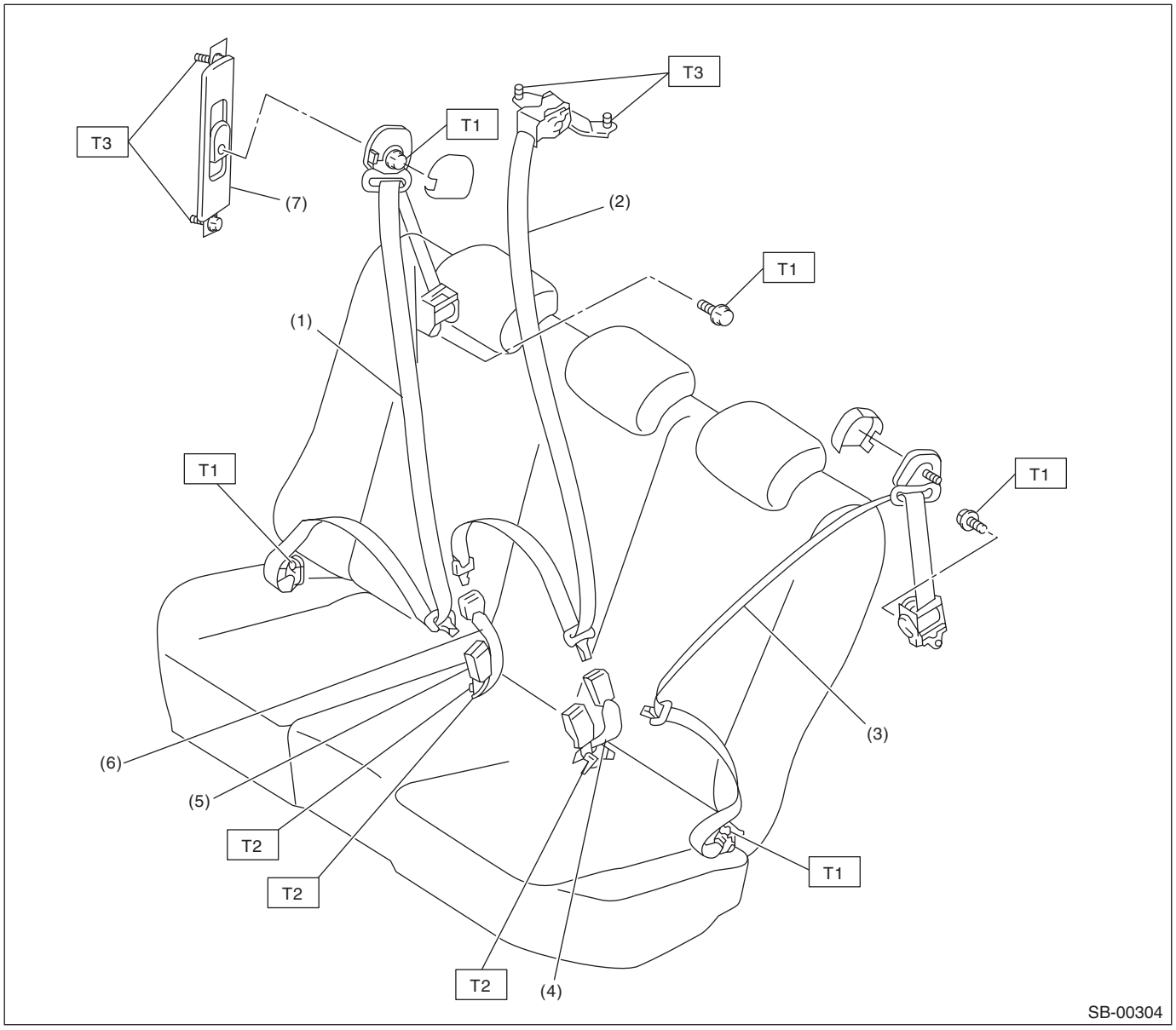
1. FRONT SEAT BELT



(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)

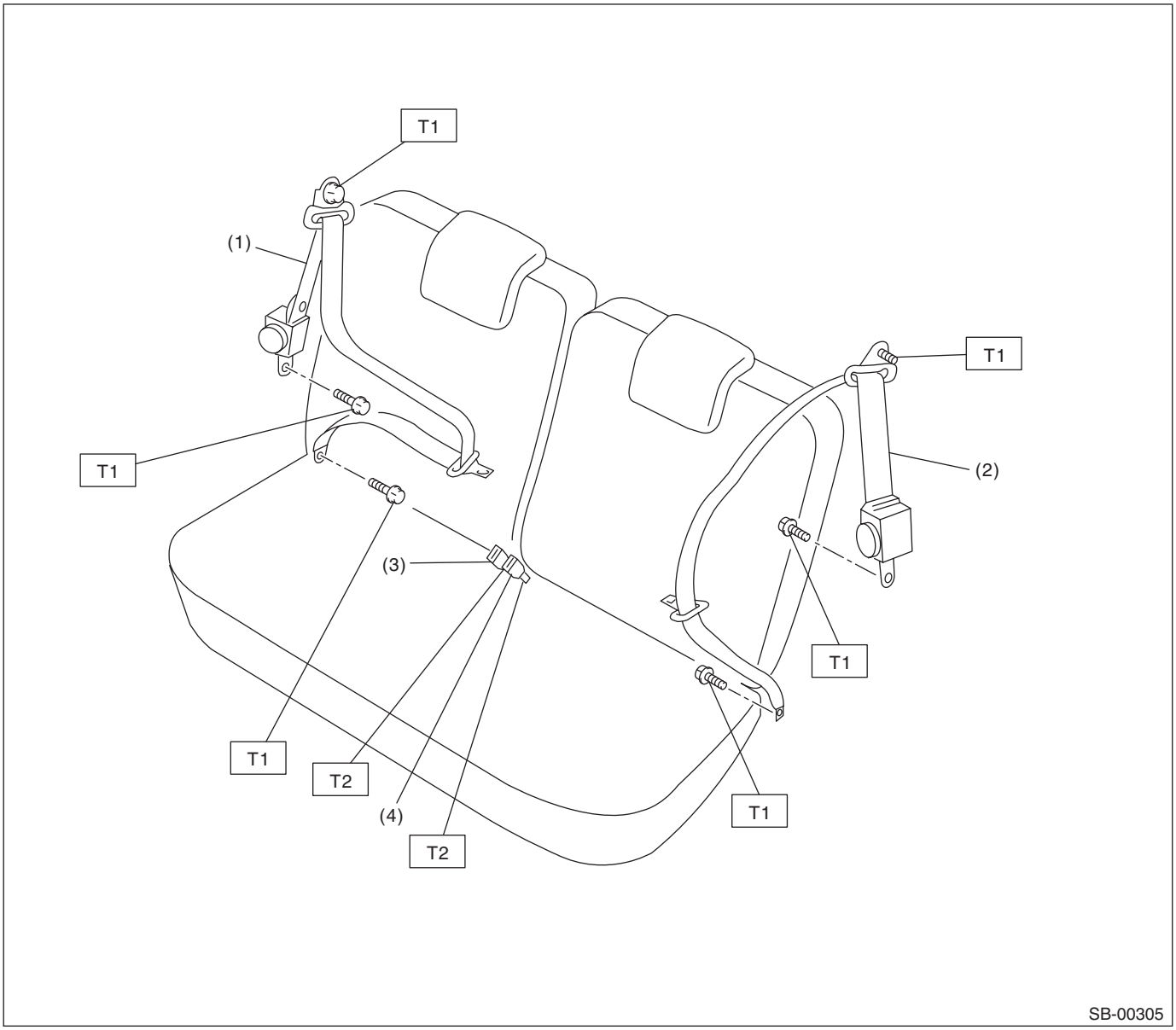
Tightening torque: N·m (kgf-m, ft-lb)
T1: 30 (3.1, 22)
T2: 38 (3.9, 28)
T3: 53 (5.4, 39)

2. SECOND SEAT BELT



(1)	Outer seat belt RH ASSY	(5)	Inner seat belt RH ASSY	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Shoulder seat belt center ASSY	(6)	Shoulder seat belt center buckle ASSY	***T1: 30 (3.1, 22)***
(3)	Outer seat belt LH ASSY			***T2: 38 (3.9, 28)***
(4)	Inner seat belt LH ASSY	(7)	Adjustable anchor ASSY	***T3: 53 (5.4, 39)***

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 20 seconds or more.
• The pretensioner system has a backup power source. The pretensioner might deploy if you do not wait for 20 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 one.
• 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. GENERAL TOOL

TOOL NAME	REMARKS
TORX® T50	Used for removing and installing the inner seat belt assembly.

2. Pretensioner Connector

A: PROCEDURE

Refer to air bag connectors in the airbag section.
<Ref. to AB-9, 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.
- Wire harness and connector are damaged.

4. Seat Belt Warning System

A: WIRING DIAGRAM

<Ref. to WI-84, WIRING DIAGRAM, Seat Belt Warning System.>

B: INSPECTION

TROUBLE SYMPTOM:

- Driver's side seat belt warning light does not turn on or off.
- Warning buzzer does not beep.

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED MODULE.** 1) Connect the Subaru Select Monitor to the data link connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Turn the Subaru Select Monitor power to ON. 4) Read the data of the driver's seat belt switch using the Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the seat belt switch display OFF?	Go to step **2**.	Go to step **6**.
2	**CHECK SEAT BELT WARNING LIGHT.** Read the data of driver's seat belt warning light using the Subaru Select Monitor.	Is the seat belt warning light display ON?	Go to step **3**.	Check the harness between combination meter and body integrated unit.
3	**CHECK BODY INTEGRATED MODULE.** 1) Connect the driver's seat belt. 2) Read the data of driver's seat belt switch using Subaru Select Monitor.	Is the seat belt switch display ON?	Go to step **4**.	Go to step **6**.
4	**CHECK SEAT BELT WARNING LIGHT.** Read the data of driver's seat belt warning light using the Subaru Select Monitor.	Is the seat belt warning light display OFF? Also, is the seat belt warning light in the combination meter gone off?	Go to step **5**.	Check the harness between ignition switch and body integrated unit.
5	**CHECK SEAT BELT WARNING BUZZER.** 1) Connect the driver's seat belt. 2) Turn the ignition switch to ON.	Does the buzzer beep?	Go to step **6**.	Replace the body integrated unit.
6	**CHECK DRIVER'S SEAT BELT BUCKLE SWITCH.** 1) Insert the tongue plate to the driver's seat belt buckle. 2) Measure the voltage between connector (R8) and chassis ground. ***Connector & terminal*** ***(R8) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Repair the harness between driver's seat buckle switch and chassis ground.
7	**CHECK DRIVER'S SEAT BELT BUCKLE SWITCH.** 1) Disconnect the connector (R8) from driver's seat inner seat belt assembly. 2) Measure the resistance between connector (R8) terminals and chassis ground. ***Connector & terminal*** ***(R8) No. 1 — Chassis ground:*** ***(R8) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Replace the driver's seat inner belt. <Ref. to SB-10, Front Seat Belt.>
8	**CHECK BODY HARNESS.** Measure the voltage between connector (R167) and chassis ground. ***Connector & terminal*** ***(R167) No. 11 (+) — Chassis ground (–):***	Is the voltage more than 10 V? Also, does the seat belt warning light come on?	Go to step **9**.	Repair or replace the driver's seat inner belt and body harness.

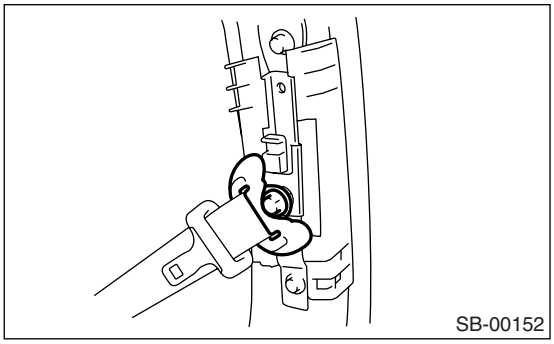
	Step	Check	Yes	No
9	**CHECK BODY INTEGRATED MODULE.** Measure the voltage between connector (i84) and chassis ground. ***Connector & terminal*** ***(i84) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **10**.	Check the body integrated unit.
10	**CHECK COMBINATION METER.** Measure the voltage between connector (R167) and chassis ground. ***Connector & terminal*** ***(R167) No. 20 (+) — Chassis ground (–):***	Is the voltage more than 10 V? Also, does the seat belt warning light come on?	Go to step **11**.	Replace the body integrated unit.
11	**CHECK COMBINATION METER.** Measure the voltage between connector (i10) and chassis ground. ***Connector & terminal*** ***(i10) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 10 V? Also, does the seat belt warning light come on?	Go to step **12**.	Check the combination meter.
12	**CHECK SEAT BELT WARNING SYSTEM.** 1) Disconnect the driver's seat belt. 2) Turn the ignition switch to ON.	Does the seat belt warning buzzer beep and warning light blink for 6 seconds after turning the ignition switch to ON?	Go to step **13**.	Replace the body integrated unit.
13	**CHECK SEAT BELT WARNING SYSTEM.** Wait for 6 seconds from the step 12 condition (seat belt warning buzzer beeps and warning light blinks).	Does the seat belt warning light repeat illuminating/blinking every 15-seconds, and the warning buzzer beep?	Go to step **14**.	Replace the body integrated unit.
14	**CHECK SEAT BELT WARNING SYSTEM.** Connect the driver's seat belt buckle in the step 13 condition (seat belt warning light repeat illuminating/blinking every 15-seconds, and warning buzzer beeps).	Does the seat belt warning light go off and the buzzer stop?	Go to step **15**.	Replace the body integrated unit.
15	**CHECK SEAT BELT WARNING SYSTEM.** Disconnect the driver's seat belt.	Does the seat belt warning light repeat illuminating/ blinking every 15-seconds?	Go to step **16**.	Replace the body integrated unit.
16	**CHECK SEAT BELT WARNING SYSTEM.** 1) Lift-up the vehicle. NOTE: Raise all wheels off floor. 2) Start the engine, and set the vehicle speed to more than 15 km/h (9 MPH). NOTE: When there is a speed difference between front and rear wheels, the ABS or VDC warning may light, but this does not indicate a malfunction. When diagnosis is complete, perform clear memory for VDC. <Ref. to VDC(diag)-16, OPERATION, Subaru Select Monitor.>	Does the seat belt warning light repeat illuminating/ blinking every 15-seconds?	Go to step **17**.	Replace the body integrated unit.
17	**CHECK SEAT BELT WARNING SYSTEM.** Connect the driver's seat belt in the step 16 condition.	Does the seat belt warning light go off and the buzzer stop?	Go to step **18**.	Replace the body integrated unit.
18	**Seat Belt Warning System** Disconnect the driver's seat belt in the step 17 condition.	Does the seat belt warning light repeat illuminating/ blinking every 15-seconds?	Go to step **19**.	Replace the body integrated unit.
19	**CHECK SEAT BELT WARNING SYSTEM.** Connect the driver's seat belt.	Does the seat belt warning light go off and the buzzer stop?	A temporary contact failure.	Replace the body integrated unit.

5. Front Seat Belt

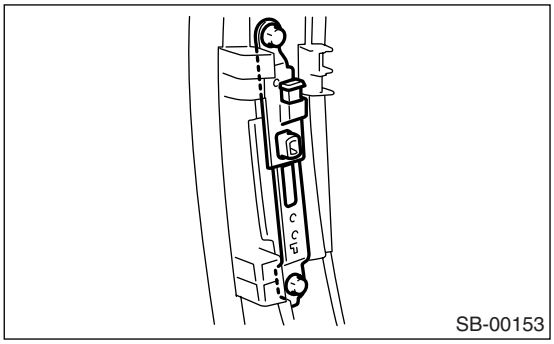
A: REMOVAL

1. OUTER SEAT BELT ASSEMBLY

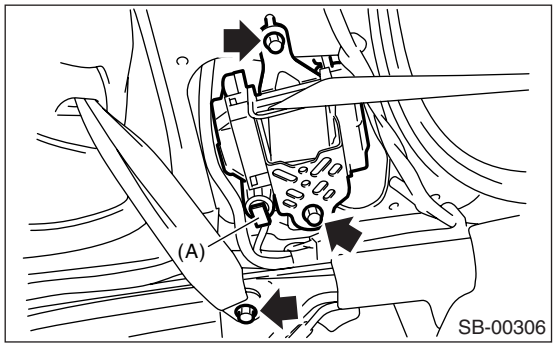
1) Fold the backrest all the way forward, and then move the front seat all the way forward.
2) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds.
3) Remove the center pillar lower trim and center pillar upper trim. <Ref. to EI-44, CENTER PILLAR LOWER TRIM, REMOVAL, Side Trim.> <Ref. to EI-44, CENTER PILLAR UPPER TRIM, REMOVAL, Side Trim.>
4) Remove the bolt, and then remove the shoulder anchor.


SB-00152

5) Remove the bolt, and then remove the adjustable anchor assembly.

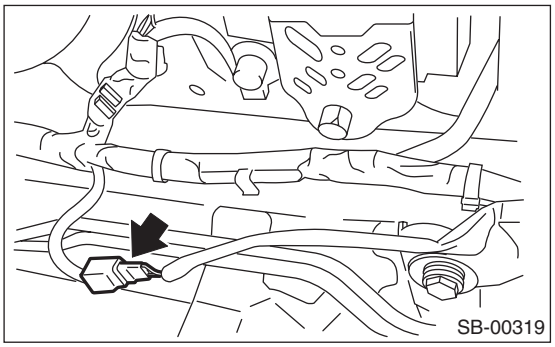

SB-00153

6) Disconnect connector (A) of the pretensioner, and remove the lower anchor bolt and seat belt retractor.



SB-00306

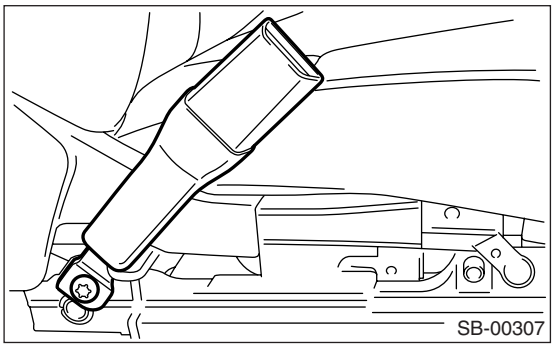
7) On the passenger side, disconnect connector of the belt tension sensor.


SB-00319

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 more than 20 seconds.
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.


SB-00307

B: INSTALLATION

1. OUTER SEAT BELT ASSEMBLY

Install in the reverse order of removal.

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.

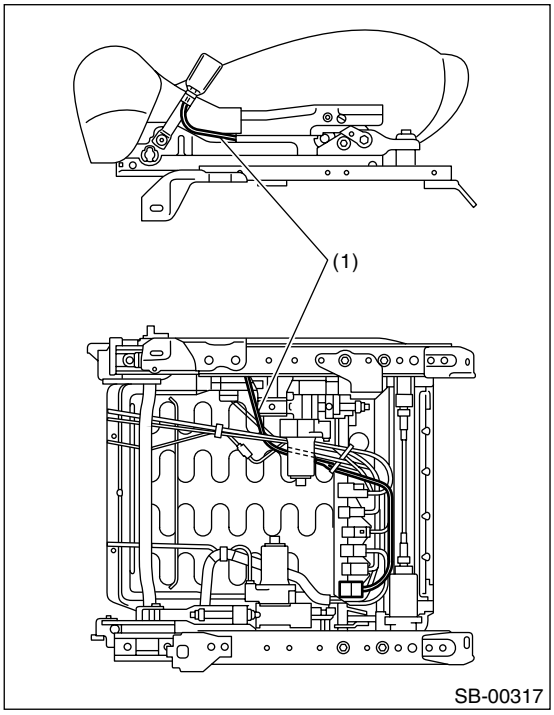
Tightening torque:
<Ref. to SB-2, FRONT SEAT BELT, COMPONENT, General Description.>

2. INNER SEAT BELT ASSEMBLY

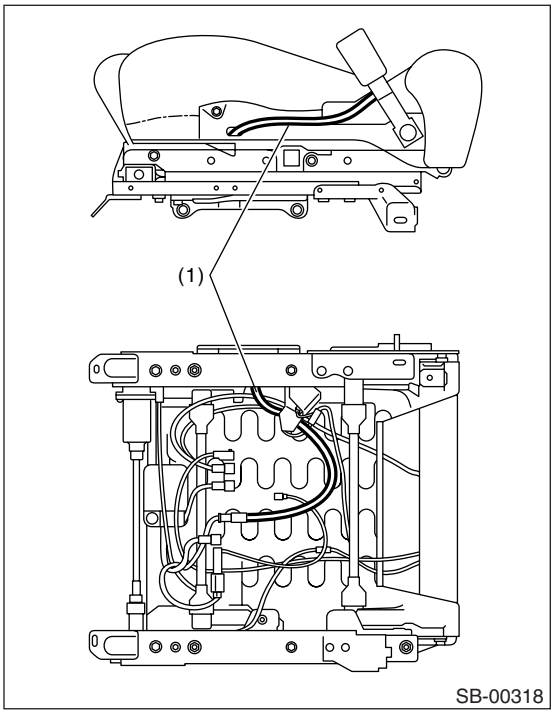
Install in the reverse order of removal.

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 in {Status Data} of "Airbag System". <Ref. to AB(diag)-32, 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**



Tightening torque:
<Ref. to SB-2, FRONT SEAT BELT, COMPONENT, General Description.>

C: INSPECTION

1. OUTER SEAT BELT ASSEMBLY

Check for the following, and replace with new parts if necessary.
• Pretensioner is cracked or deformed.
• The belt tension sensor is cracked. Or deformed.
• Seat belt is slackened, bent or worn. Seat belt is abnormally wound or extended.

2. INNER SEAT BELT ASSEMBLY

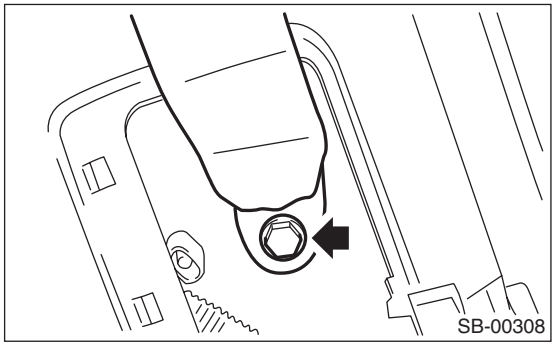
Check for the following, and replace with new parts if necessary.
• Inner seat belt assembly is deformed or damaged.
• Seat belt buckle cannot be engaged properly.

6. Second Seat Belt

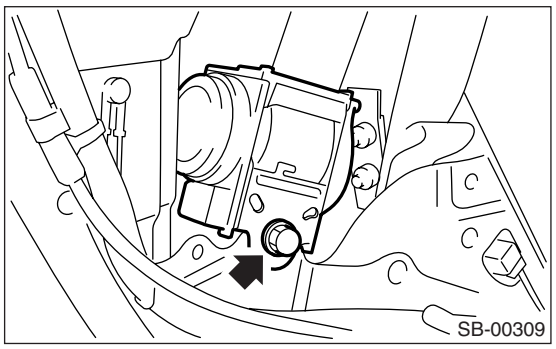
A: REMOVAL

1. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY

1) Remove the second row seats. <Ref. to SE-12, REMOVAL, Second-row Seats.>
2) Remove the third-row seats. <Ref. to SE-17, REMOVAL, Third-row Seats.>
3) Remove the rear quarter trim. <Ref. to EI-45, REMOVAL, Rear Quarter Trim.>
4) Remove the lower anchor bolt.

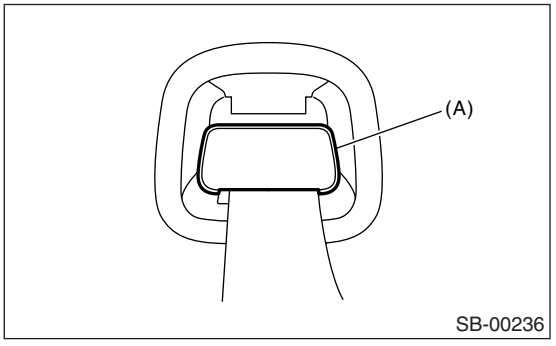

SB-00308

5) Remove the bolt to remove outer seat belt retractor.


SB-00309

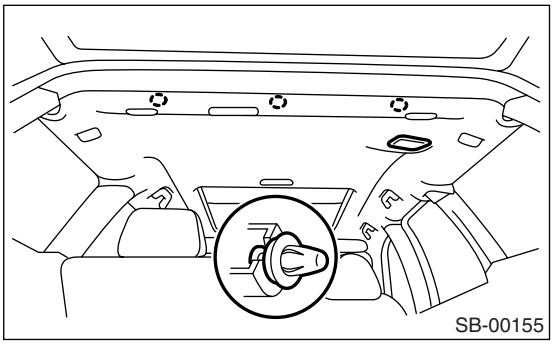
2. SHOULDER SEAT BELT CENTER ASSEMBLY

1) Remove the rear quarter trim. <Ref. to EI-45, REMOVAL, Rear Quarter Trim.>
2) Remove the cover (A) from roof trim, and then insert it to the inside of roof trim.



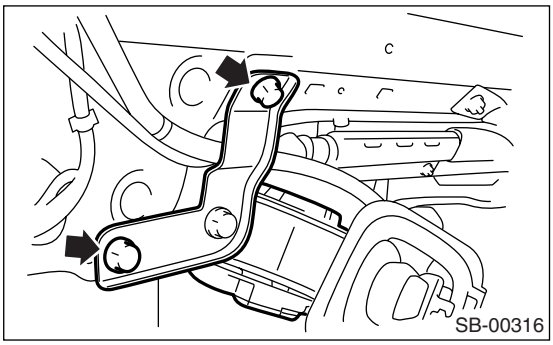
SB-00236

3) Remove the clips, and then lower the roof trim end.


SB-00155

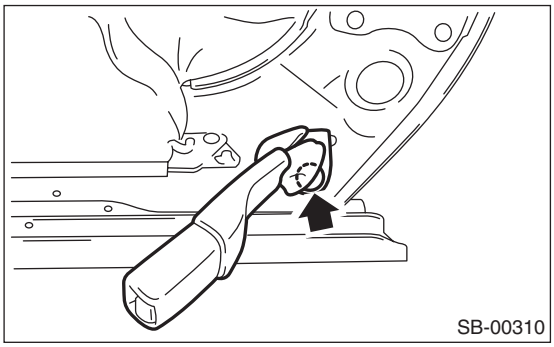
CAUTION:
When removing the roof trim clip, do not pull the roof trim end backward with excessive force, otherwise roof trim may be damaged.

4) Remove the bolt to remove the seat belt retractor.


SB-00316

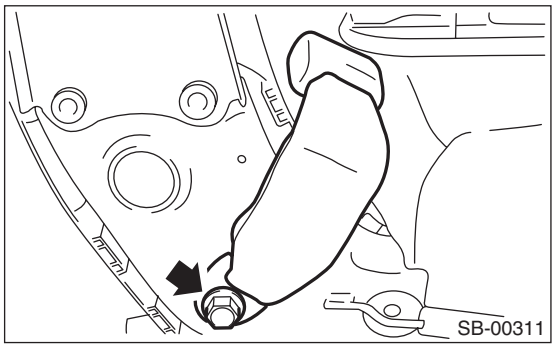
3. INNER SEAT BELT RH ASSEMBLY

1) Remove the RH second-row seat assembly. <Ref. to SE-12, LH&CTR SEAT, REMOVAL, Second-row Seats.>
2) Remove the LH hinge outer cover.
3) Remove the bolt, and then detach the inner belt assembly.


SB-00310

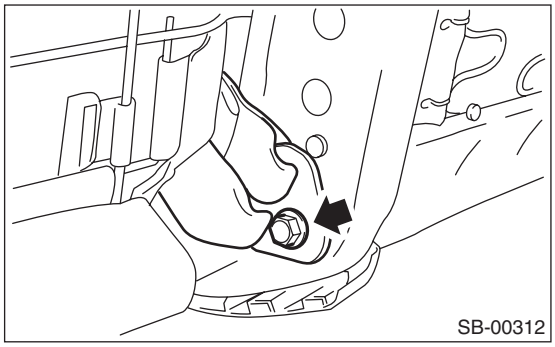
4. SHOULDER SEAT BELT CENTER BUCKLE

1) Remove the LH second-row seat assembly. <Ref. to SE-12, LH&CTR SEAT, REMOVAL, Second-row Seats.>
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-12, LH&CTR SEAT, REMOVAL, Second-row Seats.>
2) Remove the bolt from the back of the seat cushion, and then detach the inner belt assembly.



B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
When installing, be careful of the routing of the seatbelt, and make sure that the belt is not twisted.

C: INSPECTION

Check for the following, and replace with new parts if necessary.

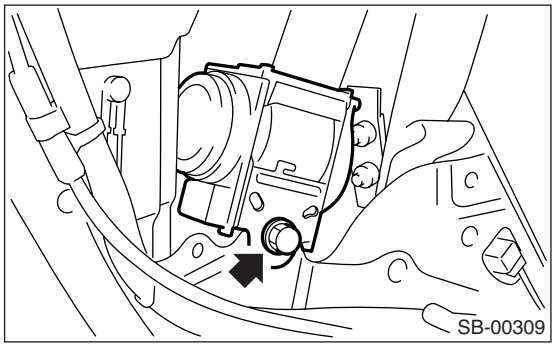
- Seat belt is slackened, bent or worn. Seat belt is abnormally wound or extended.
- Inner belt is deformed or damaged.
- Seat belt buckle cannot be engaged properly.

7. Third Seat Belt

A: REMOVAL

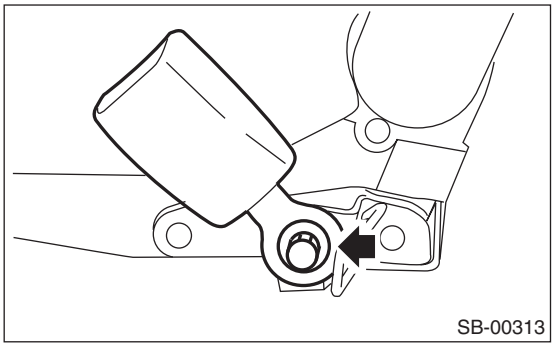
1. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY

1) Remove the third-row seats. <Ref. to SE-17, REMOVAL, Third-row Seats.>
2) Remove the rear quarter trim. <Ref. to EI-45, 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-17, REMOVAL, Third-row Seats.>
2) Remove the bolt, and then detach the inner seat belt assembly.



B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
When installing, be careful of the routing of the seatbelt, and make sure that the belt is not twisted.

C: INSPECTION

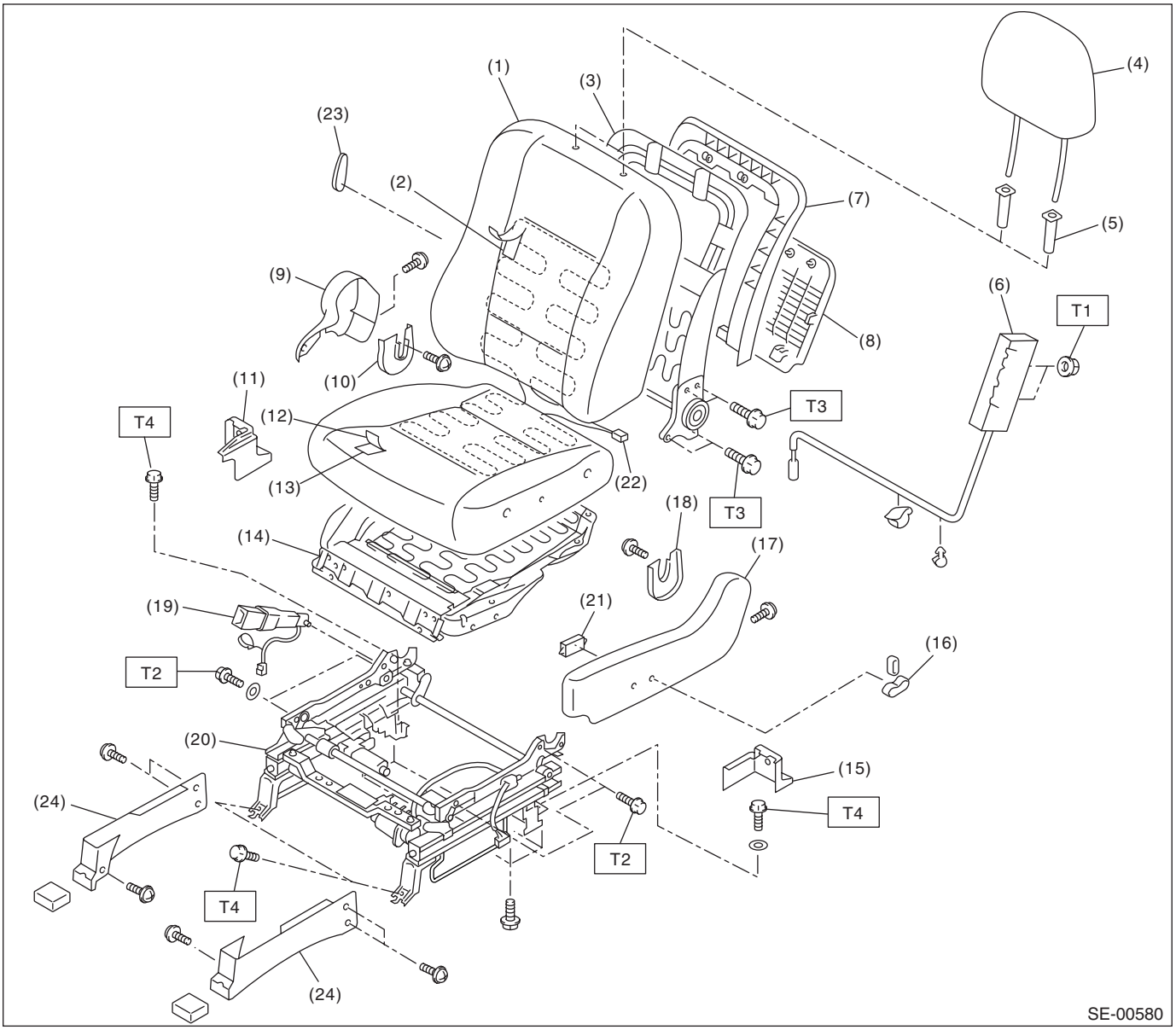
Check for the following, and replace with new parts if necessary.

- 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.

1. General Description

A: COMPONENT

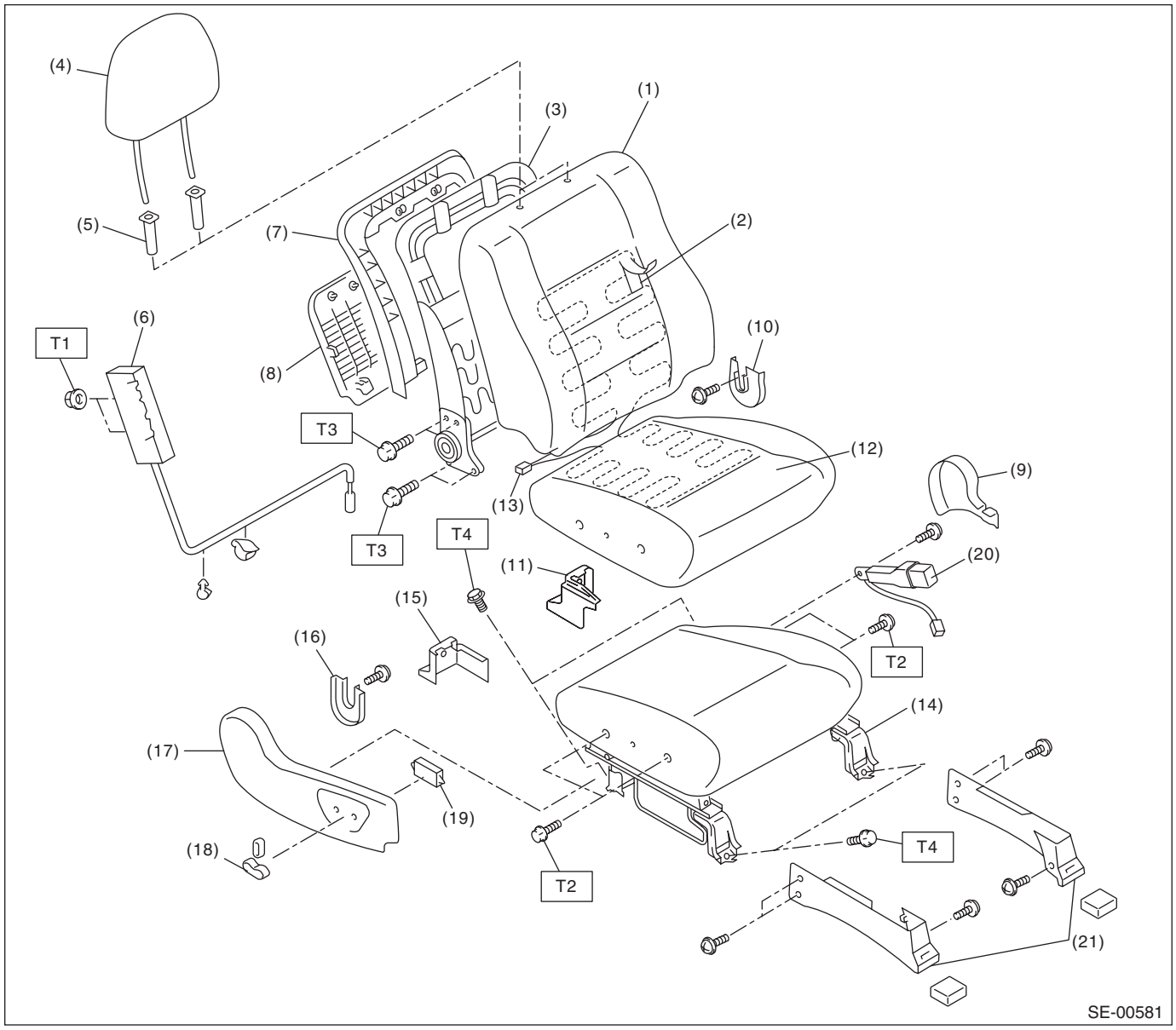
1. FRONT SEAT (DRIVER'S SEAT)



(1) Backrest cover
(2) Backrest pad
(3) Backrest frame ASSY
(4) Headrest ASSY
(5) Headrest lock bushing
(6) Side airbag module
(7) Cover frame
(8) Backrest back cover
(9) Seat side cover inside
(10) Hinge inner cover RH
(11) Rear leg cover inside
(12) Seat cushion cover
(13) Seat cushion pad
(14) Seat cushion frame ASSY
(15) Rear leg cover outside
(16) Power seat switch knob
(17) Seat side cover outside
(18) Hinge inner cover LH
(19) Inner seat belt ASSY
(20) Slide rail ASSY
(21) Power seat switch unit
(22) Seat heater unit
(23) Lumber support lever
(24) Slide rail cover

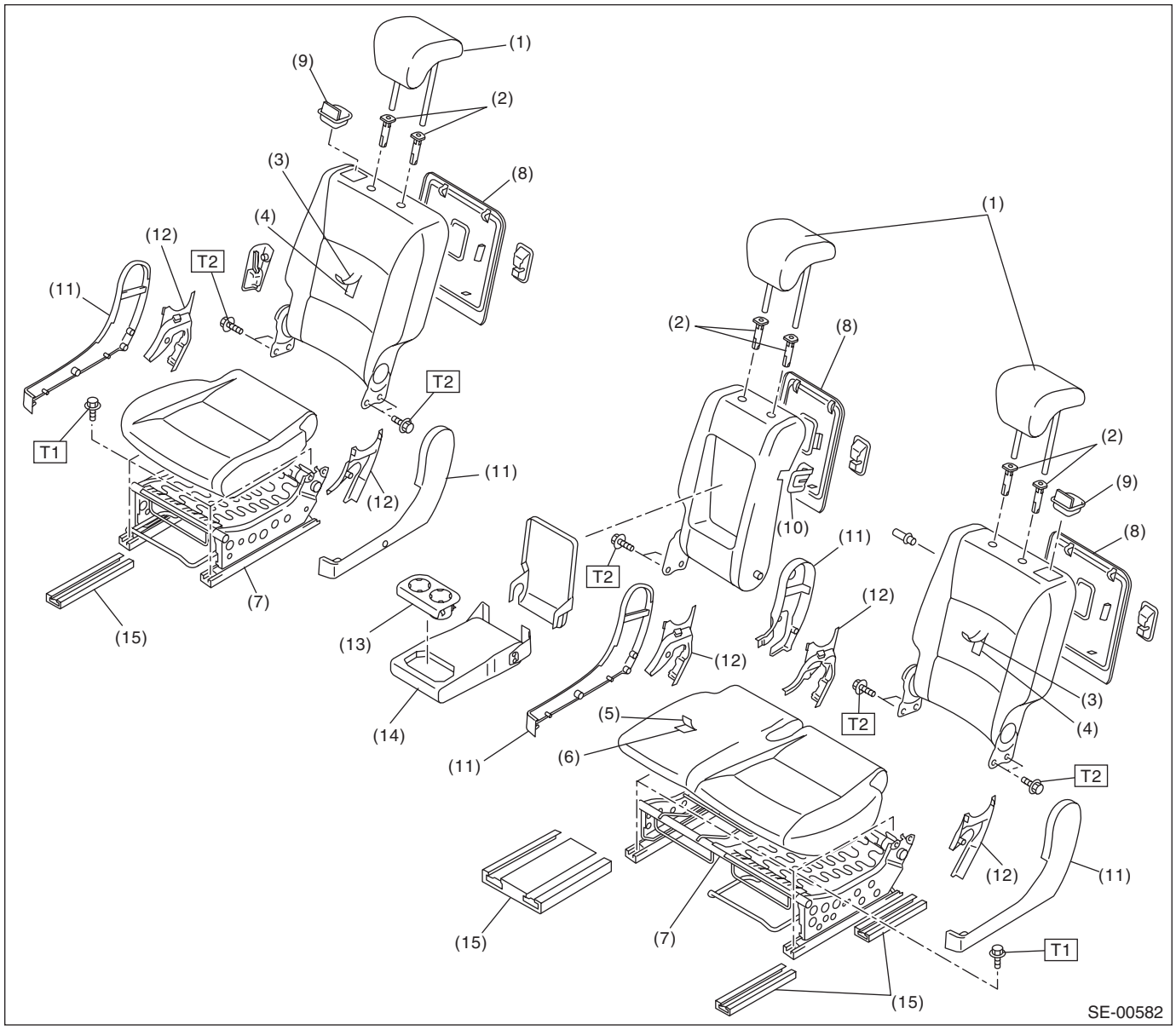
Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.61, 4.43)
T2: 17.6 (1.79, 12.7)
T3: 52 (5.30, 37.6)
T4: 53 (5.40, 38.3)

2. FRONT SEAT (DRIVER'S SEAT)



(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 & frame ASSY	***Tightening torque: N·m (kgf-m, ft-lb)***	
(6)	Side airbag module	(15)	Rear leg cover outside	***T1: 6 (0.61, 4.43)***	
(7)	Cover frame	(16)	Hinge inner cover RH	***T2: 17.6 (1.79, 12.7)***	
(8)	Backrest back cover	(17)	Seat side cover outside	***T3: 52 (5.30, 37.6)***	
(9)	Seat side cover inside	(18)	Power seat switch knob	***T4: 53 (5.40, 38.3)***	

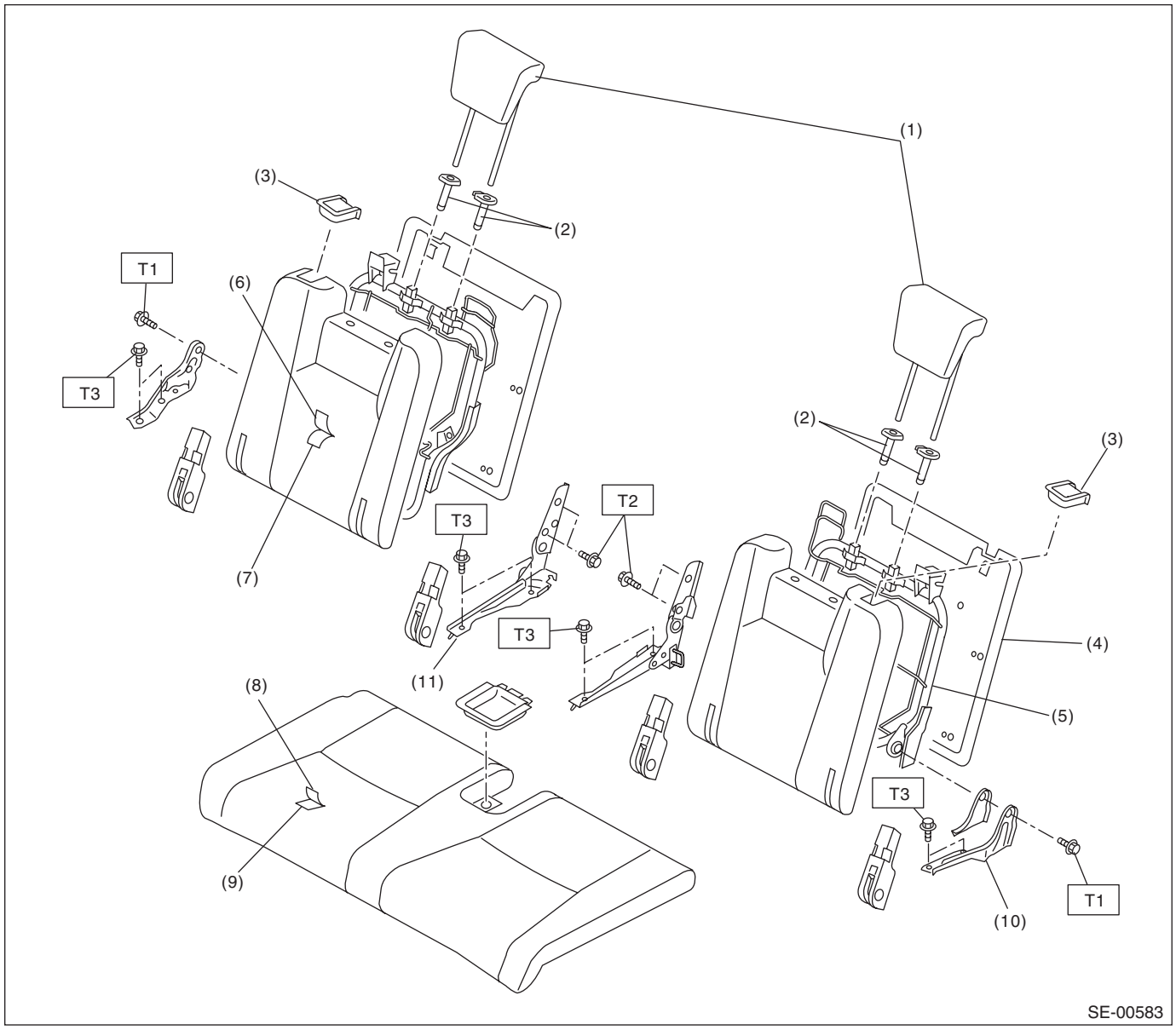
3. SECOND-ROW SEATS



(1) Headrest
(2) Lock bushing
(3) Backrest cover
(4) Backrest pad
(5) Seat cushion cover
(6) Seat cushion pad
(7) Slide rail ASSY
(8) Backrest back cover
(9) Holder
(10) Seat back latch cover
(11) Hinge outer cover
(12) Hinge inner cover
(13) Cup holder
(14) Armrest
(15) Slide rail cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 40 (4.08, 28.9)
T2: 52 (5.30, 37.6)

4. THIRD-ROW SEATS



(1) Headrest
(2) Headrest lock bushing
(3) Hinge lever ASSY
(4) Backrest back cover
(5) Backrest frame
(6) Backrest cover
(7) Backrest pad
(8) Seat cushion cover
(9) Seat cushion pad
(10) Hinge plate
(11) Inner hinge ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.01, 7.23)
T2: 52 (5.30, 37.6)
T3: 53 (5.40 38.3)

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)-18, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>
Failure to do so may cause improper operation of the passenger detection system.
• 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 from a side airbag loaded vehicle, follow cautions given in the airbag section. <Ref. to AB-4, CAUTION, General Description.>

C: PREPARATION TOOL

1. GENERAL TOOL

TOOL NAME	REMARKS
Long nose plier	Used for removing the hog ring.
Hog ring pliers	Used for installing the hog ring.
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 source. After disconnecting the battery ground cable, the airbag may deploy if you do not wait for 20 seconds before starting the service of airbag system.

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 more than 20 seconds 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 more than 20 seconds 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 belt anchor cover.

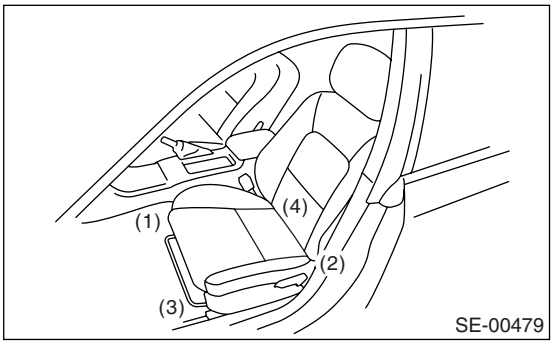
NOTE:
Tilt the seat back all the way to provide workspace.

8) Remove the seat from vehicle.

B: INSTALLATION

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.



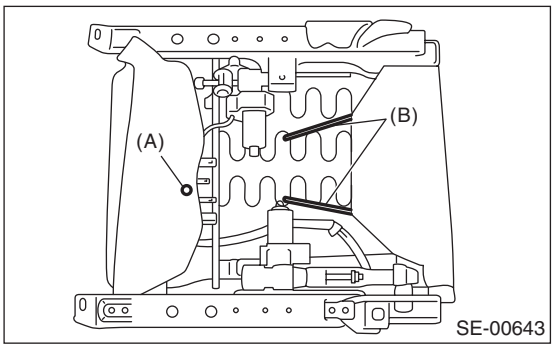
CAUTION:
After installing the driver's seat, use the Subaru Select Monitor to confirm that the seat position sensor LH is operating properly. <Ref. to AB(diag)-32, DISPLAY OF STATUS INFORMATION, OPERATION, Subaru Select Monitor.>

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to SE-2, COMPONENT, General Description.>

C: DISASSEMBLY

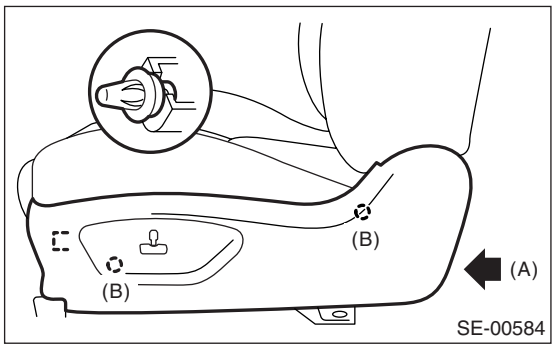
1. DRIVER'S SEAT

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.

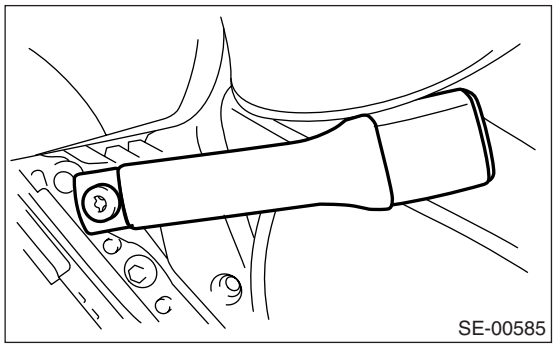


3) Disconnect the following connectors from the backside of seat cushion.
- Side airbag
- Seat position sensor
- Seat heater
- Power seat
- Seat belt

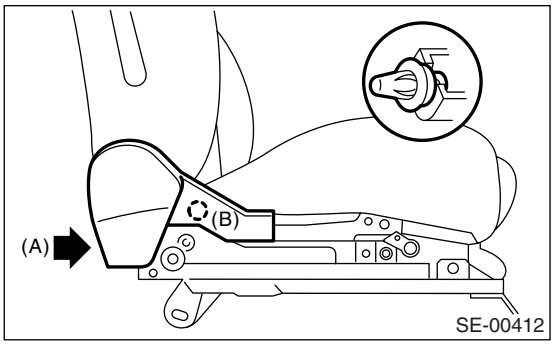
4) Remove the screw (A) and clips (B), and then disconnect the seat switch connector to remove seat side cover outside.



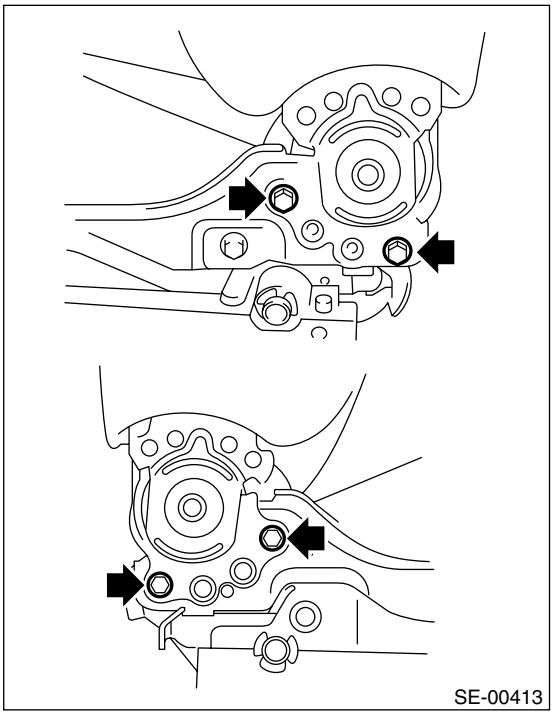
5) Remove the TORX® bolt, and then remove the inner seat belt assembly.



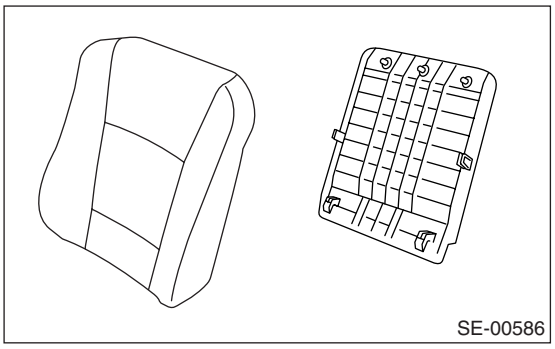
6) Remove the screw (A) and clip (B), and then remove the seat side cover inside.



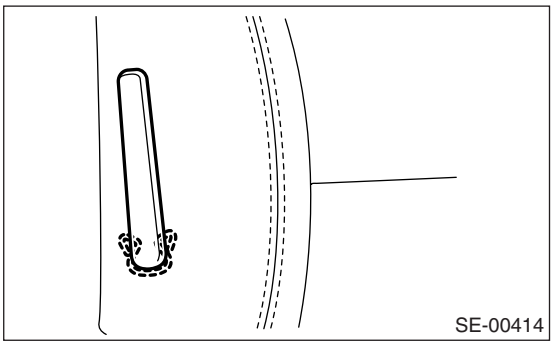
7) Remove the two bolts from the reclining hinge on each left and right side.



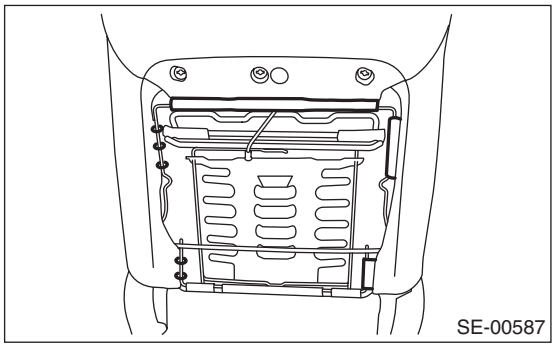
8) Remove the clips and hooks, and then detach the backrest back cover.



9) Remove the lock clip, and then remove the lumber support lever.

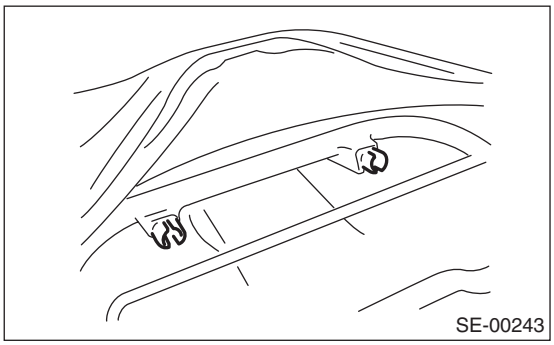


10) Remove the hooks and hog rings at the rear side of backrest.

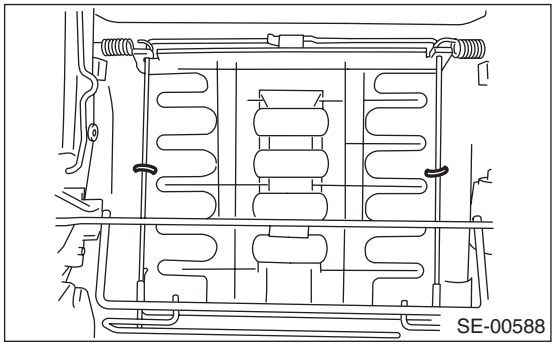


11) Remove the headrest lock bushing.

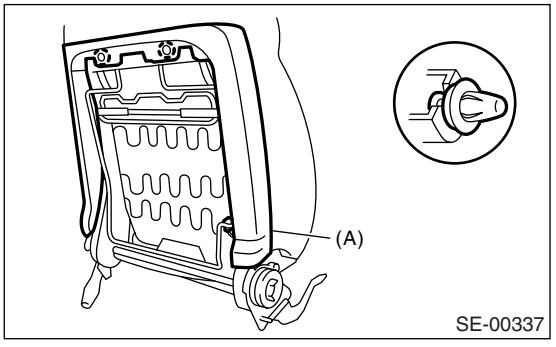
NOTE:
Push outside to remove it from the inside of seat.



12) Remove the hog rings.

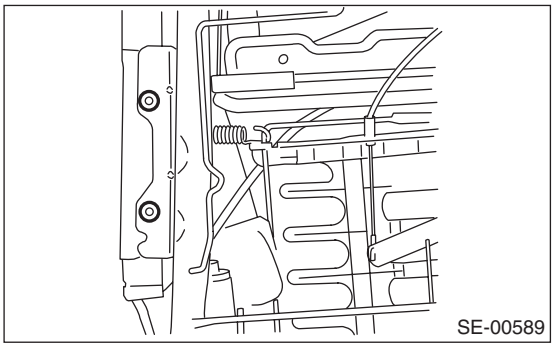


13) Remove the cover frame (A).

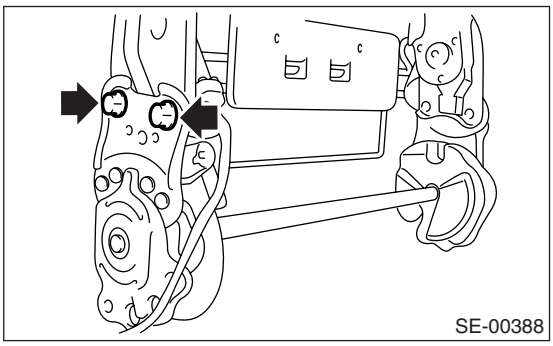


14) Pull out the backrest frame assembly.

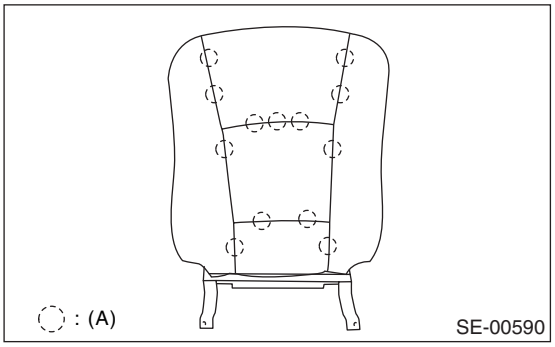
15) Remove the side airbag module.



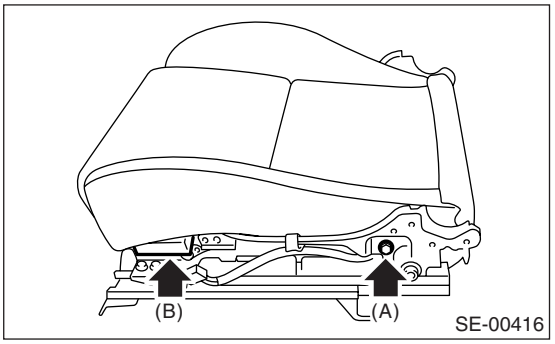
16) Remove the two bolts on each left and right side, and then remove the reclining motor assembly.



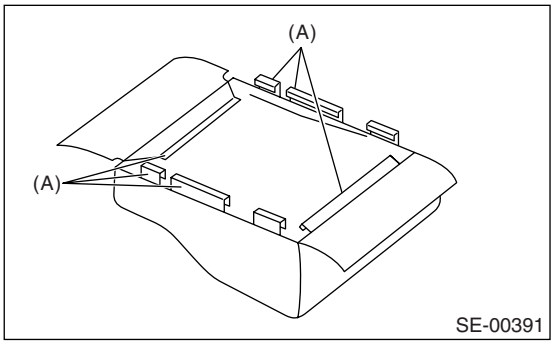
17) Remove the hog rings (A) on the surface side of backrest, and then remove the backrest cover from backrest.



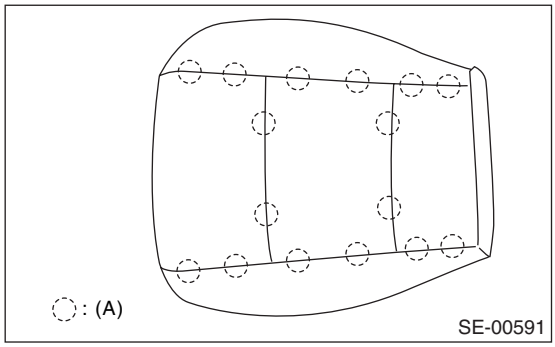
18) Remove the bolt (A) and hook (B) on left and right side, and then remove the seat cushion frame from seat rail assembly.



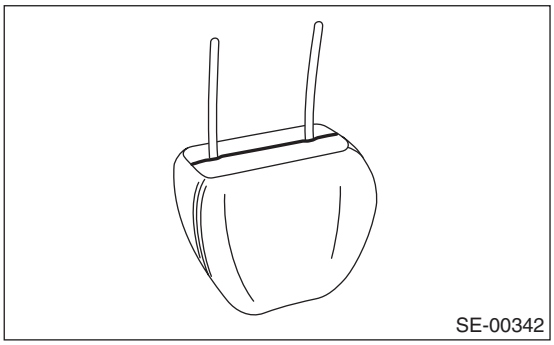
19) Remove the hooks (A), and then remove the seat cushion from seat cushion frame.



20) Remove the hog rings (A), and then remove the seat cushion cover from seat cushion pad.



21) Remove the hooks and hog rings at the bottom of headrest, and then remove the headrest cover from headrest.

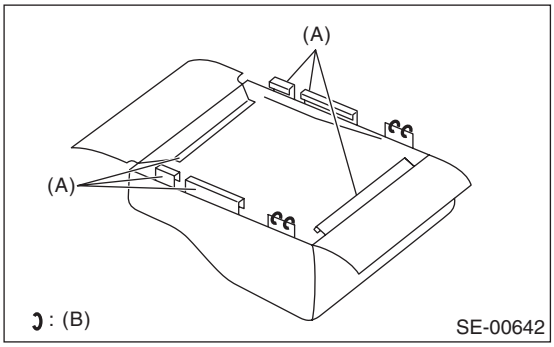


2. PASSENGER'S SEAT

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)-18, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>
Failure to do so may cause improper activation of passenger's airbag.
• 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).



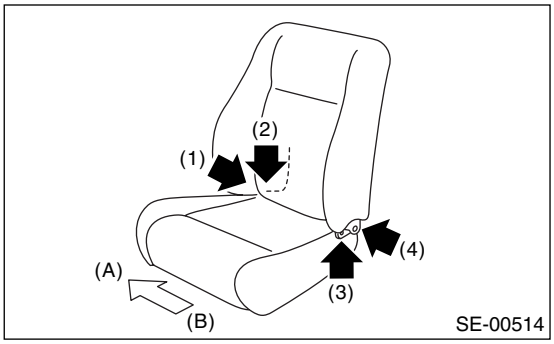
D: ASSEMBLY

CAUTION:
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.
• The back rest cover of the side airbag module are to be tightened and fixed together with the attachment nuts for the side airbag module 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 no wrinkle or twisting on backrest cover.

1. DRIVER'S SEAT

NOTE:
• When installing the inner seat belt assembly, follow the procedure described in the seat belt section. <Ref. to SB-11, 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 in the order of (1) through (4), in two or three steps by gradually increasing the torque until they reach the specified torque.



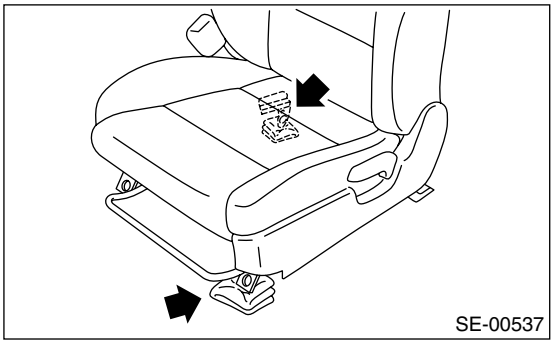
(A) Vehicle inside
(B) Vehicle outside

4) Assemble in the reverse order of disassembly.

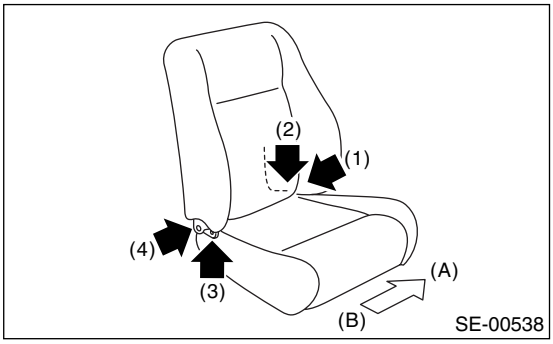
2. PASSENGER'S SEAT

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 passenger detection system adjustment after installing the seat to the vehicle. <Ref. to OD(diag)-18, SYSTEM CALIBRATION (REZEROING), OPERATION, Subaru Select Monitor.>
Failure to do so may cause improper activation of passenger's airbag.
• 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.

Assemble in the reverse order of disassembly.
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 back assembly is not locked.



(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

Check that no tear or fray on the backrest cover and seat cushion cover.

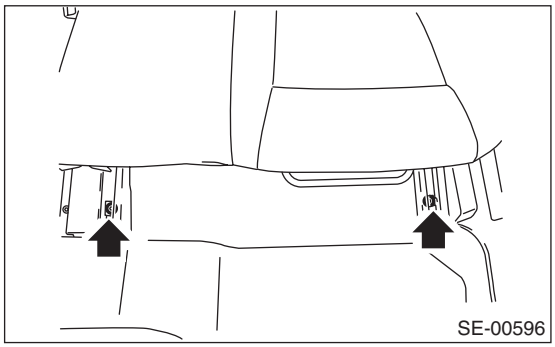
CAUTION:
If there are tears or looseness in the back rest cover or seat cushion covers, do not attempt to repair. Replace with a new cover. Repairing the cover may cause improper operation of the side airbag or the passenger detection system.

3. Second-row Seats

A: REMOVAL

1. LH&CTR SEAT

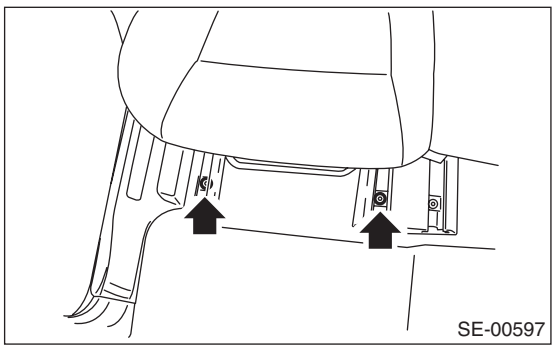
1) Tilt the backrest forward, and move the seat forward.
2) Remove the slide rail cover at the seat rear side, and remove the two bolts.
3) Move the seat to the rear end.
4) Remove the slide rail cover at the seat front side, and remove the two bolts.


SE-00596

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.


SE-00597

5) Remove the seat from vehicle.

B: INSTALLATION

Install in the reverse order of removal.

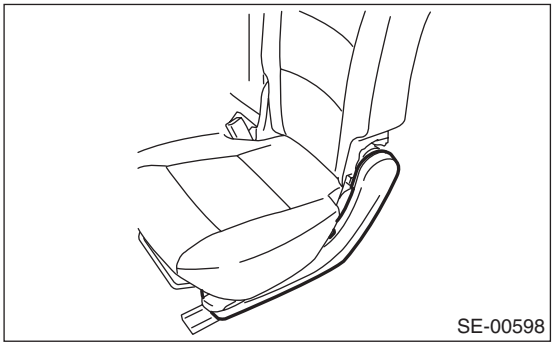
Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to SE-2, COMPONENT, General Description.>

NOTE:
Tighten the slide rail bolts diagonally in two or three steps by gradually increasing the torque, until they reach the specified torque.

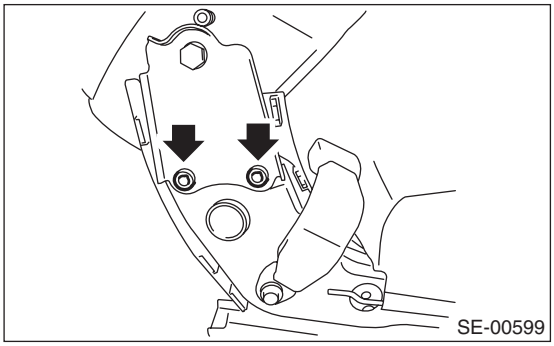
C: DISASSEMBLY

1. LH SEAT

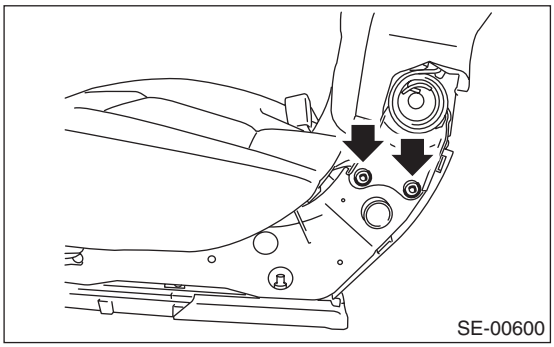
1) Remove the seat from vehicle. <Ref. to SE-12, LH&CTR SEAT, REMOVAL, Second-row Seats.>
2) Remove the headrest.
3) Remove the hinge outer cover.


SE-00598

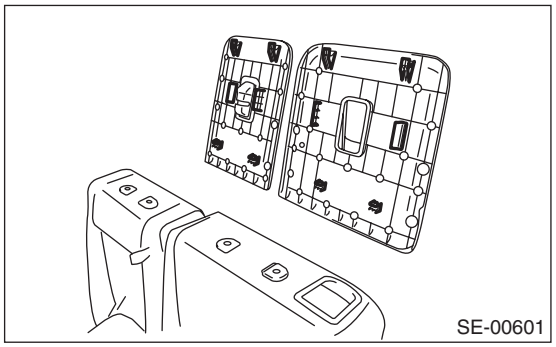
4) Remove the two reclining hinge bolts of 2nd seat CTR, then remove the seat back.


SE-00599

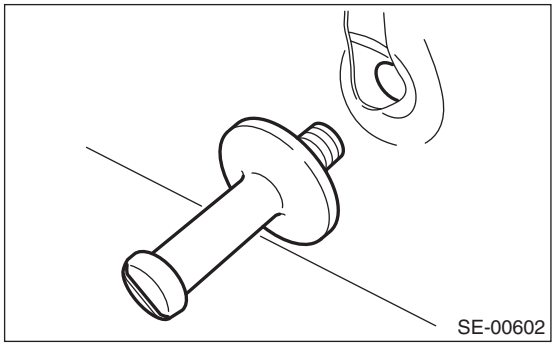
5) Remove the two reclining hinge bolts of 2nd seat LH on each of the left and right sides, then remove the seat back.


SE-00600

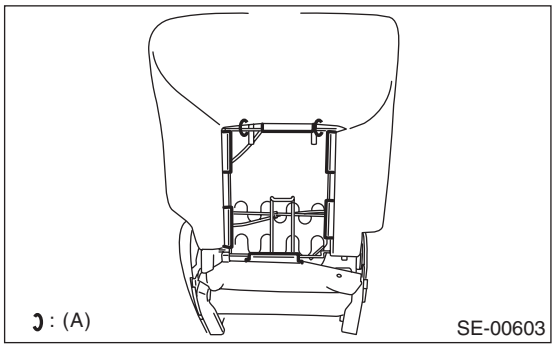
6) Remove the backrest back cover.



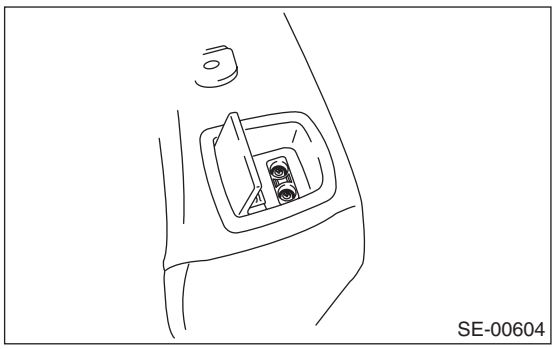
7) Remove the stopper.



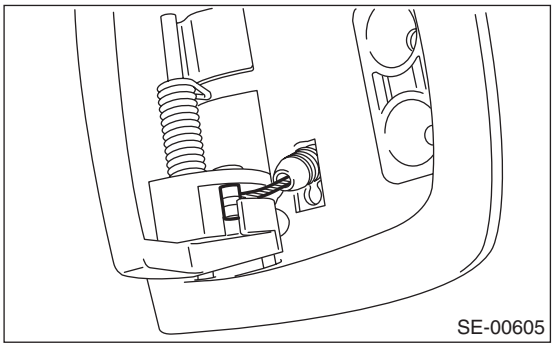
8) Remove the hog rings (A) and hooks at the rear face of the backrest.



9) Remove the two screws securing the holder.



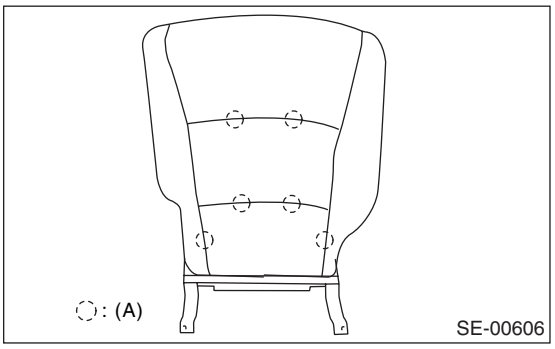
10) Disconnect the wire connected to the holder, then remove the holder.



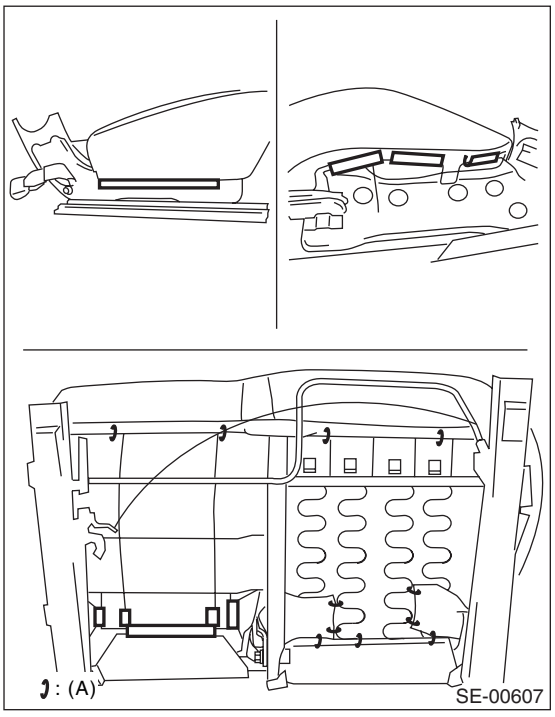
11) Remove the headrest lock bushing.

NOTE:
Push outward from inside of the seat to remove.

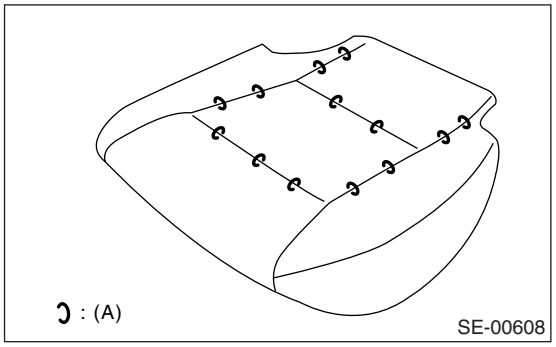
12) Pull out the frame from the backrest.
13) Remove the hog rings (A) of backrest, and then remove the backrest cover from backrest.



14) Remove the hooks and hog rings (A) from the rear side of seat cushion.

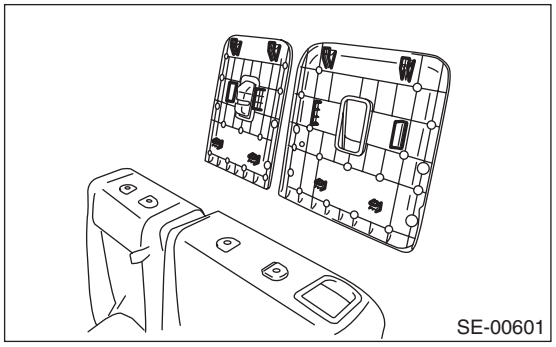


15) Remove the seat cushion from the slide rail assembly.
16) Remove the seat cushion hog rings (A), and then remove the seat cushion cover from seat cushion.

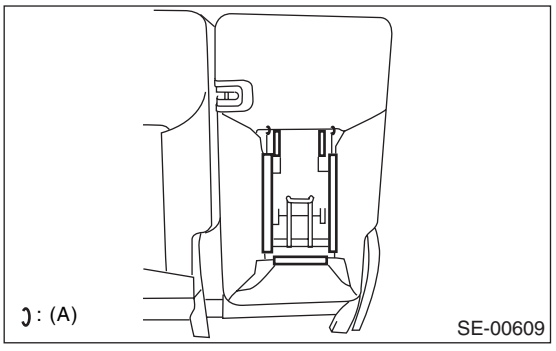


2. CTR SEAT

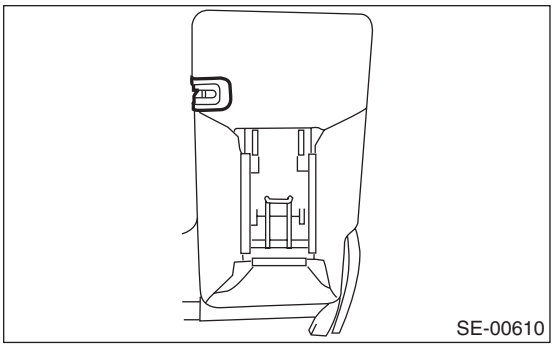
1) Remove the seat from vehicle. <Ref. to SE-12, LH&CTR SEAT, REMOVAL, Second-row Seats.>
2) Remove the hinge outer cover.
3) Remove the two reclining hinge bolts of 2nd seat CTR, then remove the seat back.
4) Remove the backrest back cover.



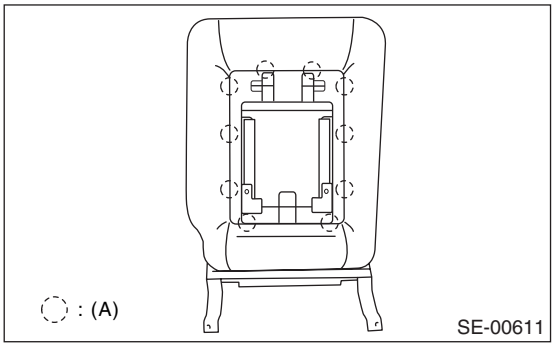
5) Remove the hooks and hog rings (A) at the rear side of backrest.



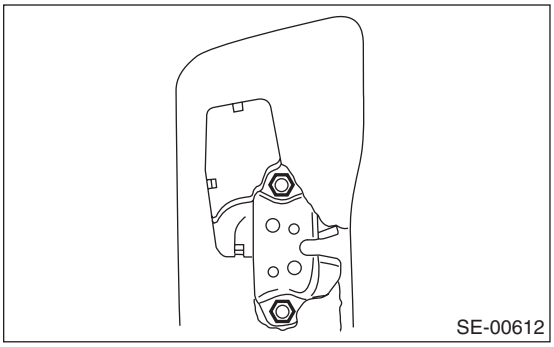
6) Remove the nut, then remove the armrest and arm rest rear board.
7) Remove the four screws securing the arm rest.
8) Remove the nut, then remove the armrest rear board and arm rest.
9) Remove the seat back latch cover.



10) Remove the hog rings (A) on the front face of the backrest, and then remove the backrest cover from the backrest.

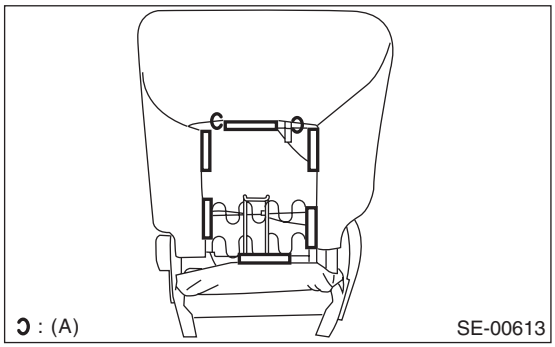


11) Remove the two bolts securing the seat back latch, then remove the seat back latch.

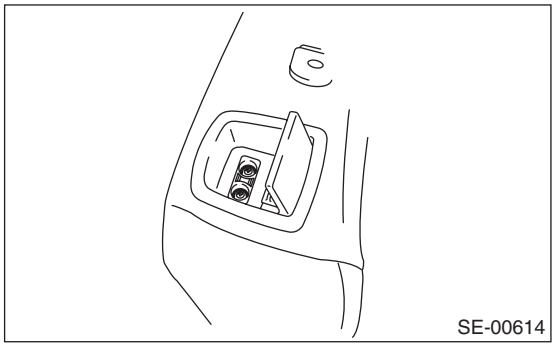


3. RH SEAT

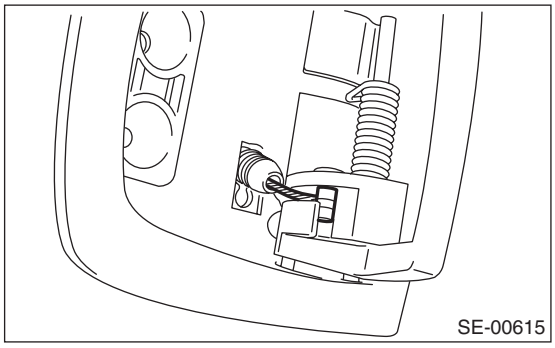
1) Remove the seat from vehicle. <Ref. to SE-12, RH SEAT, REMOVAL, Second-row Seats.>
2) Remove the headrest.
3) Remove the hinge outer cover.
4) Remove the backrest back cover.
5) Remove the hog rings (A) and hooks at the rear face of the backrest.



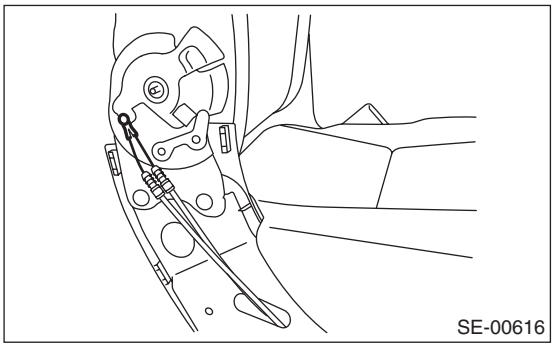
6) Remove the two screws securing the holder.



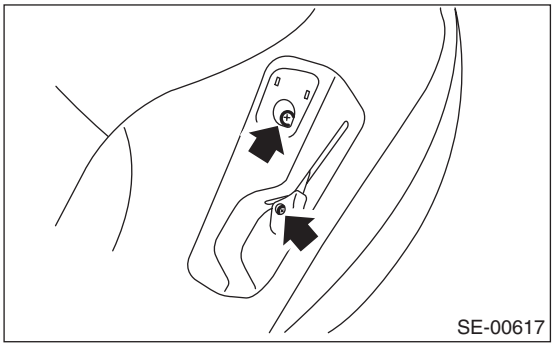
7) Disconnect the wire connected to the holder, then remove the holder.



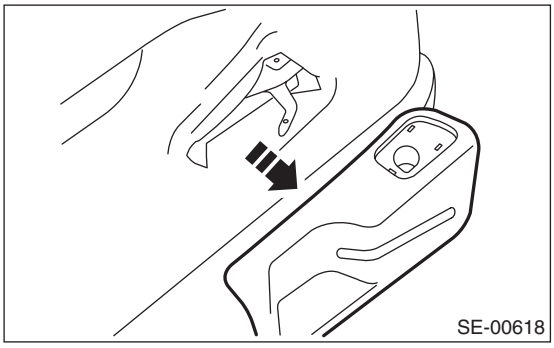
8) Disconnect the wire connected to the reclining hinge.



9) Remove the four reclining hinge bolts of 2nd seat RH, then remove the seat back.
10) Remove the two screws securing the reclining lever cover.



11) Remove the reclining lever cover.

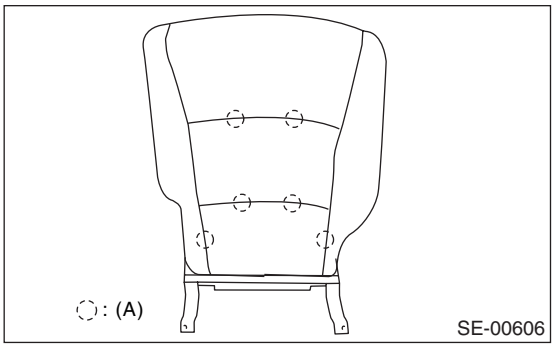


12) Remove the headrest lock bushing.

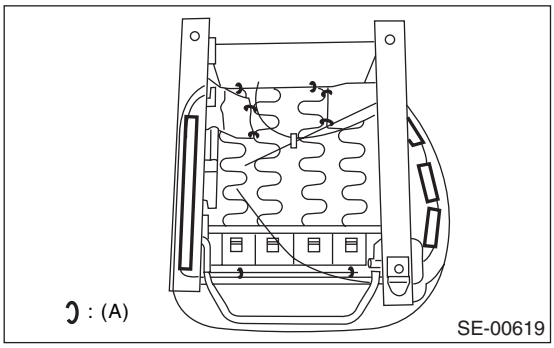
NOTE:
Push outward from inside of the seat to remove.

13) Pull out the frame from the backrest.

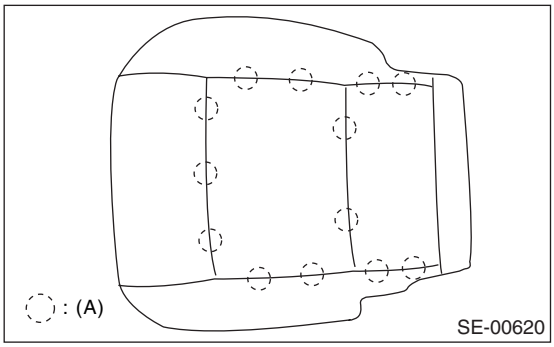
14) Remove the hog rings (A) of backrest, and then remove the backrest cover from backrest.



15) Remove the hooks and hog rings (A) from the rear side of seat cushion.



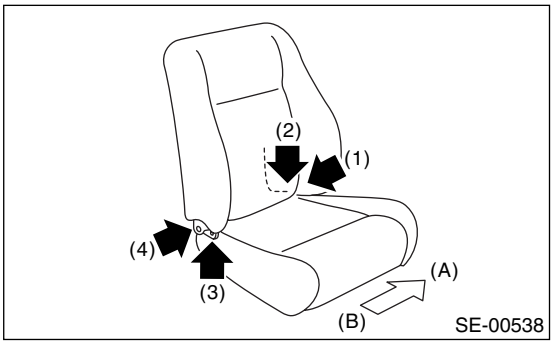
16) Remove the seat cushion from the slide rail assembly.
17) Remove the seat cushion hog rings (A), and then remove the seat cushion cover from seat cushion.



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 no wrinkle or twisting on backrest cover.

Assemble in the reverse order of disassembly.
1) Assemble the seat cushion in the reverse order of disassembly.
2) Assemble the backrest in the reverse order of disassembly.
3) Temporarily tighten the reclining hinge bolts in the order of (1) through (4), to an extent that the seat back assembly is not locked.



(A) Vehicle inside
(B) Vehicle outside

4) Use the reclining lever to place the backrest in the most upright position, and check the first lock position of recliner.
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.>

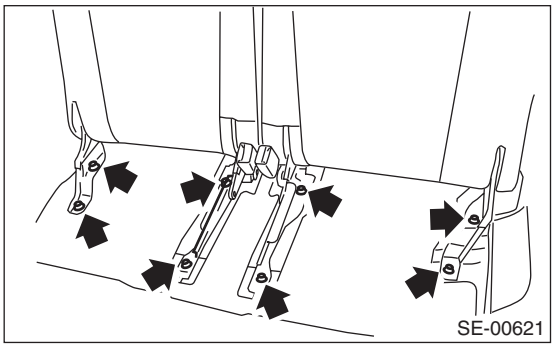
E: INSPECTION

Check that no tear or fray on the seat cover.

4. Third-row Seats

A: REMOVAL

1) Lift up the front side of the 3rd seat cushion and then remove the hooks.
2) Lift up the 3rd seat cushion and remove the seat cushion by pushing it backward to detach the hook.
3) Remove the eight bolts securing the 3rd seat back.


SE-00621

4) Remove the 3rd seat.

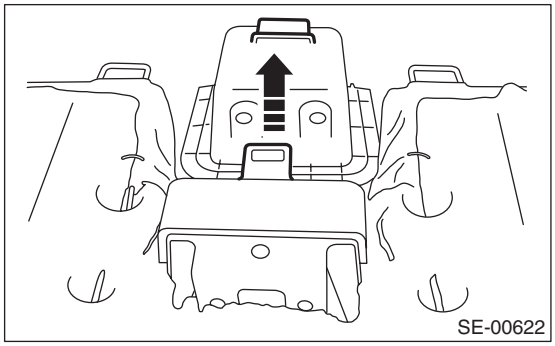
B: INSTALLATION

Install in the reverse order of removal.

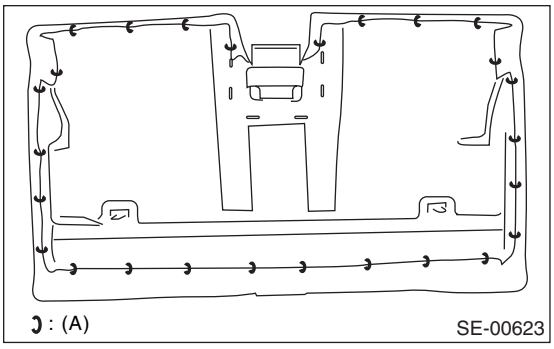
Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to SE-2, COMPONENT, General Description.>

C: DISASSEMBLY

1) Remove the 3rd seat. <Ref. to SE-17, REMOVAL, Third-row Seats.>
2) Remove the headrest.
3) Pull out the seat belt tray.

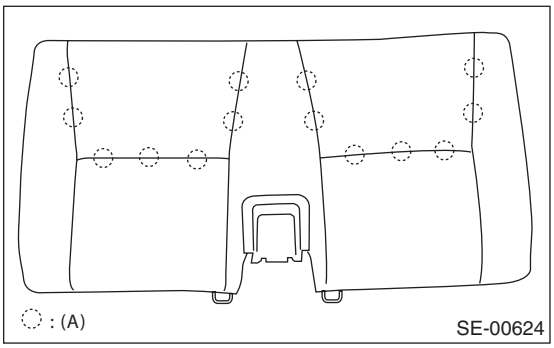

SE-00622

4) Remove the hog rings (A) on the rear side of seat cushion.



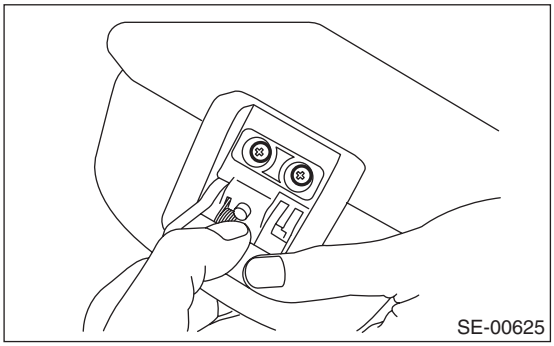
SE-00623

5) Remove the hog rings (A) on the front side of seat cushion.

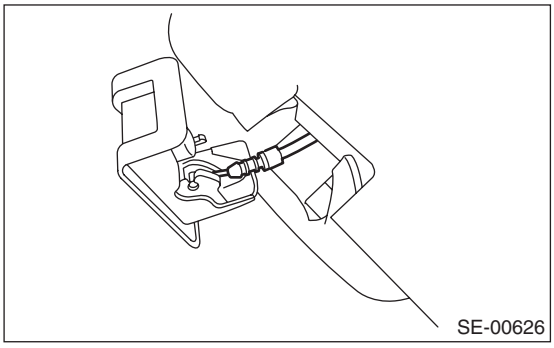


SE-00624

6) Remove the two screws securing the hinge lever assembly.

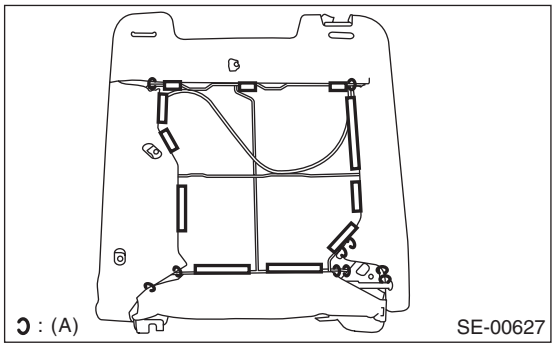

SE-00625

7) Disconnect the wire connected to the hinge lever assembly.

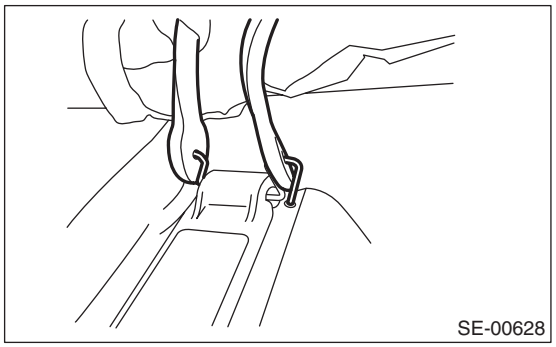

SE-00626

8) Remove the seat back cover.

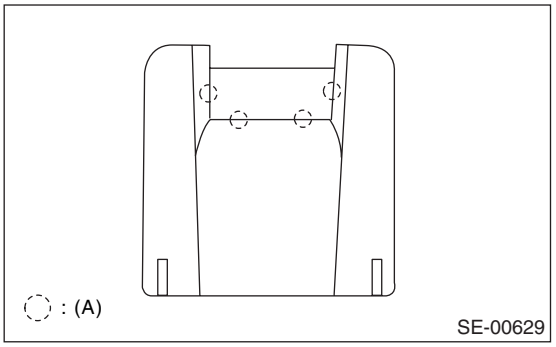
9) Remove the hog rings (A) and hooks at the rear face of the backrest.



10) Remove the hooks which secure the seat back to the frame.



11) Remove the hog rings on the rear side of seat back.



12) Remove the seat back cover.
13) Pull out the frame from the seat back 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 no wrinkle or twisting on backrest cover.

Assemble in the reverse order of disassembly.
1) Assemble the seat cushion in the reverse order of disassembly.
2) Assemble the backrest in the reverse order of disassembly.
3) 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

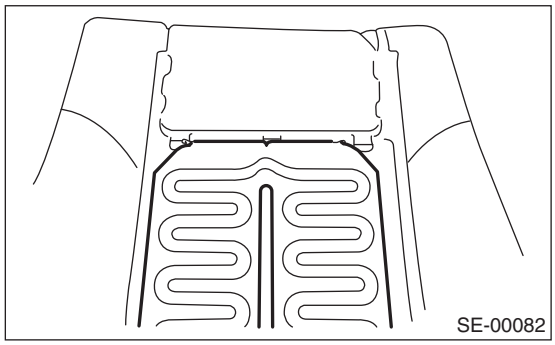
Check that no tear or fray on the seat cover.

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-7, 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-31, REMOVAL, Control Panel.>

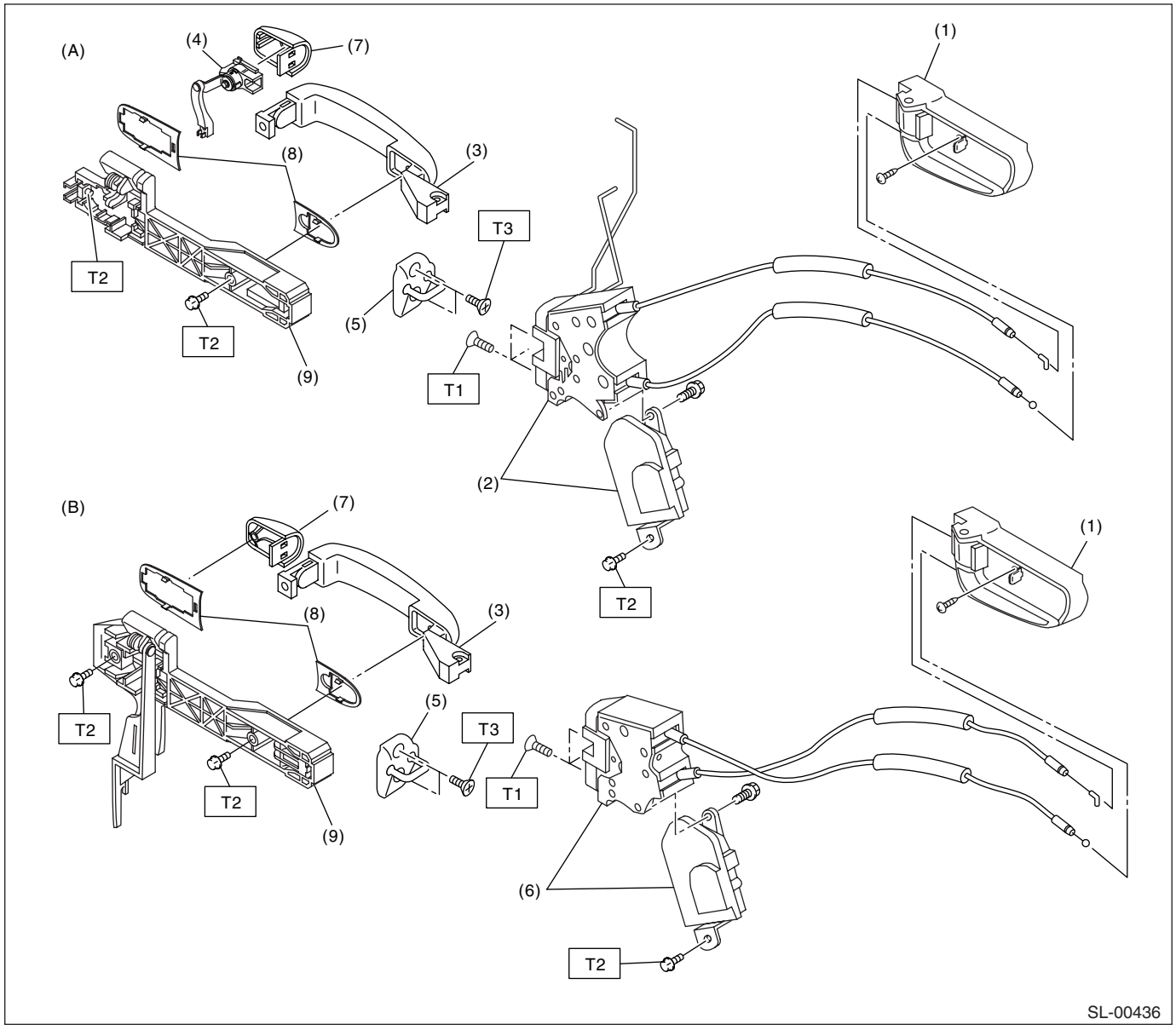
B: INSTALLATION

Install in the reverse order of removal.

1. General Description

A: COMPONENT

1. DOOR LOCK ASSEMBLY

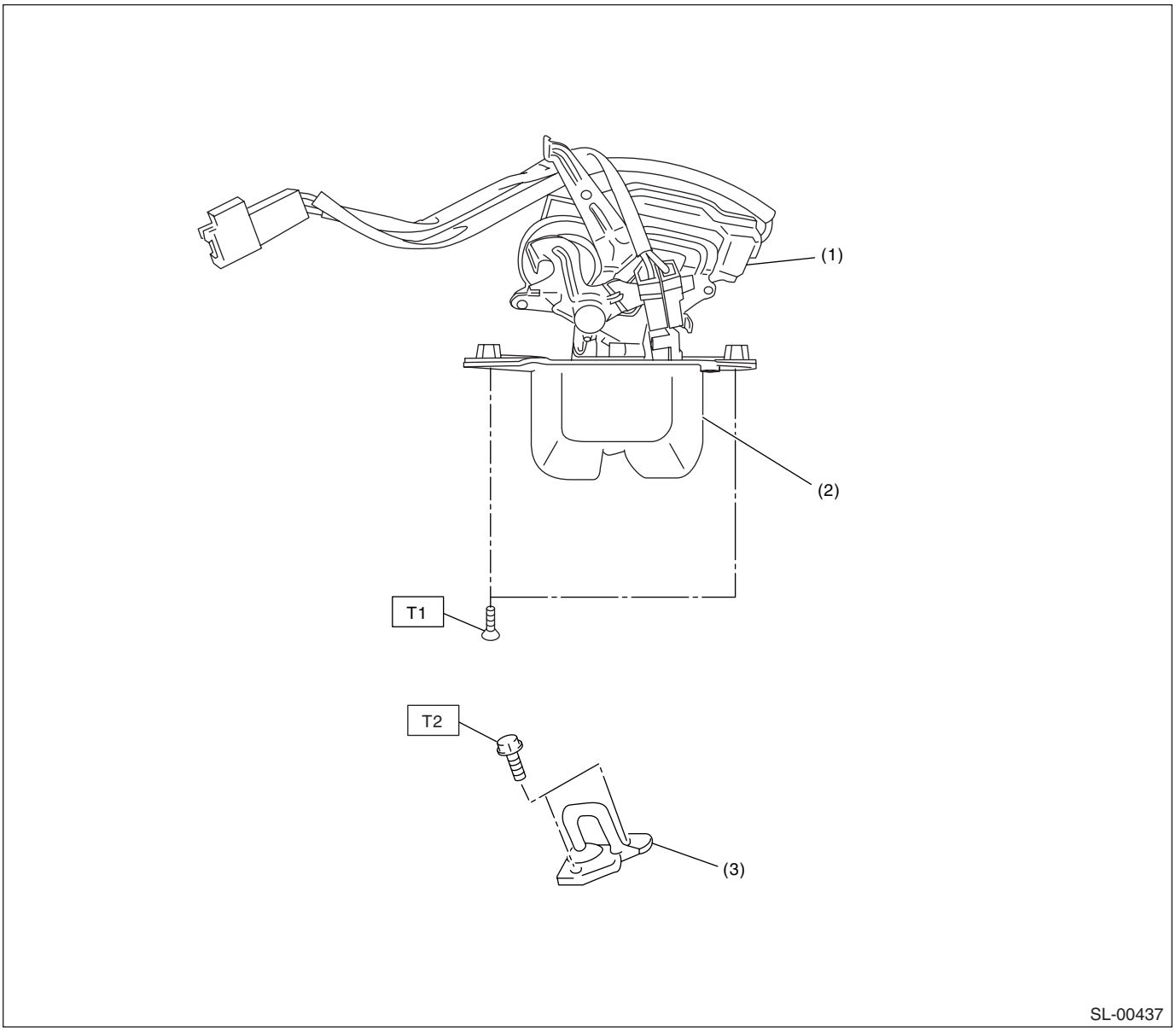


(A) Front
(B) Rear

(1) Inner remote ASSY
(2) Front door latch and door lock actuator ASSY
(3) Door outer handle
(4) Key cylinder (switch)
(5) Striker
(6) Rear door latch and door lock actuator ASSY
(7) Door outer handle cover
(8) Door outer handle spacer
(9) Door outer handle frame ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.5 (0.66, 4.8)
T2: 7.5 (0.76, 5.5)
T3: 18 (1.8, 13.3)

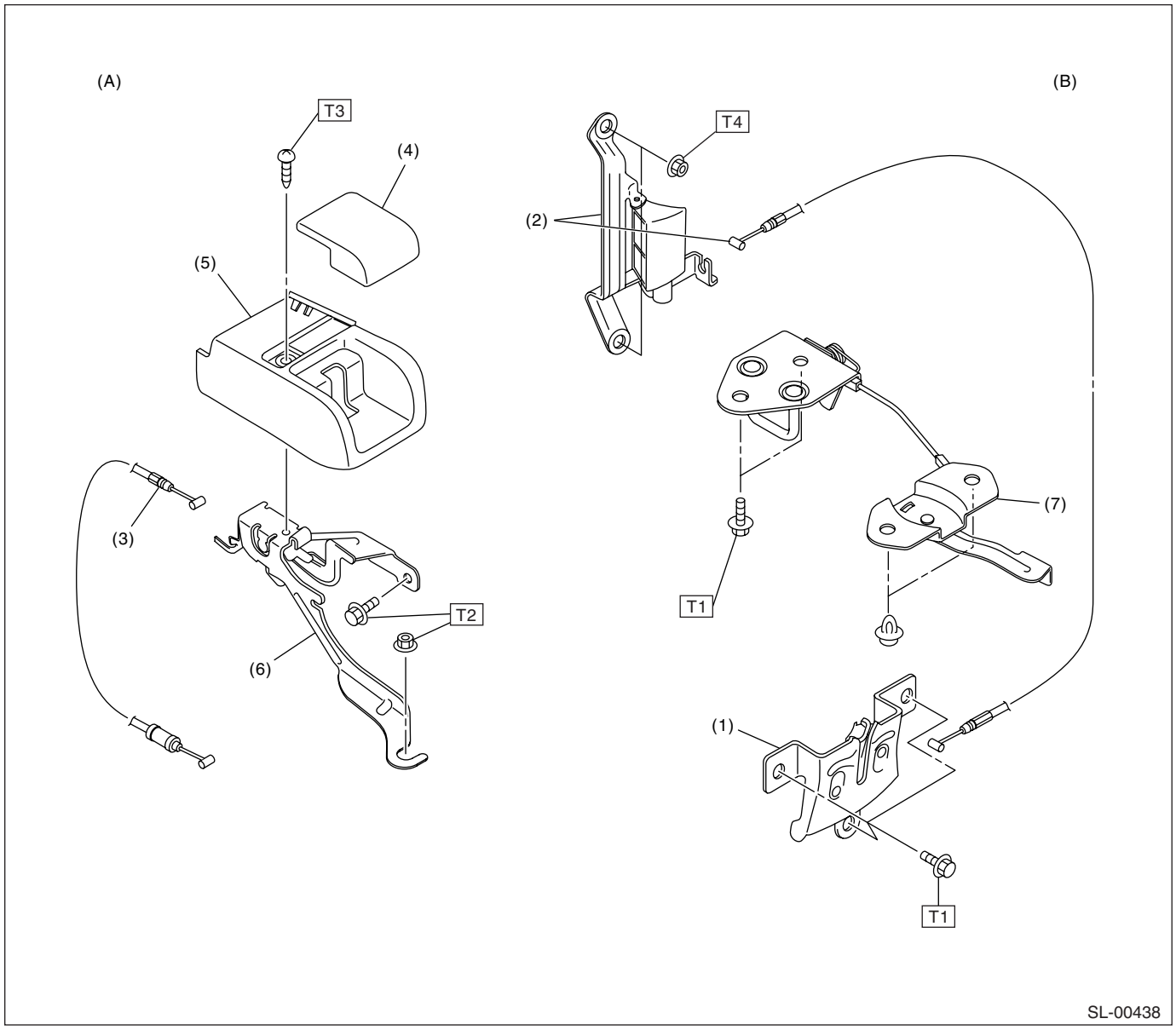
2. REAR GATE LOCK



(1) Rear gate actuator
(2) Rear gate latch
(3) Striker

Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.3)
T2: 25 (2.5, 18.4)

3. FRONT HOOD LOCK AND REMOTE OPENERS

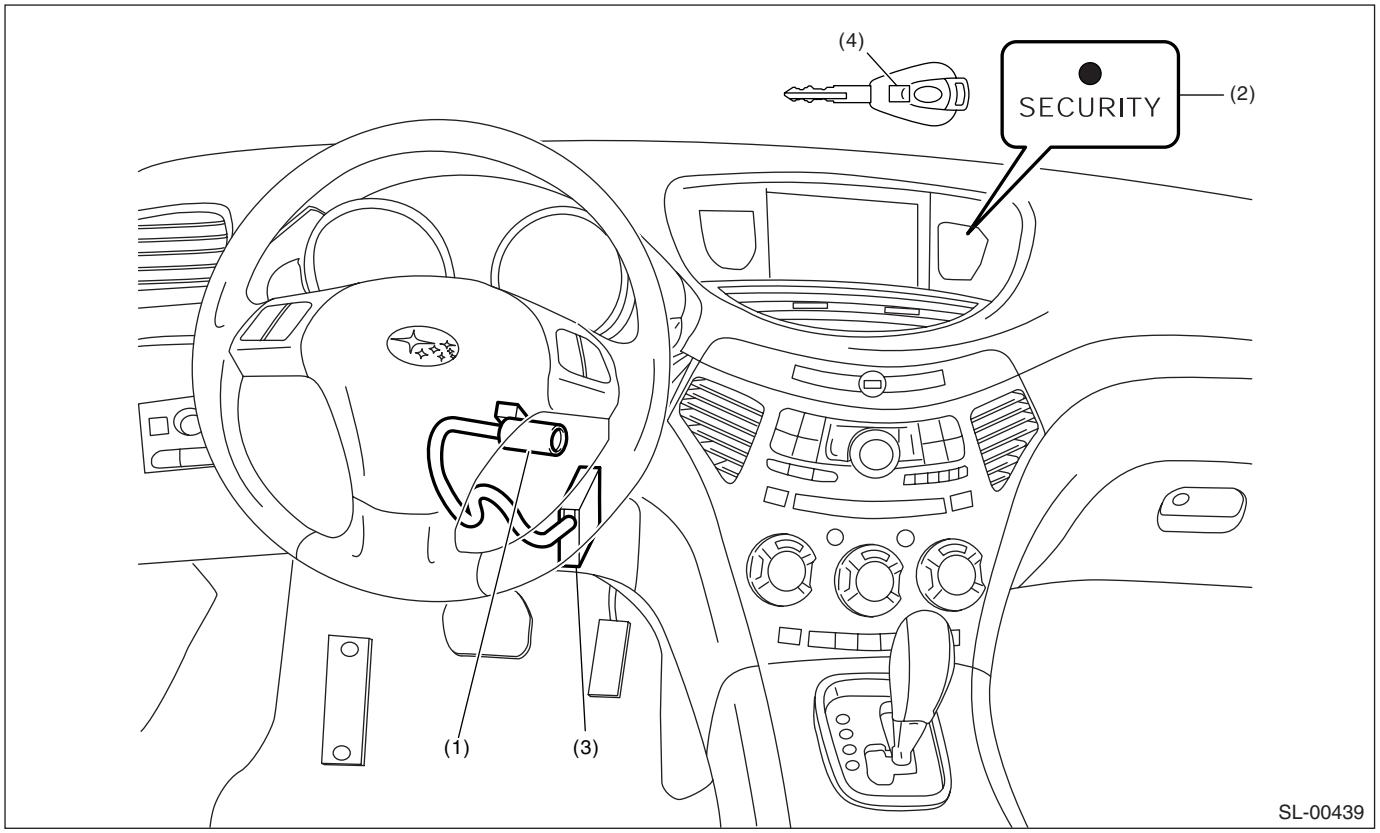


(A) Fuel lid
(B) Hood

(1) Front hood lock assembly
(2) Cable assembly, front hood
(3) Cable assembly, fuel
(4) Pull lever
(5) Cover
(6) Pull handle ASSY
(7) Hood operation lever

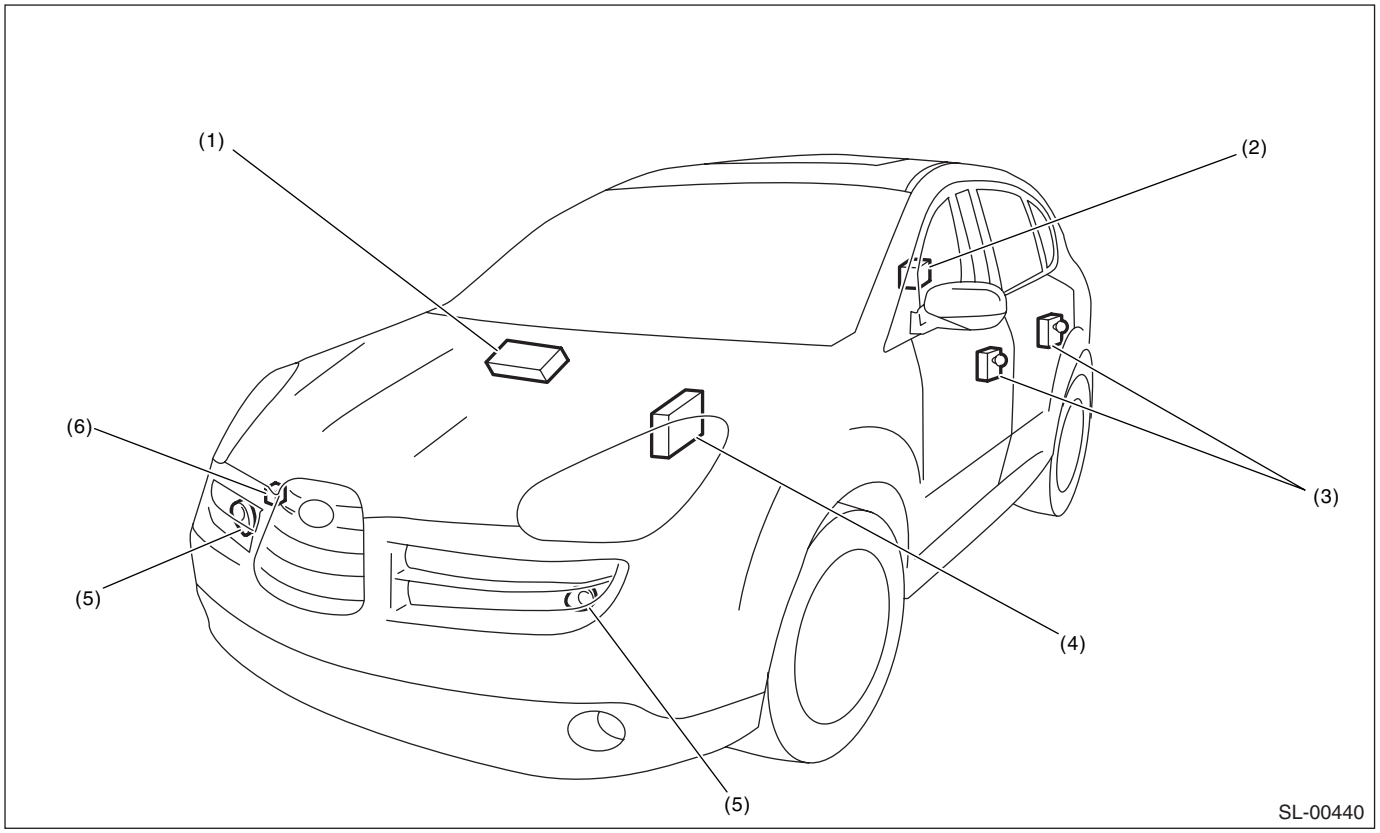
Tightening torque: N·m (kgf-m, ft-lb)
T1: 33.0 (3.36, 24.3)
T2: 7.5 (0.76, 5.5)
T3: 4.5 (0.46, 3.3)
T4: 25 (2.55, 18.4)

4. IMMOBILIZER SYSTEM



(1) Antenna
(2) Security indicator light (LED bulb)
(3) Body integrated unit
(4) Transponder

5. KEYLESS ENTRY SYSTEM



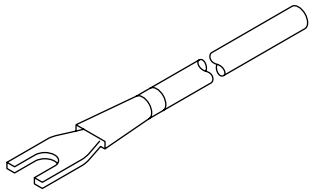
(1) Keyless entry control module
(2) Rear gate latch switch
(3) Door switch
(4) Body integrated unit
(5) Horn
(6) Keyless buzzer

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 air bag system wiring harness is routed near electrical parts and switches.
- Airbag system wiring harnesses and connectors are 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
 ST-925580000	925580000	PULLER	Used for removing trim clip

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.

2. Door Lock Control System

A: WIRING DIAGRAM

1. DOOR LOCK CONTROL

<Ref. to WI-140, WIRING DIAGRAM, Keyless Entry System.>

B: INSPECTION

1. SYMPTOM CHART

Symptom	Repair order	Reference
The door lock control system does not operate.	1. Check the fuse.	<Ref. to SL-8, CHECK FUSE, INSPECTION, Door Lock Control System.>
	2. Check the power supply and ground circuit for body integrated unit.	<Ref. to SL-8, 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 door lock actuator and the circuit.	<Ref. to SL-10, CHECK DOOR LOCK ACTUATOR & CIRCUIT, INSPECTION, Door Lock Control System.>
The door lock switch does not operate.	Check the door lock switch.	<Ref. to SL-9, CHECK DOOR LOCK SWITCH., INSPECTION, Door Lock Control System.>
A specific door lock actuator does not operate.	Check the door lock actuator and circuit.	<Ref. to SL-10, CHECK DOOR LOCK ACTUATOR & CIRCUIT, INSPECTION, Door Lock Control System.>

2. CHECK FUSE

	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check the fuse No. 3 (in the fuse and relay box) and No. 7 (in the fuse and relay box).	Is the fuse blown out?	Replace the fuse with a new one.	Check the power supply and ground circuit. <Ref. to SL-8, CHECK POWER SUPPLY & GROUND CIRCUIT, INSPECTION, Door Lock Control System.>

3. CHECK POWER SUPPLY & GROUND CIRCUIT

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(i84) No. 34 (+) — Chassis ground (–):*** ***(B281) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check the harness for open or short circuit between body integrated unit and fuse.
2	**CHECK GROUND CIRCUIT.** Measure the resistance between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 22 — Chassis ground:*** ***(B281) No. 8, 9 — Chassis ground:***	Is the resistance less than 10 Ω?	The power supply and ground circuit are OK.	Repair the harness.

4. CHECK DOOR LOCK SWITCH.

	Step	Check	Yes	No
1	**CHECK DOOR LOCK SWITCH.** Check the input from door lock switch to body integrated unit using Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Integ. unit} from main menu. 4) Select the {Current Data Display & Save}. 5) Check the input 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**.
2	**CHECK DOOR LOCK SWITCH CIRCUIT.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between the harness connector terminal and chassis ground when moving the door lock switch to LOCK. ***Connector & terminal*** ***(i84) No. 15 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3**.	Go to step **4**.
3	**CHECK DOOR LOCK SWITCH CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground when the door lock switch is moved to UNLOCK. ***Connector & terminal*** ***(i84) No. 29 — Chassis ground:***	Is the resistance less than 10 Ω?	The door lock switch is OK.	Go to step **4**.
4	**CHECK DOOR LOCK SWITCH.** 1) Disconnect the door lock switch harness connector. 2) Measure the resistance between the door lock switch terminals when moving the door lock switch to LOCK. ***Connector & terminal*** ***Driver's side:*** ***(D7) No. 5 — No. 9:*** ***Passenger's side:*** ***(D125) No. 2 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **5**.	Replace the door lock switch.
5	**CHECK DOOR LOCK SWITCH.** Measure the resistance between the door lock switch terminals when moving the door lock switch to UNLOCK. ***Connector & terminal*** ***Driver's side:*** ***(D7) No. 5 — No. 8:*** ***Passenger's side:*** ***(D125) No. 4 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **6**.	Replace the door lock switch.
6	**HARNESS INSPECTION.** Measure the resistance between door lock switch harness connector terminal and chassis ground. ***Connector & terminal*** ***Driver's side:*** ***(D7) No. 5 — Chassis ground:*** ***Passenger's side:*** ***(D125) No.5 — Chassis ground:***	Is the resistance less than 1 Ω?	Replace the door lock switch.	Repair the open circuit or chassis short circuit of the harness.

5. CHECK DOOR LOCK ACTUATOR & CIRCUIT

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal and chassis ground of body integrated unit when moving the door lock switch to LOCK. ***Connector & terminal*** ***(i84) No. 7 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>
2	**CHECK OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal and chassis ground of body integrated unit when moving the door lock switch to UNLOCK. ***Connector & terminal*** ***Driver's side:*** ***(i84) No. 23 (+) — Chassis ground (–):*** ***Except for driver's side:*** ***(i84) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>
3	**CHECK DOOR LOCK ACTUATOR.** Check the door lock actuator. • Front door lock actuator <Ref. to SL-37, Front Door Lock Actuator.> • Rear door lock actuator <Ref. to SL-41, Rear Door Lock Actuator.> • Rear gate latch lock actuator <Ref. to SL-43, Rear Gate Latch Assembly.>	Is the door lock actuator OK?	Check the harness for open or short circuits between body integrated unit and door lock actuator.	Replace the door lock actuator.

3. Keyless Entry System

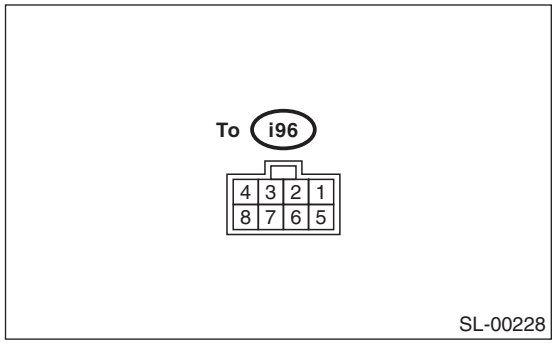
A: WIRING DIAGRAM

1. KEYLESS ENTRY

<Ref. to WI-140, WIRING DIAGRAM, Keyless Entry System.>

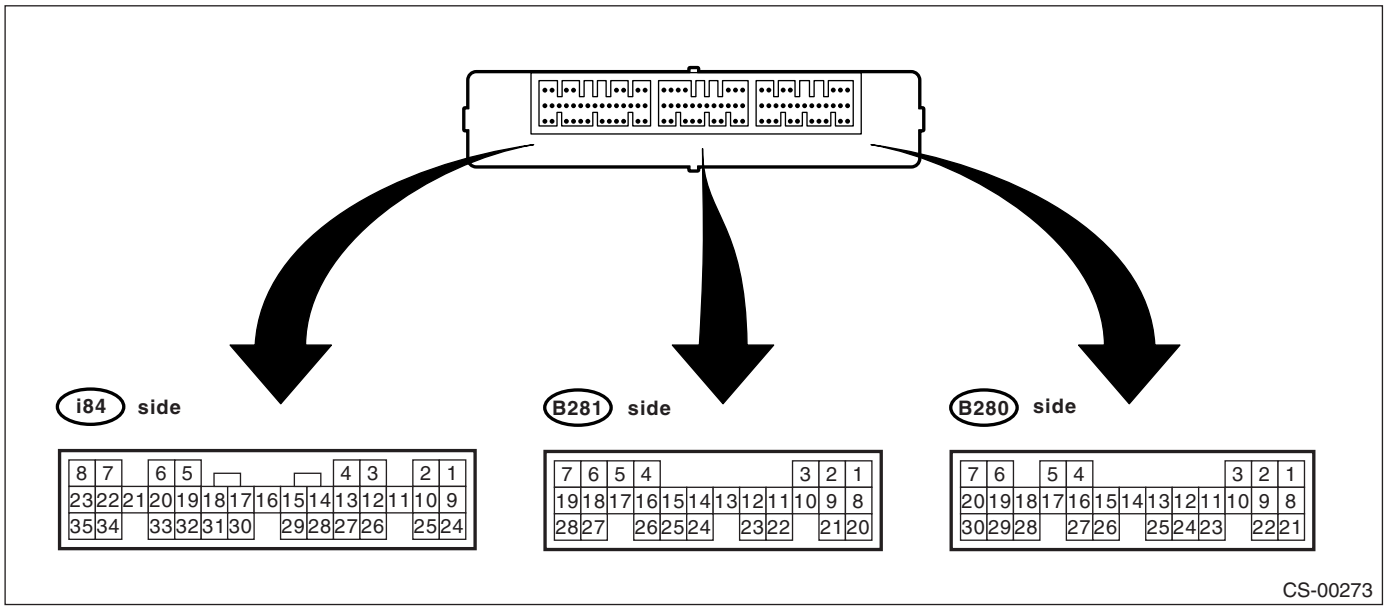
B: ELECTRICAL SPECIFICATION

1. KEYLESS ENTRY CONTROL MODULE



Description	Terminal No.	Measuring condition
Body integrated unit	3 (OUTPUT)	Battery voltage cannot be measured because of digital signal.
Power supply (Backup)	4	Battery voltage is constantly present.
Ground	7	0 V is constantly present.

2. BODY INTEGRATED UNIT



Description	Terminal No.	Measuring condition
Ignition switch (ON)	A1 (INPUT)	Battery voltage is present when ignition switch is turned ON.
Keyless buzzer	A6 (OUTPUT)	12 V is present when pressing the LOCK or UNLOCK button of transmitter.
Driver's side front door lock actuator	A7 (OUTPUT)	Battery voltage is present when pressing the transmitter LOCK button.
Door and rear gate lock actuator	A8 (OUTPUT)	Battery voltage is present when pressing the transmitter UNLOCK button.
Keyless entry control module	A9 (INPUT)	Communication line (Cannot be measured because of digital signal)
Rear gate latch switch	A17 (INPUT)	0 V is present when opening the rear gate.
Rear door switch RH	A18 (INPUT)	0 V is present when opening the rear door RH.
Front door switch LH	A19 (INPUT)	0 V is present when opening the front door LH.
Ground	A21	0 V is constantly present.
Rear gate release switch	C22 (OUTPUT)	0 V is present when pressing the rear gate release switch.
Rear gate release actuator	A22 (OUTPUT)	The battery voltage is detected for 0.6 seconds when operating the rear gate release switch.
Driver's side front door lock actuator	A23 (OUTPUT)	Battery voltage is present when pressing the transmitter UNLOCK button.
Driver's side power window main switch (door lock switch) Passenger's side door lock switch	A15	0 V is present when pressing the door lock switch to the LOCK side.
	A29	0 V is present when pressing the door lock switch to the UNLOCK side.
Rear door switch LH	A31 (INPUT)	0 V is present when opening the rear door LH.
Front door switch RH	A32 (INPUT)	0 V is present when opening the front door RH.
Power supply	A34	Battery voltage is constantly present.
Room light	B3 (INPUT)	• 0 V is present when pressing the UNLOCK button of transmitter. • 0 V is present when opening the door.
Power supply	B7	Battery voltage is constantly present.
Horn circuit	B11 (INPUT)	0 V is present when pressing the panic button of transmitter
Turn signal & hazard circuit	B12 (OUTPUT)	0 V is present when pressing the LOCK or UNLOCK button of transmitter.
Ground	B22	0 V is constantly present.
Power supply	C1	Battery voltage is constantly present.
Power supply	C2	Battery voltage is constantly present.
Key warning switch	C7 (INPUT)	Battery voltage is present when inserting the key into ignition switch.
Ground	C8	0 V is constantly present.
Ground	C9	0 V is constantly present.

C: INSPECTION

1. SYMPTOM CHART

Symptom	Repair order	Reference
None of the functions of keyless entry system operate.	1. Check the transmitter battery.	<Ref. to SL-15, CHECK KEYLESS TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the fuse.	<Ref. to SL-16, CHECK FUSE, INSPECTION, Keyless Entry System.>
	3. Check the keyless entry control module.	<Ref. to SL-16, 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-22, CHECK DOOR LOCK SWITCH., INSPECTION, Keyless Entry System.>
	3. Check the ignition switch.	<Ref. to SL-25, 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-15, CHECK KEYLESS TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the keyless entry control module.	<Ref. to SL-16, 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.>

Symptom	Repair order	Reference
The panic alarm does not operate.	1. Check the keyless transmitter battery and function.	<Ref. to SL-15, CHECK KEYLESS TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	Check the horn operation.	<Ref. to SL-23, CHECK HORN OPERATION, INSPECTION, Keyless Entry System.>
	3. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
Buzzer or hazard light does not operate.	1. Check the buzzer operation.	<Ref. to SL-24, 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-20, 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-23, CHECK IGNITION SWITCH ILLUMINATION., INSPECTION, Keyless Entry System.>
	2. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

2. CHECK KEYLESS TRANSMITTER BATTERY AND FUNCTION

	Step	Check	Yes	No
1	**CHECK TRANSMITTER BATTERY.** 1) Remove the battery from the transmitter. <Ref. to SL-53, REMOVAL, Transmitter.> 2) Check the battery voltage. <Ref. to SL-53, INSPECTION, Transmitter.>	Is the voltage more than 2.5 V?	Go to step **2**.	Replace the transmitter battery. <Ref. to SL-53, Transmitter.>
2	**CHECK KEYLESS TRANSMITTER BATTERY.** Register the keyless transmitter which operates normally on other vehicles to the inspection target vehicle. <Ref. to SL-53, 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.	Is the inspection target vehicle operates lock and unlock normally?	Go to step **3**.	Due to vehicle malfunction, continue the keyless entry system diagnosis.
3	**CHECK KEYLESS TRANSMITTER BATTERY.** Register the keyless transmitter of inspection target vehicle to the another vehicle which the keyless system operates normally. <Ref. to SL-53, 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-53, REGISTRATION OF KEYLESS TRANSMITTER WITH SUBARU SELECT MONITOR, REPLACEMENT, Transmitter.>
4	**CHECK KEYLESS TRANSMITTER BATTERY.** Check the registered keyless transmitter battery. 1) Close all the doors and rear gate of the vehicle which operates keyless system normally. 2) Remove the key from ignition switch. 3) Using the keyless transmitter, lock and unlock the doors and rear gate of vehicle.	Is the vehicle operates lock and unlock normally?	The transmitter is OK.	Replace the transmitter. <Ref. to SL-53, REGISTRATION OF KEYLESS TRANSMITTER WITH SUBARU SELECT MONITOR, REPLACEMENT, Transmitter.>

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.)

3. CHECK FUSE

	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check the fuse No. 3 (in the fuse and relay box) and No. 7 (in the fuse and relay box).	Is the fuse blown out?	Replace the fuse with a new one.	Check the power supply and ground circuit. <Ref. to SL-17, CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT., INSPECTION, Keyless Entry System.>

4. CHECK KEYLESS ENTRY CONTROL MODULE

	Step	Check	Yes	No
1	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Integ. unit} from main menu. 4) Select the {Diagnostic Trouble Code}. 5) Check that the DTC is displayed.	Is DTC B0500 “Keyless UART com. Malfunction” displayed?	Go to step **2**.	Keyless entry control module is normal.
2	**CHECK POWER SUPPLY.** 1) Disconnect the keyless entry control module harness connector. 2) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(i96) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Check the harness for open circuits and shorts between the keyless entry control module and fuse.
3	**CHECK GROUND CIRCUIT.** Measure the resistance between harness connector terminal and chassis ground. ***Connector & terminal*** ***(i96) No. 7 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair the harness.
4	**CHECK KEYLESS ENTRY CONTROL MODULE CIRCUIT.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(i84) No. 9 — (i96) No. 3:***	Is the resistance less than 10 Ω?	Replace the keyless entry control module. <Ref. to SL-50, Keyless Entry Control Module.>	Repair the harness.

5. CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT.

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY OF BODY INTEGRATED UNIT.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 7 (+) — Chassis ground (–):*** ***(B281) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Check the harness for open or short between body integrated unit and fuse.
2	**CHECK BODY INTEGRATED UNIT GROUND CIRCUIT.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 22 — Chassis ground:*** ***(B281) No. 8 — Chassis ground:*** ***(B281) No. 9 — Chassis ground:***	Is the resistance less than 10 Ω?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Repair the harness.

6. CHECK DOOR SWITCH

	Step	Check	Yes	No
1	**CHECK DOOR SWITCH CIRCUIT.** Measure the voltage between the body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***Front door RH:*** ***(i84) No. 32 (+) — Chassis ground (–):*** ***Front door LH:*** ***(i84) No. 19 (+) — Chassis ground (–):*** ***Rear door RH:*** ***(i84) No. 18 (+) — Chassis ground (–):*** ***Rear door LH:*** ***(i84) No. 31 (+) — Chassis ground (–):*** ***Rear gate:*** ***(i84) No. 17 (+) — Chassis ground (–):***	Is the voltage 0 V when each door or rear gate is opened?	Go to step **2**.	Go to step **3**.
2	**CHECK DOOR SWITCH CIRCUIT.** Measure the voltage between the body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***Front door RH:*** ***(i84) No. 32 (+) — Chassis ground (–):*** ***Front door LH:*** ***(i84) No. 19 (+) — Chassis ground (–):*** ***Rear door RH:*** ***(i84) No. 18 (+) — Chassis ground (–):*** ***Rear door LH:*** ***(i84) No. 31 (+) — Chassis ground (–):*** ***Rear gate:*** ***(i84) No. 17 (+) — Chassis ground (–):***	Is the voltage more than 10 V when each door or rear gate is closed?	The door switch is OK.	Go to step **3**.
3	**CHECK DOOR SWITCH.** 1) Disconnect the door switch harness connector. 2) Measure the resistance between door switch terminals. ***Connector & terminal*** ***(R12) Front RH door switch:*** ***(R9) Front LH door switch:*** ***(R16) Rear RH door switch:*** ***(R22) Rear LH door switch:*** ***No. 1 — No. 3:*** ***Rear gate latch switch: (D140) No. 3 — No. 4:***	Is the resistance more than 1 MΩ when door switch is pushed?	Go to step **4**.	Replace the door switch.
4	**CHECK DOOR SWITCH.** Measure the resistance between door switch terminals. ***Connector & terminal*** ***(R12) Front RH door switch:*** ***(R9) Front LH door switch:*** ***(R16) Rear RH door switch:*** ***(R22) Rear LH door switch:*** ***No. 1 — No. 3:*** ***Rear gate latch switch: (D140) No. 3 — No. 4:***	Is the resistance less than 1 Ω when door switch is released?	Check the harness for open or short between body integrated unit and door switch.	Replace the door switch.

7. CHECK KEY WARNING SWITCH

	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check the fuse No. 14 (in the main fuse box).	Is the fuse blown out?	Replace the fuse with a new one.	Go to step **2**.
2	**CHECK KEY WARNING SWITCH CIRCUIT.** 1) Disconnect the harness connector of body integrated unit. 2) Insert the key into ignition switch. (LOCK position) 3) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B281) No. 7 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Go to step **4**.
3	**CHECK KEY WARNING SWITCH CIRCUIT.** 1) Remove the key from ignition switch. 2) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B281) No. 7 (+) — Chassis ground (–):***	Is the voltage 0 V?	The key warning switch is OK.	Go to step **4**.
4	**CHECK KEY WARNING SWITCH.** 1) Disconnect the key warning switch harness connector. 2) Insert the key into ignition switch. (LOCK position) 3) Measure the resistance between key warning switch terminals. ***Connector & terminal*** ***(B350) No. 3 — No. 4:***	Is the resistance less than 1 Ω?	Go to step **5**.	Replace the key warning switch.
5	**CHECK KEY WARNING SWITCH.** 1) Remove the key from ignition switch. 2) Measure the resistance between key warning switch terminals. ***Connector & terminal*** ***(B350) No. 3 — No. 4:***	Is the resistance more than 1 MΩ?	Check the following: • Harness for open circuits and shorts between the key warning switch and fuse • Harness for open or short between the body integrated unit and key warning switch	Replace the key warning switch.

8. CHECK ROOM LIGHT OPERATION

	Step	Check	Yes	No
1	**CHECK ROOM LIGHT OPERATION.** Make sure the room light illuminates when the room light switch is turned to ON.	Does the room light illuminate?	Go to step **2**.	Check the room light circuit.
2	**CHECK HARNESS BETWEEN ROOM LIGHT AND BODY INTEGRATED UNIT.** 1) Disconnect the body integrated unit harness connector and room light harness connector. 2) Measure the resistance between the body integrated unit harness connector terminal and room light harness connector terminal. ***Connector & terminal*** ***(B280) No. 3 — (R52) No. 2:***	Is the resistance less than 10 Ω?	The room light operation circuit is OK.	Check the harness for open or short between body integrated unit and room light.

9. CHECK HAZARD LIGHT OPERATION

	Step	Check	Yes	No
1	**CHECK HAZARD LIGHT OPERATION.** 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	**CHECK OUTPUT TO HAZARD LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the key warning switch harness connector. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON. 5) Select {Integ. unit} from main menu. 6) Select {ECU customizing}. 7) Check {Hazard answer-back setup}, and then switch to ON setting if necessary. 8) Select the {Current Data Display & Save}. 9) 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 the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
3	**CHECK CIRCUIT OF HAZARD LIGHT.** 1) Disconnect the harness connector of body integrated unit. 2) Disconnect the turn signal & hazard unit harness connector. 3) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 12 — (B32) No. 8:***	Is the resistance less than 10 Ω?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Repair the harness.

10.CHECK REAR GATE RELEASE ACTUATOR OPERATION

	Step	Check	Yes	No
1	**CHECK REAR GATE RELEASE ACTUATOR OPERATION.** 1) Turn the ignition switch to OFF. 2) Disconnect the key warning switch harness connector. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON. 5) Select {Integ. unit} from main menu. 6) Select the {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 the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
2	**CHECK THE CIRCUIT OF REAR GATE RELEASE ACTUATOR.** 1) Disconnect the harness connector of body integrated unit. 2) Disconnect the rear gate release actuator harness connector. 3) Measure the resistance between harness connectors. ***Connector & terminal*** ***(i84) No. 22 — (D140) No. 1:***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair the harness.
3	**CHECK CIRCUIT OF HAZARD LIGHT.** 1) Check the ground circuit of rear gate release actuator 2) Disconnect the rear gate release actuator harness connector. 3) Measure the resistance between harness connector terminal and chassis ground. ***Connector & terminal*** ***(D140) No. 2 — Chassis ground:***	Is the resistance less than 10 Ω?	Check the trunk lid lock actuator. <Ref. to SL-43, INSPECTION, Rear Gate Latch Assembly.>	Repair the harness.

11.CHECK DOOR LOCK SWITCH.

	Step	Check	Yes	No
1	**CHECK DOOR LOCK SWITCH.** Check the input signal from door lock switch to body integrated unit using Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Integ. unit} from main menu. 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**.
2	**CHECK DOOR LOCK SWITCH CIRCUIT.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between the harness connector terminal and chassis ground when moving the door lock switch to LOCK. ***Connector & terminal*** ***(i84) No. 15 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3**.	Go to step **4**.
3	**CHECK DOOR LOCK SWITCH CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground when the door lock switch is moved to UNLOCK. ***Connector & terminal*** ***(i84) No. 29 — Chassis ground:***	Is the resistance less than 10 Ω?	The door lock switch is OK.	Go to step **4**.
4	**CHECK DOOR LOCK SWITCH.** 1) Disconnect the door lock switch harness connector. 2) Measure the resistance between the door lock switch terminals when moving the door lock switch to LOCK. ***Connector & terminal*** ***Driver's side:*** ***(D7) No. 5 — No. 9:*** ***Passenger's side:*** ***(D125) No. 2 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **5**.	Replace the door lock switch.
5	**CHECK DOOR LOCK SWITCH.** Measure the resistance between the door lock switch terminals when moving the door lock switch to UNLOCK. ***Connector & terminal*** ***Driver's side:*** ***(D7) No. 5 — No. 8:*** ***Passenger's side:*** ***(D125) No. 4 — No. 5:***	Is the resistance less than 1 Ω?	Check the harness for open circuits or shorts between the body integrated unit and the door lock switch.	Replace the door lock switch.

12.CHECK IGNITION SWITCH ILLUMINATION.

	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check the fuse No. 14 (in the main fuse box).	Is the fuse blown out?	Replace the fuse with a new one.	Go to step **2**.
2	**CHECK POWER SUPPLY.** 1) Disconnect the ignition switch illumination harness connector. 2) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B414) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Check the harness for open circuits and shorts between the ignition switch illumination and fuse.
3	**CHECK IGNITION SWITCH ILLUMINATION CIRCUIT.** 1) Disconnect the harness connector of body integrated unit and ignition switch illumination harness connector. 2) Measure the resistance between body integrated unit harness connector terminal and ignition switch illumination harness connector terminal. ***Connector & terminal*** ***(B280) No. 4 — (B414) No. 1:***	Is the resistance less than 10 Ω?	Replace the ignition switch illumination bulb with a new one. <Ref. to LI-35, REMOVAL, Ignition Switch Illumination.>	Check the harness for open circuits and shorts between the body integrated unit and ignition switch illumination.

13.CHECK HORN OPERATION

	Step	Check	Yes	No
1	**CHECK HORN OPERATION.** Make sure the horn sounds when the horn switch is pushed.	Does the horn sound?	Go to step **2**.	Check the horn circuit.
2	**CHECK HORN OPERATION.** 1) Disconnect the harness connector of body integrated unit. 2) Connect the harness connector terminal to ground using a suitable lead wire. ***Connector & terminal*** ***(B280) No. 11 (+) — Chassis ground (–):***	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.

14.CHECK KEYLESS BUZZER

	Step	Check	Yes	No
1	**CHECK KEYLESS BUZZER OPERATION.** 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**.
2	**CHECK KEYLESS BUZZER ON/OFF SWITCH.** 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 2, pull out ⇔ insert the key from the ignition key cylinder 5 times. 4) From 3, open → close the driver's side door within 10 seconds. 5) The keyless buzzer sound ON/OFF will switch, and the hazard lamp will blink 3 times. If the driver's side door is not opened → closed within 10 seconds in step 4, the hazard lamp 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**.
3	**CHECK FOR POWER SUPPLY OF KEYLESS BUZZER.** 1) Turn the ignition switch to OFF. 2) Disconnect the keyless buzzer harness connector. 3) Press the LOCK/UNLOCK button of the keyless transmitter. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(F102) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Check the harness for open circuits and shorts between the keyless buzzer and fuse.
4	**CHECK FOR GROUND CIRCUIT OF KEYLESS BUZZER.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(i84) No. 6 — (F102) No. 1:***	Is the resistance less than 10 Ω?	Go to step **5**.	Repair the harness.
5	**CHECK KEYLESS BUZZER.** 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-7, Power Window Control Switch.>	Replace the keyless buzzer.

15.CHECK IGNITION SWITCH.

	Step	Check	Yes	No
1	**CHECK FUSIBLE LINK.** 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	**CHECK FOR POWER SUPPLY OF IGNITION SWITCH.** 1) Disconnect the ignition switch harness connector. 2) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Check the harness for open circuits and shorts between the ignition switch and fusible link.
3	**CHECK IGNITION SWITCH.** 1) Insert the ignition key into ignition switch, and turn the each position. 2) Measure the resistance between ignition switch terminals. ***Connector & terminal*** ***No. 3 — No. 4 (ACC position):*** ***No. 3 — No. 4 — No. 6 — No. 1 (ON position):*** ***No. 3 — No. 6 — No. 1 — No. 2 (ST position):***	Is the resistance less than 1 Ω when turning the ignition key to each position?	Ignition switch is normal.	Replace the ignition switch with a new part. <Ref. to SL-46, REPLACEMENT, Ignition Key Lock.>

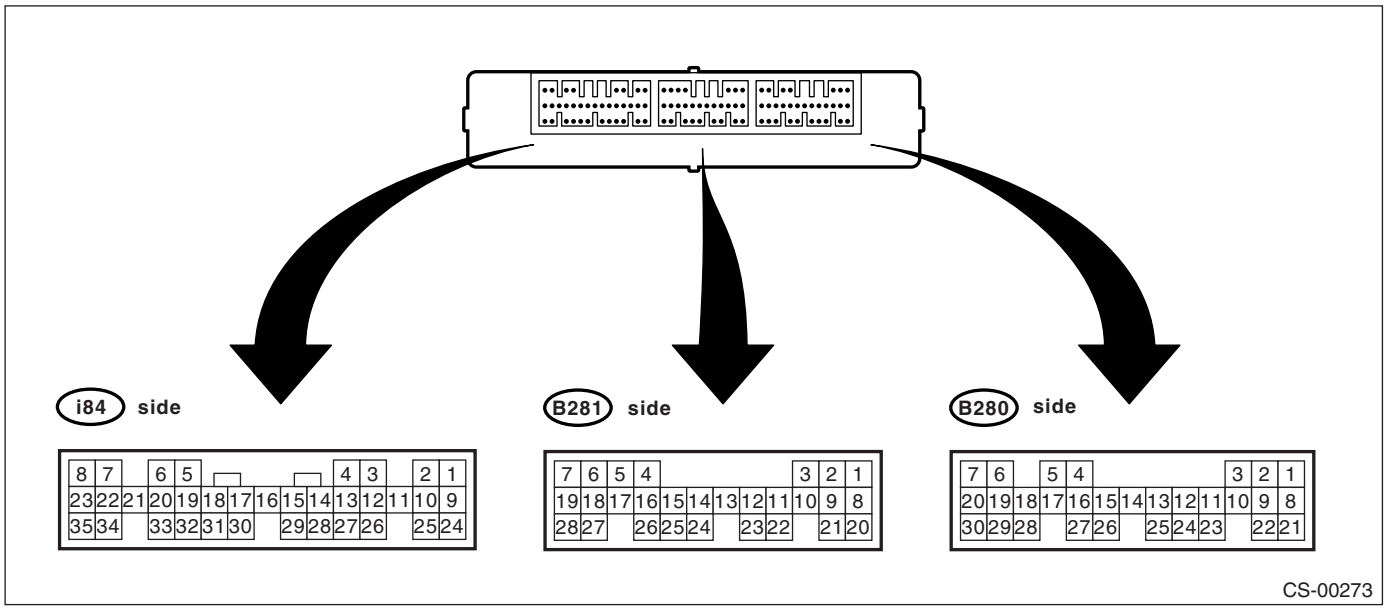
CAUTION:
When the ignition key lock is replaced, all ignition keys also must be registered. (Refer to the "IMMOBILIZER TEACHING OPERATION MANUAL".)

4. Security System

A: WIRING DIAGRAM

<Ref. to WI-144, WIRING DIAGRAM, Security System.>

B: ELECTRICAL SPECIFICATION



Description	Terminal No.	Measuring condition
Ignition switch	A1 (INPUT)	Battery voltage is present when ignition switch is turned ON.
Keyless entry control module	A9 (INPUT)	Communication line (Cannot be measured because of digital signal)
Rear gate latch switch	A17 (INPUT)	0 V is present when opening the rear gate.
Rear door switch RH	A18 (INPUT)	0 V is present when opening the rear door RH.
Front door switch LH	A19 (INPUT)	0 V is present when opening the front door LH.
Rear door switch LH	A31 (INPUT)	0 V is present when opening the rear door LH.
Front door switch RH	A32 (INPUT)	0 V is present when opening the front door RH.
Security indicator light	A33 (INPUT)	Battery voltage is present when the alarm operation is activated.
Horn relay	B11 (OUTPUT)	Battery voltage is present when the alarm operation is activated.
Turn signal & hazard circuit	B12 (OUTPUT)	Battery voltage is present when the alarm operation is activated.
Ground	B22	0 V is constantly present.
Power supply	C2	Battery voltage is constantly present.
Impact sensor	C5	When not applying vibration to the impact sensor, it repeats displaying the 0 V and battery voltage in every 45 milliseconds.
Ground	C8	0 V is constantly present.
Ground	C9	0 V is constantly present.

C: INSPECTION

1. BASIC DIAGNOSTIC PROCEDURE

	Step	Check	Yes	No
1	**INITIAL CHECK.** Check keyless entry system.	Does the keyless entry system operate normally?	Go to step **2**.	Check keyless entry system. <Ref. to SL-13, INSPECTION, Keyless Entry System.>
2	**CHECK SECURITY ON/OFF SETTING.** 1) Remove the key from ignition switch, and then close all doors. 2) Press the UNLOCK button of the keyless transmitter. 3) Check the security indicator light blinking patterns.	Does the security indicator light blink at 3 seconds intervals?	Go to step **3**.	Check the security indicator light circuit. <Ref. to SL-32, CHECK SECURITY INDICATOR LIGHT CIRCUIT., INSPECTION, Security System.>
3	**CHECK SECURITY ON/OFF SETTING.** 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 second at 2 seconds intervals. When monitoring lag is set to 30 seconds: Blinks three times within 1 second at 0.4 second intervals.	Go to step **6**.	Go to step **4**.
4	**CHANGE THE SETTING OF SECURITY SYSTEM.** Change the setting of security system to ON. <Ref. to SL-29, SECURITY SYSTEM ON/OFF SETTING, INSPECTION, Security System.>	Is setting change completed correctly?	Go to step **5**.	• Check the ignition switch circuit. <Ref. to SL-33, CHECK IGNITION SWITCH CIRCUIT, INSPECTION, Security System.> • Check the door lock switch circuit. <Ref. to SL-22, CHECK DOOR LOCK SWITCH., INSPECTION, Keyless Entry System.>
5	**CHECK THE SETTING CHANGE OF SECURITY SYSTEM.** 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 second at 2 seconds intervals. When monitoring lag is set to 30 seconds: Blinks three times within 1 second at 0.4 second intervals.	Go to step **6**.	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>
6	**CHECK SECURITY SYSTEM OPERATION.** Press the LOCK button of keyless transmitter, and wait for 30 seconds.	Is the blinking pattern of security indicator light blink twice within 0.5 second in 2 seconds cycle?	Go to step **7**.	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>

	Step	Check	Yes	No
7	**CHECK SECURITY ALARM OPERATION.** 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 **8**.	• Check the door switch. <Ref. to SL-30, CHECK DOOR SWITCH, INSPECTION, Security System.> • Check the rear gate latch switch. <Ref. to SL-31, CHECK REAR GATE LATCH SWITCH., INSPECTION, Security System.>
8	**CHECK SECURITY ALARM OPERATION.** Check the security alarm operation.	Does all of the following security alarm operate? •Horn sounds •Hazard light blinks •Security indicator light blinks	Go to step **9**.	• Check horn. <Ref. to SL-32, CHECK HORN, INSPECTION, Security System.> • Check the hazard light. <Ref. to SL-33, CHECK HAZARD LIGHT OPERATION, INSPECTION, Security System.>
9	**CHECK SECURITY ALARM CANCEL OPERATION.** Press any button of transmitter while operating security alarm. Or turn the ignition switch OFF→ON three times.	Does all of the following security alarm stop? •Horn •Hazard light	Go to step **10**.	Check the ignition switch circuit. <Ref. to SL-33, CHECK IGNITION SWITCH CIRCUIT, INSPECTION, Security System.>
10	**CHECK SECURITY SYSTEM CONDITION MEMORY.** Check that the system function properly when the battery is not connected temporally. <Ref. to SL-29, CHECK SECURITY SYSTEM CONDITION MEMORY, INSPECTION, Security System.>	Does the system function properly when the battery is not connected temporally?	Go to step **11**.	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>
11	**CHECK IMPACT SENSOR.** Check the sensibility of impact sensor. <Ref. to SL-49, CHECK IMPACT SENSOR, ADJUSTMENT, Impact Sensor.>	Is the sensibility set properly?	Press the UNLOCK button of keyless transmitter, and finish the diagnosis.	Adjust the sensibility. <Ref. to SL-49, IMPACT SENSITIVITY ADJUSTMENT, ADJUSTMENT, Impact Sensor.>

CAUTION:
• Security alarm ON/OFF setting
At the time of shipment from the factory, the security alarm is set to "ON". However, when {Security setting initialization} is performed with the Subaru Select Monitor, the security alarm automatically is set to "OFF". When security initialization has been performed, always return the ON/OFF setting for the security alarm to "ON".
• Siren YES/NO setting
The {Siren YES/NO} setting of the item {Unit customization} of the Subaru Select Monitor always shall be set to "NO". If it is set to "YES", the horn of the security alarm will not sound.

NOTE:
Check the function setting of 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 sec at intervals of 2 seconds.
5) Disconnect the ground cable from battery.
6) Connect the ground cable to the battery.
7) Check that the security indicator light blinks twice within 0.5 seconds at 2 seconds 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 down on the driver's seat. Press the UNLOCK button of the keyless transmitter.
2) Turn the ignition switch 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.

4. CHECK DOOR SWITCH

	Step	Check	Yes	No
1	**CHECK INPUT FROM EACH DOOR SWITCH.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Integ. unit} from main menu. 4) Select the {Current Data Display & Save}. 5) Check the door switch input to the body integrated unit when opening the each door (front RH and LH, rear RH and LH).	Is the input signal detected when opening the each door (front RH and LH, rear RH and LH)?	The door switch circuit is OK.	When the input signal cannot be detected in some door switch, Go to step **2**.
2	**CHECK THE DOOR SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of body integrated unit. 3) Disconnect the harness connector of faulty door switch. 4) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(i84) No. 19 — (R12) No. 1: (front door LH)*** ***(i84) No. 32 — (R9) No. 1: (front door RH)*** ***(i84) No. 31 — (R22) No. 1: (rear door LH)*** ***(i84) No. 18 — (R16) No. 1: (rear door RH)***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair the harness.
3	**CHECK THE GROUND CIRCUIT OF DOOR SWITCH.** 1) Disconnect the harness connector of faulty door switch. 2) Measure the resistance of harness connector and chassis ground. ***Connector & terminal*** ***(R9) No. 3 — Chassis ground: (front door LH)*** ***(R12) No. 3 — Chassis ground: (front door RH)*** ***(R22) No. 3 — Chassis ground: (rear door LH)*** ***(R16) No. 3 — Chassis ground: (rear door RH)***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair the harness.
4	**CHECK DOOR SWITCH.** 1) Disconnect the harness connector of faulty door switch. 2) Measure the resistance between door switch terminals. ***Terminals*** ***No. 1 — No. 3:***	Is the resistance more than 1 MΩ when door switch is pushed?	Go to step **5**.	Replace the door switch.
5	**CHECK DOOR SWITCH.** Measure the resistance between door switch terminals. ***Terminals*** ***No. 1 — No. 3:***	Is the resistance less than 1 Ω when door switch is released?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Replace the door switch.

5. CHECK REAR GATE LATCH SWITCH.

	Step	Check	Yes	No
1	**CHECK THE INPUT FROM REAR GATE LATCH SWITCH.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Integ. unit} from main menu. 4) Select the {Current Data Display & Save}. 5) Check the input signal to the body integrated unit when opening the rear gate.	Is the input signal detected when opening the rear gate?	Rear gate latch switch circuit is OK.	Go to step **2**.
2	**CHECK REAR GATE LATCH SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of body integrated unit. 3) Disconnect the rear gate latch switch harness connector. 4) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(i84) No. 17 — (D140) No. 3:***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair the harness.
3	**CHECK REAR GATE LATCH SWITCH GROUND CIRCUIT.** 1) Disconnect the rear gate latch switch harness connector. 2) Measure the resistance between harness connector terminal and chassis ground. ***Connector & terminal*** ***(D140) No. 4 — Chassis ground: (model)***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair the harness.
4	**CHECK REAR GATE LATCH SWITCH.** 1) Disconnect the rear gate latch switch harness connector. 2) Measure the resistance between switch terminals. ***Terminals*** ***No. 3 — No. 4: (model)***	Is the resistance more than 1 MΩ when switch is pushed?	Go to step **5**.	Replace the rear gate latch switch.
5	**CHECK REAR GATE LATCH SWITCH.** Measure the resistance between switch terminals. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance less than 1 Ω when switch is released?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Replace the rear gate latch switch.

6. CHECK SECURITY INDICATOR LIGHT CIRCUIT.

	Step	Check	Yes	No
1	**CHECK SECURITY INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of body integrated unit. 3) Connect the resistor (100 Ω) between the body integrated unit harness connector terminal (i84) No. 33 and chassis ground. ***Connector & terminal*** ***(i84) No. 33 — Chassis ground:***	Does the security indicator light illuminate?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Go to step **2**.
2	**CHECK POWER SUPPLY FOR SECURITY INDICATOR LIGHT.** 1) Disconnect the connector from warning box. 2) Measure the voltage between warning box harness connector terminal and chassis ground. ***Connector & terminal*** ***(i116) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Check the harness for open or short circuits between warning box and fuse.
3	**CHECK SECURITY INDICATOR LIGHT CIRCUIT.** Measure the resistance between the warning box harness connector terminal and security control unit harness connector terminal. ***Connector & terminal*** ***(i116) No. 2 — (i84) No. 33:***	Is the resistance less than 10 Ω?	Replace the warning box. <Ref. to IDI-17, Warning Box.>	Check the harness for open or short circuits between warning box and body integrated unit.

7. CHECK HORN

	Step	Check	Yes	No
1	**CHECK HORN OPERATION.** Check the horn sounds when the horn switch is pushed.	Does the horn sound?	Go to step **2**.	Check the horn circuit.
2	**CHECK OUTPUT TO HORN RELAY.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Integ. unit} from main menu. 4) Select {Function Check}. 5) Select {Horn Output} and execute	Does the horn sound?	Horn circuit is OK.	Go to step **3**.
3	**CHECK HORN RELAY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of body integrated unit. 3) Disconnect the main fuse box harness connector (B186). 4) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 11 — (B186) No. 1:***	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

	Step	Check	Yes	No
1	**CHECK HAZARD LIGHT OPERATION.** 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	**CHECK OUTPUT TO HAZARD LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the key warning switch harness connector. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON. 5) Select {Integ. unit} from main menu. 6) Select {ECM customizing}. 7) Check the {Hazard answer-back setup}, and then switch to ON setting. 8) Select the {Current Data Display & Save}. 9) Check the hazard output signal of body integrated unit when operating the LOCK/UNLOCK button of transmitter.	Is output signal is present when operating the transmitter LOCK/UNLOCK button?	Go to step **3**.	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
3	**CHECK CIRCUIT OF HAZARD LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of body integrated unit. 3) Disconnect the turn signal & hazard unit harness connector. 4) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 12 — (B32) No. 8:***	Is the resistance less than 10 Ω?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Repair the harness.

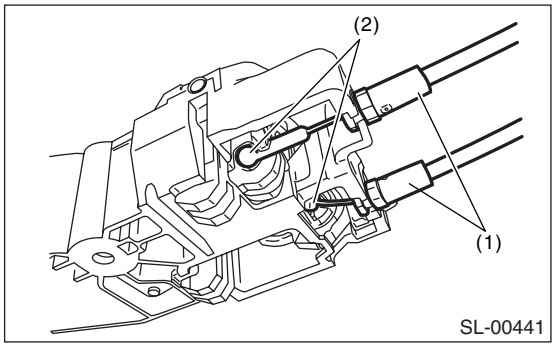
9. CHECK IGNITION SWITCH CIRCUIT

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH VOLTAGE.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Integ. unit} from main menu. 4) Select the {Current Data Display & Save}. 5) Check the {BATT voltage} and {IG power supply}.	Is the {IG power supply} within ±1 V against {BATT voltage}?	The ignition switch input circuit is OK.	Go to step **2**.
2	**CHECK IGNITION SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of body integrated unit. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(i84) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Check the harness for an open or short circuit between the body integrated unit and fuse.

5. Front Inner Remote

A: REMOVAL

1) Remove the door trim. <Ref. to EI-35, 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.

NOTE:
Make sure the inner remote works correctly after installation.

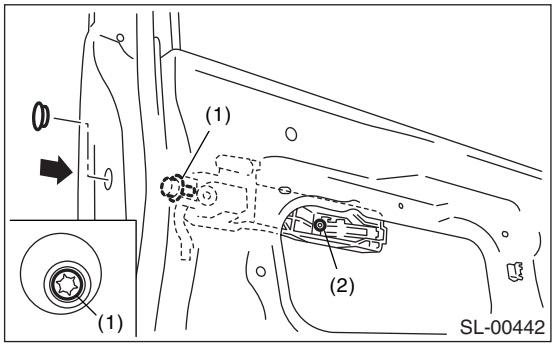
C: INSPECTION

1) Check the cable of the remote handle and lock knob for deformation. When it is deformed, straighten it because failure operations may occur. When it is unrepairable, replace the front door latch and door lock actuator assembly.
2) Check that the remote handle and lock knob operates smoothly.

6. Front Outer Handle

A: REMOVAL

1) Raise the front door glass to the top position.
2) Remove the door trim. <Ref. to EI-35, REMOVAL, Door Trim.>
3) Remove the sealing cover. <Ref. to EB-18, REMOVAL, Front Sealing Cover.>
4) Remove the plug at the rear end of the door panel.
5) Remove the rod clamp.
6) Loosen the bolt (1) and turn bolt (2) five times.
7) 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.

8) 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.

NOTE:
Make sure that the outer handle works correctly after installation.

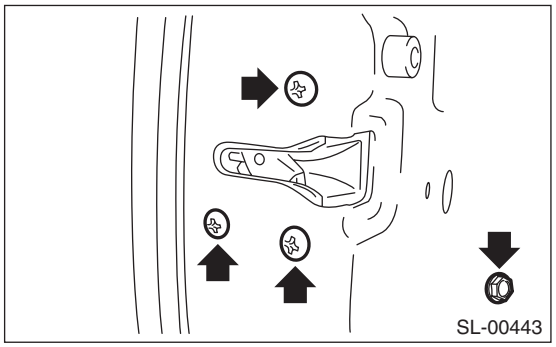
C: INSPECTION

1) Make sure that the key cylinder and latch are contacting securely.
2) Check the rod for deformation.
3) Check the lever and rod for smooth operation.

7. Front Door Latch and Door Lock Actuator Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Raise the rear door glass to the top position.
3) Remove the front door trim. <Ref. to EI-35, REMOVAL, Door Trim.>
4) Remove the cable from the front inner remote. <Ref. to SL-34, REMOVAL, Front Inner Remote.>
5) Remove the sealing cover. <Ref. to EB-18, REMOVAL, Front Sealing Cover.>
6) Remove the door sash. <Ref. to GW-10, REMOVAL, Front Regulator and Motor Assembly.>
7) Remove the connection rod of the key cylinder lever. (Driver's side only)
8) Remove the three screws and one bolt.



9) Remove the front door latch and actuator assembly, and disconnect the connector.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure lock and unlock works correctly after installation.

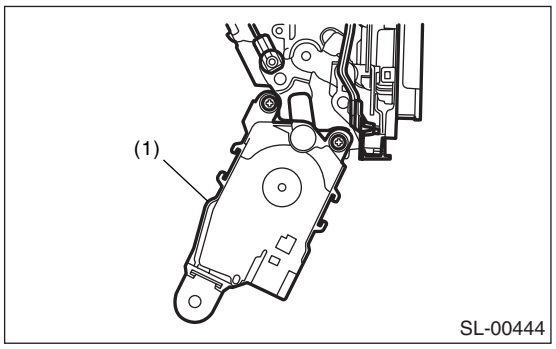
C: INSPECTION

1) Check the rod and cable for deformation. When it is deformed, straighten it because failure operations may occur. When it is unrepairable, replace the front door latch and actuator assembly.
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-36, 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.



(1) Front door lock actuator

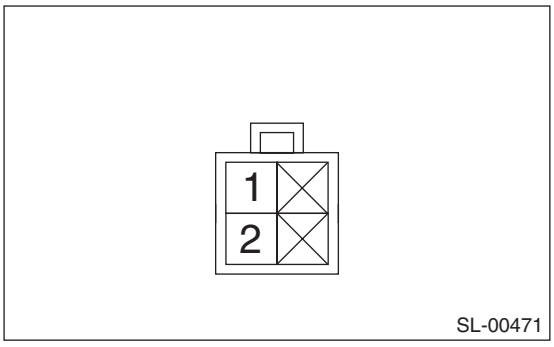
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure lock and unlock works correctly after installation.

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.

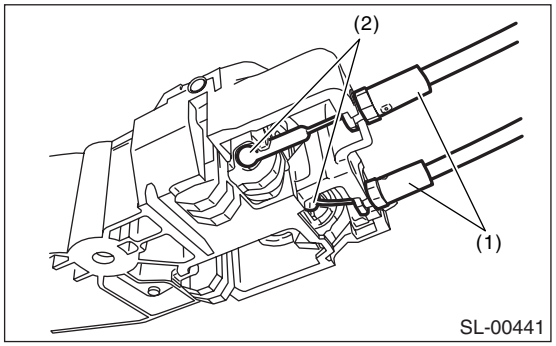


Terminal No.	Actuator operation
No. 1 (+) and No. 2 (–)	Unlock → Lock
No. 2 (+) and No. 1 (–)	Lock → Unlock

9. Rear Inner Remote

A: REMOVAL

1) Remove the rear door trim. <Ref. to EI-35, 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.

NOTE:
Make sure the inner remote works correctly after installation.

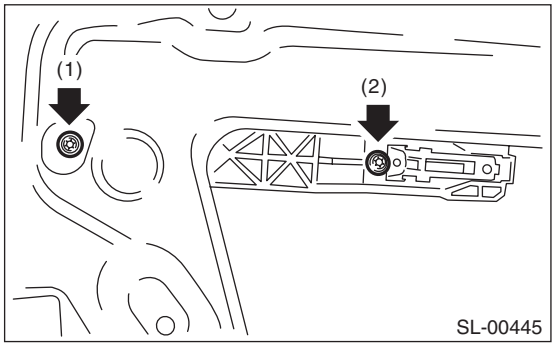
C: INSPECTION

1) Check the cable of the remote handle and lock knob for deformation. When it is deformed, straighten it because failure operations may occur. When it is unrepairable, replace the rear door latch and door lock actuator assembly.
2) Check that the remote handle and lock knob operates smoothly.
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-35, REMOVAL, Door Trim.>
4) Remove the sealing cover. <Ref. to EB-21, REMOVAL, Rear Sealing Cover.>
5) Loosen the bolt (1) and turn bolt (2) twice.
6) Remove the outer handle cover.
7) Remove the outer side spacer, move the rear outer handle forward/backward 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.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure that the outer handle works correctly after installation.

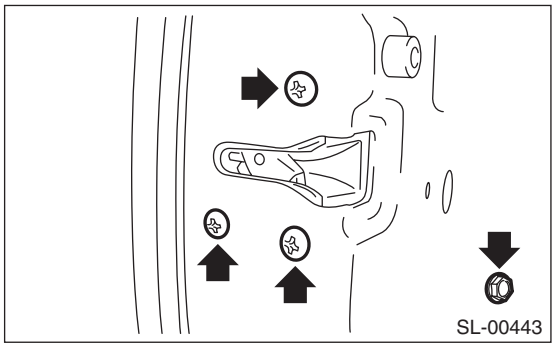
C: INSPECTION

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-35, REMOVAL, Door Trim.>
4) Remove the cable from rear inner remote. <Ref. to SL-38, REMOVAL, Rear Inner Remote.>
5) Remove the sealing cover. <Ref. to EB-21, REMOVAL, Rear Sealing Cover.>
6) Remove the rear sash. <Ref. to GW-17, REMOVAL, Rear Regulator and Motor Assembly.>
7) Pull out the cable from the cable clamp of the outer handle.
8) Remove the three screws and one bolt.



9) Disconnect the connectors, and then remove the rear door latch and door lock actuator assembly.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure lock and unlock works correctly after installation.

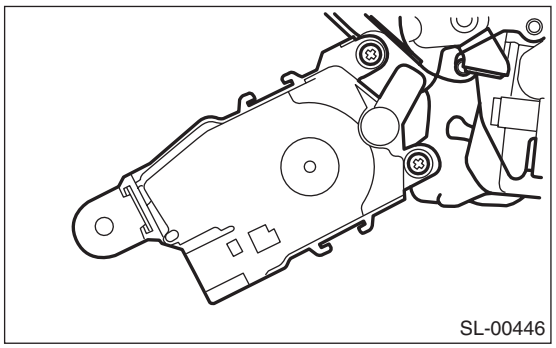
C: INSPECTION

1) Check the cable for deformation. When it is deformed, straighten it because failure operations may occur. When it is unrepairable, replace the rear door latch and door lock actuator assembly.
2) Check that the lever and cable operates smoothly.

12.Rear Door Lock Actuator

A: REMOVAL

1) Remove the rear door latch and door lock actuator assembly. <Ref. to SL-40, REMOVAL, Rear Door Latch and Door Lock Actuator Assembly.>
2) Remove the pawl of rear door latch security cover, and then remove the cover.
3) Remove the screw from the rear door latch and door lock actuator, and then remove the door lock actuator.



(1) Rear door lock actuator

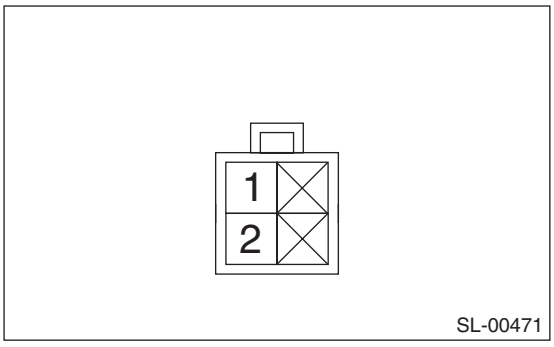
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure lock and unlock works correctly after installation.

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.

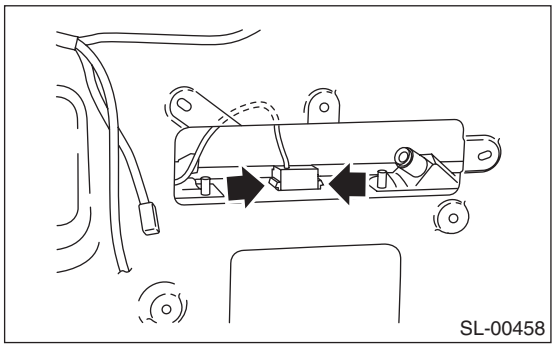


Terminal No.	Actuator operation
No. 1 (+) and No. 2 (–)	Unlock → Lock
No. 2 (+) and No. 1 (–)	Lock → Unlock

13.Rear Gate Release Switch

A: REMOVAL

1) Remove the rear gate trim. <Ref. to EI-51, REMOVAL, Rear Gate Trim.>
2) Remove the rear gate garnish. <Ref. to EI-52, REMOVAL, Rear Gate Garnish.>
3) Disconnect the harness connector of the rear gate release switch.
4) Hold the rear gate release switch hook, and remove the rear gate release switch.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the rear gate latch assembly works after installation.

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.

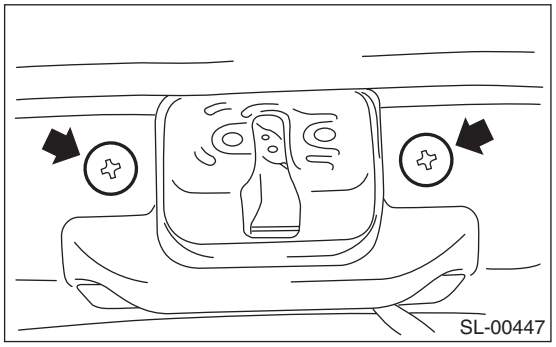
Switch	Terminals	Standard
Open	No.1 and No. 2	Less than 1 Ω
Close		1 MΩ or more

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-51, 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.

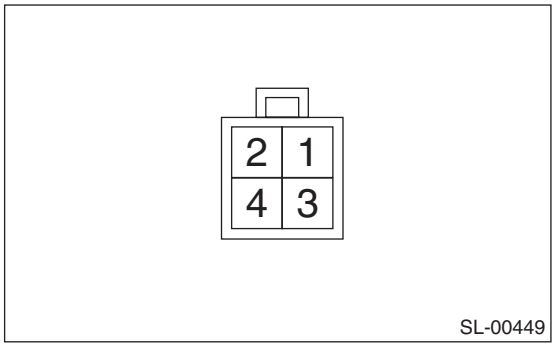
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the lock works correctly after installation.

C: INSPECTION

1) Disconnect the rear gate lock actuator harness connector.
2) Connect the battery to rear gate lock actuator terminals.



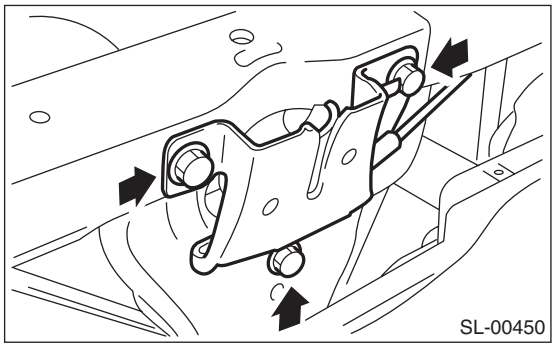
Terminal No.	Actuator operation
No. 2 (+) and No. 1 (–)	Unlock → Lock
No. 1 (+) and No. 2 (–)	Lock → Unlock

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.

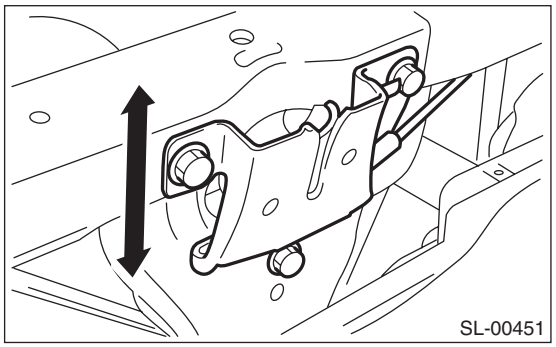
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
- Apply grease to the movable part.
- Make sure the cable works correctly after installation.

C: ADJUSTMENT

Loosen the bolt, and adjust the lock assembly while moving it up and down.



D: INSPECTION

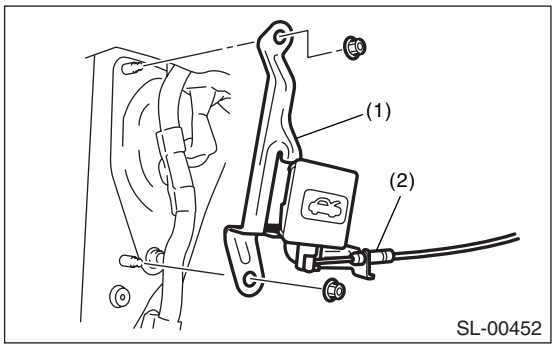
1) Check the striker for deformation or abnormal wear.
2) Check the safety lever for improper movement.
3) Check other levers and springs for rust formation or unsmooth movement.

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.

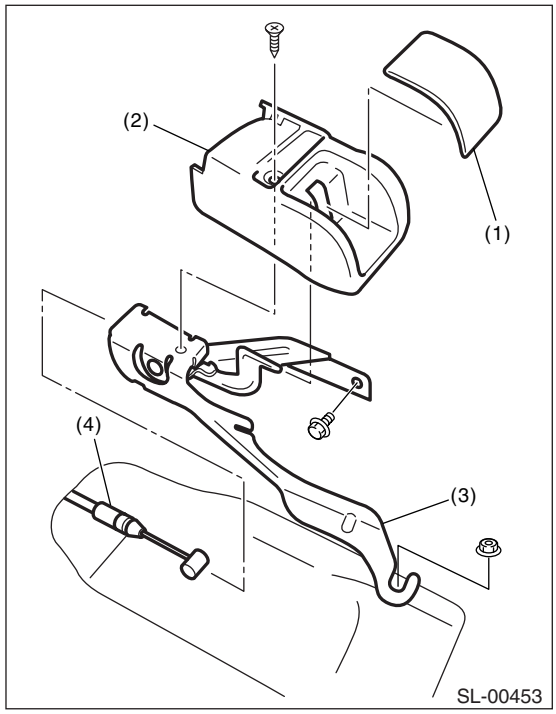


(1) Front hood opener
(2) Cable

2. FUEL FILLER FLAP LID OPENER

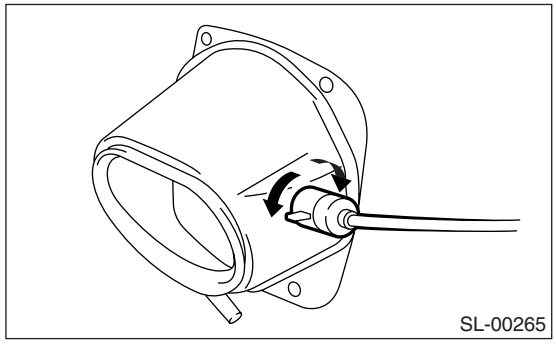
1) Remove the second–row seats. <Ref. to SE-12, REMOVAL, Second-row Seats.>
2) Remove the third-row seats. <Ref. to SE-17, REMOVAL, Third-row Seats.>
3) Remove the following side trims. <Ref. to EI-43, REMOVAL, Side Trim.>
- Front door scuff plate LH
- Rear door scuff plate LH
- Center pillar lower trim

4) Remove the right rear quarter trim. <Ref. to EI-45, 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

1. FRONT HOOD OPENER

Install in the reverse order of removal.

2. FUEL FILLER FLAP LID OPENER

Install in the reverse order of removal.

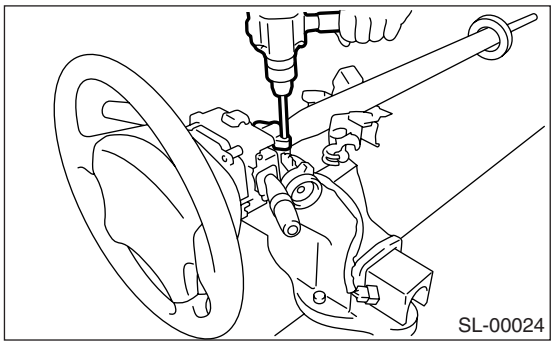
C: INSPECTION

Make sure the front hood and fuel filler flap lid open and close smoothly.

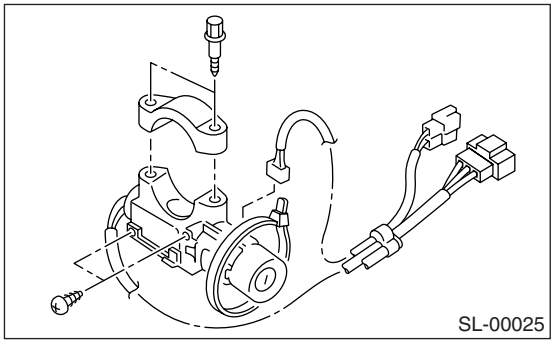
17.Ignition Key Lock

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.

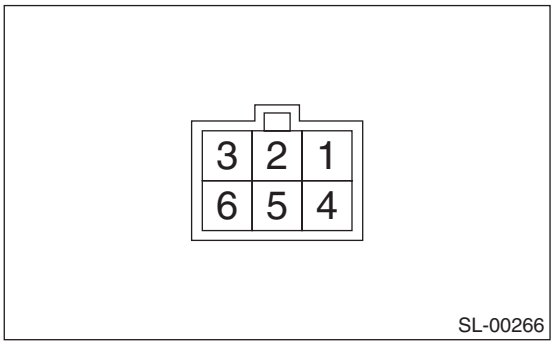


4) Remove the ignition key lock.
5) Using a new bolt, tighten the bolts all the way.



B: INSPECTION

1) Remove the instrument panel lower panel.
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.



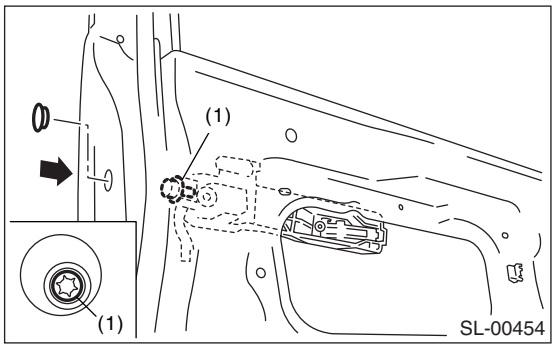
Switch position	Terminal No.	Standard
LOCK	—	—
ACC	No. 3 and No. 4	Less than 1 Ω
ON	No. 3, No. 1 and No. 4 No. 3 and No. 6	Less than 1 Ω
ST	No. 3 and No. 1 No. 3, No. 2 and No. 6	Less than 1 Ω

If NG, replace the ignition switch.

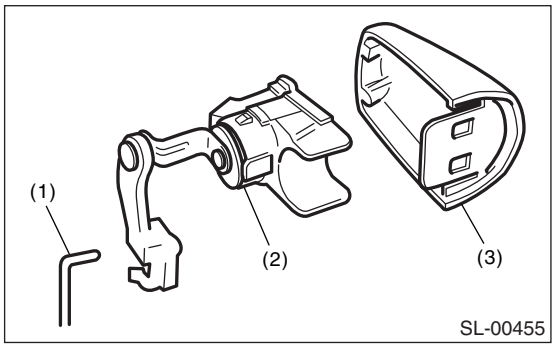
18.Key Lock Cylinders

A: REPLACEMENT

1) Raise the front door glass to the top position.
2) Remove the door trim. <Ref. to EI-35, REMOVAL, Door Trim.>
3) Remove the sealing cover.
4) Remove the plug at the rear end of the panel.
5) Loosen bolt (1) to 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 Unit

A: NOTE

The control of security system is carried out in body integrated unit.

B: REMOVAL

<Ref. to SL-52, REMOVAL, Body Integrated Unit.>

C: INSTALLATION

<Ref. to SL-52, 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 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 battery.
5) Install the impact sensor.
6) Connect the 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) Connect the Subaru Select Monitor to data link connector.
2) Turn the ignition switch to ON.
3) Select {Integ. unit} from main menu.
4) Select {ECU customizing}.
5) Make a impact monitor setting.
- When installing: ON
- When removing: OFF

6) Make a impact monitor ON/OFF setting.
- When installing: ON
- When removing: OFF

7) 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 seconds cycle 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) Connect the Subaru Select Monitor to data link connector.
2) Turn the ignition switch to ON.
3) Select {Impact Sensor} from the main menu.
4) Make a {ECU customizing}.
- Sensitivity can be adjusted in 11 levels (0 to 10).
- Initial setting is 5.
- Smaller number means more sensitive.
- Larger number means less sensitive.

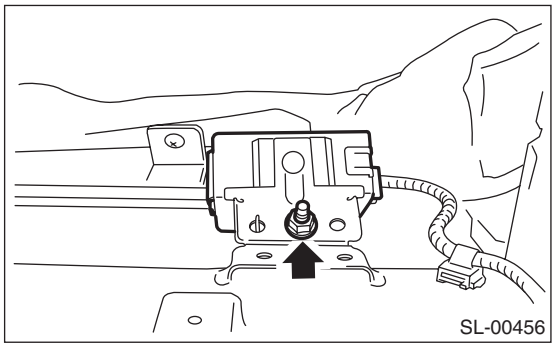
5) Turn the ignition switch to OFF, and then remove the Subaru Select Monitor.

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-37, REMOVAL, Glove Box.>
3) Remove the nut, then disconnect the connector to 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 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

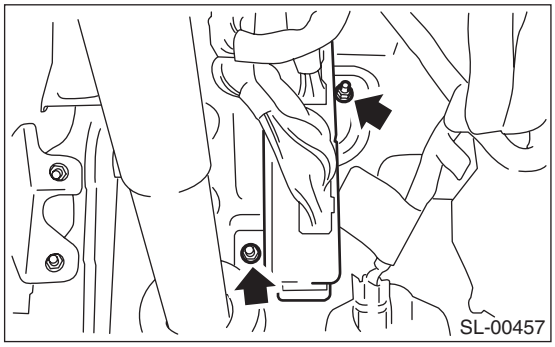
A: REMOVAL

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.

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-36, 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 attach or register the immobilizer related unit which is already registered to another vehicle, for the purpose of diagnosis or function check.

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.>

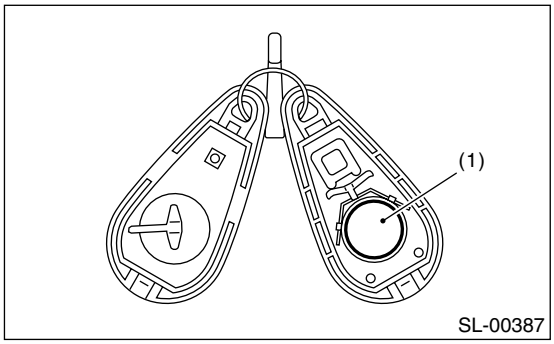
24.Transmitter

A: REMOVAL

1. TRANSMITTER BATTERY

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

1. TRANSMITTER BATTERY

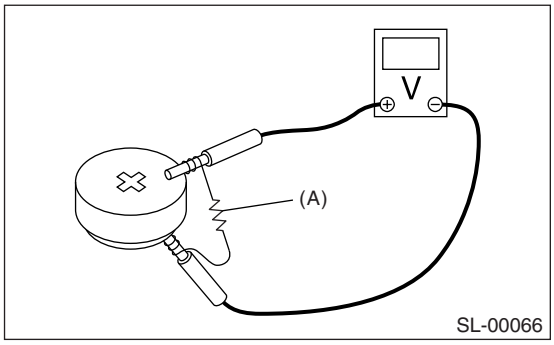
Install in the reverse order of removal.

C: INSPECTION

1. TRANSMITTER BATTERY

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 Ω)

Tester connection		Standard
(+)	(–)	
Battery Positive terminal	Battery Ground terminal	2.5 — 3.0 V

If NG, replace the battery. (Use CR2025 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) Connect the Subaru Select Monitor to the vehicle.
2) Turn the ignition switch to ON.
3) From the «Main menu» on the Subaru Select Monitor, select the {2. Check individual system} → {7. Integrated unit mode} → {8. Transmitter ID registration}, and press the [YES] key.
4) Input the 8-digit ID number fund inside the plastic bag that the transmitter came in, or inside the transmitter, from left to right. Press the [YES] key.

NOTE:
Press the [▲] key on the Subaru Select Monitor to increase the number, and the [▼] key to decrease. Press the [<] key to move to the digit in the left, and [>] to the right.

5) The ID number you have entered will be shown. Make sure that the ID number shown is the same as that of plastic bag.
6) Press the [YES] key if the ID number is correct. Press the [NO] key if incorrect, to return to the step 3) and try again.
7) «ID registration in process···» is displayed and registration starts.
8) »ID registration done» will be displayed when the registration process is done.
9) To exit, select «END:NO», and press the [NO] key to return to {8. Transmitter ID registration}. If there are additional transmitters to be registered, select «Next registration:YES», and press the [YES] key to return to the step 3).

NOTE:
• If the registration fails, «ID registration failed. Try again.» will be shown. Press the [YES] key to return to the {8. Transmitter ID registration}. Retry from step 2.
• «END: NO» is shown on the Subaru Select Monitor when fourth keyless transmitter has been registered. Press the [NO] key to return to {8. Transmitter ID registration}.

25.Immobilizer Control Unit

A: NOTE

The control of immobilizer system is carried out in body integrated unit.

B: REMOVAL

<Ref. to SL-52, REMOVAL, Body Integrated Unit.>

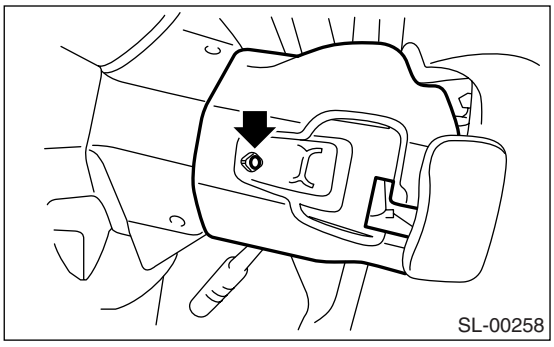
C: INSTALLATION

Install in the reverse order of removal.

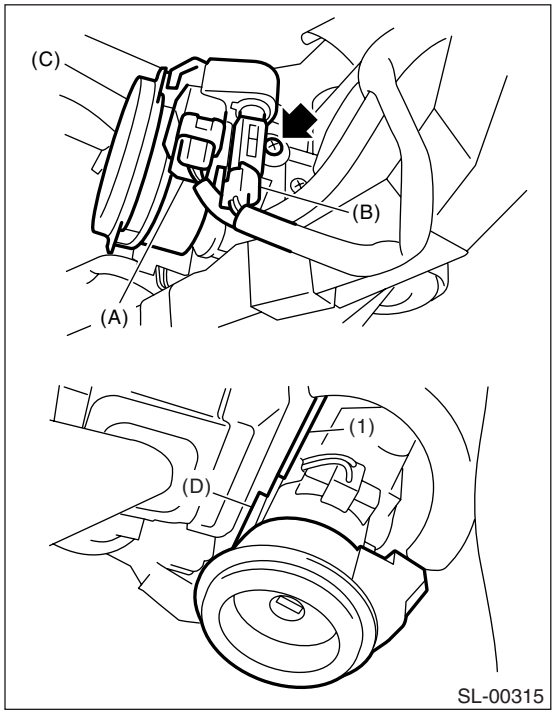
26.Immobilizer Antenna

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-36, 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).



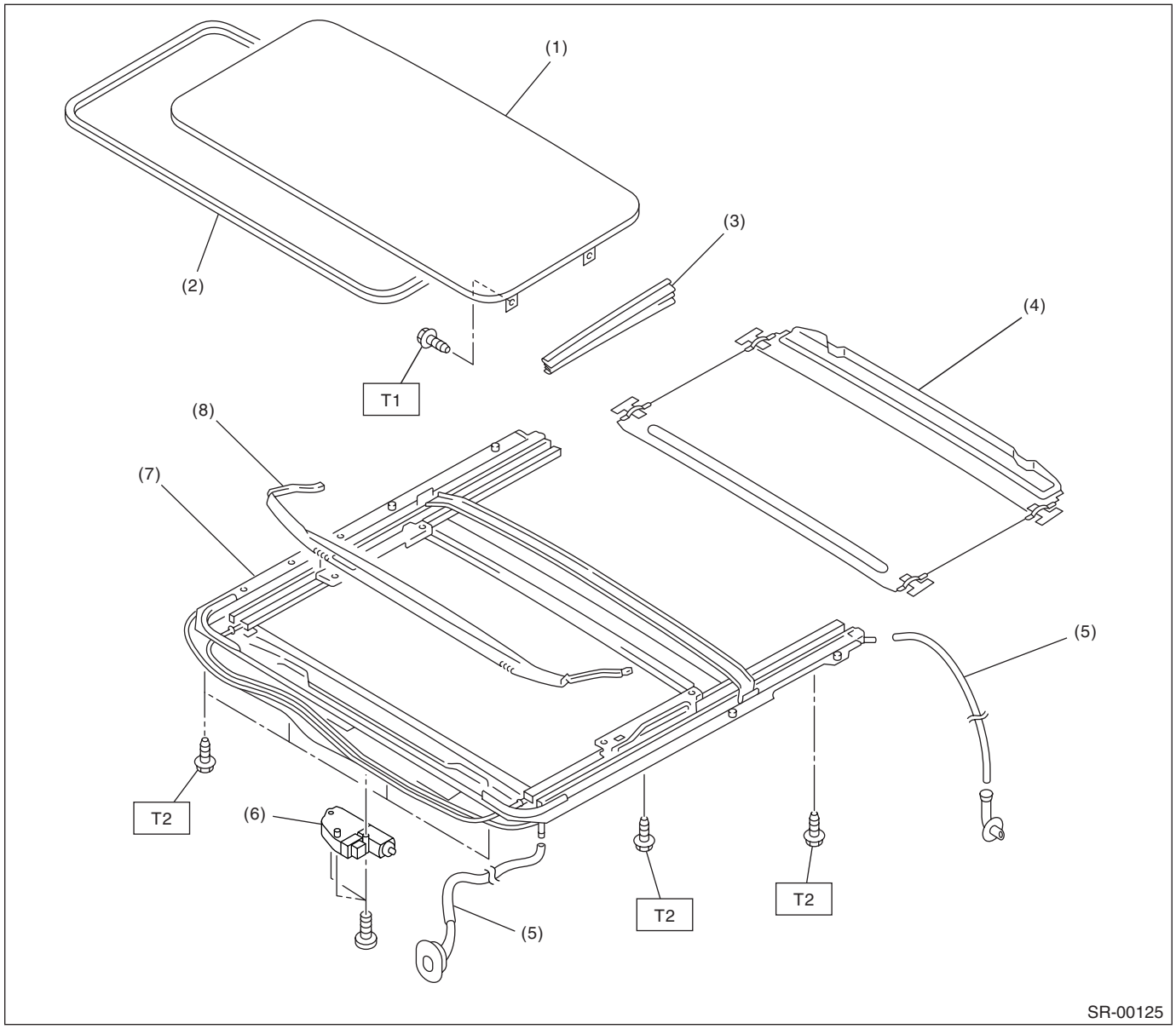
CAUTION:
Do not apply excessive force to remove the immobilizer antenna and lock. Otherwise they may be broken because those parts are the products made of a plastic.

B: INSTALLATION

Install in the reverse order of removal.

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)

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.

2. Sunroof Control System

A: WIRING DIAGRAM

1. SUNROOF

<Ref. to WI-139, WIRING DIAGRAM, Sunroof Control System.>

B: INSPECTION

Symptom	Inspection order
Water leakage	1. Check roof panel and glass lid for improper or poor sealing. 2. Check drain tube for clogging. 3. Check sunroof frame seal and body for improper fit.
Booming noise, wind noise and other noise	1. Check glass lid and roof panel for improper clearance. 2. Check sunshade and roof trim for improper clearance.
Abnormal motor noise	1. Check installing part of motor for looseness. 2. Check gears and bearings for wear. 3. Check cable for wear. 4. Check cable pipe for deformities.
Failure of sunroof (Motor operates properly.)	1. Check guide rail for foreign particles. 2. Check guide rail for improper installation. 3. Check parts for mutual interference. 4. Check cable slider for improper clinching. 5. Check cable for improper installation.
Motor does not rotate or rotate improperly.	1. Check fuse for blown out. 2. Check switch for improper function. 3. Check motor for incorrect terminal voltage. 4. Check the relay for improper operation. 5. Check poor grounding system. 6. Check harness for open or short and terminals for poor connections.
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

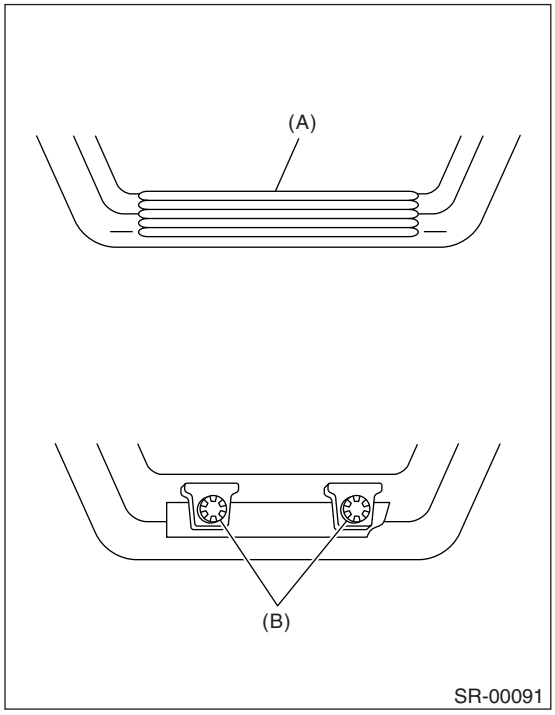
1) Tilt up the glass lid.
2) Release the switch once, and press the tilt up switch again for 15 seconds.
3) When the glass lid is raised a little and returned to tilt up position, release the switch for the moment. (Initialization of position detecting function)
4) Holding down the tilt up switch again within 5 seconds from releasing the switch will automatically perform tilt down/slide open/slide close. (When more than 5 seconds pass, the position detecting function is cancelled.)
5) Initialize operation is completed.

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.

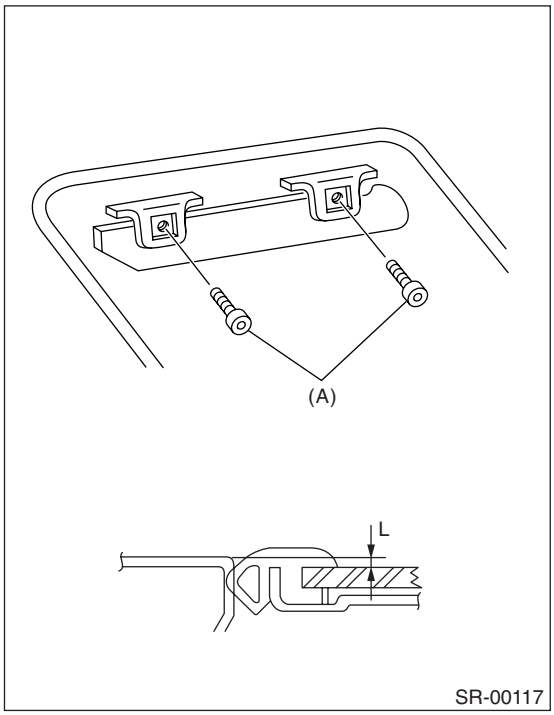
B: INSTALLATION

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)

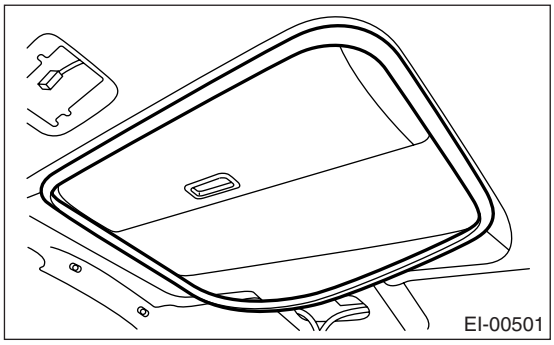


D: FORCED DRIVE

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 bolt width 4 mm (0.16 in)

1) Remove the spot map light. <Ref. to LI-29, 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.

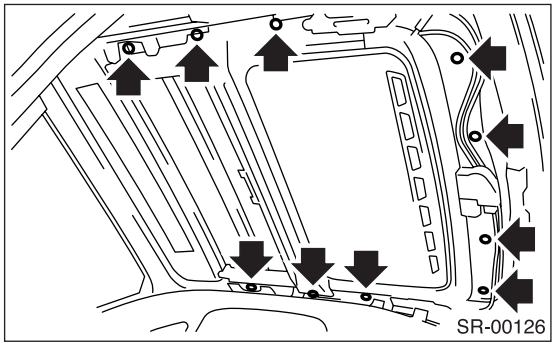
CAUTION:
Make sure not to bend or wrinkle the roof trim during work.

5) Turn the hexagon wrench, and move the glass lid.
- Turning right, the glass lid open.
- Turning left, the glass lid close.

4. Sunroof Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the roof trim. <Ref. to EI-50, 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.



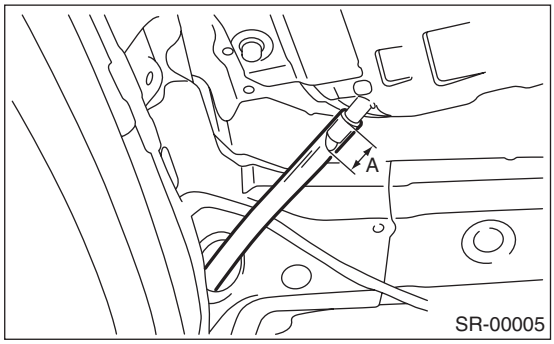
B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Be careful not to snag the harness.

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-8, REMOVAL, Sunroof Motor.>
2) Remove the sunshade. <Ref. to SR-11, REMOVAL, Sunshade.>

D: ASSEMBLY

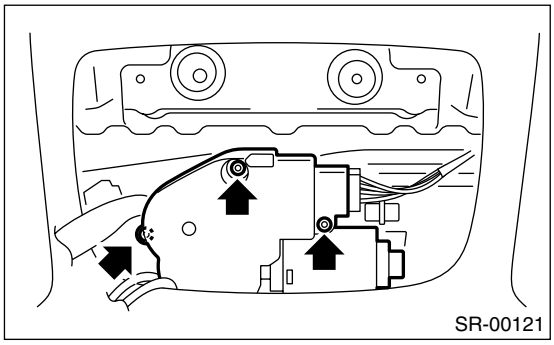
Assemble in the reverse order of disassembly.

5. Sunroof Motor

A: REMOVAL

CAUTION:
• When removing the clip, use great care not to damage the roof trim.
• Never rotate the sunroof motor after removing it.

1) Completely close the glass lid.
2) Disconnect the ground cable from battery.
3) Remove the spot map light. <Ref. to LI-29, REMOVAL, Spot Map Light.>
4) Disconnect the harness connector, and then remove the motor assembly mounting screw.

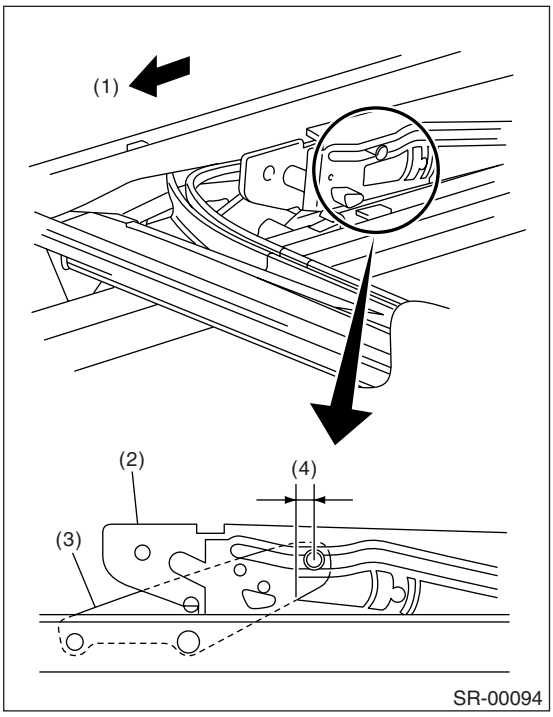


CAUTION:
When removing the motor assembly, secure the cable wires to prevent moves.

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.

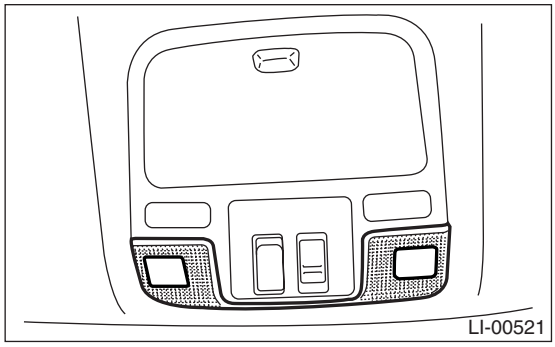
Operation	Switch position
(1) Glass lid closes completely.	Close
(2) Glass lid tilt up to the top position.	Tilt up
(3) Glass lid lowers completely.	Tilt down
(4) Glass lid opens completely.	Open
(5) Glass lid closes 150 mm (5.91 in) away from the completely closed position.	Close
(6) Glass lid closes completely.	Close

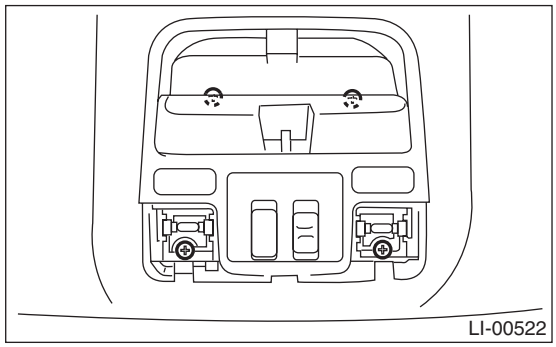
6) Install the trim in the reverse order of removal.

6. Sunroof Switch

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the spot map light lens (A) and sunroof switch mounting screws (B).





3) Disconnect the harness connector, and then remove the sunroof switch.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

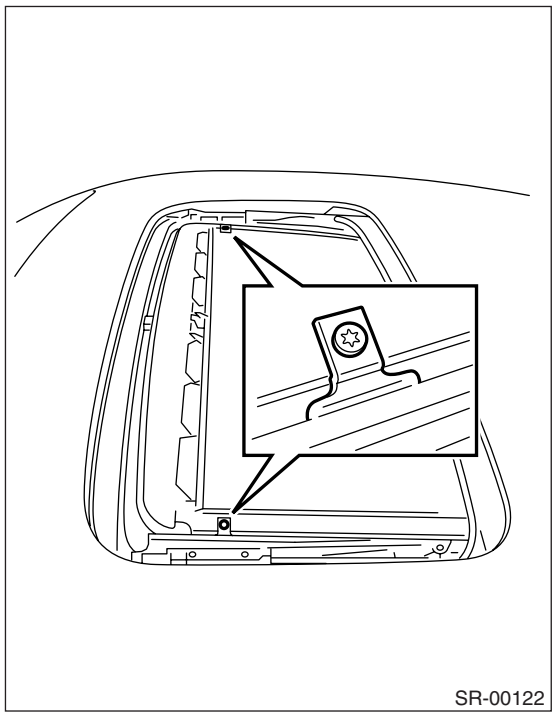
Measure the sunroof switch resistance.

Switch position	Terminal No.	Standard	Connector No.
Open	1 and 3	Less than 1 Ω	R128
Close	3 and 4	Less than 1 Ω	
Tilt up	1 and 3	Less than 1 Ω	R187
Tilt down	3 and 4	Less than 1 Ω	

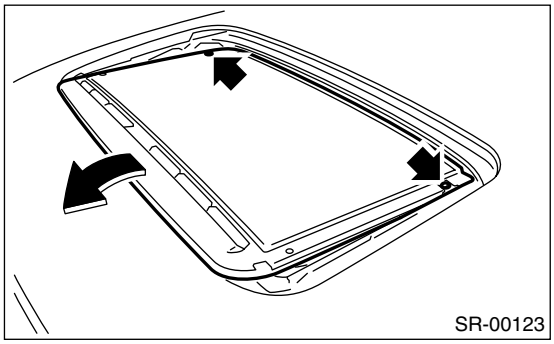
7. Sunshade

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.


SR-00122

3) Pull the sunshade until the rear sunshade bracket comes into the sight, then loosen the TORX ® bolts to remove the sunshade.


SR-00123

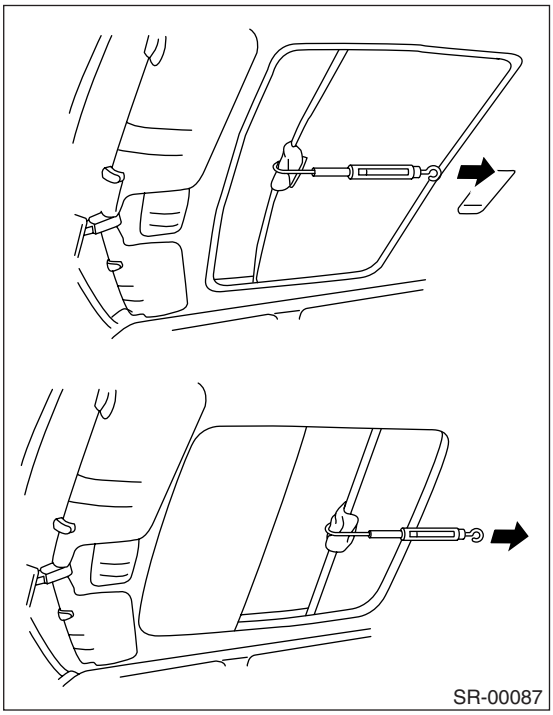
B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1. CHECK FOR MOVING LOAD OF SUNSHADE

1) Attach a spring balance to sunshade edge using a cloth.


SR-00087

2) Pull the spring balance to measure moving load of the sunshade.

Moving load of sunshade:
Specification
18.0±5.0 N (1.8±0.5 kgf, 13±3.7 lbf)

NOTE:
Moving load is larger at the beginning of pulling a spring balance, so take a spring balance reading while sunshade sliding smoothly.

3) If moving load exceeds specifications, check the glass lid, sunshade and frame assembly for improper installation.

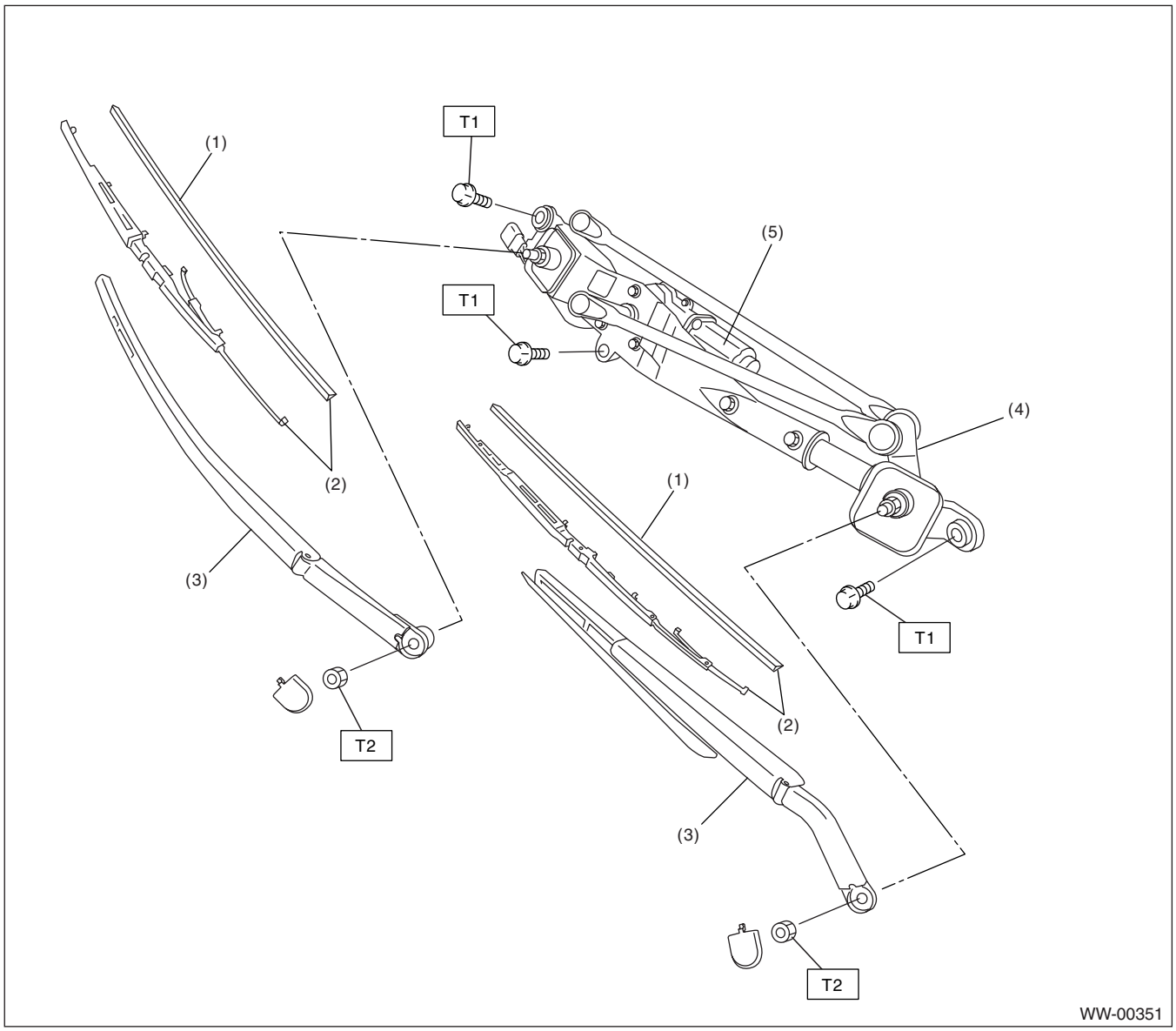
1. General Description

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

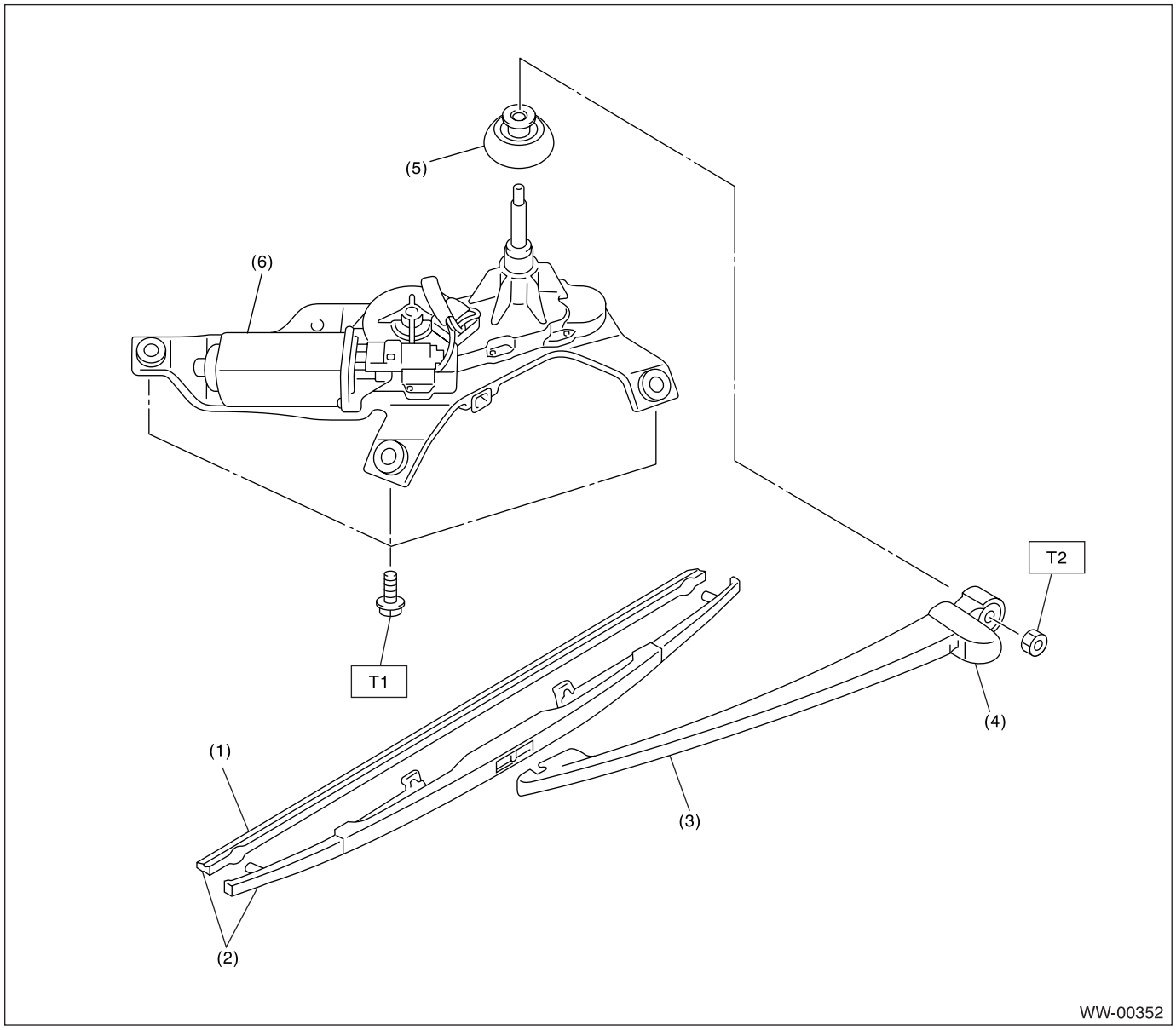
1. FRONT WIPER



(1) Wiper rubber
(2) Wiper blade ASSY
(3) Wiper arm
(4) Wiper link ASSY
(5) Wiper motor ASSY

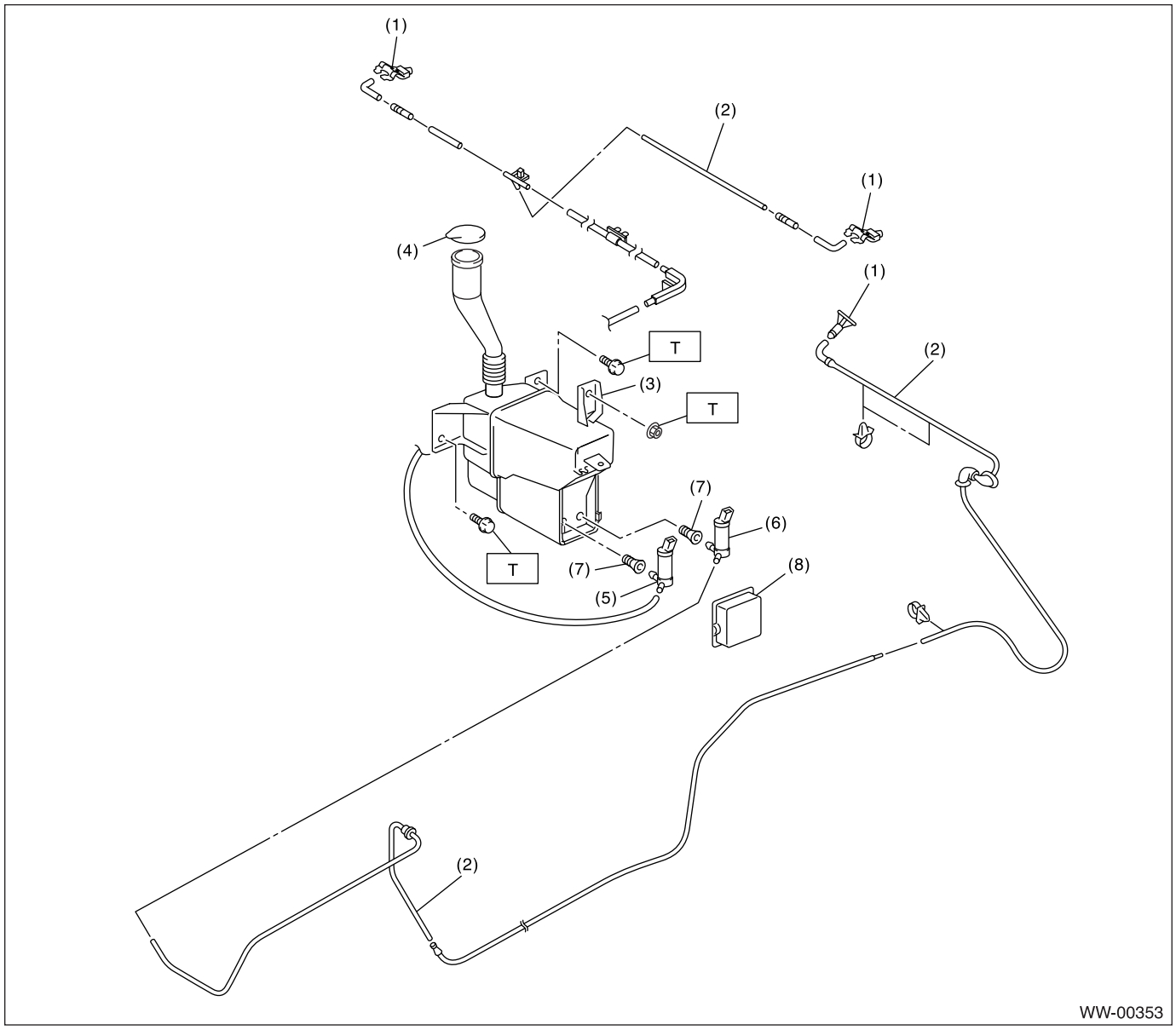
Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.0 (0.61, 4.4)
T2: 20 (2.0, 14.5)

2. REAR WIPER



(1)	Wiper rubber	(4)	Wiper arm cover	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Wiper blade ASSY	(5)	Cap	***T1: 7.0 (0.71, 5.2)***
(3)	Wiper arm	(6)	Wiper motor ASSY	***T2: 8.0 (0.82, 5.9)***

3. WASHER TANK



(1) Washer nozzle
(2) Washer hose
(3) Washer tank
(4) Washer tank cap
(5) Front washer motor
(6) Rear washer motor
(7) Grommet
(8) Washer motor cover

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 wire 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.

2. Wiper and Washer System

A: WIRING DIAGRAM

1. WIPER AND WASHER (FRONT)

<Ref. to WI-105, WIRING DIAGRAM, Front Wiper and Washer System.>

2. WIPER AND WASHER (REAR)

<Ref. to WI-106, WIRING DIAGRAM, Rear Wiper and Washer System.>

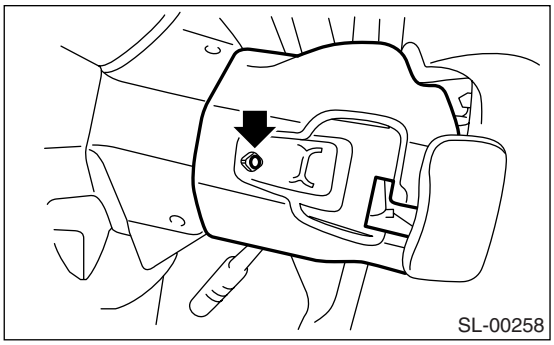
B: INSPECTION

Symptom	Repair order
Wiper and washers do not operate.	1. Wiper fuse (Front: F/B No. 30, Rear: F/B No. 23) 2. Combination switch 3. Wiper motor assembly 4. Wiring harness 5. Wiper relay unit 6. Body integrated unit (rear wiper only)
Wipers do not operate in LO or HI.	1. Combination switch 2. Wiper motor assembly 3. Wiring harness 4. Wiper relay unit
Wipers do not operate in INT.	1. Combination switch 2. Wiper motor assembly 3. Wiring harness 4. Body integrated unit (rear wiper only)
Washer motor does not operate.	1. Washer switch 2. Washer motor 3. Wiring harness
Wipers do not operate when washer switch is ON.	1. Wiper motor assembly 2. Wiring harness
Washer fluid spray does not operate properly.	1. Washer motor 2. Washer hose and nozzle

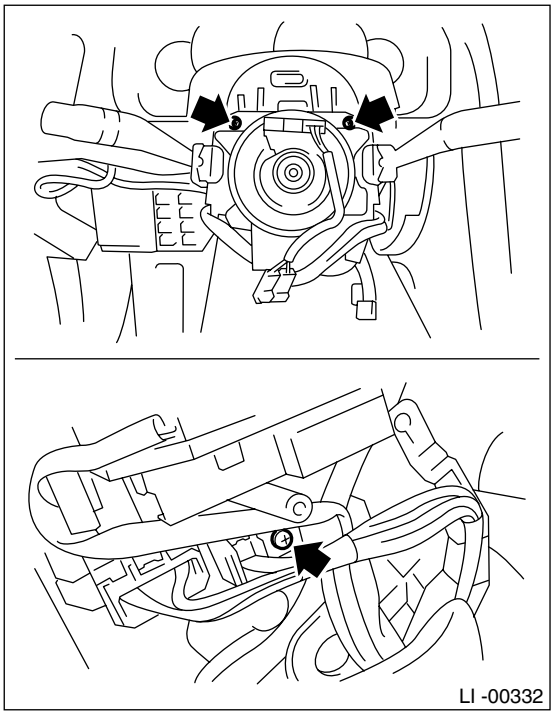
3. Combination Switch (Wiper)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the driver's airbag module. <Ref. to AB-15, 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).


SL-00258

5) Disconnect the connector from the combination switch.
6) Remove the three screws, and pull out the combination base switch assembly toward you.


LI -00332

7) Remove the screws which secure the switch, then remove the combination switch.

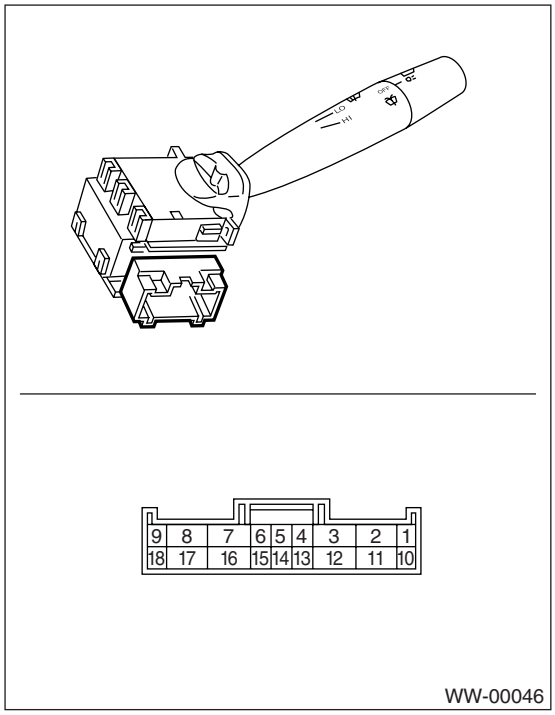
B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1. COMBINATION SWITCH

1) Inspect the continuity between each connector terminal.



WW-00046

	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 2 and 12 2 and 13 10 and 12 10 and 13 12 and 13	1 MΩ or more
	INT	2 and 13	Less than 1 Ω
	ON	2 and 10	Less than 1 Ω
	Washer ON	2 and 12 12 and 10 2 and 10	Less than 1 Ω

2) If continuity is not as specified, replace the switch.

2. FRONT WIPER

1) Check with Subaru Select Monitor

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL TO THE BODY INTEGRATED UNIT.** When the front wiper switch is operated, check the input signal using the Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Integ. unit} from main menu. 4) Select the {Current Data Display & Save}. 5) Check the input signal when the front wiper switch is set to LO or HI.	Is the input signal normal?	Finish the diagnosis.	Replace the body integrated unit. <Ref. to SL-52, 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 (–).

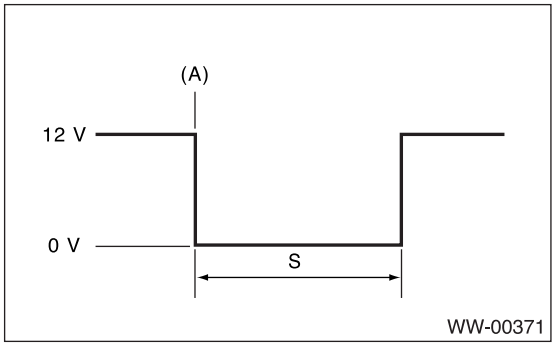
(3) Turn the wiper switch to INT.

(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. 21seconds

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 more than 10 km/h (6 mph), 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.

(3) CHECK THE 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. 33:

Check	Yes	No
Is the resistance 0 Ω?	Replace the wiper switch.	Repair the harness.

3. REAR WIPER

1) Check with Subaru Select Monitor

	Step	Check	Yes	No
1	**CHECK INPUT OF REAR WIPER SWITCH.** Check the input from body integrated unit using the Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Integ. unit} from main menu. 4) Select the {Current Data Display & Save}. 5) Check the input of the rear wiper switch.	Is the input normal?	Go to step **2**.	Check the rear wiper switch. <Ref. to WW-6, INSPECTION, Combination Switch (Wiper).>
2	**CHECK OUTPUT OF BODY INTEGRATED UNIT.** 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 and set to each position of ON and INT. 3) At this time, check the body integrated unit output.	When set to ON, is ON output continuous? When set to INT, is ON/OFF output repeated? (INT OFF time (when vehicle parked): 12 seconds)	Check the rear wiper motor. <Ref. to WW-19, INSPECTION, Rear Wiper Motor.>	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>

2) Check rear wiper motor circuit

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT OF THE REAR WIPER MOTOR.** 1) Disconnect the harness connector of the rear wiper motor. 2) Turn the ignition switch to ACC. 3) Measure the voltage between the rear wiper motor harness connector terminal and chassis ground. ***Connector & terminal*** ***(D43) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	• Check the fuse (No. 23 in fuse & relay box). • Check the fusible link (No. 6 in main fuse box).
2	**CHECK GROUND CIRCUIT OF REAR WIPER MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between the rear wiper motor harness connector terminal and chassis ground. ***Connector & terminal*** ***(D43) No. 3 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3**.	Repair the open circuit of the rear wiper motor ground circuit.
3	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND REAR WIPER MOTOR.** 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. ***Connector & terminal*** ***(B280) No. 1 — (D43) No. 2:*** ***(B280) No. 8 — (D43) No. 4:***	Is the resistance less than 10 Ω?	Go to step **4**.	Repair the open circuit of the harness between body integrated unit and rear wiper motor.
4	**CHECK OPERATION OF REAR WIPER MOTOR.** 1) Remove the rear wiper motor. 2) Check the rear wiper motor. <Ref. to WW-19, INSPECTION, Rear Wiper Motor.>	Does the rear wiper motor rotate normally?	End.	Replace the rear wiper motor.

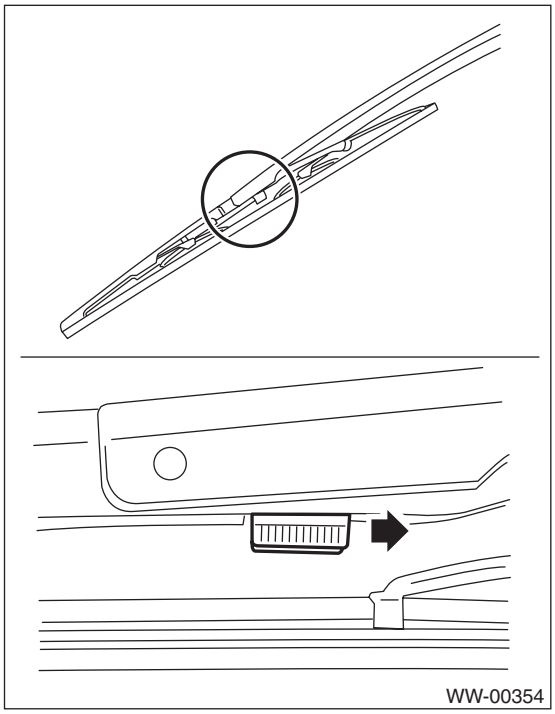
4. Wiper Blade

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.

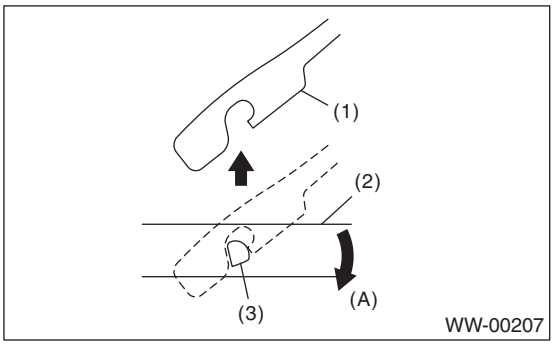
1. FRONT

While pushing the locking clip to the direction of the arrow, pull out and remove the blade from the arm.



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

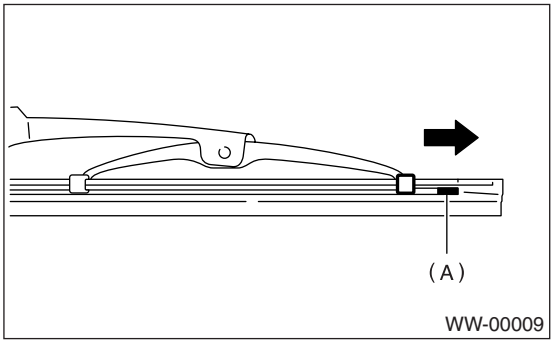
B: INSTALLATION

1) Install in the reverse order of removal.
2) Confirm that the clip is locked securely.

C: DISASSEMBLY

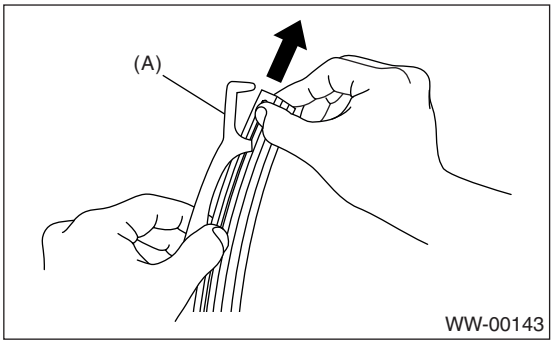
1. FRONT

Pull side (A) of the wiper rubber stopper and remove the rubber from the blade assembly.



2. REAR

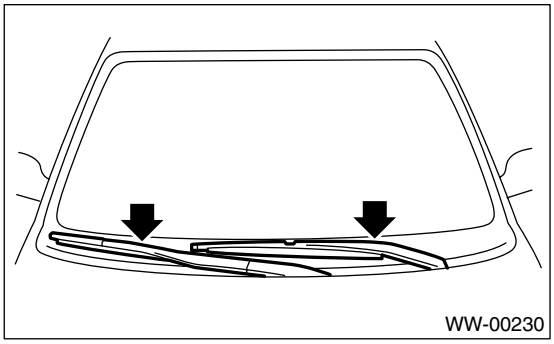
Pull the wiper rubber top slightly from stopper (A) and pull out completely.



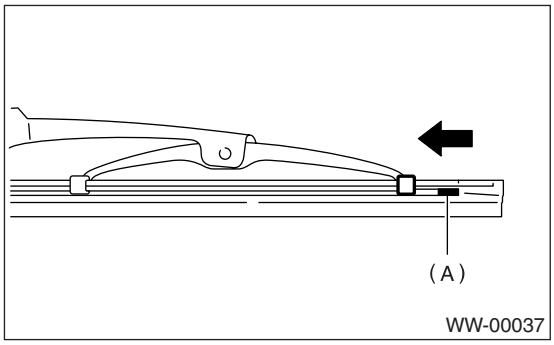
D: ASSEMBLY

1. FRONT

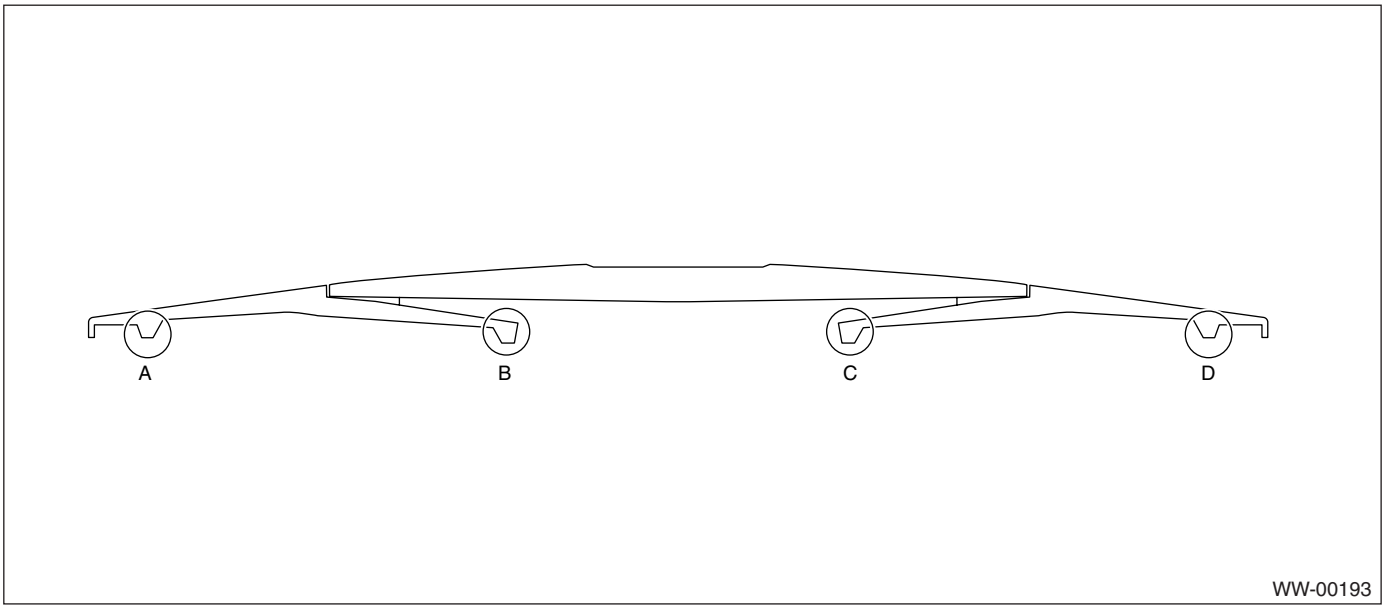
1) Insert the wiper rubber onto the blade so that the stopper is in the position shown in the figure.



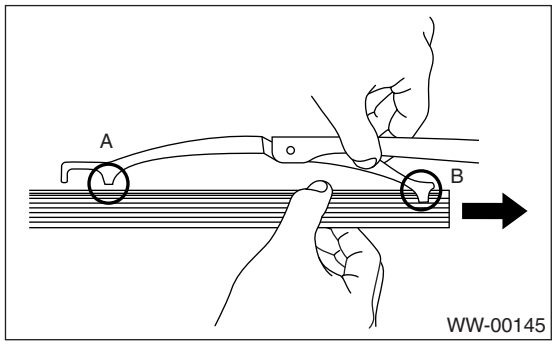
2) Make sure the wiper rubber is securely fastened to pull stopper (A).



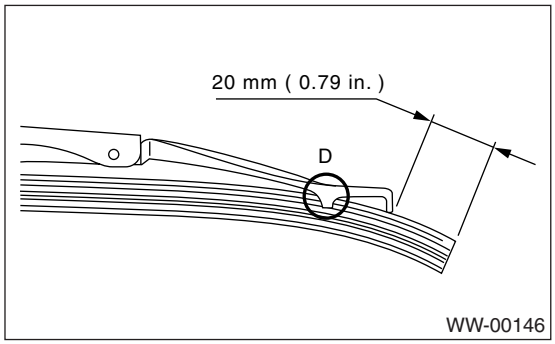
2. REAR



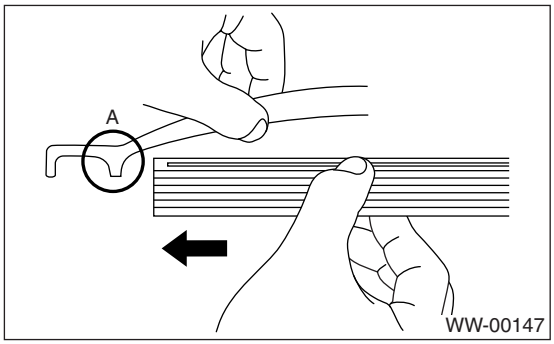
1) Insert the wiper rubber into claw B.



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.



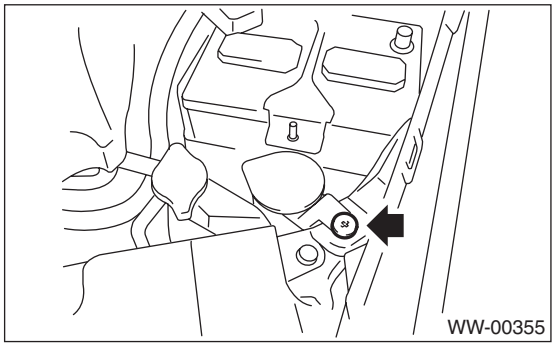
E: INSPECTION

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.

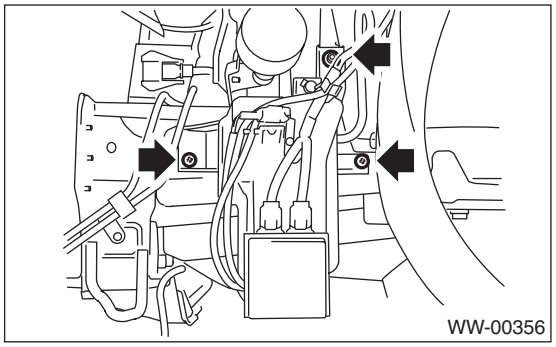
5. Washer Tank and Motor

A: REMOVAL

1) Open the front hood.
2) Disconnect the ground cable from battery.
3) Remove the front bumper. <Ref. to EI-21, 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.



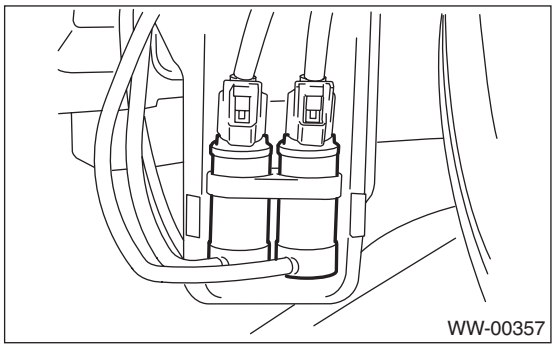
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
6.0 N·m (0.61 kgf-m, 4.4 ft-lb)

C: DISASSEMBLY

Pull out the washer motor from the tank.

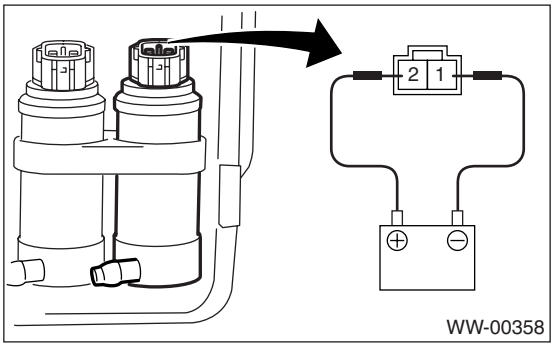


D: ASSEMBLY

1) Assemble in the reverse order of disassembly.
2) Confirm that water does not leak from installation area of motor.

E: INSPECTION

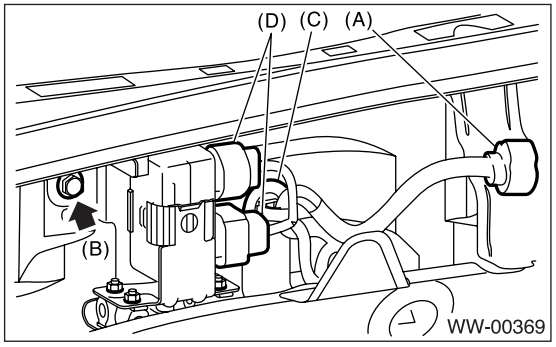
Apply battery voltage to the connector terminal of the washer motor and make sure the motor operates.



6. Wiper Relay Unit

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the wiper arm. <Ref. to WW-15, 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.



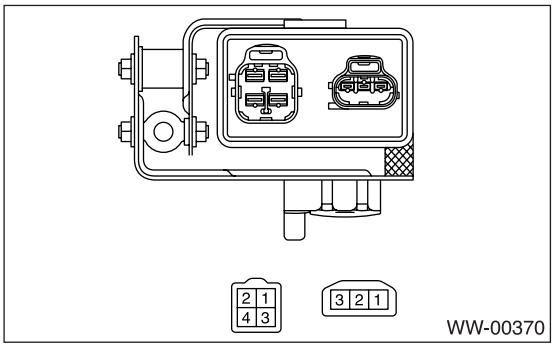
NOTE:
Unit body, bracket, and rubber mount is an assembly component and cannot be disassembled.

B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
• Do not reuse the clips. Always replace them with new ones.
• Make sure the connector connection and clip insertion is secure, and confirm the contact

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

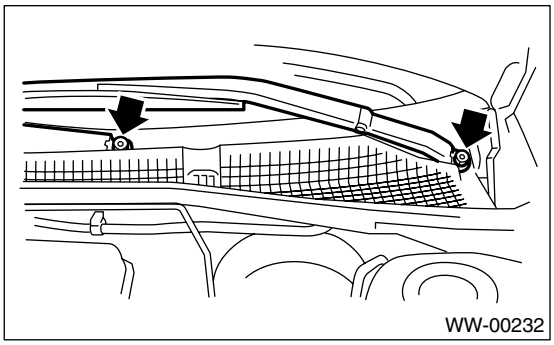
3) When measurement value is different from the specification, replace the wiper relay unit.

7. Front Wiper Arm

A: REMOVAL

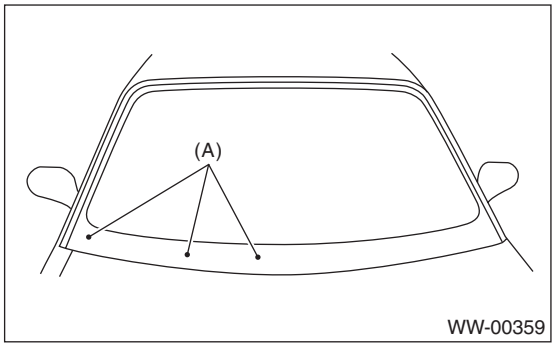
CAUTION:
When standing up the wiper arm, be sure to stand up the driver's side wiper arm first, and then passenger's side wiper arm next. Also, when putting the wiper arms back, be sure to start with passenger's side first, then driver's side next. Doing this in the reverse order may cause the driver's 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

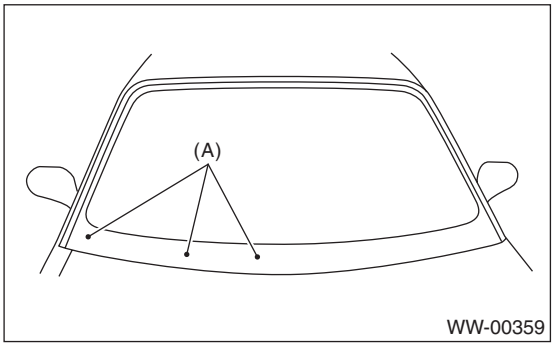
1) Install in the reverse order of removal.
2) Operate the wiper once.
3) Align the wiper blade to ceramic print point mark (A) of front window panel.



Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to WW-2, FRONT WIPER, COMPONENT, General Description.>

C: ADJUSTMENT

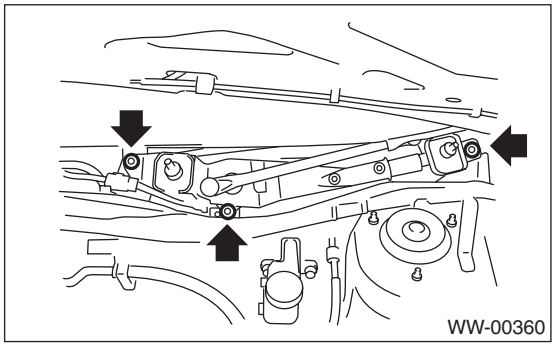
Operate the wiper once. Align the wiper blade to ceramic print point mark (A) of front window panel.



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) Disconnect the connector of wiper motor assembly.
4) Remove the bolt, and then remove the wiper assembly.


WW-00360

NOTE:
The wiper motor and wiper link is an assembly part and is not to be disassembled.

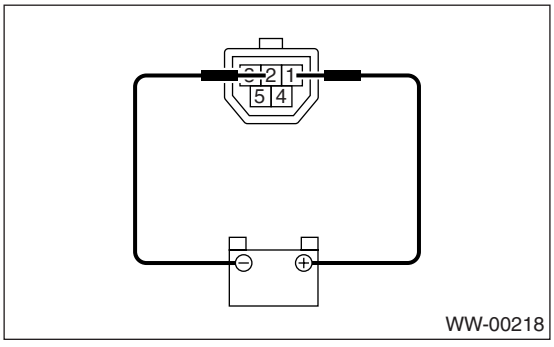
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to WW-2, FRONT WIPER, COMPONENT, General Description.>

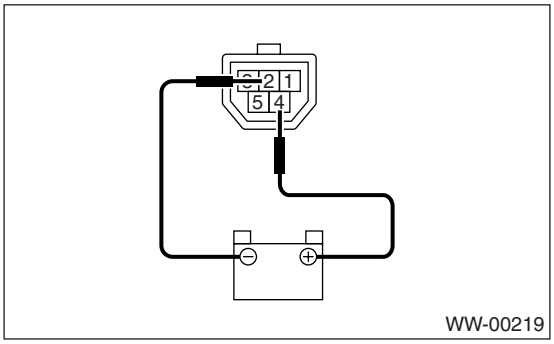
C: INSPECTION

1) When the battery is connected to the terminal of connectors, confirm that the wiper motor operates at low speed.



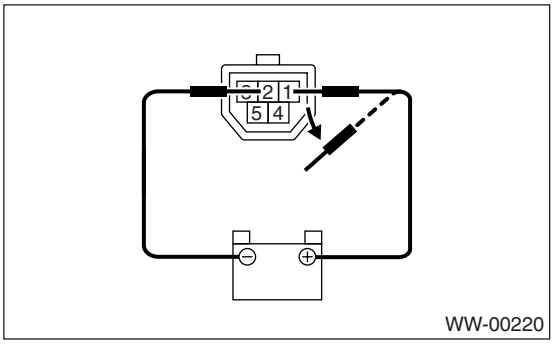
WW-00218

2) When the battery is connected to the terminal of connectors, confirm that the wiper motor operates at high speed.



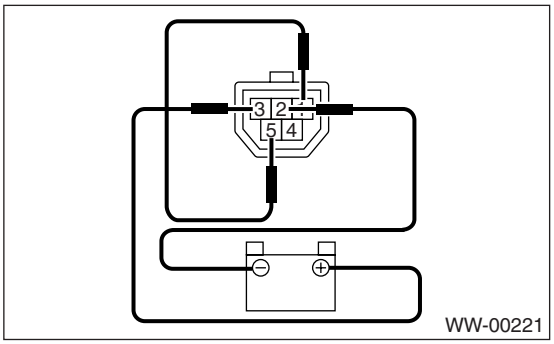
WW-00219

3) Connect the battery to the terminals to the connector, then run the wiper motor at low speed and disconnect the terminal in mid motion.



WW-00220

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.

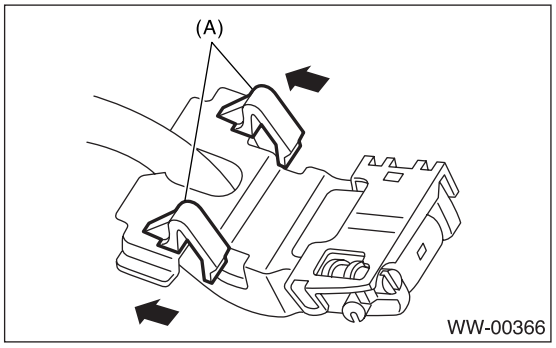


WW-00221

9. Front Washer Nozzle

A: REMOVAL

1) Remove the front hood insulator. <Ref. to EB-13, 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

1) Install in the reverse order of removal.
2) Adjust the washer nozzle position. <Ref. to WW-17, ADJUSTMENT, Front Washer Nozzle.>

C: INSPECTION

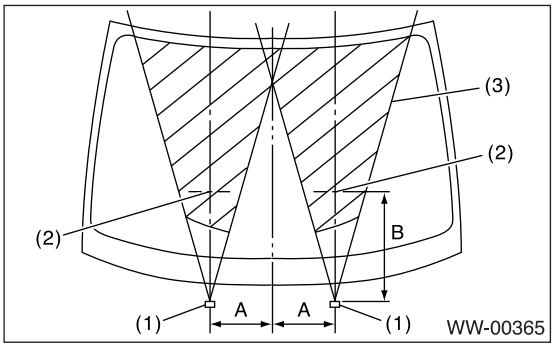
- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.

D: ADJUSTMENT

CAUTION:
Do not move the spray nozzle area directly to adjust. Doing so will damage the slit and cause improper spray.

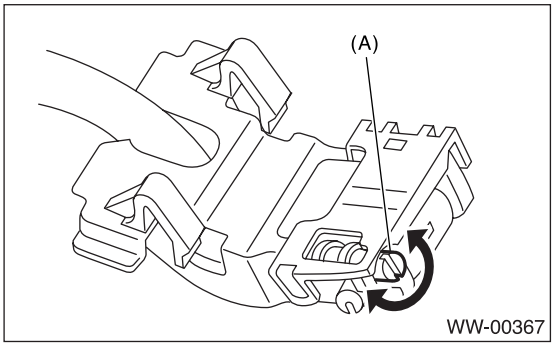
1) Turn the wiper switch to OFF position.
2) While the vehicle is at a standstill, adjust the washer injection position as shown in the figure.

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)

3) Spray angle should be adjusted by rotating adjusting dial (A) with a flat tip screwdriver.

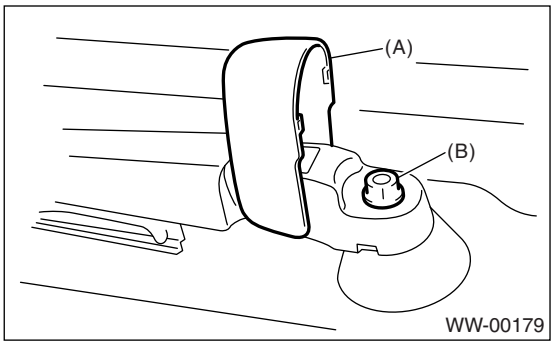


NOTE:
Adjusting dial will return to the original spray angle with 1 rotation.

10.Rear Wiper Arm

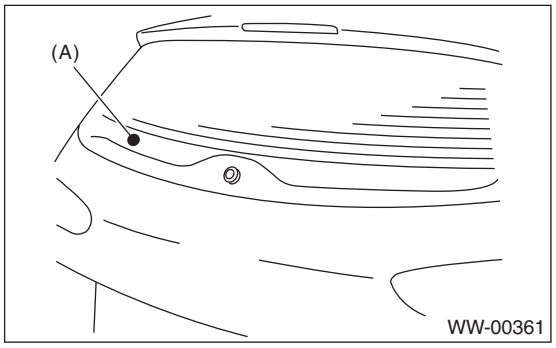
A: REMOVAL

1) Detach the wiper arm cover (A).
2) Remove the nut (B) to remove the wiper arm.



B: INSTALLATION

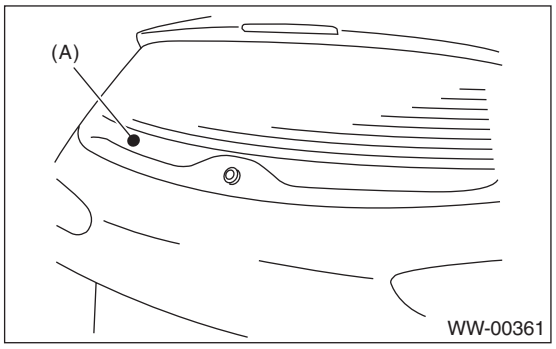
1) Install in the reverse order of removal.
2) Operate the rear wiper once.
3) Align the blade with the marking (A) of the glass.



Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to WW-3, REAR WIPER, COMPONENT, General Description.>

C: ADJUSTMENT

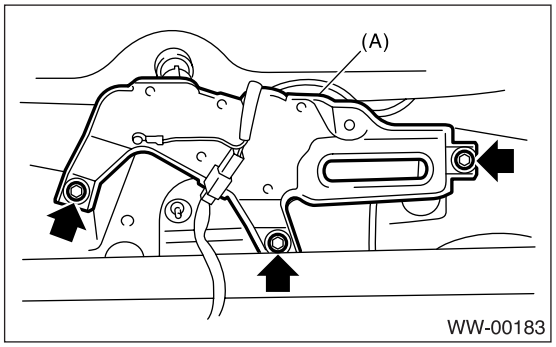
1) Operate the rear wiper once.
2) Align the blade with the marking (A) of the glass.



11.Rear Wiper Motor

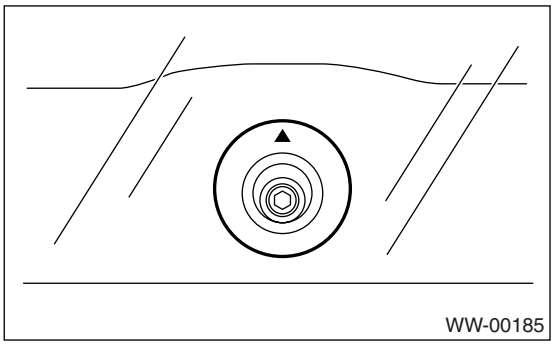
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear wiper arm. <Ref. to WW-18, REMOVAL, Rear Wiper Arm.>
3) Remove the rear gate lower trim. <Ref. to EI-51, 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

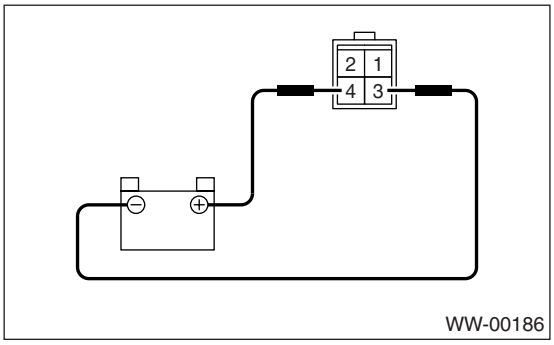
1) Install in the reverse order of removal.
2) Be sure that the pivot cap with the arrow mark facing up, as shown in the figure.



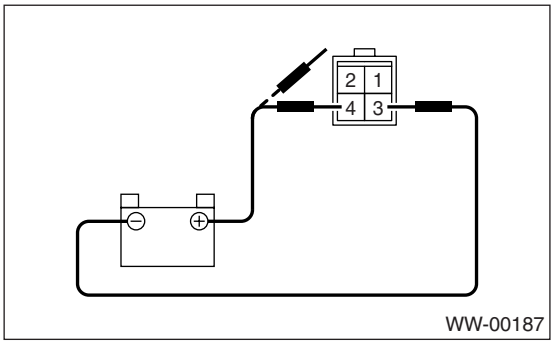
Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to WW-3, REAR WIPER, COMPONENT, General Description.>

C: INSPECTION

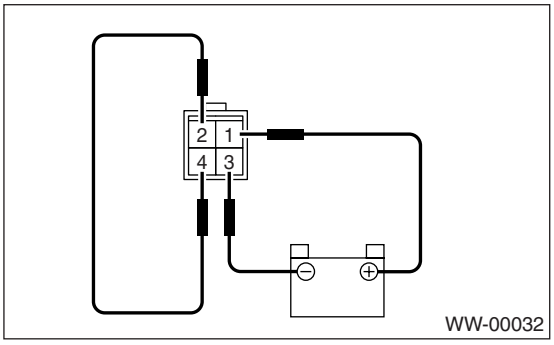
1) Connect the battery to the wiper motor connector and confirm that wiper motor operates.



2) Connect the battery to the terminals to the connector, then run the wiper motor at low speed and disconnect the terminal in mid motion.



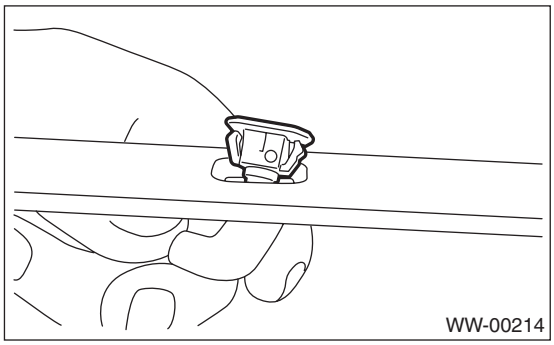
3) Connect the battery and confirm that the wiper motor stops at the automatic stop position after the wiper motor operates at low speed again.



12.Rear Washer

A: REMOVAL

1) Detach the roof spoiler. <Ref. to EI-31, REMOVAL, Roof Spoiler.>
2) Remove the washer hose from washer nozzle.
3) Push the claw of the nozzle from the reverse side of roof spoiler with a flat tip screwdriver or equivalent, and remove the washer nozzle.



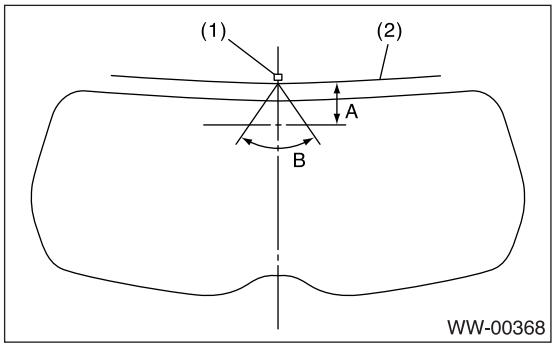
B: INSTALLATION

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) 72 mm (2.83 in)
(B) 70°

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^3 (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 **CAUTION:** **• Avoid mixing brake fluid of different brands to prevent fluid performance from degrading.** **• When filling with brake fluid, be careful not to allow any dust to enter the reservoir.** **• Use new SUBARU genuine brake fluid when replacing or refilling the fluid.**			FMVSS No. 116, DOT3, or DOT4

NOTE:
Refer to “PB” section for parking brake specifications. <Ref. to PB-2, SPECIFICATION, General Description.>

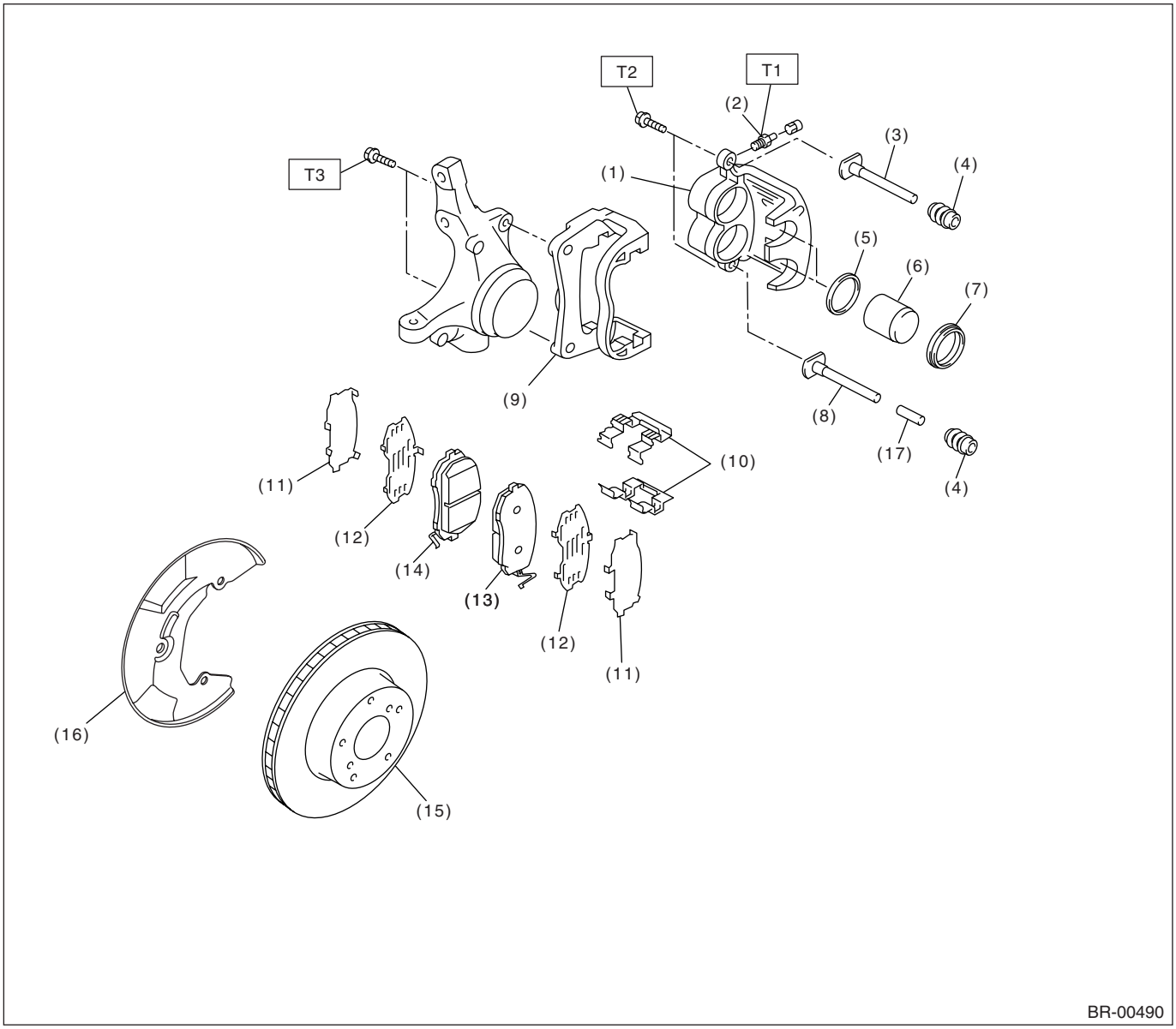
Item			Specification	Limit
Front brake	Pad thickness	mm (in)	11 (0.43)	1.5 (0.059)
	Disc thickness	mm (in)	30 (1.18)	28 (1.10)
	Disc runout	mm (in)	—	0.05 (0.0020)
Rear brake (disc type)	Pad thickness	mm (in)	11.0 (0.433)	1.5 (0.059)
	Disc thickness	mm (in)	18 (0.71)	16 (0.63)
	Disc runout	mm (in)	—	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^2, 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).]

B: COMPONENT

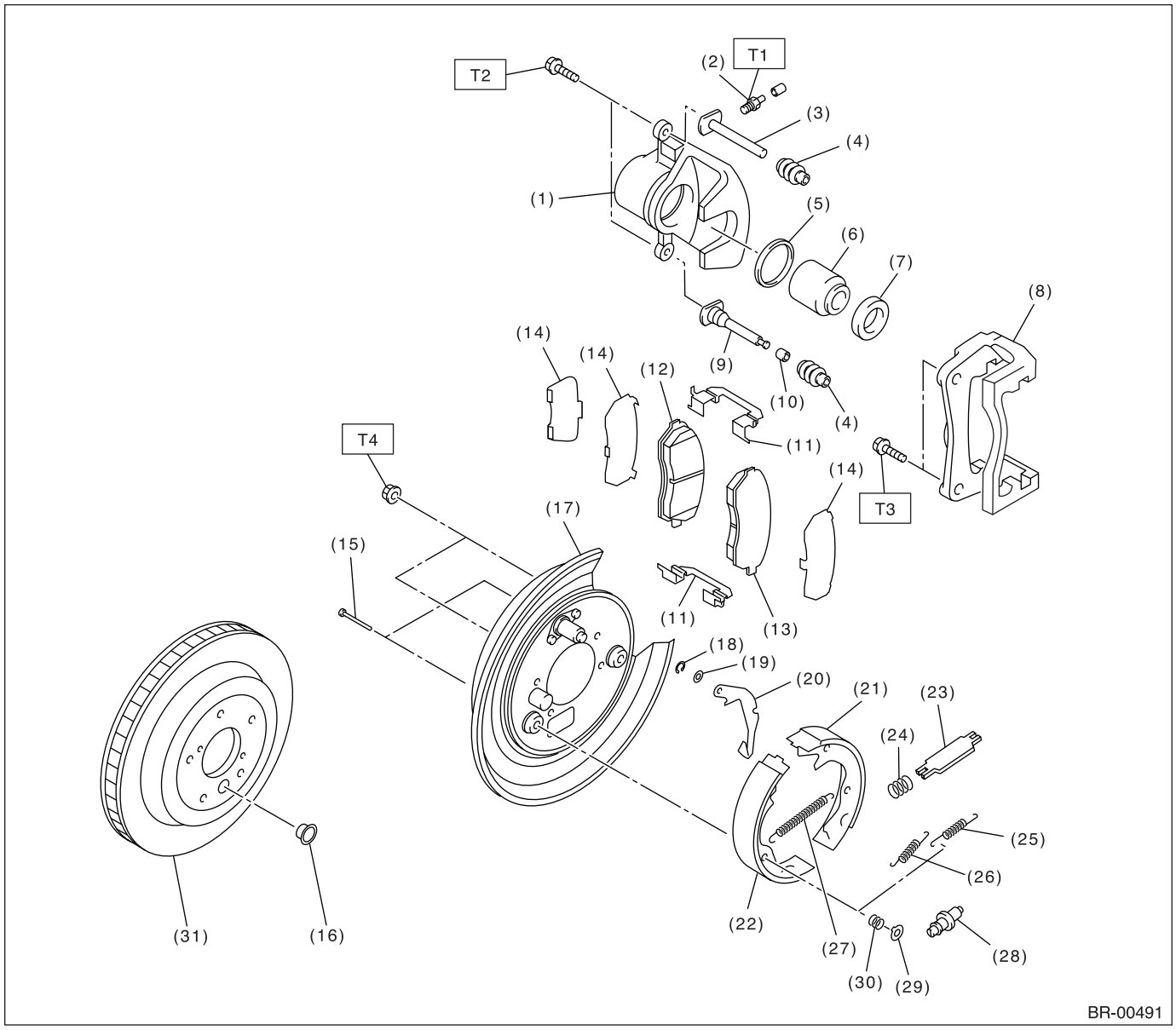
1. FRONT DISK BRAKE



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Lock pin (Yellow)
(9) Support
(10) Pad clip
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover
(17) Bushing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 27 (2.8, 19.9)
T3: 120 (12.2, 88.5)

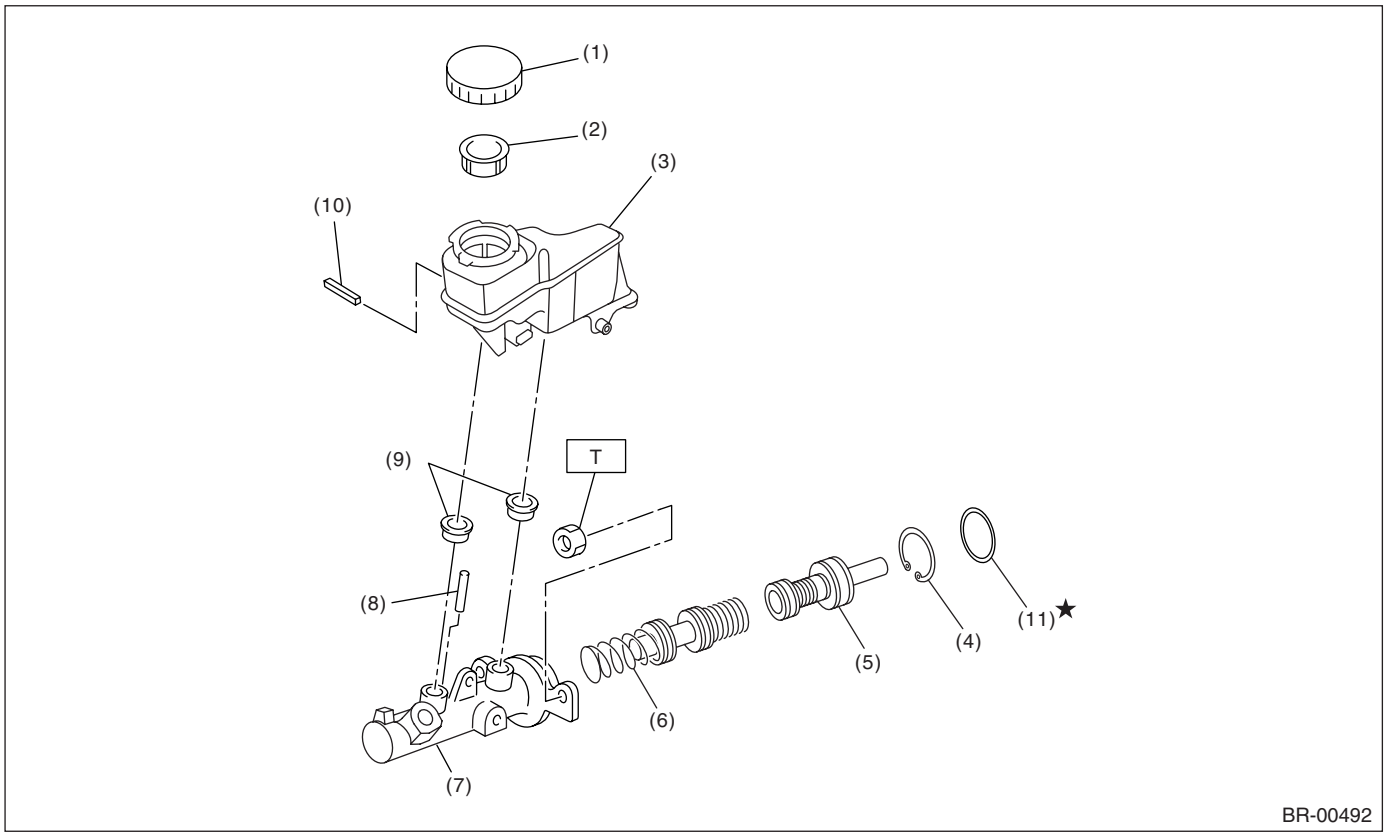
2. REAR DISC BRAKE



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Support
(9) Lock pin (Yellow)
(10) Bushing
(11) Pad clip
(12) Inner pad
(13) Outer pad
(14) Shim
(15) Shoe hold pin
(16) Cover
(17) Back plate
(18) Retainer
(19) Spring washer
(20) Parking brake lever
(21) Parking brake shoe (Secondary)
(22) Parking brake shoe (Primary)
(23) Strut
(24) Strut shoe spring
(25) Secondary shoe return spring
(26) Primary shoe return spring
(27) Adjusting spring
(28) Adjuster
(29) Brake shoe cup
(30) Brake shoe spring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 27 (2.8, 19.9)
T3: 37 (3.7, 27.2)
T4: 66 (6.7, 48.7)

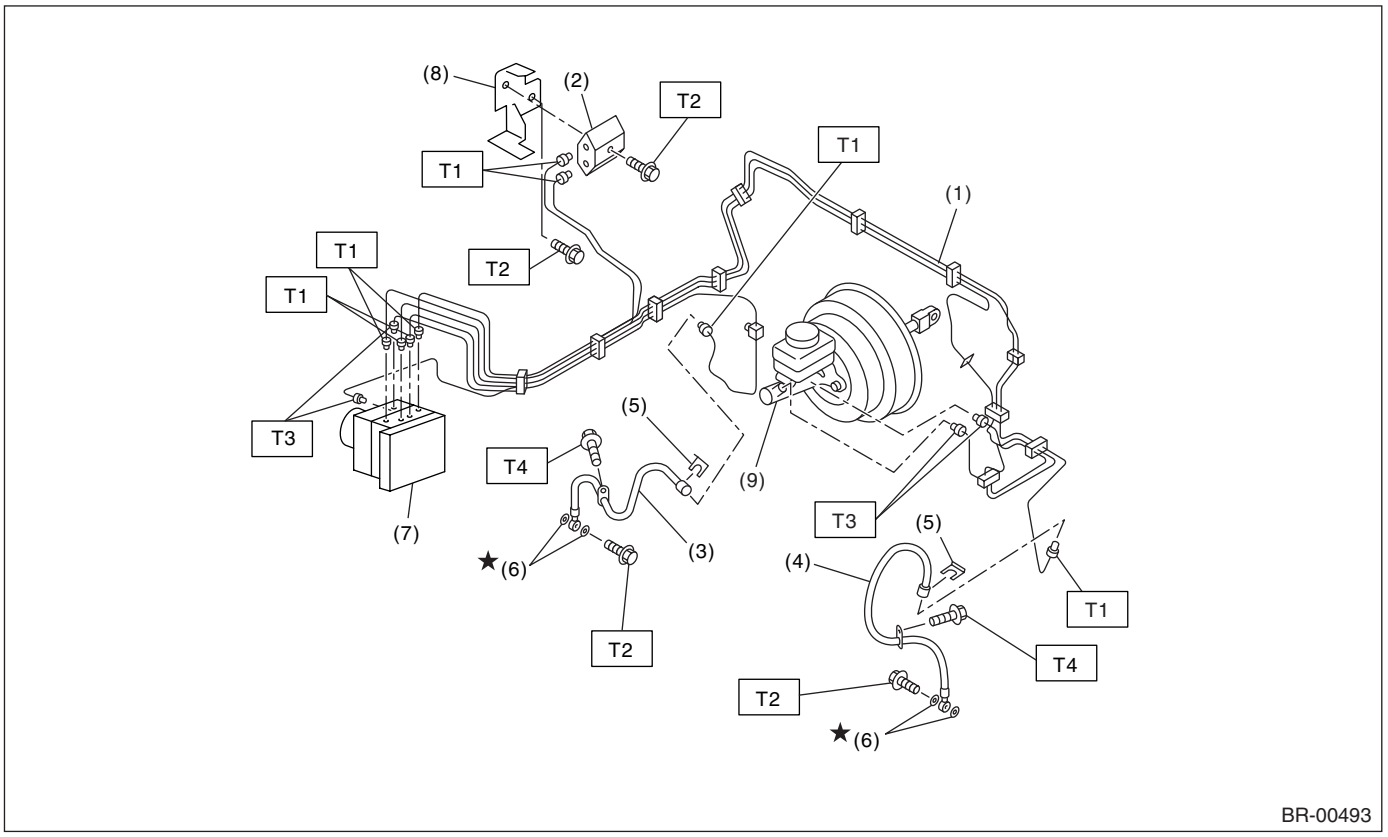
3. MASTER CYLINDER



(1) Cap
(2) Filter
(3) Reservoir tank
(4) C-ring
(5) Primary piston
(6) Secondary piston
(7) Cylinder body
(8) Cylinder pin
(9) Seal
(10) Pin
(11) O–ring

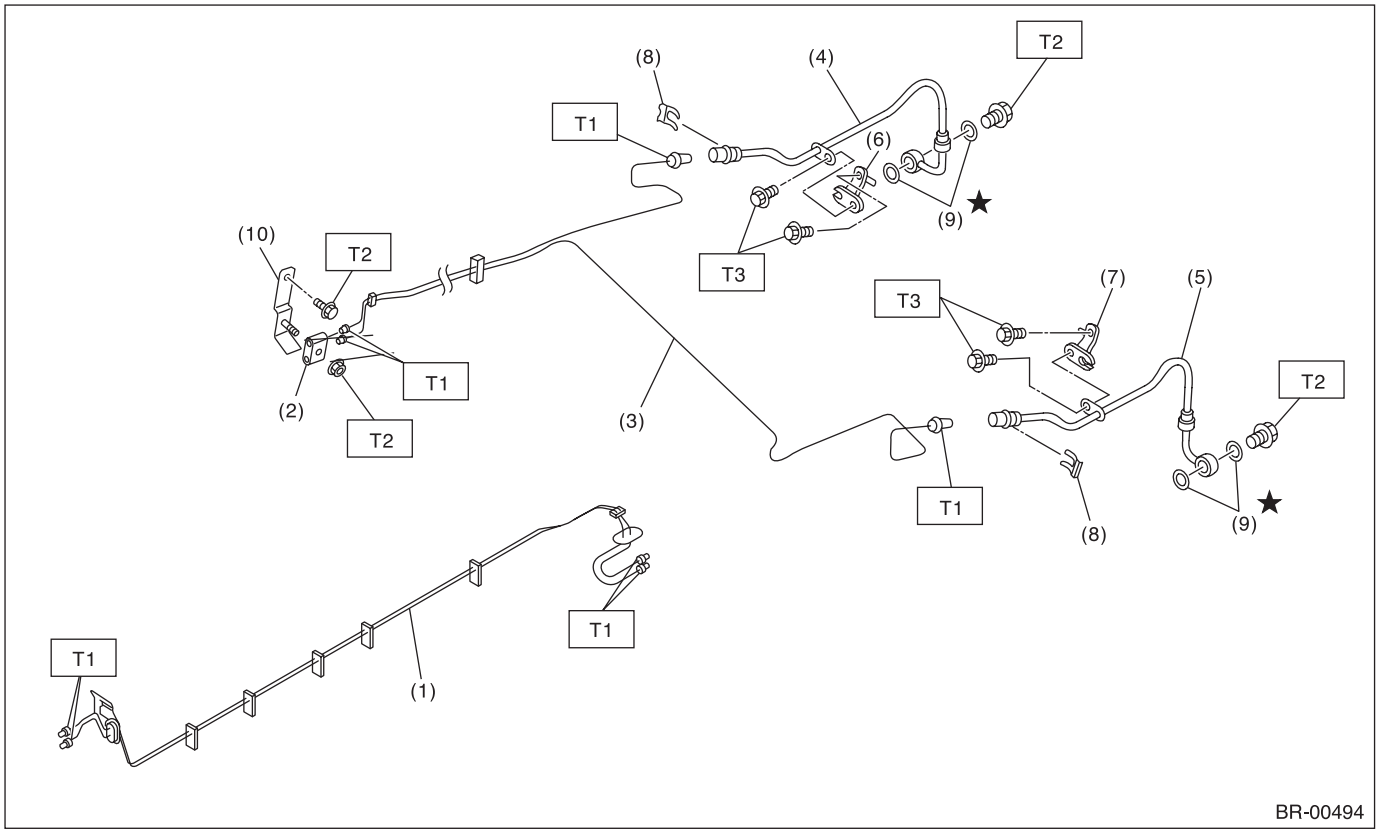
Tightening torque: N·m (kgf-m, ft-lb)
T: 25 (2.5, 18.4)

4. FRONT BRAKE PIPES AND HOSE



(1)	Front brake pipe ASSY	(6)	Gasket	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Two-way connector	(7)	VDC control module and hydraulic control unit (VDCCM&H/U)	***T1: 15 (1.5, 10.8)***
(3)	Front brake hose RH			***T2: 18 (1.8, 13.0)***
(4)	Front brake hose LH	(8)	Bracket	***T3: 19 (1.9, 14.0)***
(5)	Clamp	(9)	Master cylinder	***T4: 33 (3.4, 24.3)***

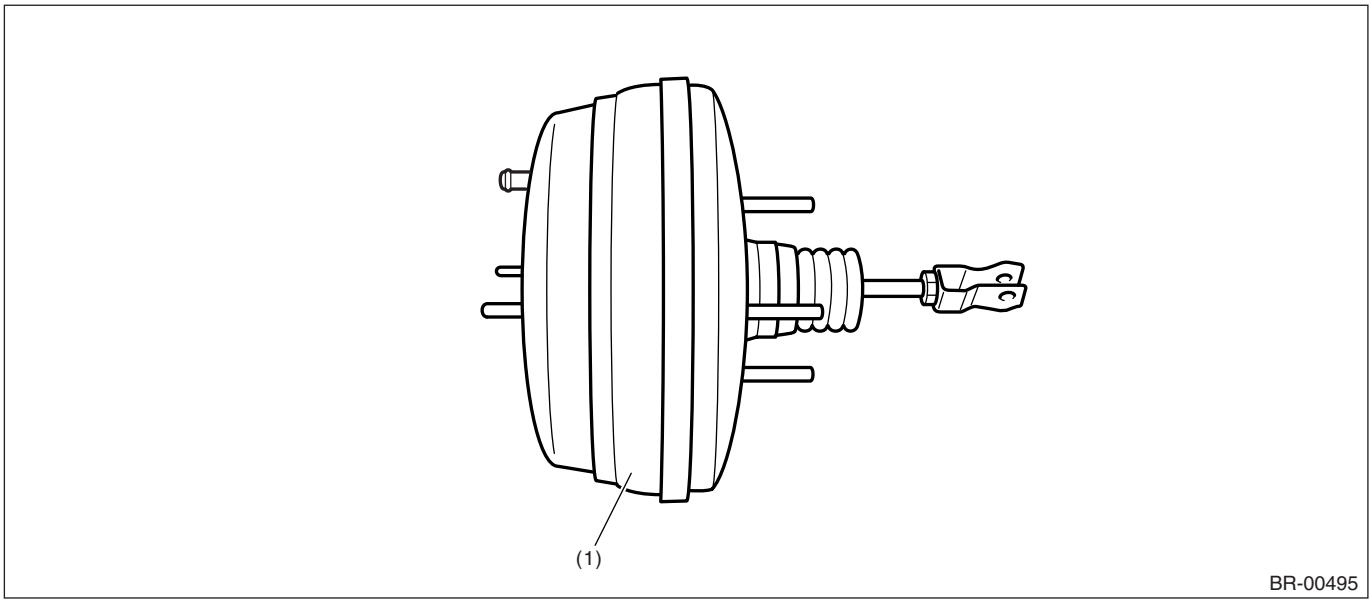
5. CENTER AND REAR BRAKE PIPES AND HOSE



(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

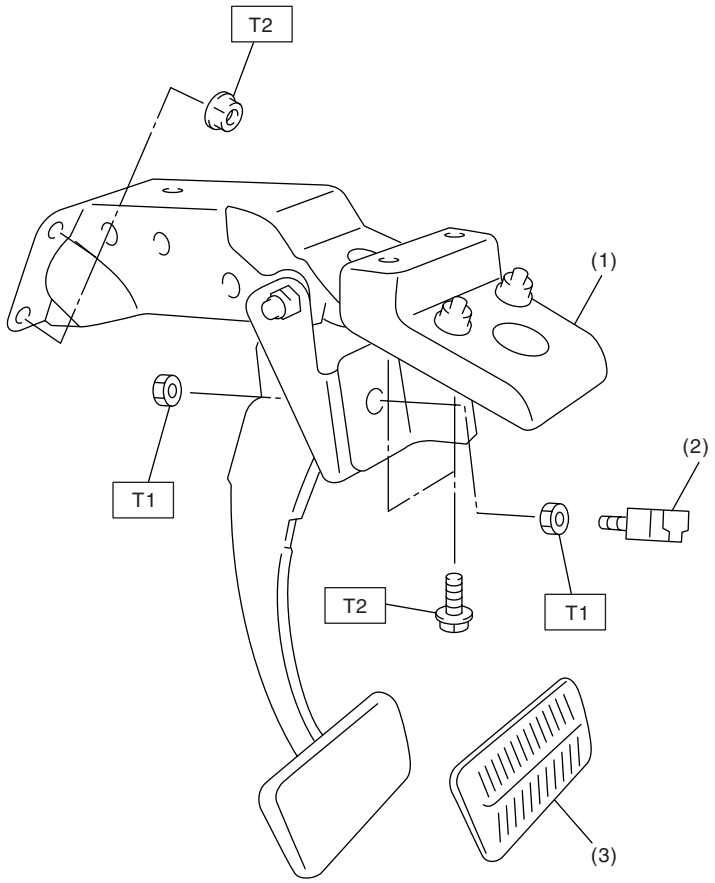
Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)
T3: 33 (3.4, 24.3)

6. BRAKE BOOSTER



(1) Brake booster

7. BRAKE PEDAL

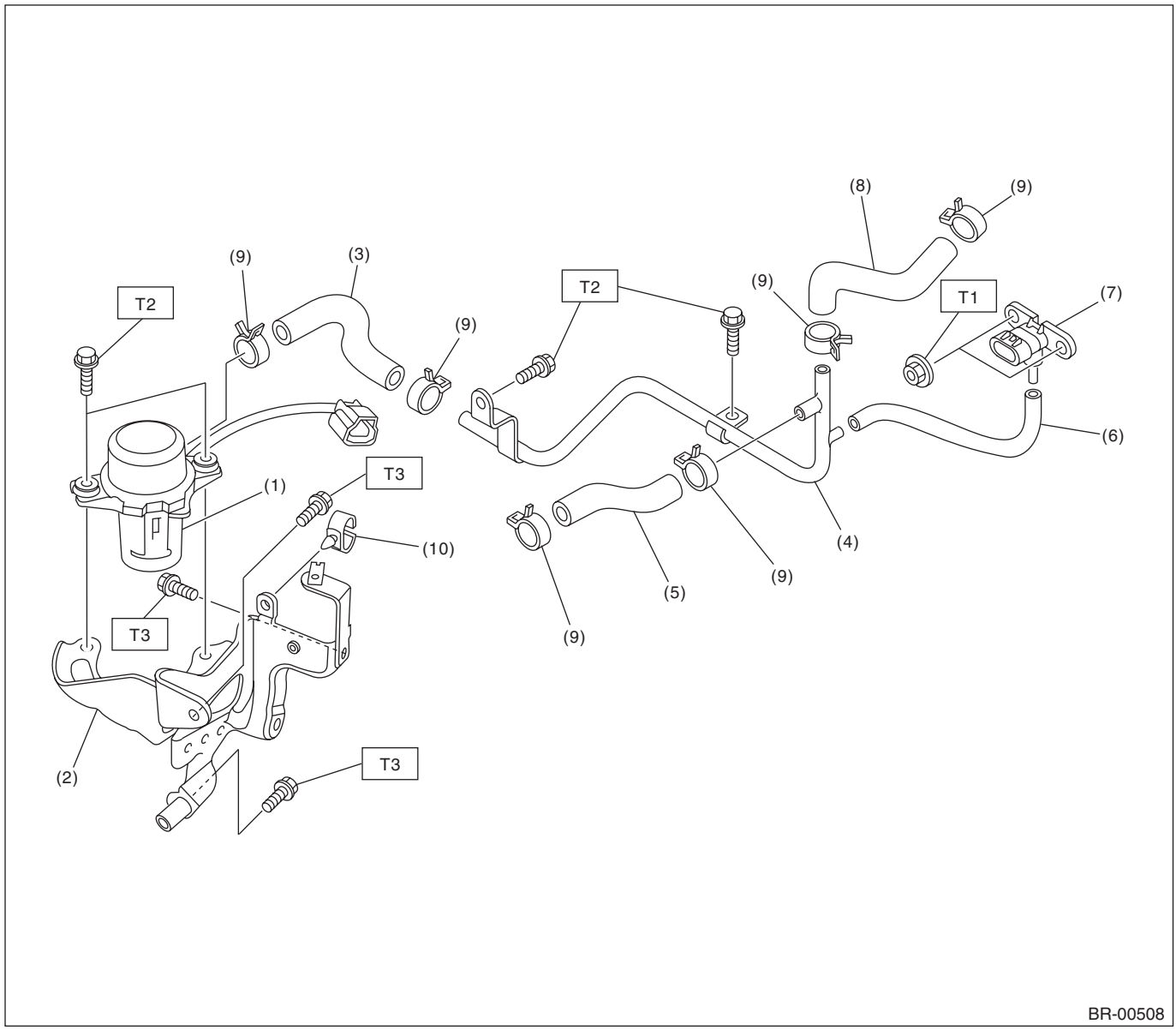


BR-00338

(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, 13.0)

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)	(10)	Clip

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 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 work clothing, including a cap, protective goggles and protective shoes during operation.
• 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. with that of another grade or from other 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 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

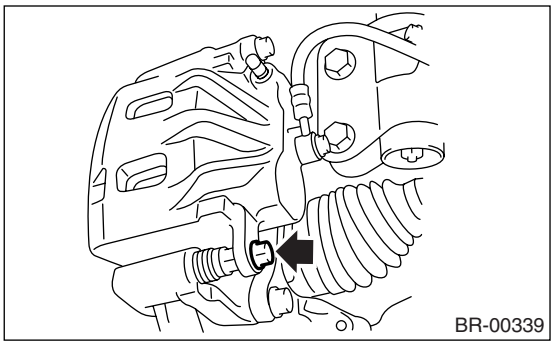
1. GENERAL TOOL

TOOL NAME	REMARKS
Snap ring pliers	Used for removing and installing snap rings.

2. Front Brake Pad

A: REMOVAL

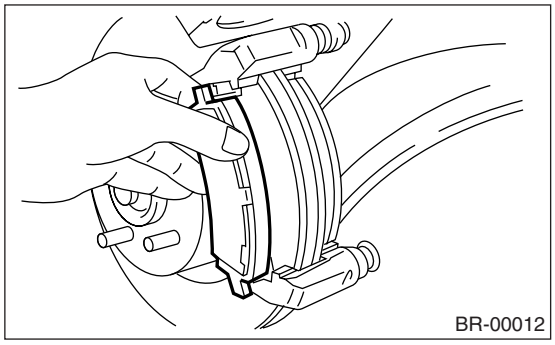
1) Lift-up the vehicle, and remove the front wheels.
2) Remove the caliper bolt.



3) Raise the caliper body and support it.

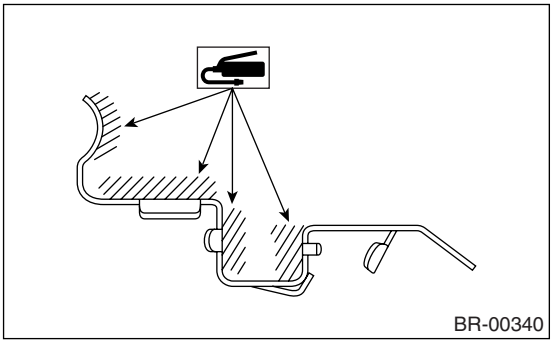
NOTE:
Do not disconnect the brake hose from the caliper body.

4) Remove the pad.

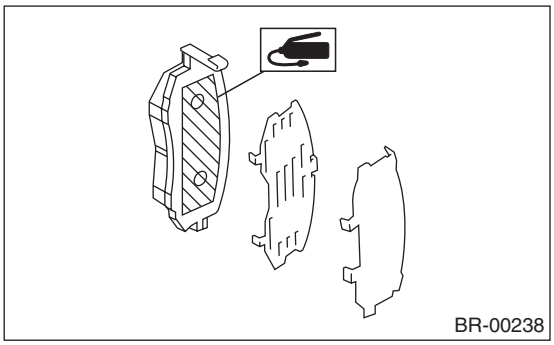


B: INSTALLATION

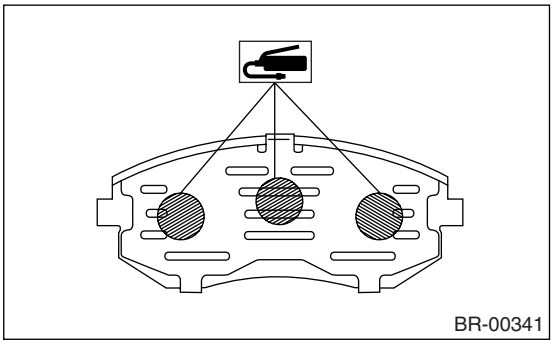
1) Apply a thin coat of Molykote M7439 to the pad clip.



2) Apply a thin coat of Molykote AS880N (Part No. K0779YA010) to the contact surface between the pad and pad inner shim.

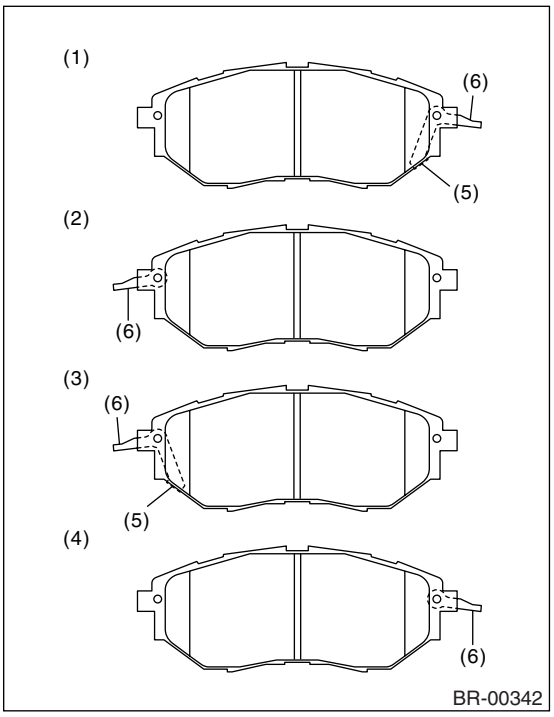


3) Apply a thin coat of Molykote AS880N (Part No. K0779YA010) to the three contact surfaces between inner shim and outer shim of outer pads.



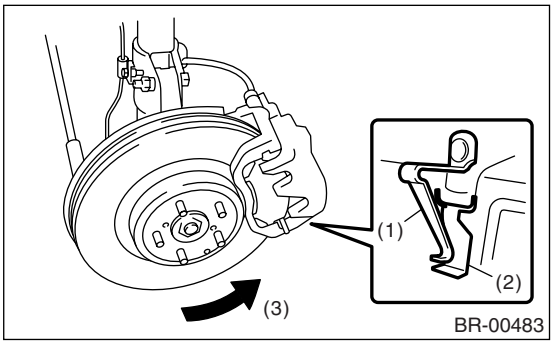
4) Install the pad to support.

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.



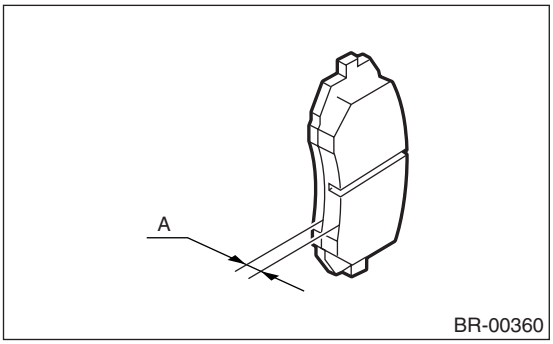
(1) Pad return spring
(2) Supporting surface of pad clip
(3) Direction of brake rotor rotation

5) Install the caliper body to the support.

Tightening torque:
27 N·m (2.8 kgf-m, 19.9 ft-lb)

C: INSPECTION

Check thickness A of the pad.



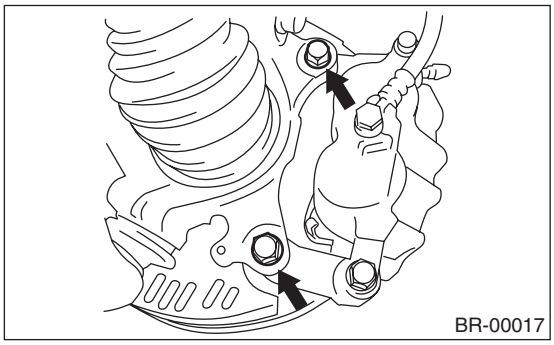
Pad thickness mm (in)	Specification	11 (0.433)
	Wear limit	1.5 (0.059)

NOTE:
- Always replace the pads on both sides as a set.
- Replace pad clips if they are twisted or worn.
- Replace the pad if there is oil or grease on it.

3. Front Disc Rotor

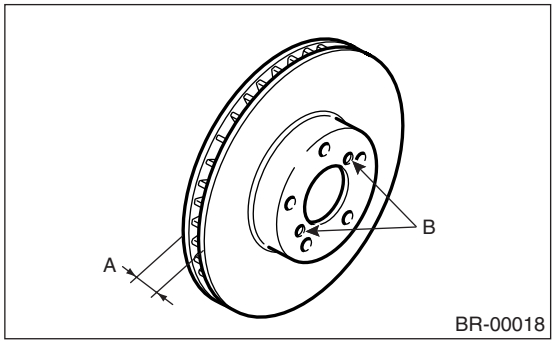
A: REMOVAL

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 support.

B: INSTALLATION

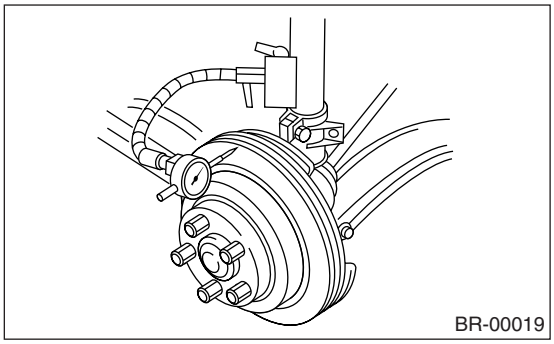
1) Install the disc rotor.
2) Install the caliper body and the support to housing.

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

3) Install the front wheels.

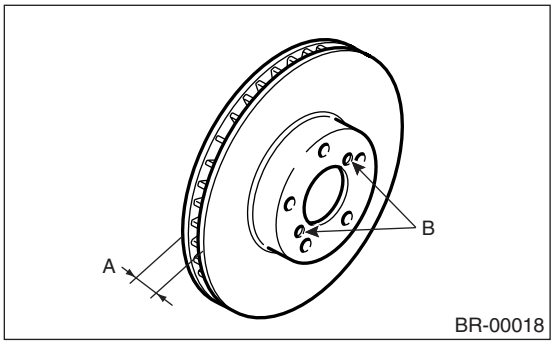
C: INSPECTION

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, replace with a new disc rotor. After grinding, check disk rotor thickness according to 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 the disc rotor exceeds the service limit, replace with a new disc rotor.



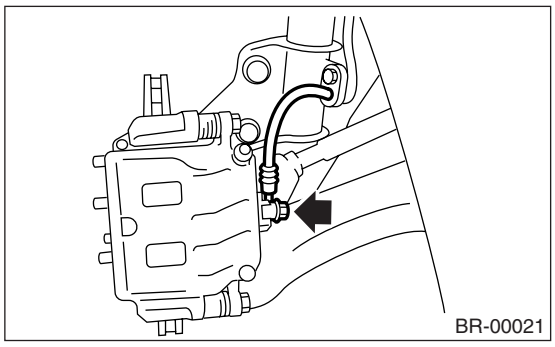
	Specification	Limit	Disc rotor outer diameter
Disc rotor thickness A mm (in)	30 (1.18)	28 (1.10)	316 (12.44)

4. Front Disc Brake Assembly

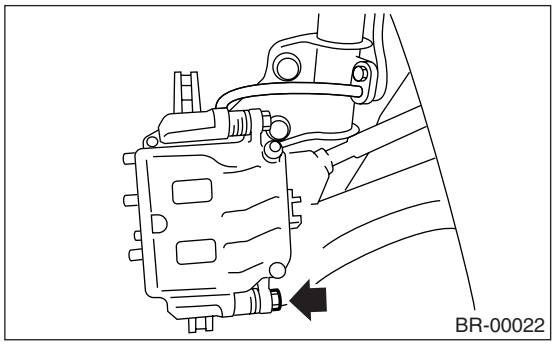
A: REMOVAL

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.

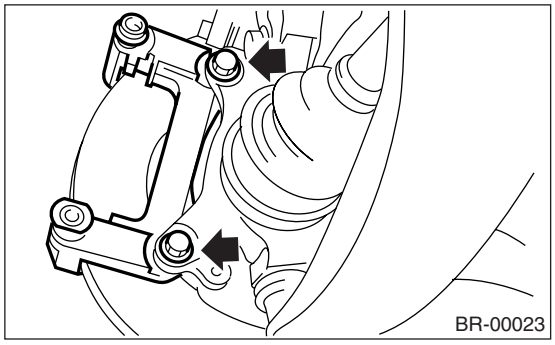


3) Remove the bolt securing the lock pin to caliper body.



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 need not be removed when servicing the caliper body assembly.



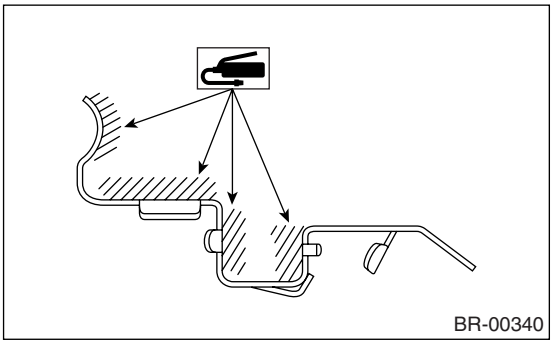
6) Remove mud and foreign matter from the caliper body assembly and support.

B: INSTALLATION

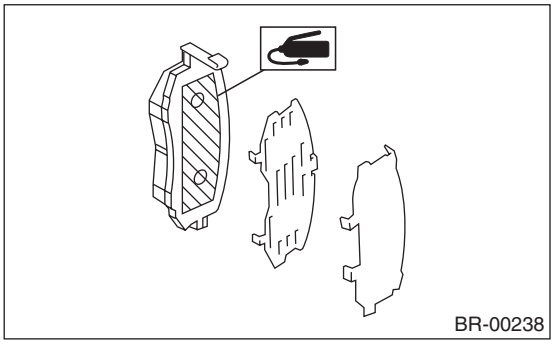
1) Install the support to the housing.

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

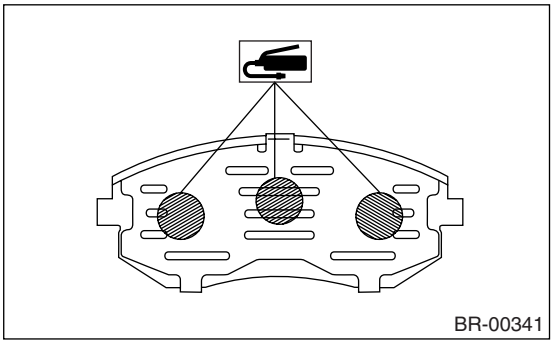
2) Apply a thin coat of Molykote M7439 to the pad clip.



3) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the contact surface between pad and inner shim.

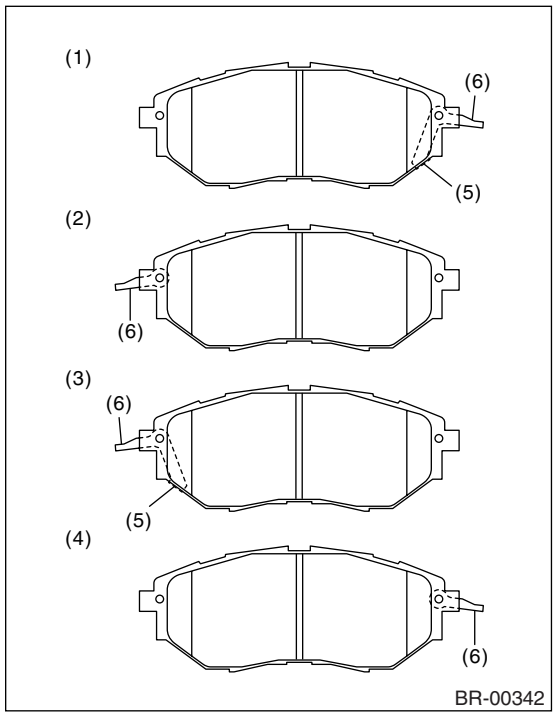


4) Apply a thin coat of Molykote AS880N (Part No. K0779YA010) to the three contact surfaces between inner shim and outer shim of outer pads.



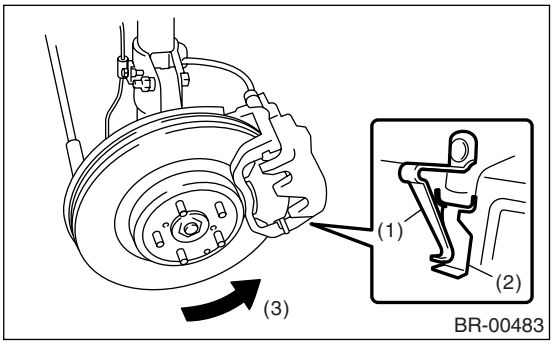
5) Install the pad to support.

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, 13.0 ft-lb)

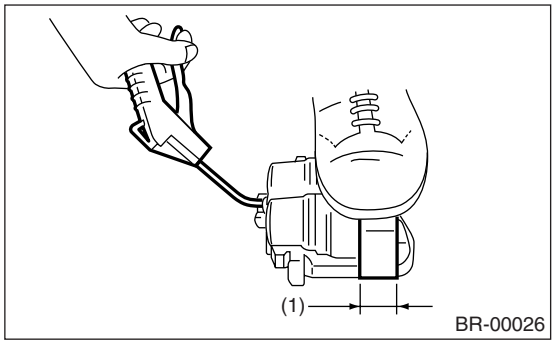
8) Bleed air from the brake system.

C: DISASSEMBLY

1) Remove mud and foreign matter from the caliper body assembly and support.

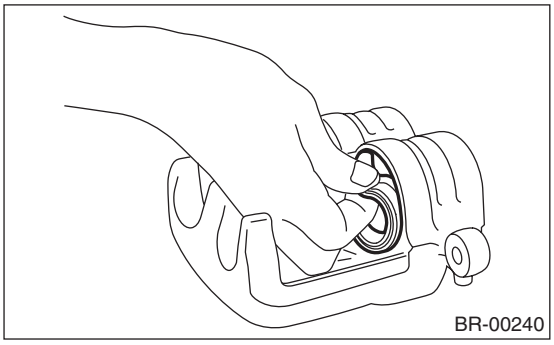
CAUTION:
Be careful not to allow foreign matter to enter the brake hose connector.

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.



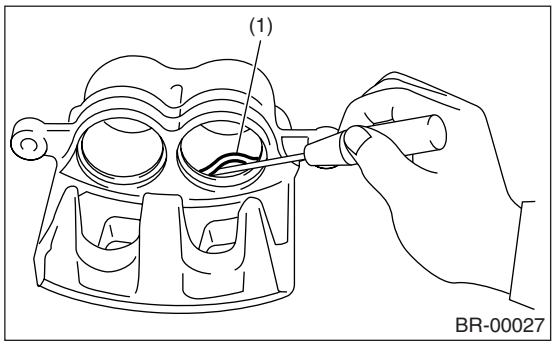
(1) Place a wood block of 30 mm (1.18 in) width.

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.

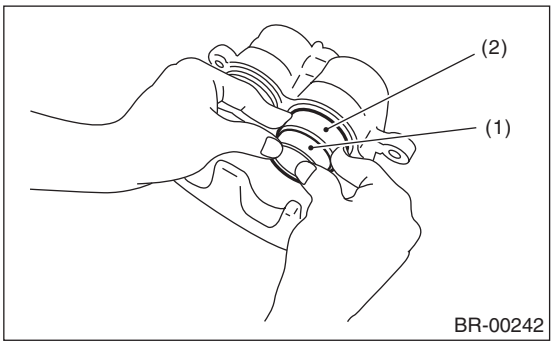
D: ASSEMBLY

1) Clean the inside of the caliper body using brake fluid.
2) Apply a coat of brake fluid to piston seal and install piston seal in the groove on caliper body.
3) Apply a coat of brake fluid to the inner surface of cylinder and the entire outer surface of the piston.
4) Apply a coat of specified grease to the boot, and fit to the groove on the ends of the cylinder.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

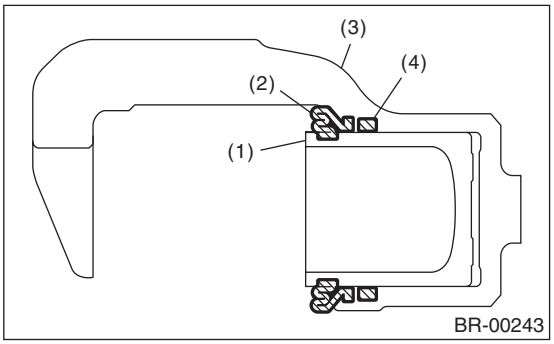
5) Insert the piston into cylinder.

CAUTION:
Do not force the piston into cylinder.



(1) Piston
(2) Piston boot

6) Position the boot in the grooves on cylinder and piston.

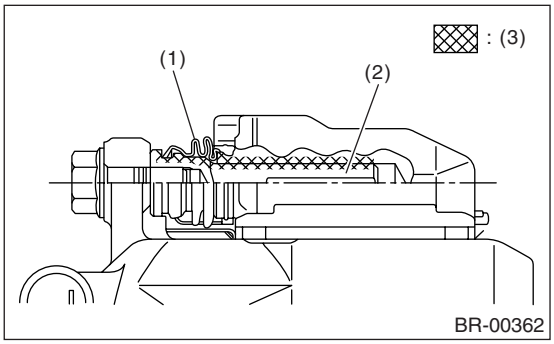


(1) Piston
(2) Piston boot
(3) Caliper body
(4) Piston seal

7) Apply a coat of specified grease to the lock pin and guide pin outer surface, cylinder inner surface, and boot grooves.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

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

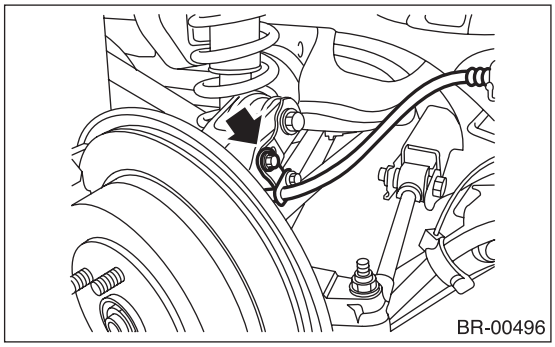
E: INSPECTION

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.

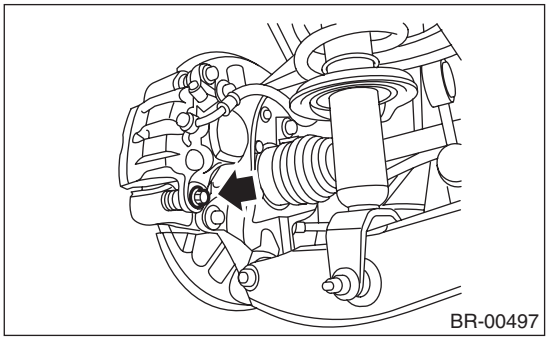
5. Rear Brake Pad

A: REMOVAL

1) Lift-up the vehicle, and then remove the rear wheels.
2) Remove the brake hose bracket.



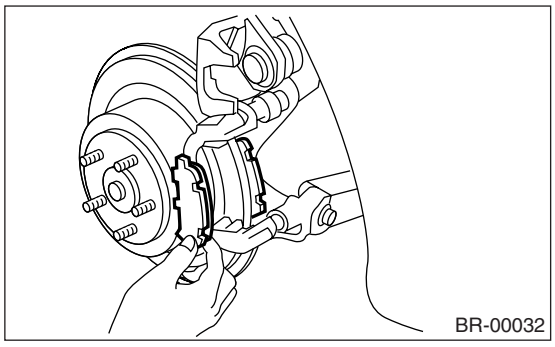
3) Remove the caliper bolt.



4) Raise the caliper body and support it.

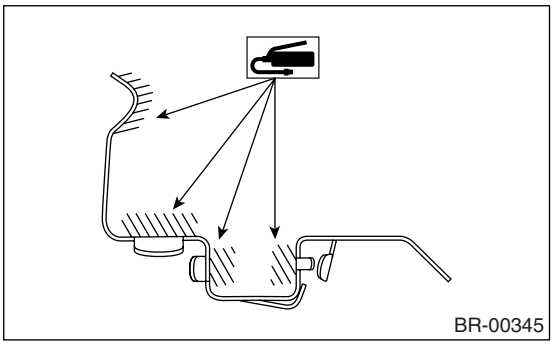
NOTE:
Do not disconnect the brake hose from the caliper body.

5) Remove the pad.



B: INSTALLATION

1) Apply a thin coat of Molykote M7439 to the pad clip.

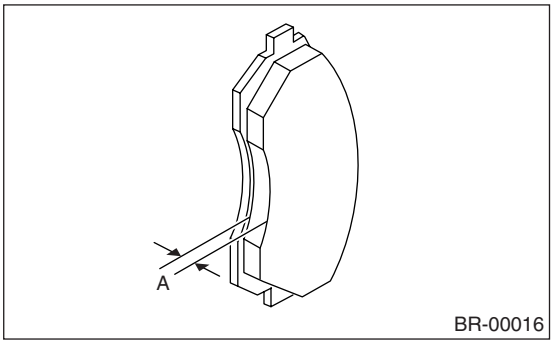


2) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the contact surface between the pad and shim.
3) Install the pad to support.
4) Install the caliper body to the support.

Tightening torque:
27 N·m (2.8 kgf-m, 19.9 ft-lb)

C: INSPECTION

Check thickness A of the pad.



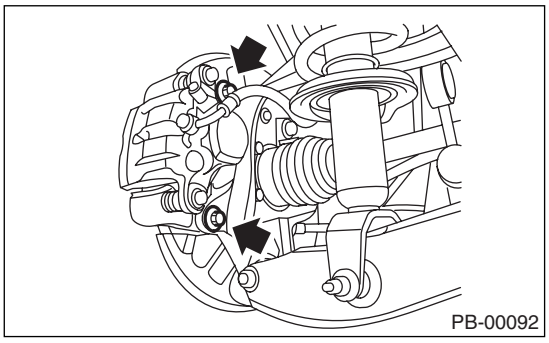
Pad thickness mm (in)	Specification	11.0 (0.433)
	Wear limit	1.5 (0.059)

NOTE:
- Always replace the pads on 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

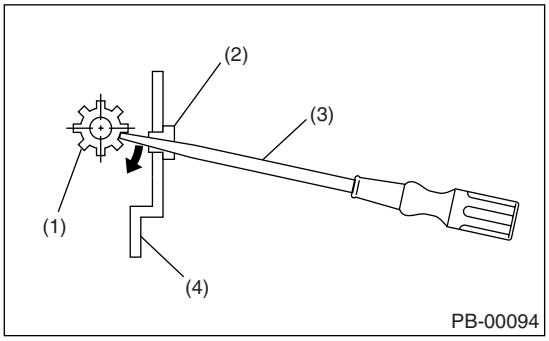
1) Lift-up the vehicle, and then remove the rear wheels.
2) Release the parking brake.
3) Remove the two mounting bolts, and remove the rear disc brake assembly.



4) Suspend the rear disk brake assembly so that the hose is not stretched.
5) Remove the rear disk brake rotor.

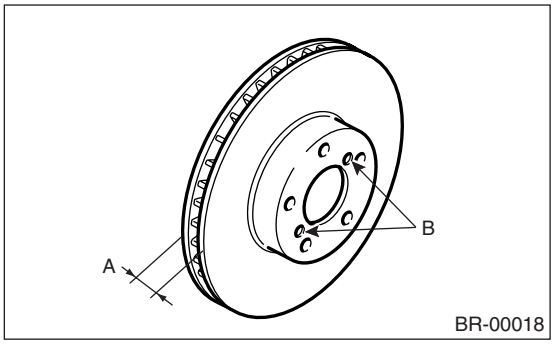
NOTE:
If the disc rotor is difficult to remove, try the following two methods in order.

(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

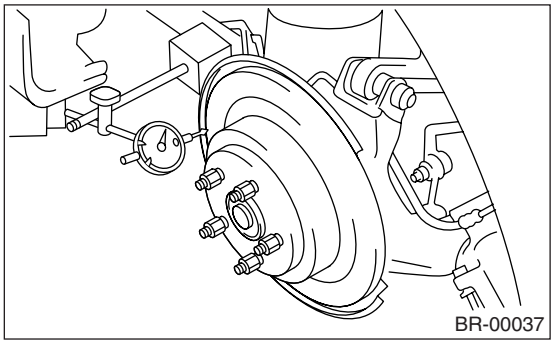
1) Install in the reverse order of removal.

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).>

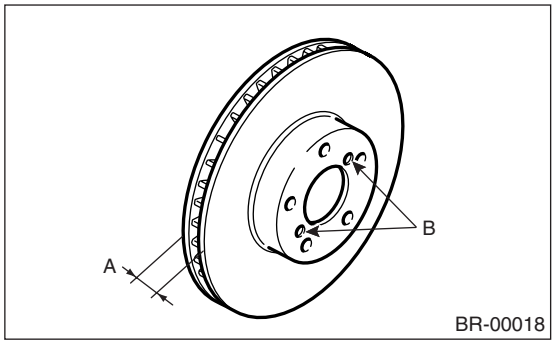
C: INSPECTION

1) Check the rear wheel bearing play and axle hub runout before inspecting the disc rotor runout limit. <Ref. to DS-23, 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, replace with a new disc rotor. After grinding, check disk rotor thickness according to 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 the disc rotor exceeds the service limit, replace with a new disc rotor.



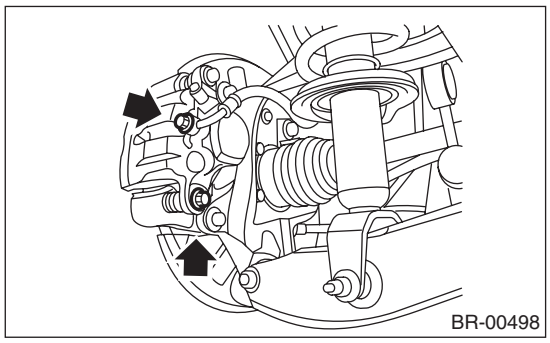
	Specification	Limit	Disc rotor outer diameter
Disc rotor thickness A mm (in)	18 (0.71)	16 (0.63)	320 (12.59)

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 need not be removed when servicing the caliper body assembly.

6) Remove mud and foreign matter from the caliper body assembly and support.

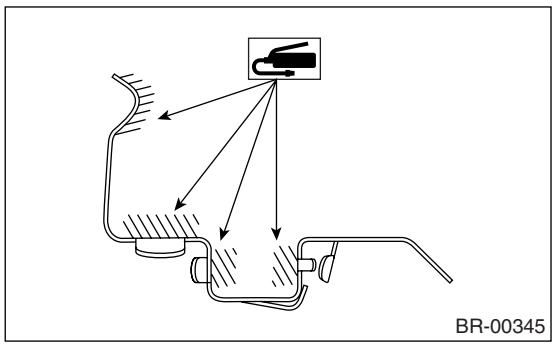
CAUTION:
Be careful not to allow foreign matter to enter the brake hose connector.

B: INSTALLATION

1) Install the support to the housing.

Tightening torque:
66 N·m (6.7 kgf-m, 48.7 ft-lb)

2) Apply a thin coat of Molykote M7439 to the pad clip.



3) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the contact surface between the pad and 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)

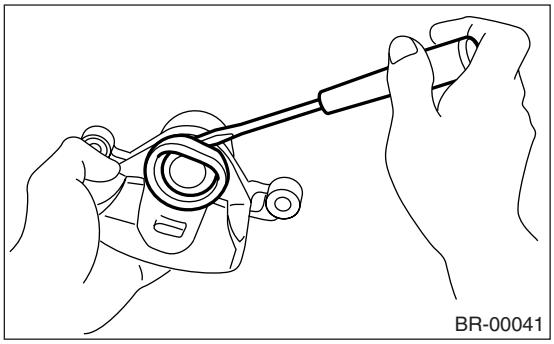
6) Connect the brake hose using a new brake hose gasket.

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

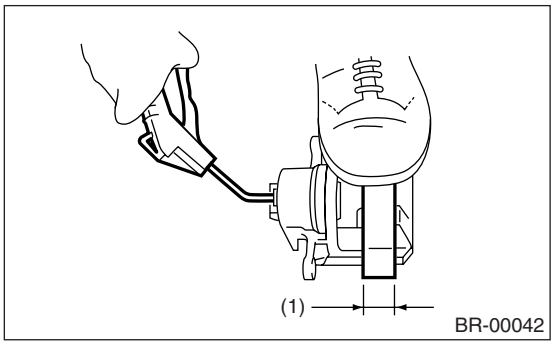
7) Bleed air from the brake system.

C: DISASSEMBLY

1) Remove the piston boot.



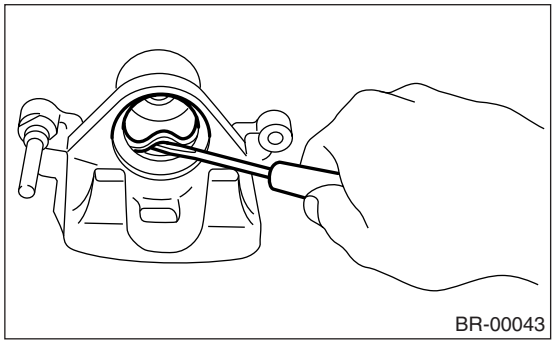
2) Place a wooden block in the caliper body as shown in the figure to prevent the piston from jumping out and being damaged.
3) Gradually apply compressed air via the brake hose installation hole to push the piston out.



(1) Place a wood block of 30 mm (1.18 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

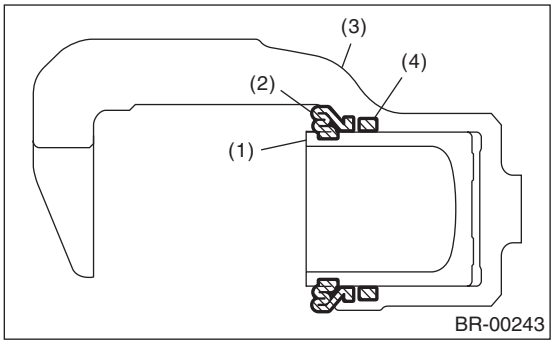
1) Clean the inside of the caliper body using brake fluid.
2) Apply a coat of brake fluid to piston seal and install piston seal in the groove on caliper body.
3) Apply a coat of brake fluid to the inner surface of cylinder and the entire outer surface of the piston.
4) Apply a coat of specified grease to the boot and fit to the groove on the ends of cylinder.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

5) Insert the piston into cylinder.

CAUTION:
Do not force the piston into cylinder.

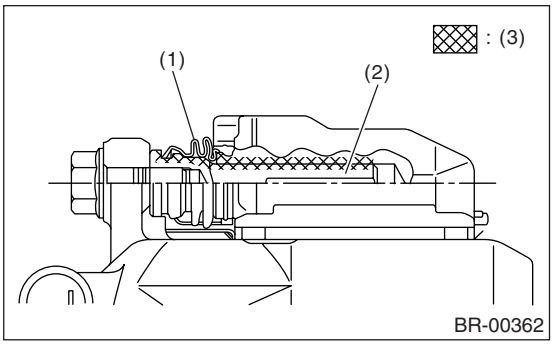
6) Position the boot in the grooves on piston and cylinder.



(1) Piston
(2) Piston boot
(3) Caliper body
(4) Piston seal

7) Apply a coat of specified grease to the guide pin, outer surface, sleeve outer surface, cylinder inner surface, and boot grooves.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)



(1) Pin boot
(2) Lock pin or guide pin
(3) Grease applied area

8) Install the guide pin boot to the support.
9) Install 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.

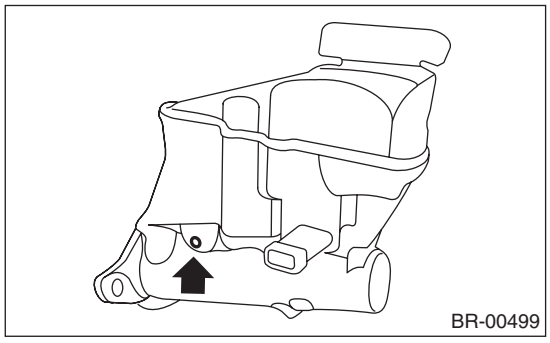
2) Bleed air from brake system. <Ref. to BR-31, PROCEDURE, Air Bleeding.>

C: REPLACEMENT

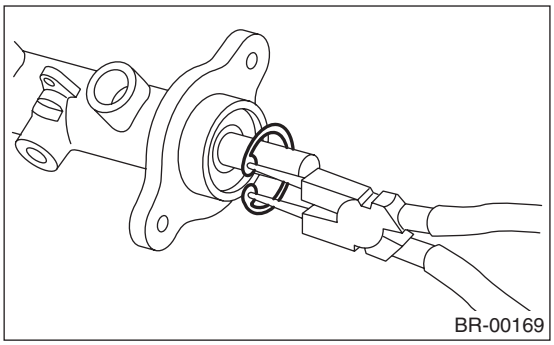
1) Remove mud and dirt from the surface of brake master cylinder.
2) Secure the master cylinder in a vise.

NOTE:
To avoid damaging the master cylinder, place between aluminum plates or other material when holding with a vise.

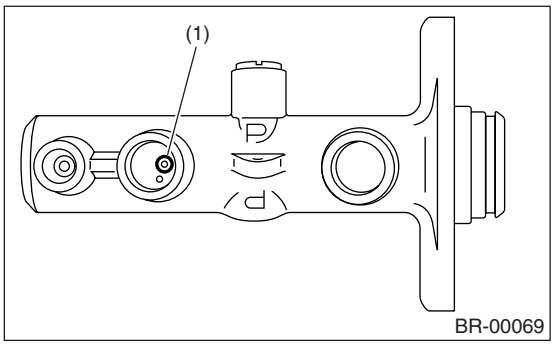
3) Remove the pin which secures the master cylinder and reservoir tank, then remove the reservoir tank and seal.


BR-00499

4) While pushing in the primary piston, remove the C-ring using pliers.


BR-00169

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.

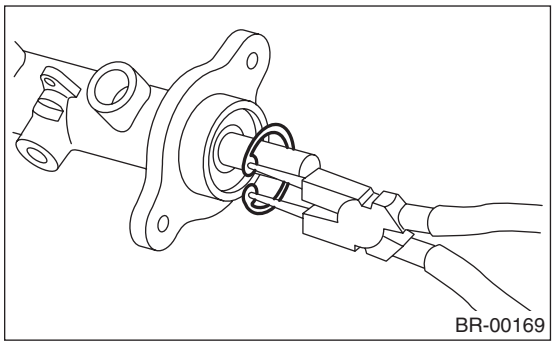


BR-00069

(1) Straight pin

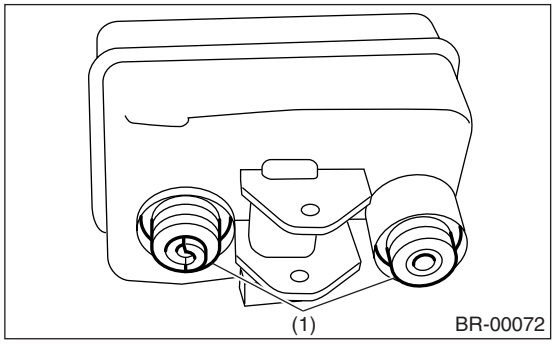
6) Extract the primary piston assembly and secondary piston assembly straight out while taking care not to scratch the inner surface of the cylinders.
7) Clean the inside of master cylinder with brake fluid. Check the inside of the cylinder for damage, deformation and wear. Replace the master cylinder 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.

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

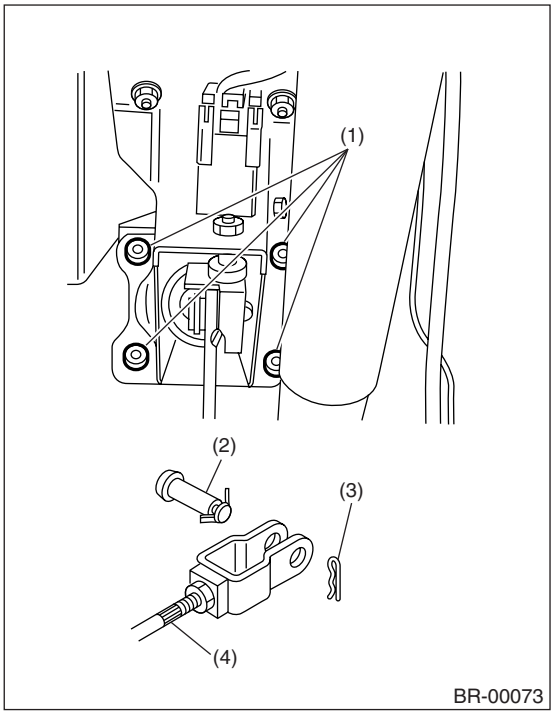
Inspect for oil leakage from the master cylinder.

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

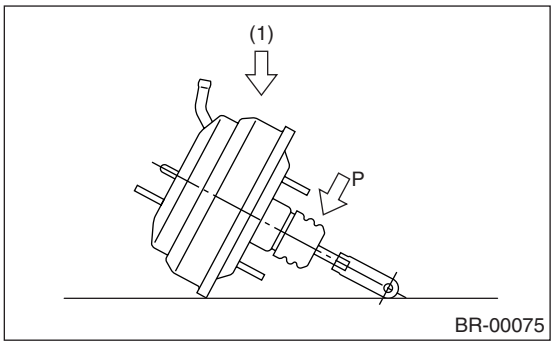


(1) Nut
(2) Clevis pin
(3) Snap pin
(4) Operating rod

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 ±3°, 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.



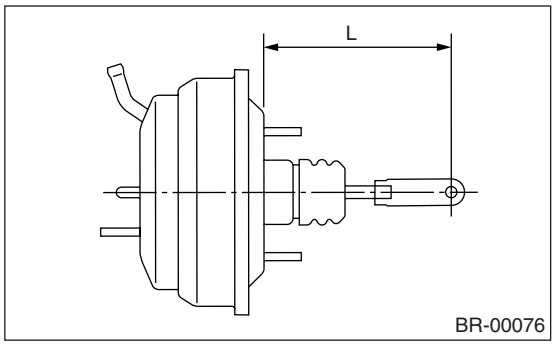
(1) Force

B: INSTALLATION

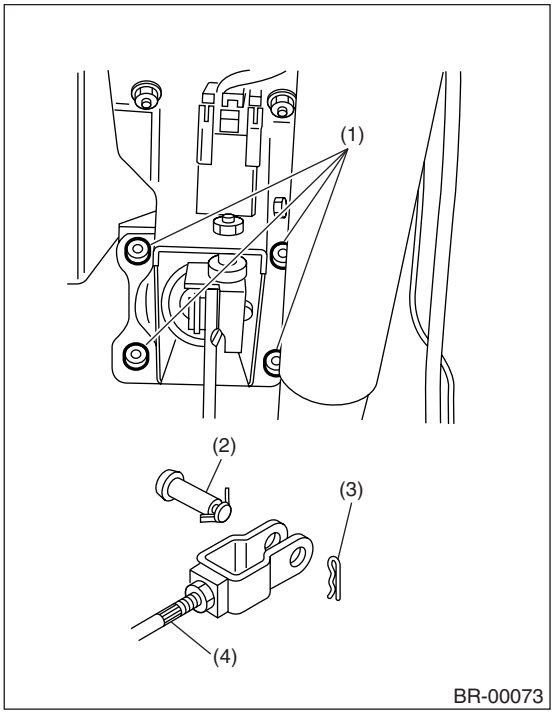
1) Check and adjust the operating rod of the brake booster.

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.
3) Connect the operating rod to brake pedal with the clevis pin and snap pin.



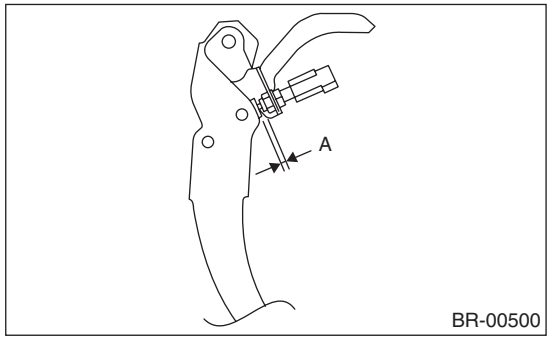
(1) Nut
(2) Clevis pin
(3) Snap pin
(4) Operating rod

NOTE:
Apply a thin coat of SUNLIGHT 2 (Part No. 003602010) 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-38, 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 brake does not drag.

C: INSPECTION

1. OPERATION CHECK (WITHOUT GAUGES)

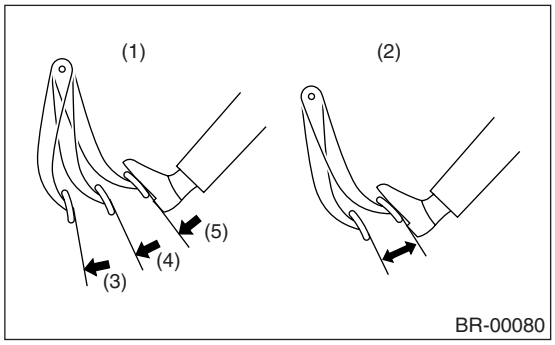
CAUTION:
When checking operation, be sure to apply the parking brake securely.

Check without gauges

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.

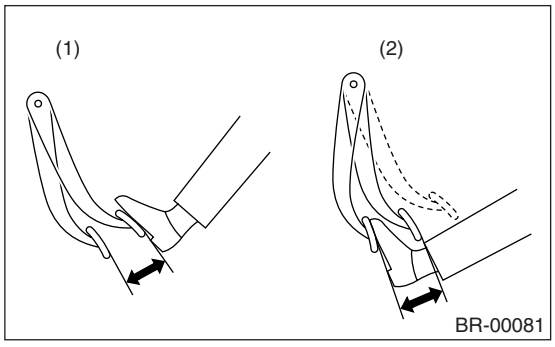


(1) Normal
(2) Not OK
(3) 1st
(4) 2nd
(5) 3rd

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 pressed, 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.

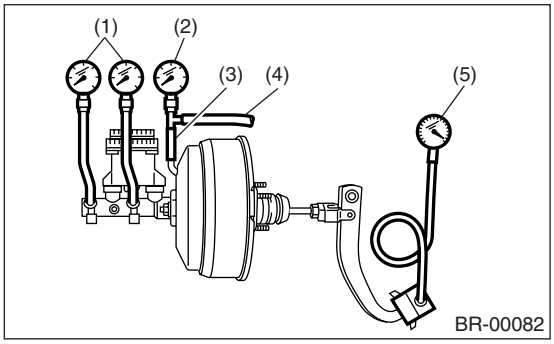
NOTE:
If faulty, perform an accurate check with a gauge.

2. OPERATION CHECK (WITH GAUGE)

CAUTION:
When checking operation, be sure to apply the parking brake securely.

Check with gauge

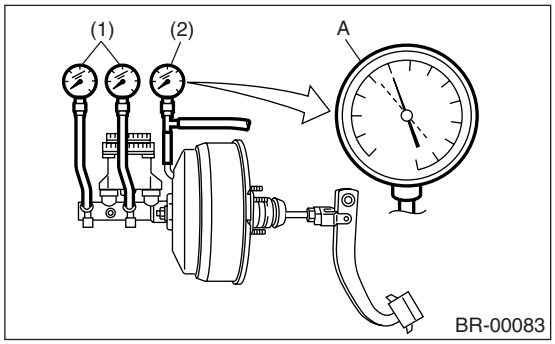
Connect the gauge as shown in the figure. After bleeding air from the pressure gauge, perform the checks.



(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 gage = 66. 7 kPa (500 mmHg, 19. 69 inHg). Do not depress the brake pedal at this time.

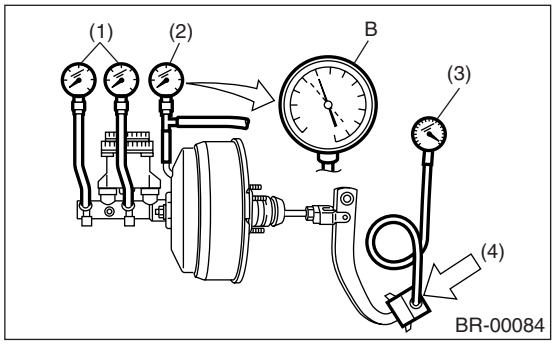


(1) Pressure gauge
(2) Vacuum gauge

2) Stop the engine and check the gauge. If the vacuum pressure drop within 15 seconds after stopping the engine is less than 3. 3 kPa (25 mmHg, 0. 98 inHg), 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 less than 3.3 kPa (25 mmHg, 0.98 inHg), the function of brake booster is normal.
If defective, refer to “AIR TIGHTNESS CHECK”.
<Ref. to BR-27, INSPECTION, Brake Booster.>
3) If the brake booster is faulty, replace the 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 (kgf/cm^2, 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 (kgf/cm^2, psi)	38,539 (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, perform work with 2 people.
• The required amount of brake fluid is approximately 600 m ℓ (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-31, PROCEDURE, Air Bleeding.>

NOTE:
Perform the brake fluid replacement starting in order from the farthest wheel cylinder from the master cylinder.

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.

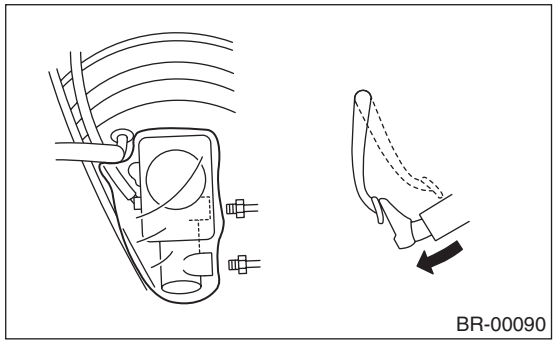
1. MASTER CYLINDER

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-31, BRAKE LINE, PROCEDURE, Air Bleeding.>

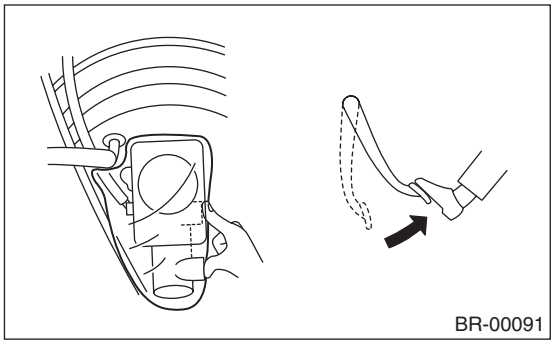
1) Fill the reservoir tank of the master cylinder with brake fluid.

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.


BR-00090

5) Plug the outlet plug with your finger, and then release the brake pedal.


BR-00091

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)

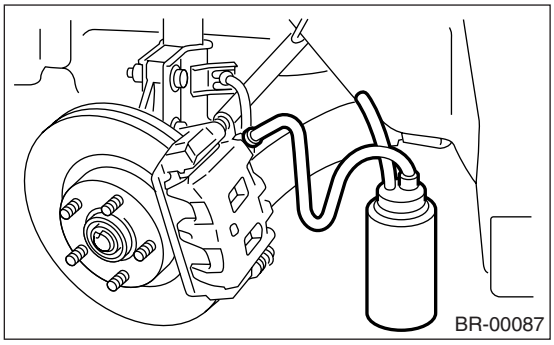
9) Bleed air from the brake line. <Ref. to BR-31, BRAKE LINE, PROCEDURE, Air Bleeding.>

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-31, 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.


BR-00087

4) Depress the brake pedal several times, and keep it pressed.
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.

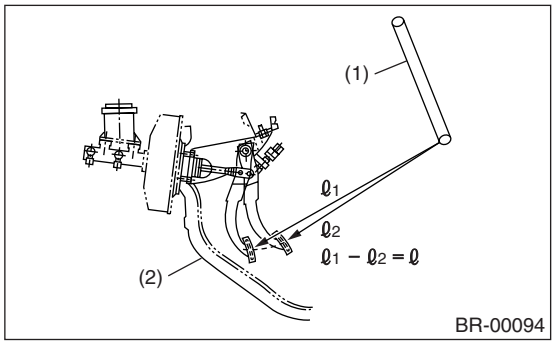
NOTE:
Perform the operation in the order from closest wheel cylinder to the master cylinder.

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.

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 lb).
Less than 115 mm (4.53 in)

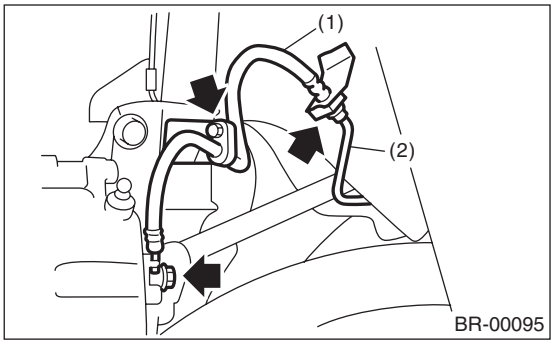
11) If the distance is more than specification, there is a possibility of air being caught in the brake line. Bleed the brake line of all air until the pedal stroke meets the specification.
12) Operate the hydraulic control unit in the sequence control mode. <Ref. to VDC-15, VDC Sequence Control.>
13) 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 brake fluid up to the “MAX” level of the reservoir tank.
16) Test run the vehicle and ensure that the brakes operate normally.

12.Brake Hose

A: REMOVAL

1. FRONT BRAKE HOSE

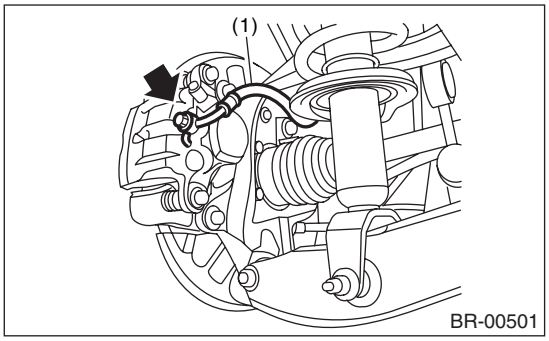
1) Separate the brake pipe from brake hose using a flare nut wrench.
2) Remove the clamp, bolt of the strut mount and union bolt.



(1) Brake hose
(2) Brake pipe

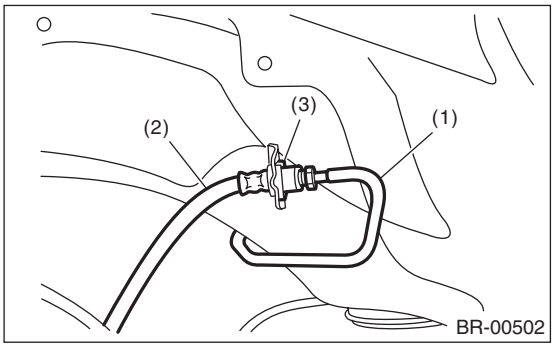
2. REAR BRAKE HOSE

1) Remove the union bolt from the rear brake caliper.



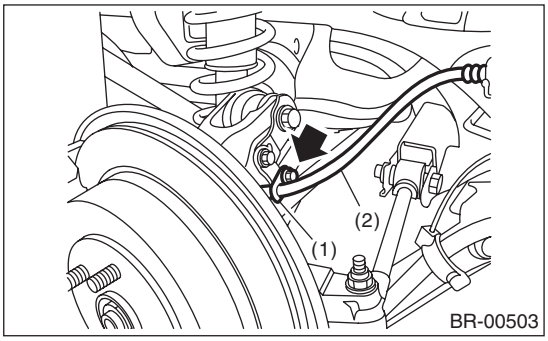
(1) Brake hose

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

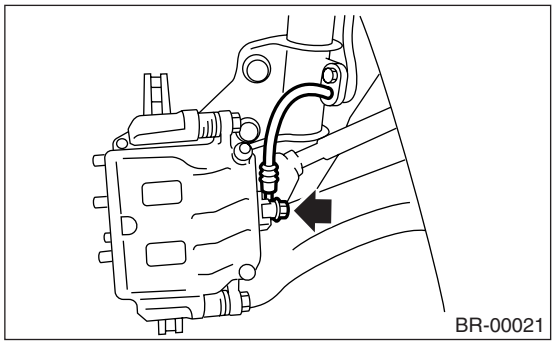
1. FRONT BRAKE HOSE

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, 13.0 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.

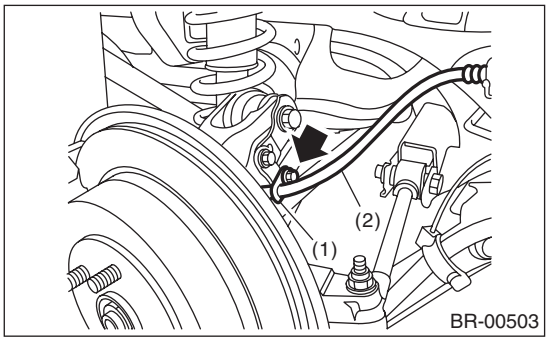
Tightening torque (brake pipe flare nut):
15 N·m (1.5 kgf-m, 10.8 ft-lb)

7) Bleed air from brake system.

2. REAR BRAKE HOSE

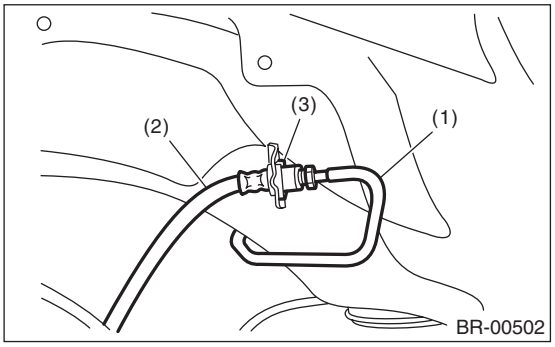
1) Install the brake hose bracket.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)



(1) Brake hose bracket
(2) Brake hose

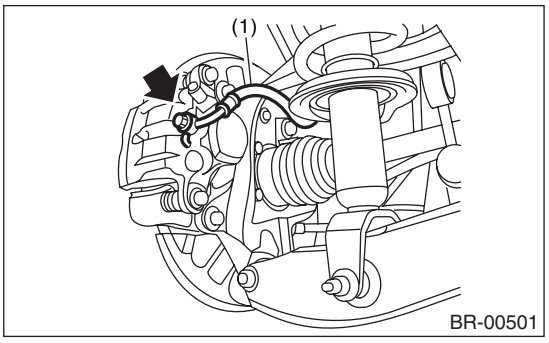
2) Connect the brake hose to the brake pipe.
3) Insert the clamp to secure brake hose.



(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, 13.0 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 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 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

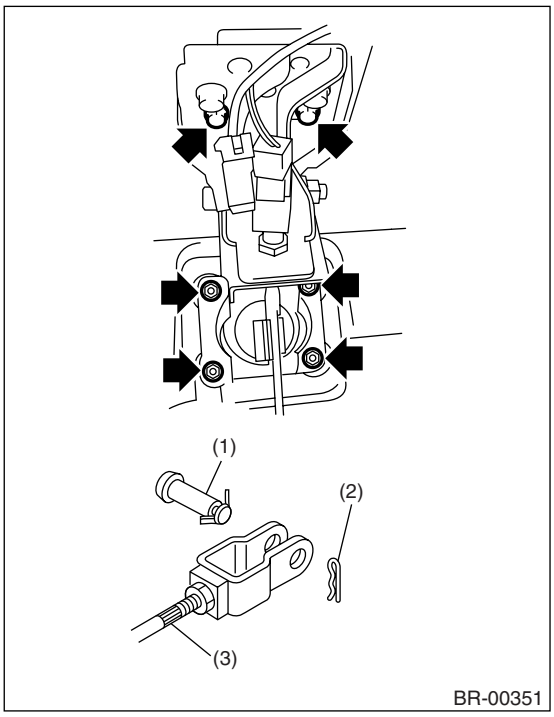
Make sure there are no cracks, breakage or damage on hoses. Check the joint for fluid leakage. If any cracks, breakage, damage or fluid leakage is found, repair or replace the pipes.

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.

CAUTION:
Always use a new clevis pin.

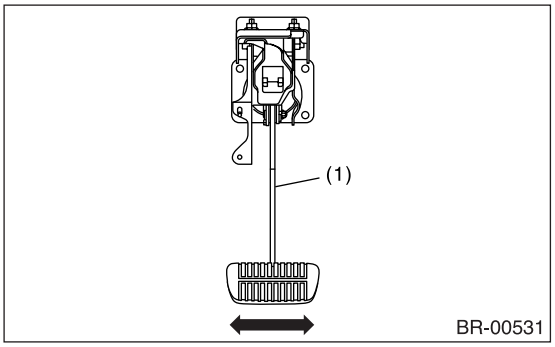
2) Check the brake pedal after installation. <Ref. to BR-36, INSPECTION, Brake Pedal.>

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
Less than 4.0 mm (0.157 in)

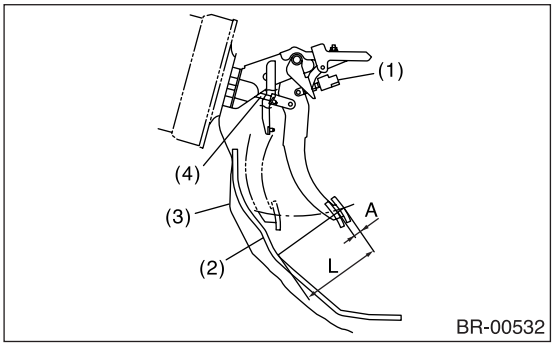


(1) Brake pedal

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).]]



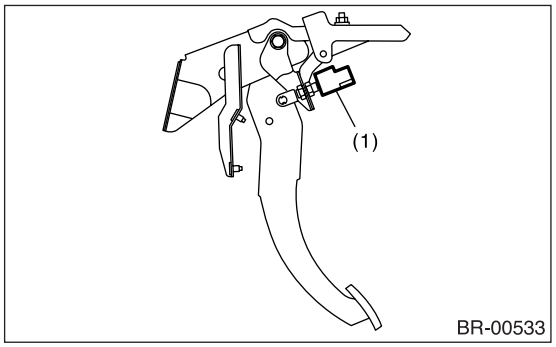
(1) Stop light switch
(2) Mat
(3) Toe board
(4) Brake booster operating rod

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.

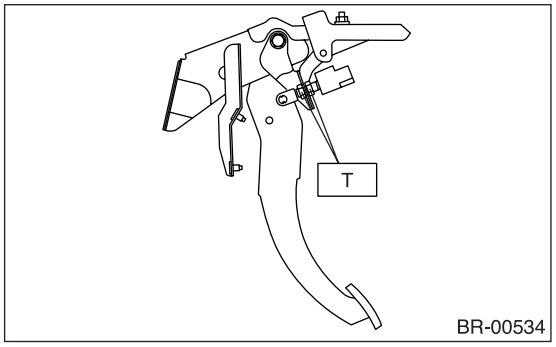


(1) Stop light switch

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-38, ADJUSTMENT, Stop Light Switch.>

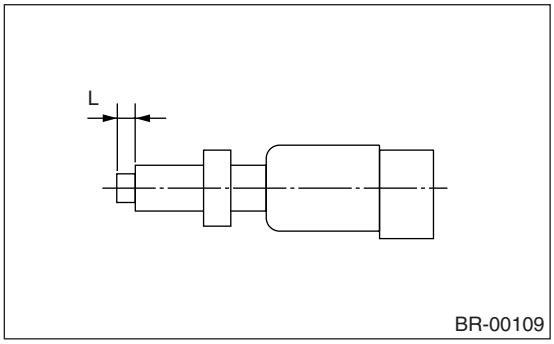
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



C: INSPECTION

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.

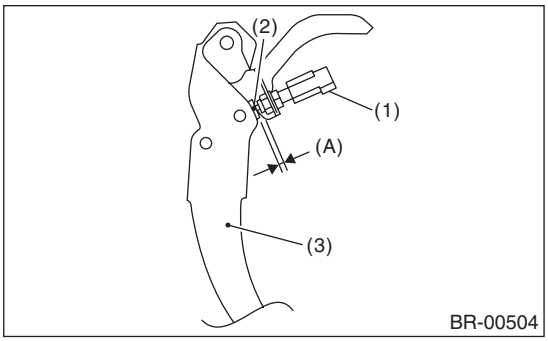
Specified position L:
2 mm (0.079 in)



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 mm (0.031 in)



(1) Stop light switch
(2) Stopper
(3) Brake pedal

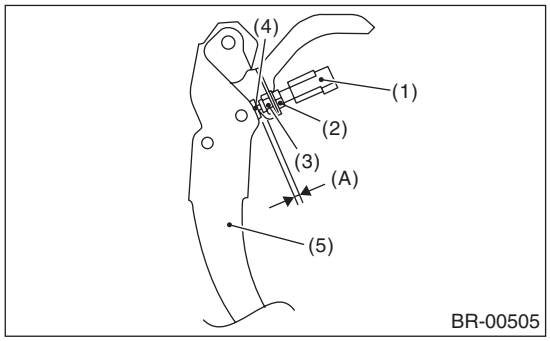
3) If it is not within the specification, adjust it by adjusting the position of the stop light switch.

CAUTION:
Be careful not to rotate the stop light switch.

D: ADJUSTMENT

Loosen the lock nut, and adjust the stop light switch position until the clearance between the threaded end of the stop light switch and stopper (A) becomes 0. 8 mm (0. 031 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

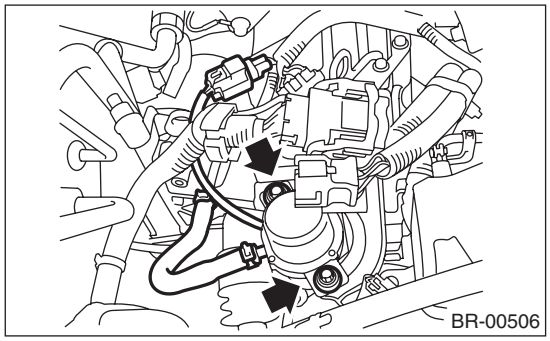
NOTE:
Tighten lock nut B until the threaded end of switch contacts the stopper. Hold the switch so that it does not rotate, and loosen the lock nut B approx. 60°. The clearance (A) will become 0.3 mm (0.012 in).

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

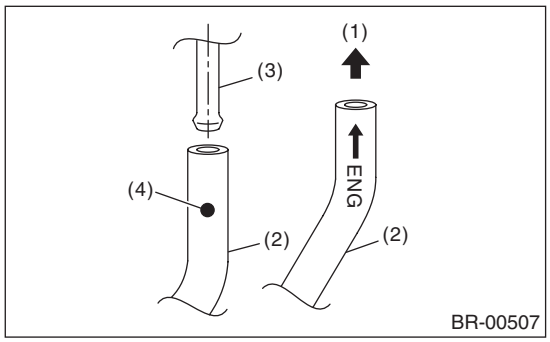
Install in the reverse order of removal.

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.

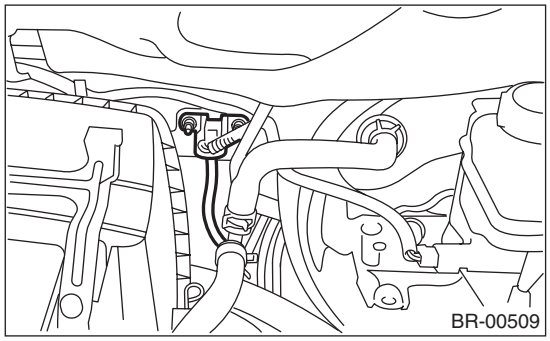
2. VACUUM HOSE

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:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

18.General Diagnostic Table

A: INSPECTION

	Trouble and possible cause	Corrective action
1. Insufficient braking performance	(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.
2. Unstable or uneven braking	(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 wear lining material	Repair by grinding, or replace.
	(4) Deformed back plate	Repair or replace.
	(5) Over inflation 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 effect of parking brake	Check, adjust or replace the rear brake and cable system.
3. Excessive pedal stroke	(1) Entry of air into the hydraulic mechanism	Bleed 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.
4. Brake dragging or improper brake return	(1) Insufficient pedal play	Adjust play.
	(2) Improper master cylinder return	Clean or replace the cylinder.
	(3) Clogged hydraulic system	Replace.
	(4) Improper return or adjustment of parking brake	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.
Brake noise (1) (creaking sound)	(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.
6. Brake noise (2) (hissing sound)	(1) Worn brake pad	Replace the pad.
	(2) Improperly installed pad	Correct or replace the pad.
	(3) Loose or bent rotor	Retighten or replace.
7. Brake noise (3) (click sound)	Excessively worn pad or support	Replace the pad or the support.

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 broken wires 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	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using 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	**BASIC INSPECTION** 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 vacuum control normal?	Go to step **3**.	Repair or replace each component.
3	**CHECK INDICATION OF DTC.** 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 the Subaru Select Monitor power switch to ON. 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	**PERFORM GENERAL DIAGNOSTICS.** Inspect using “General Diagnostic Table”. <Ref. to VDC(diag)-87, INSPECTION, General Diagnostic Table.>	Is result of inspection OK?	Finish the diagnosis.	Go to step **5**.
5	**PERFORM THE DIAGNOSIS.** 1) Correct the cause of trouble according to 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 4 until DTC is not shown.	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Check the following item about the vehicle's state.

1. STATUS OF THE ERROR DISPLAY

An error is displayed in odo/trip meter.	❑ Always ❑ Sometimes ❑ Only once ❑ Does not come on • When/How long does it come on?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after starting engine, while engine is running) ❑ ON (after starting engine, engine is stop)		
Timing	❑ Immediately after turning the ignition switch to ON ❑ Immediately after turning the ignition switch to START		
	❑ Accelerating	—	km/h
		—	MPH
	❑ While traveling at a constant speed	km/h	MPH
	❑ Reducing speed	—	km/h
		—	MPH

2. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others:
	b) Ambient temperature	°C (°F)
	c) Altitude	m (ft)
	d) Road	❑ Inner city ❑ Suburbs ❑ Highway ❑ General road ❑ Uphill ❑ Downhill ❑ Paved road ❑ Gravel road ❑ Muddy road ❑ Sandy place ❑ Straight road ❑ Sharp curve ❑ Gentle curve ❑ S-curve ❑ Road with a slope on both sides ❑ Others:
	e) Road surface	❑ Dry ❑ Wet ❑ New-fallen snow ❑ Compressed snow ❑ Frozen slope ❑ Others:
Condition	a) Brakes	Deceleration: G ❑ continuous / ❑ intermittent
	b) Accelerator	Acceleration: G ❑ continuous / ❑ intermittent
	c) Vehicle speed	km/h | MPH ❑ Advancing ❑ Accelerating ❑ Reducing speed ❑ Low speed ❑ Turning ❑ Others: ❑ Immediately after starting the engine ❑ Idling etc.

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:
• 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.

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

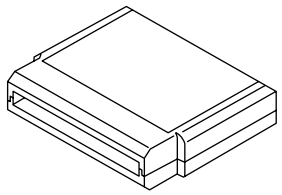
Specific gravity: 1.260 or more

2. BRAKE VACUUM HOSE

Make sure the brake vacuum hose is not cracked or loose.

C: PREPARATION TOOL

1. SPECIAL TOOL

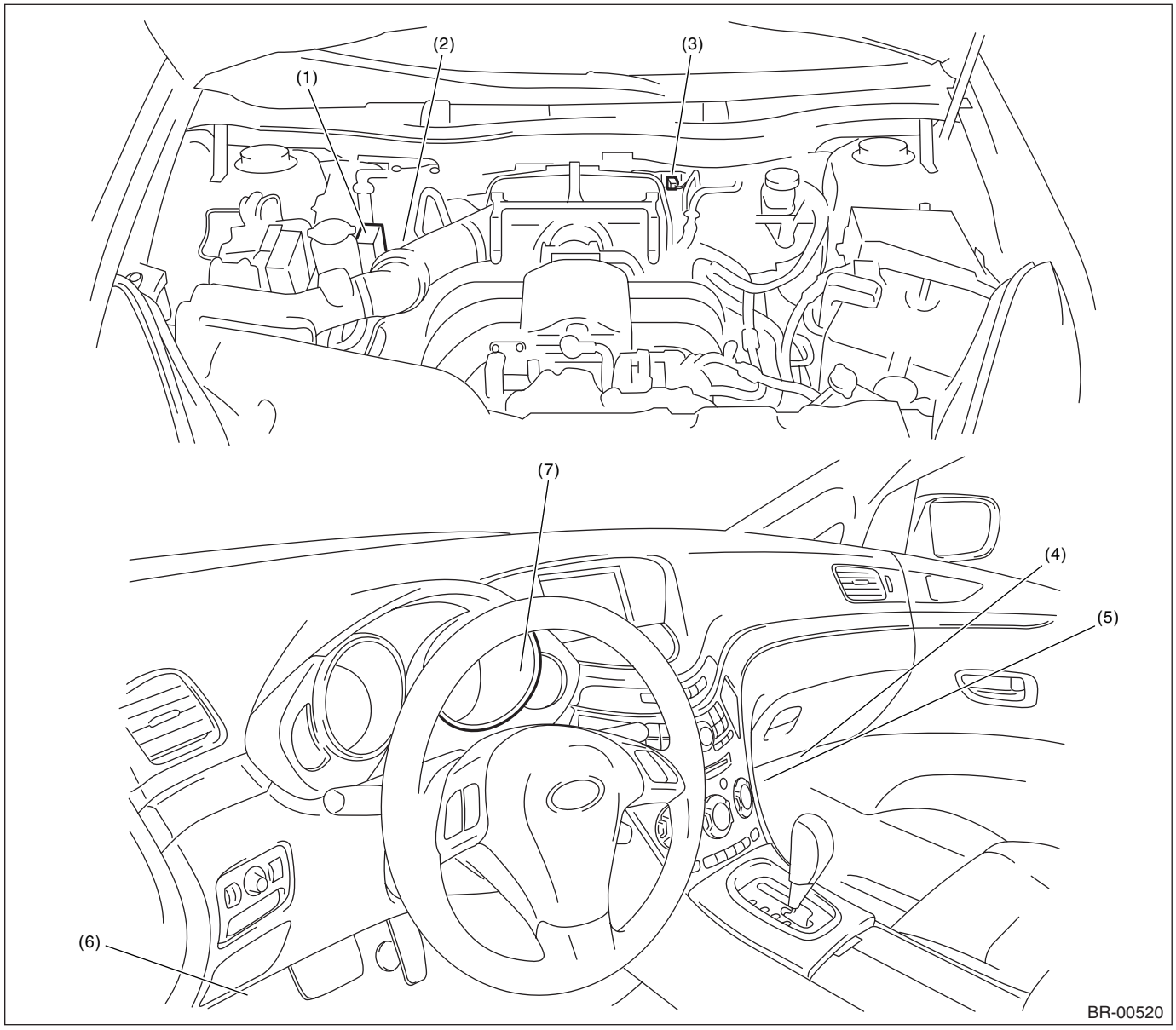
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for the electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for the electrical system.

2. GENERAL TOOL

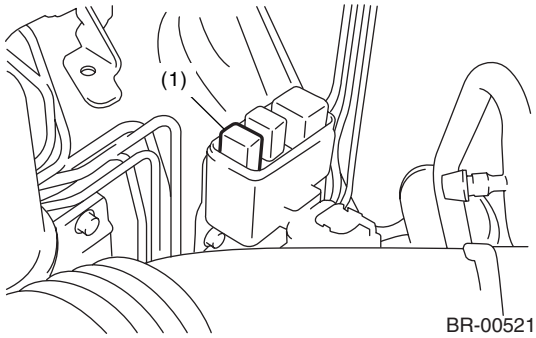
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring the sensor.

4. Electrical Component Location

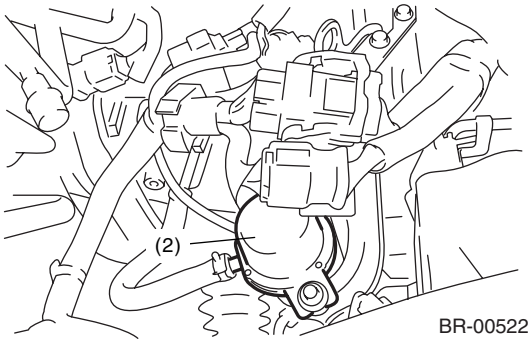
A: LOCATION



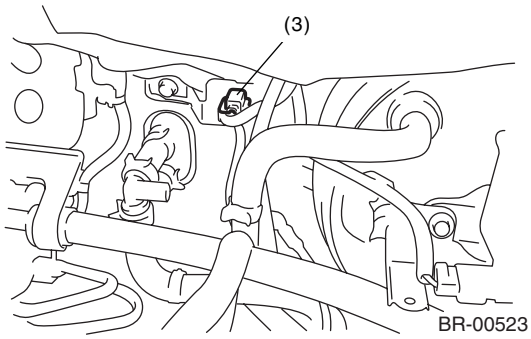
(1) Brake vacuum pump relay
(2) Brake vacuum pump
(3) Brake vacuum sensor
(4) Test mode connector
(5) Engine control module (ECM)
(6) Data link connector
(7) Odo/trip meter



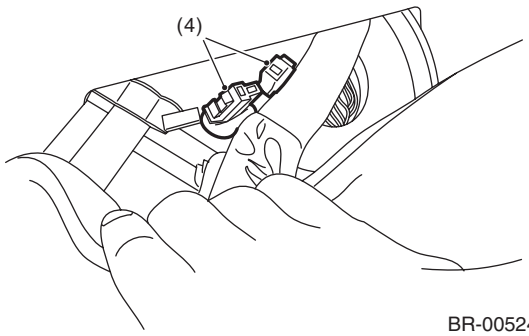
BR-00521



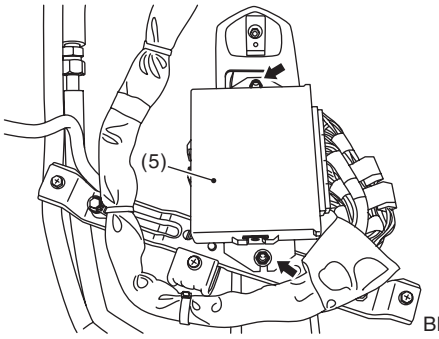
BR-00522



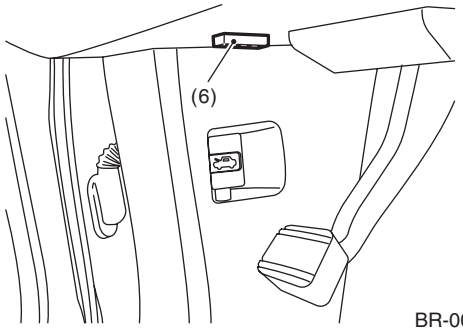
BR-00523



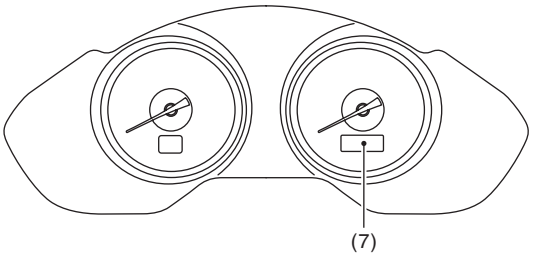
BR-00524



BR-00525



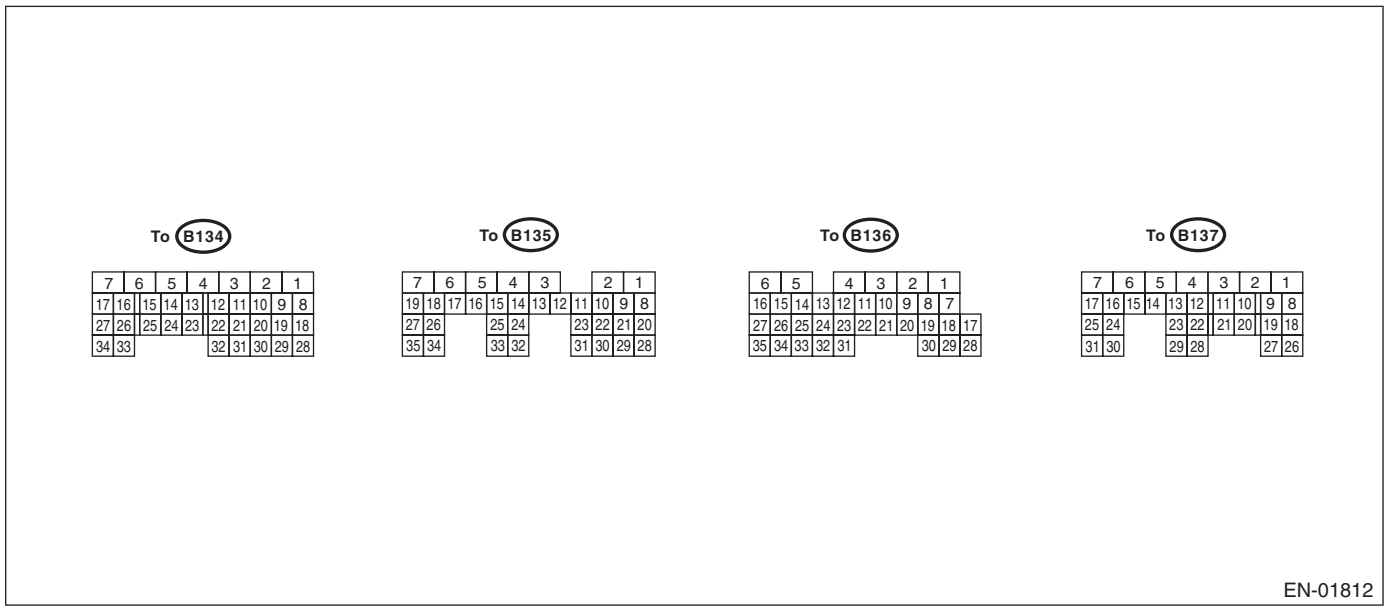
BR-00526



BR-00527

5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



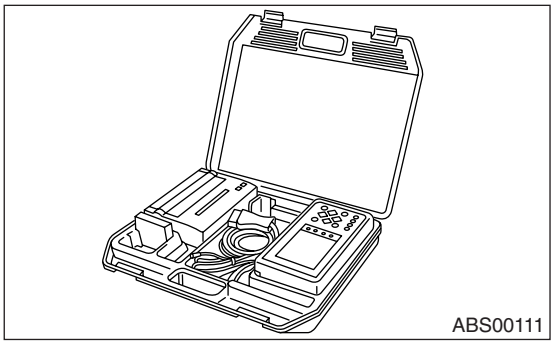
Description		Connector No.	Terminal No.	Signal (V)		NOTE
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Brake vacuum sensor	Signal	B134	27	1 — 3.8	1 — 3.8	—
	Power supply	B135	22	5	5	—
	Ground	B135	30	0	0	—
Self-shutoff control		B136	23	0	0	—
Brake vacuum pump	Relay drive	B136	8	10 — 13 (When the pump is OFF)	12 — 14 (When the pump is ON)	—
				0 (When the pump is ON)	0 (When the pump is ON)	
	Electric load	B135	25	0 (When the pump is OFF)	0 (When the pump is OFF)	—
				10 — 13 (When the pump is ON)	12 — 14 (When the pump is ON)	
SSM communication line		B136	16	1 or less ←→ 4 or more	1 or less ←→ 4 or more	—

6. Subaru Select Monitor

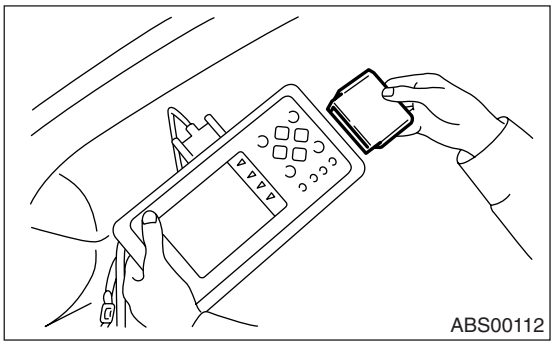
A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit. <Ref. to BVC(diag)-5, SPECIAL TOOL, PREPARATION TOOL, General Description.>

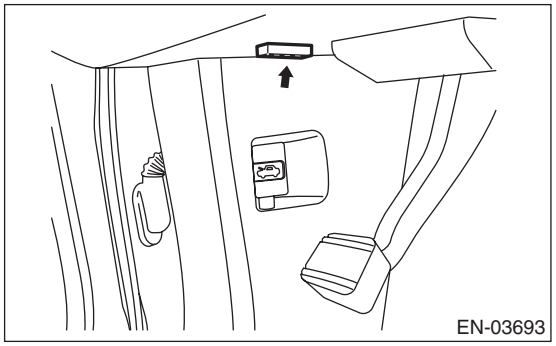


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to the Subaru Select Monitor. <Ref. to BVC(diag)-5, SPECIAL TOOL, PREPARATION TOOL, General Description.>



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

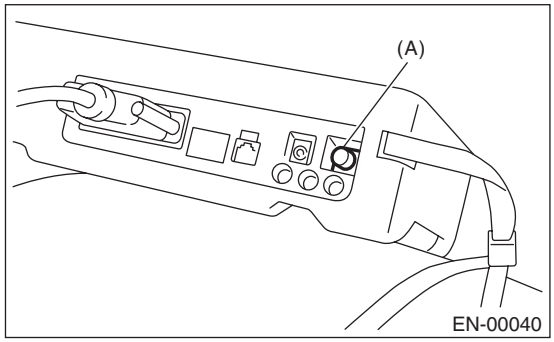
(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON.



(A) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Brake Negative Pressure Pump System} and press the [YES] key.
8) Press the [YES] key after the {3.0 DOHC} is displayed.
9) On the «Negative Pressure Pump Diagnosis Menu» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.

NOTE:
• For details concerning operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".
• For details concerning DTCs, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to BVC(diag)-14, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Brake Negative Pressure Pump System} and press the [YES] key.
3) Press the [YES] key after the {3.0 DOHC} is displayed.
4) On the «Negative Pressure Diagnosis Menu» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» screen, select the {Data Display} and press the [YES] key.
6) Using a 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 monitored	Unit of measure
Atmospheric pressure	Atmospheric pressure is displayed.	mmHg, kPa or psig
Brake booster pressure	Brake booster pressure is displayed.	mmHg, kPa or psig
Test mode terminal	Test mode terminal connection status is displayed.	D Check or U Check
Negative pressure pump motor	Negative pressure motor operating status is displayed.	ON or OFF
Negative pressure pump motor relay	Negative pressure pump motor relay operating status is displayed.	ON or OFF

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

3. CLEAR MEMORY MODE

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Brake Negative Pressure Pump System} and press the [YES] key.
3) Press the [YES] key after the {3.0 DOHC} is displayed.
4) On the «Negative Pressure Pump Diagnosis Menu» display screen, select the {Clear Memory} and press the [YES] key.

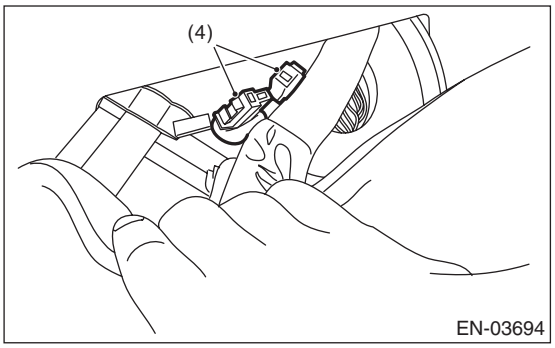
Display	Contents to be monitored
Clear Memory?	DTC deleting function

5) When “Done” and “Turn ignition switch OFF” are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

4. FUNCTION CHECK MODE

1) Connect the test mode connector located under the glove box.



(A) Test mode connector

2) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON.
3) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
4) On the «System Selection Menu» display screen, select the {Brake Negative Pressure Pump System} and press the [YES] key.
5) Press the [YES] key after the {3.0 DOHC} is displayed.
6) On the «Negative Pressure Pump Diagnosis Menu» display screen, select the {Function Check Mode} and press the [YES] key.
7) When the “Start Function Check Mode” is shown on the screen, press the [YES] key.
8) When the “Depress the Brake Pedal 5 Times” is shown on the screen, depress the brake pedal 5 times, and press the [YES] key while brake pedal is not depressed.
9) Press the [YES] key after the {OK} is displayed.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

For details concerning DTC reading procedure, refer to “Subaru Select Monitor”. <Ref. to BVC(diag)-9, Subaru Select Monitor.>

8. Inspection Mode

A: PROCEDURE

Reproduce the malfunction occurrence condition as possible.
Drive the vehicle at least ten minutes.

9. Clear Memory Mode

A: OPERATION

For details concerning DTC clear operation, refer to “Subaru Select Monitor”. <Ref. to BVC(diag)-9, Subaru Select Monitor.>

10.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Display	Content of diagnosis	Reference target
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	Error in comparison with other brake booster relative pressure	<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 seizure malfunction	<Ref. to BVC(diag)-20, DTC 13 PRESSURE SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
21	Discrepancy in relays (ON)	Drive does not match between the brake vacuum pump relay and the 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)	Drive does not match between the brake vacuum pump relay and the 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	Malfunction in brake vacuum pump continuous operation	<Ref. to BVC(diag)-28, DTC 23 PUMP CONTINUOUS OPERATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

11.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 11 SENSOR OUTPUT OUT OF RANGE

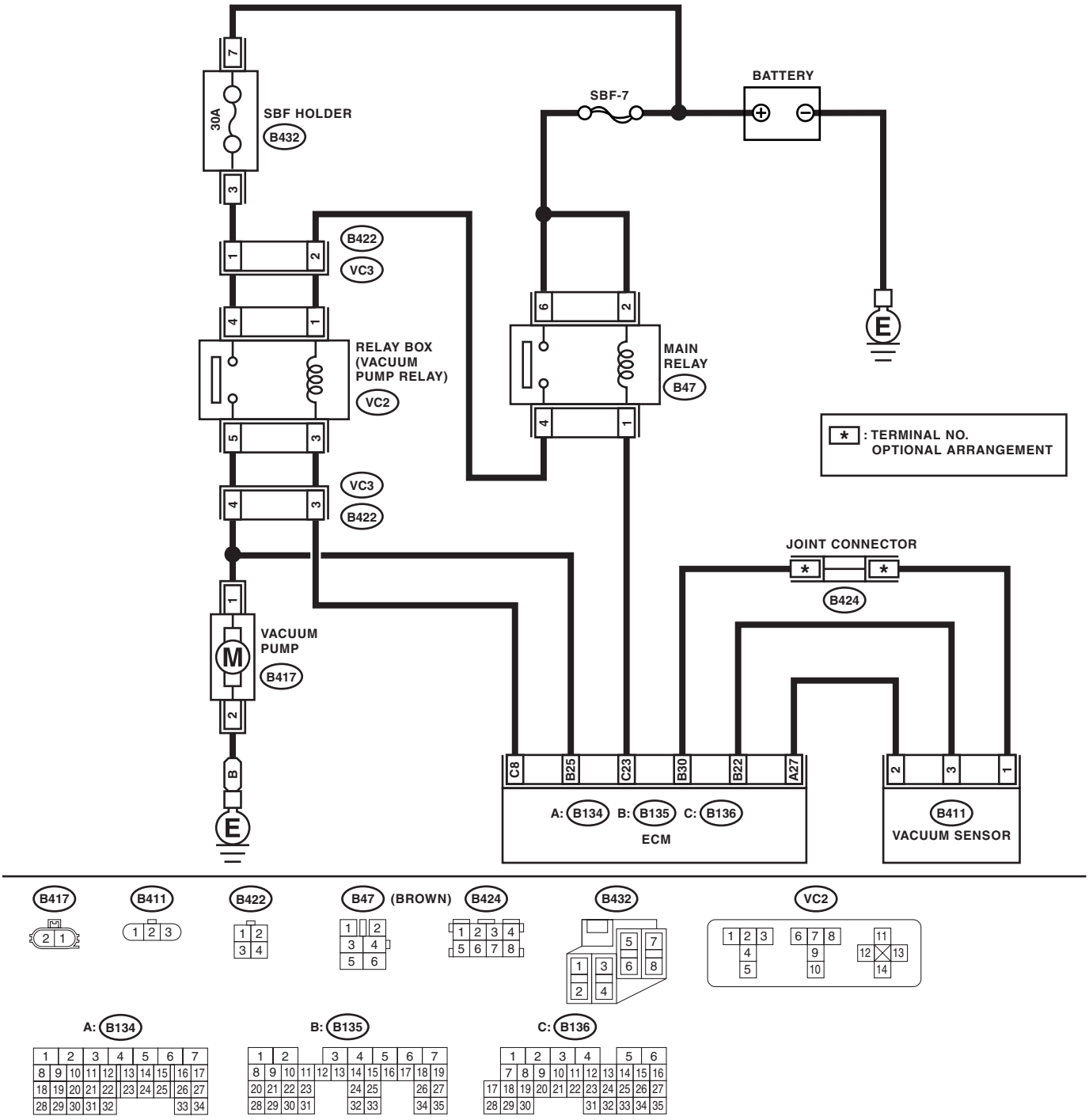
DTC DETECTING CONDITION:

Brake vacuum sensor malfunction

TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

WIRING DIAGRAM:



BR-00528

	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum sensor connector. 3) Remove the brake vacuum sensor. <Ref. to BR-40, REMOVAL, Brake Vacuum Sensor.> 4) Measure the resistance between brake vacuum sensor connector terminals. ***Terminals*** ***No. 1 — No. 3:*** ***No. 2 — No. 3:***	Is the resistance 15 kΩ or less?	Go to step **2**.	Replace the brake vacuum sensor. <Ref. to BR-40, Brake Vacuum Sensor.>
2	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of the harness between ECM and the brake vacuum sensor connector. ***Connector & terminal*** ***(B135) No. 30 — (B411) No. 1:*** ***(B135) No. 22 — (B411) No. 3:*** ***(B134) No. 27 — (B411) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between ECM and brake vacuum sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 30 — Chassis ground:*** ***(B135) No. 22 — Chassis ground:*** ***(B134) No. 27 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair the ground short of the harness between ECM and brake vacuum sensor connector.
4	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 30 (+) — Chassis ground (–):*** ***(B135) No. 22 (+) — Chassis ground (–):*** ***(B134) No. 27 (+) — Chassis ground (–):***	Is the voltage less than 0.5 V?	Go to step **5**.	Repair the battery short circuit between ECM and brake vacuum sensor connector.
5	**CHECK THE BRAKE VACUUM SENSOR POWER SUPPLY.** 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. ***Connector & terminal*** ***(B135) No. 22 (+) — (B135) No. 30 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **6**.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
6	**CHECK CURRENT DATA.** 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 negative pressure pump system using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the atmospheric pressure — brake booster pressure between –8 — +8 mmHg?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

B: DTC 12 COMPARE ERROR IN OTHER SENSOR

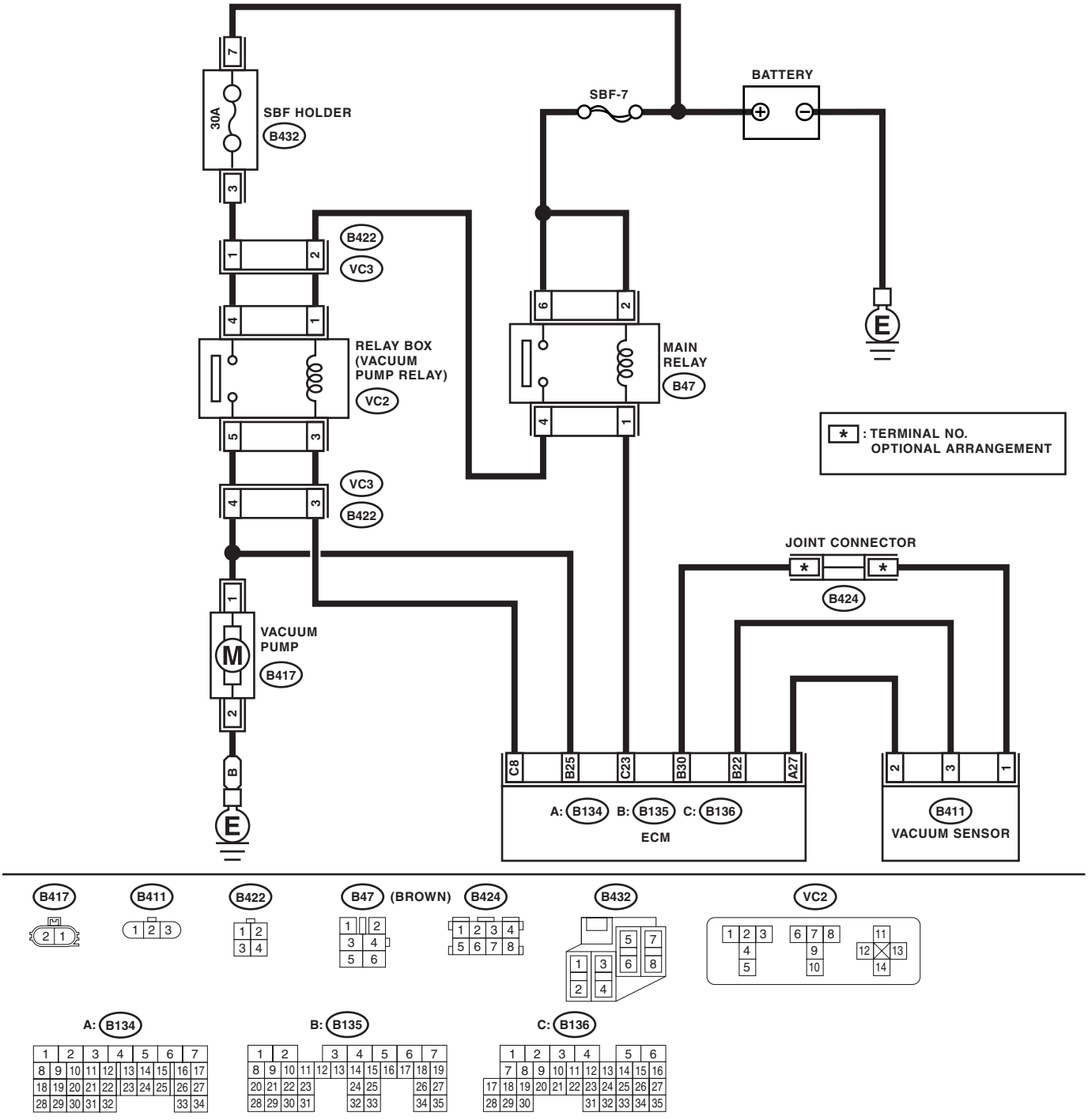
DTC DETECTING CONDITION:

Brake vacuum sensor malfunction

TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

WIRING DIAGRAM:



BR-00528

	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to OFF. 2) Check that status of the brake vacuum hose connection.	Is the brake vacuum hose connected firmly?	Go to step **2**.	Connect the brake vacuum hose.
2	**CHECK BRAKE VACUUM HOSE.** 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	**CHECK BRAKE VACUUM SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum sensor connector. 3) Remove the brake vacuum sensor. <Ref. to BR-40, REMOVAL, Brake Vacuum Sensor.> 4) Measure the resistance between brake vacuum sensor connector terminals. ***Terminals*** ***No. 1 — No. 3:*** ***No. 2 — No. 3:***	Is the resistance 15 kΩ or less?	Go to step **4**.	Replace the brake vacuum sensor. <Ref. to BR-40, Brake Vacuum Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of the harness between ECM and the brake vacuum sensor connector. ***Connector & terminal*** ***(B135) No. 30 — (B411) No. 1:*** ***(B135) No. 22 — (B411) No. 3:*** ***(B134) No. 27 — (B411) No. 2:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between ECM and brake vacuum sensor connector.
5	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 30 — Chassis ground:*** ***(B135) No. 22 — Chassis ground:*** ***(B134) No. 27 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair the ground short circuit between ECM and brake vacuum sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 30 (+) — Chassis ground (–):*** ***(B135) No. 22 (+) — Chassis ground (–):*** ***(B134) No. 27 (+) — Chassis ground (–):***	Is the voltage less than 0.5 V?	Go to step **7**.	Repair the battery short of the harness between ECM and brake vacuum sensor connector.
7	**CHECK THE BRAKE VACUUM SENSOR POWER SUPPLY.** 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. ***Connector & terminal*** ***(B135) No. 22 (+) — (B135) No. 30 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **8**.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

	Step	Check	Yes	No
8	**CHECK CURRENT DATA.** 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 negative pressure pump system using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the atmospheric pressure — brake booster pressure between –8 — +8 mmHg?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

C: DTC 13 PRESSURE SENSOR OUTPUT

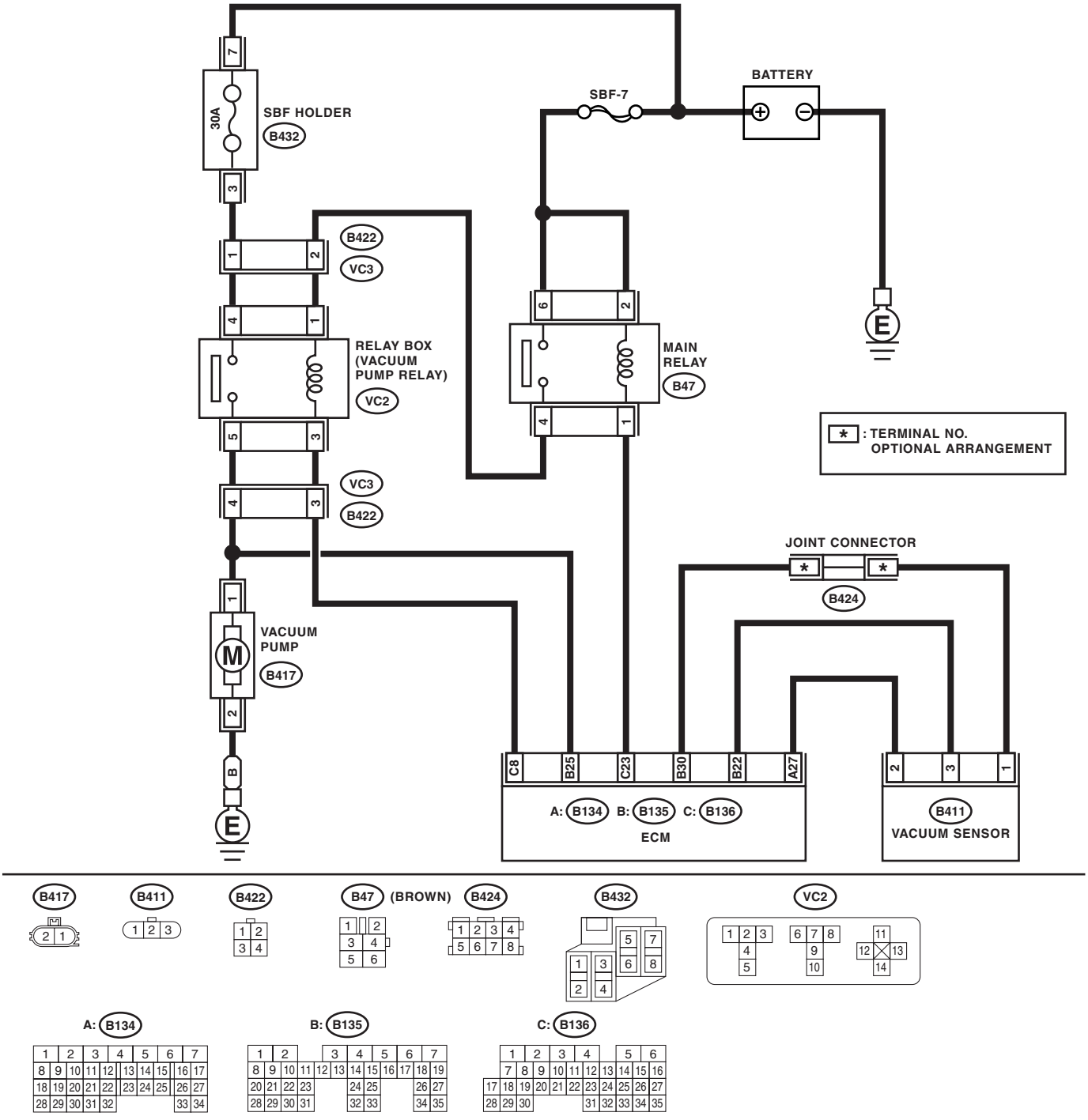
DTC DETECTING CONDITION:

Brake vacuum sensor malfunction

TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

WIRING DIAGRAM:



BR-00528

	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to OFF. 2) Check that status of the brake vacuum hose connection.	Is the brake vacuum hose connected firmly?	Go to step **2**.	Connect the brake vacuum hose.
2	**CHECK BRAKE VACUUM HOSE.** 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	**CHECK BRAKE VACUUM SENSOR CONNECTOR.** Check that 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	**CHECK BRAKE VACUUM SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum sensor connector. 3) Remove the brake vacuum sensor. <Ref. to BR-40, REMOVAL, Brake Vacuum Sensor.> 4) Measure the resistance between brake vacuum sensor connector terminals. ***Connector & terminal*** ***No. 1 — No. 3:*** ***No. 2 — No. 3:***	Is the resistance 15 kΩ or less?	Go to step **5**.	Replace the brake vacuum sensor. <Ref. to BR-40, Brake Vacuum Sensor.>
5	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of the harness between ECM and the brake vacuum sensor connector. ***Connector & terminal*** ***(B135) No. 30 — (B411) No. 1:*** ***(B135) No. 22 — (B411) No. 3:*** ***(B134) No. 27 — (B411) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between ECM and brake vacuum sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 30 — Chassis ground:*** ***(B135) No. 22 — Chassis ground:*** ***(B134) No. 27 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair the ground short of the harness between ECM and brake vacuum sensor connector.
7	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM SENSOR CONNECTOR.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 30 (+) — Chassis ground (–):*** ***(B135) No. 22 (+) — Chassis ground (–):*** ***(B134) No. 27 (+) — Chassis ground (–):***	Is the voltage less than 0.5 V?	Go to step **8**.	Repair the battery short of the harness between ECM and brake vacuum sensor connector.
8	**CHECK THE BRAKE VACUUM SENSOR POWER SUPPLY.** 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. ***Connector & terminal*** ***(B135) No. 22 (+) — (B135) No. 30 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **9**.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

	Step	Check	Yes	No
9	**CHECK CURRENT DATA.** 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 negative pressure pump system using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the atmospheric pressure — brake booster pressure between –8 — +8 mmHg?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

D: DTC 21 DISCREPANCY IN RELAYS (ON)

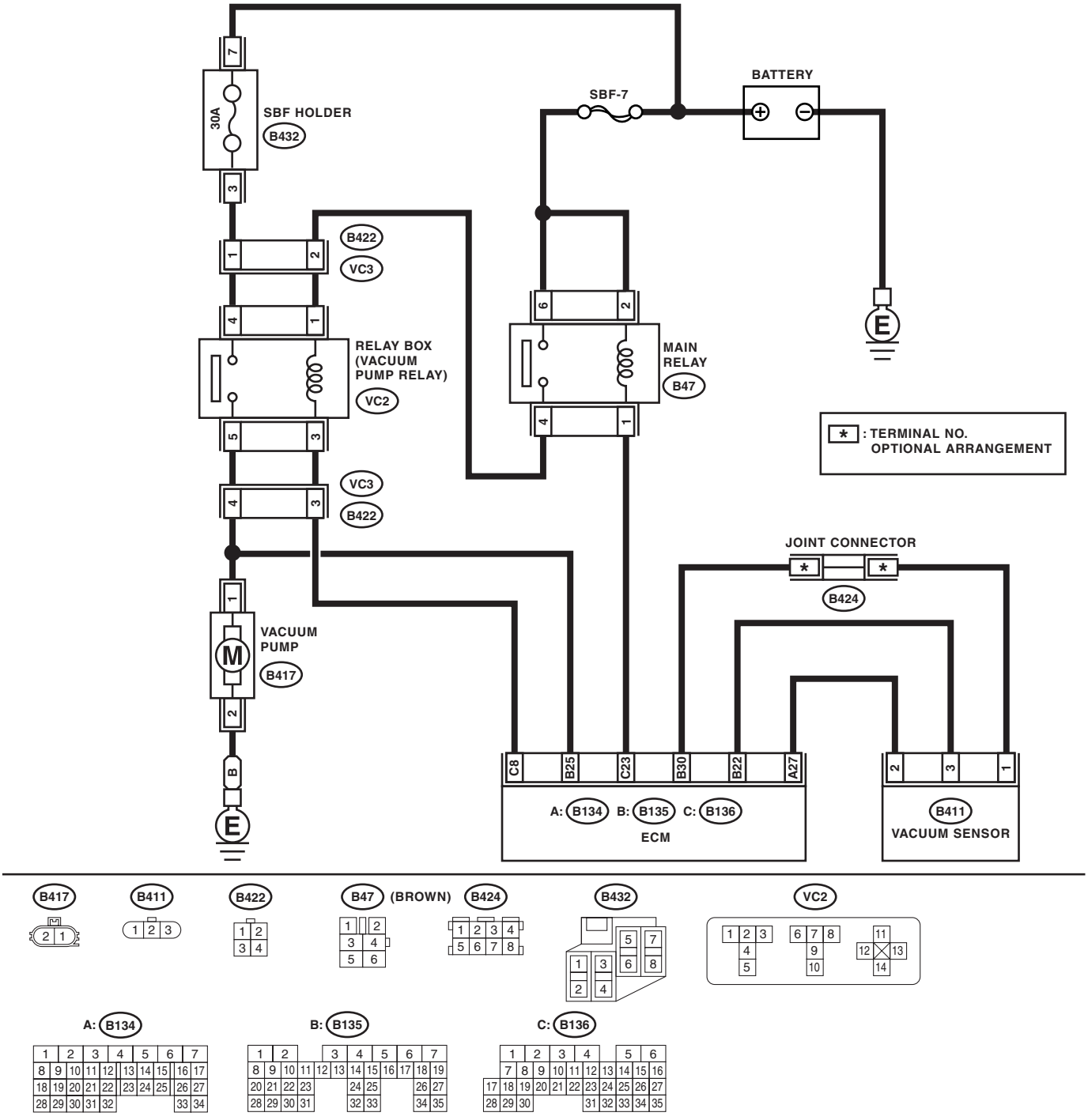
DTC DETECTING CONDITION:

Brake vacuum pump relay malfunction

TROUBLE SYMPTOM:

Brake vacuum pump does not operate.

WIRING DIAGRAM:



BR-00528

	Step	Check	Yes	No
1	**CHECK CONNECTOR.** Check that 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.
2	**CHECK FUSE.** 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**.
3	**CHECK BRAKE VACUUM PUMP RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump relay from the relay box. 3) Connect the battery to terminals No. 1 and No. 3 of the brake vacuum pump relay. 4) Measure the resistance between the brake vacuum pump relay terminals. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **4**.	Replace the brake vacuum pump relay.
4	**CHECK BRAKE VACUUM PUMP RELAY POWER SUPPLY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between brake vacuum pump relay connector and chassis ground. ***Connector & terminal*** ***(VC2) No. 1 (+) — Chassis ground (–):*** ***(VC2) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5**.	Repair the open or ground short circuit of power supply circuit.
5	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of ECM. 3) Measure the resistance of the harness between ECM and the brake vacuum pump relay connector. ***Connector & terminal*** ***(B136) No. 8 — (VC2) No. 3:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between ECM and the brake vacuum pump relay connector.
6	**CHECK HARNESS BETWEEN THE BRAKE VACUUM PUMP AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum pump connector. 3) Measure the resistance of the harness between the brake vacuum pump and brake vacuum pump relay connector. ***Connector & terminal*** ***(VC2) No. 5 — (B417) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of the harness between the brake vacuum pump and the brake vacuum pump relay connector.
7	**CHECK THE HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP CONNECTOR.** Measure the resistance of the harness between brake vacuum pump connector and the chassis ground. ***Connector & terminal*** ***(B417) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair the ground short of the harness between ECM and brake vacuum pump connector.
8	**CHECK THE HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP CONNECTOR.** Measure the voltage between brake vacuum pump connector and the chassis ground. ***Connector & terminal*** ***(B417) No. 1 (+) — Chassis ground (–):***	Is the voltage less than 0.5 V?	Go to step **9**.	Repair the battery short of the harness between the ECM and the brake vacuum pump connector.

	Step	Check	Yes	No
9	**CHECK BRAKE VACUUM PUMP.** 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump. <Ref. to BR-39, REMOVAL, Brake Vacuum Pump.> 3) Connect the battery positive terminal to the brake vacuum pump terminal No. 1, and the negative terminal to terminal No. 2.	Is the brake vacuum pump operating?	Go to step **10**.	Replace the brake vacuum pump. <Ref. to BR-39, Brake Vacuum Pump.>
10	**CHECK BRAKE VACUUM PUMP.** 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 brake negative pressure pump system function check mode using the Subaru Select Monitor. <Ref. to BVC(diag)-9, Subaru Select Monitor.>	Is the brake vacuum pump operating?	Temporary poor contact occurs.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

E: DTC 22 DISCREPANCY IN RELAYS (OFF)

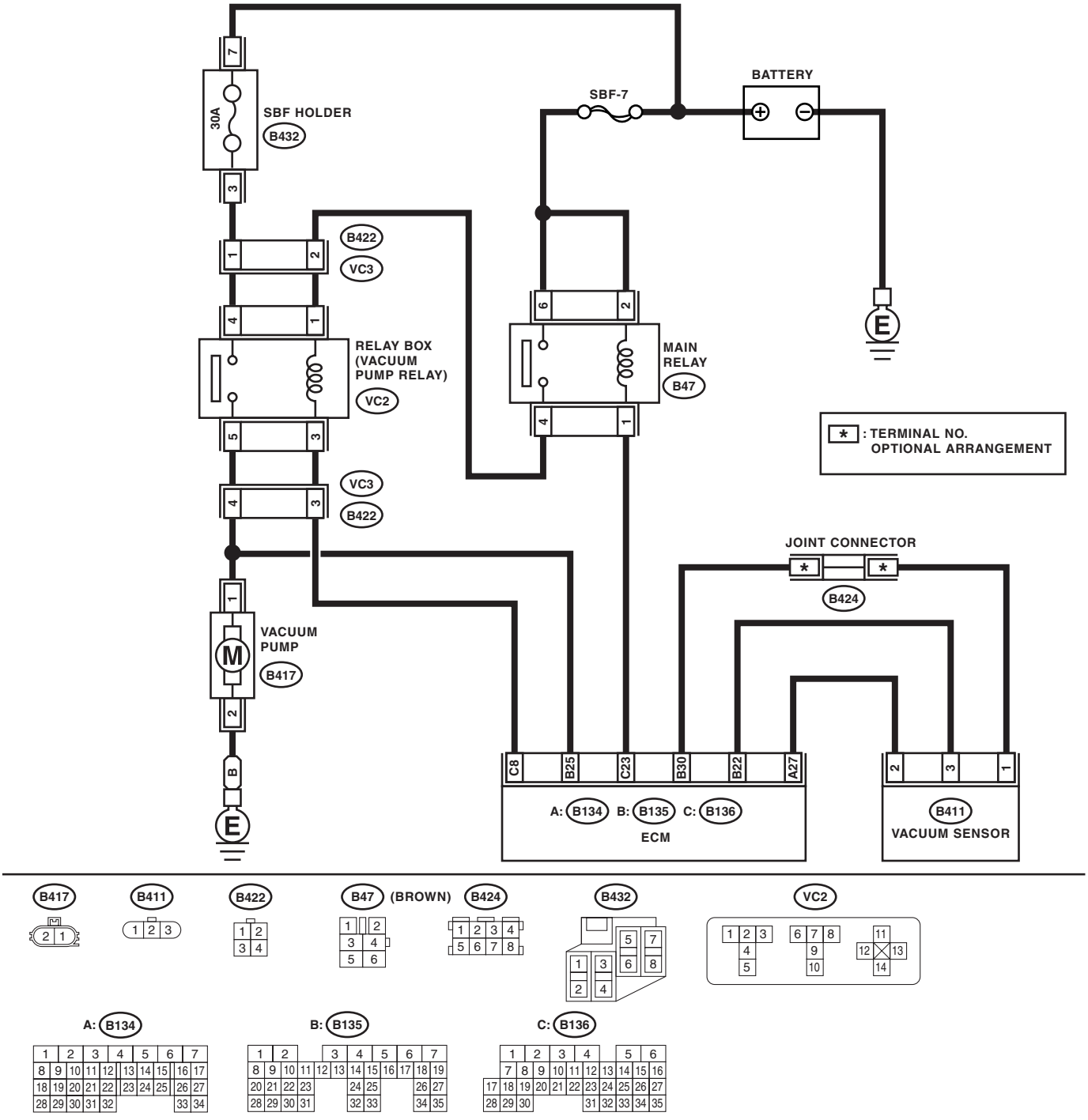
DTC DETECTING CONDITION:

Brake vacuum pump relay malfunction

TROUBLE SYMPTOM:

Vacuum pump does not operate properly.

WIRING DIAGRAM:



BR-00528

	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM PUMP RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump relay from the relay box. 3) Connect the battery to terminals No. 1 and No. 3 of the brake vacuum pump relay. 4) Measure the resistance between the brake vacuum pump relay terminals. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **2**.	Replace the brake vacuum pump relay.
2	**CHECK BRAKE VACUUM PUMP RELAY POWER SUPPLY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between brake vacuum pump relay connector and chassis ground. ***Connector & terminal*** ***(VC2) No. 1 (+) — Chassis ground (–):*** ***(VC2) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of ECM. 3) Measure the resistance of the harness between ECM and the brake vacuum pump relay connector. ***Connector & terminal*** ***(B136) No. 8 — (VC2) No. 3:*** ***(B135) No. 25 — (VC2) No. 5:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between ECM and the brake vacuum pump relay connector.
4	**CHECK HARNESS BETWEEN THE BRAKE VACUUM PUMP AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum pump connector. 3) Measure the resistance of the harness between the brake vacuum pump and brake vacuum pump relay connector. ***Connector & terminal*** ***(VC2) No. 5 — (B417) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of the harness between the brake vacuum pump and the brake vacuum pump relay connector.
5	**CHECK ECM.** 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) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 8 — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Temporary poor contact occurs.

F: DTC 23 PUMP CONTINUOUS OPERATION

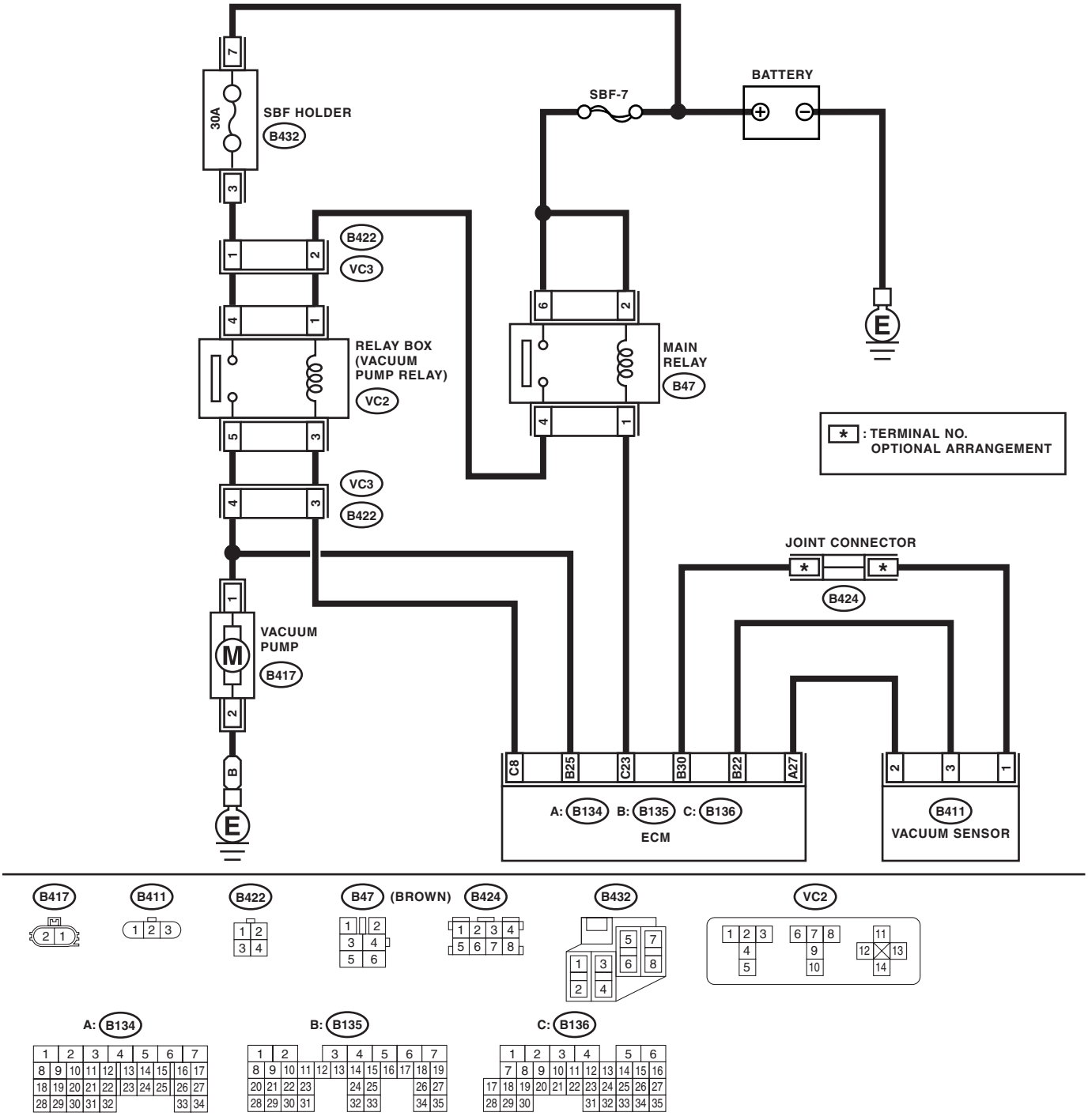
DTC DETECTING CONDITION:

Brake vacuum pump malfunction

TROUBLE SYMPTOM:

Break vacuum pump operates continuously.

WIRING DIAGRAM:



BR-00528

	Step	Check	Yes	No
1	**CHECK BRAKE VACUUM HOSE.** 1) Turn the ignition switch to OFF. 2) Check that status of the brake vacuum hose connection.	Is the brake vacuum hose connected firmly?	Go to step **2**.	Connect the brake vacuum hose.
2	**CHECK BRAKE VACUUM HOSE.** 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	**CHECK BRAKE VACUUM PUMP RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the brake vacuum pump relay from the relay box. 3) Connect the battery to terminals No. 1 and No. 3 of the brake vacuum pump relay. 4) Measure the resistance between the brake vacuum pump relay terminals. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **4**.	Replace the brake vacuum pump relay.
4	**CHECK BRAKE VACUUM PUMP RELAY POWER SUPPLY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between brake vacuum pump relay connector and chassis ground. ***Connector & terminal*** ***(VC2) No. 1 (+) — Chassis ground (–):*** ***(VC2) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5**.	Repair the open or ground short circuit of power supply circuit.
5	**CHECK HARNESS BETWEEN ECM AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of ECM. 3) Measure the resistance of the harness between ECM and the brake vacuum pump relay connector. ***Connector & terminal*** ***(B136) No. 8 — (VC2) No. 3:*** ***(B135) No. 25 — (VC2) No. 5:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between ECM and the brake vacuum pump relay connector.
6	**CHECK HARNESS BETWEEN THE BRAKE VACUUM PUMP AND BRAKE VACUUM PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the brake vacuum pump connector. 3) Measure the resistance of the harness between the brake vacuum pump and brake vacuum pump relay connector. ***Connector & terminal*** ***(VC2) No. 5 — (B417) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of the harness between the brake vacuum pump and the brake vacuum pump relay connector.
7	**CHECK ECM.** 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) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 8 — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Temporary poor contact occurs.

12.General Diagnostic Table

A: INSPECTION

Symptom		Main probable cause	Other probable cause
Poor brake performance	Long braking/ stopping distance	• Brake pad • Aeration to brake line • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Master cylinder • Brake caliper • Disc rotor • Brake pipe • Brake booster
	Long brake pedal stroke	• Aeration to brake line • Brake pedal play	• Master cylinder • Brake caliper • Brake pad • Brake pipe • Brake booster
	Short brake pedal stroke	• Brake vacuum pump • Brake vacuum sensor • Brake vacuum hose	• Master cylinder • Brake caliper • Brake pad • Brake pipe • Brake booster

1. General Description

A: SPECIFICATION

1. REAR DIFFERENTIAL

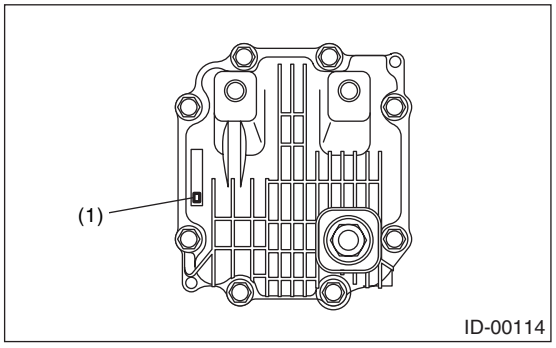
When replacing a rear differential assembly, select the correct one according to the following table.

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	XX
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 label positions are shown in the following figures. For details concerning identification, refer to the “ID” section.

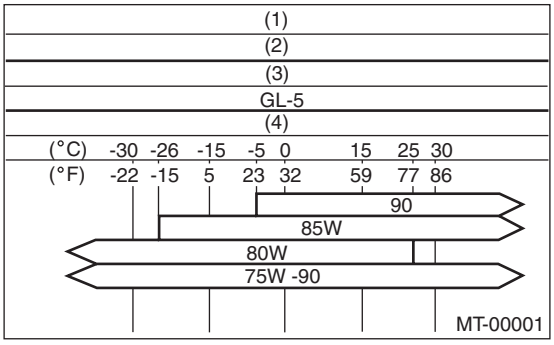


(1) Identification

3. REAR DIFFERENTIAL GEAR OIL

Recommended gear oil:
GL–5 (75W–90)

NOTE:
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

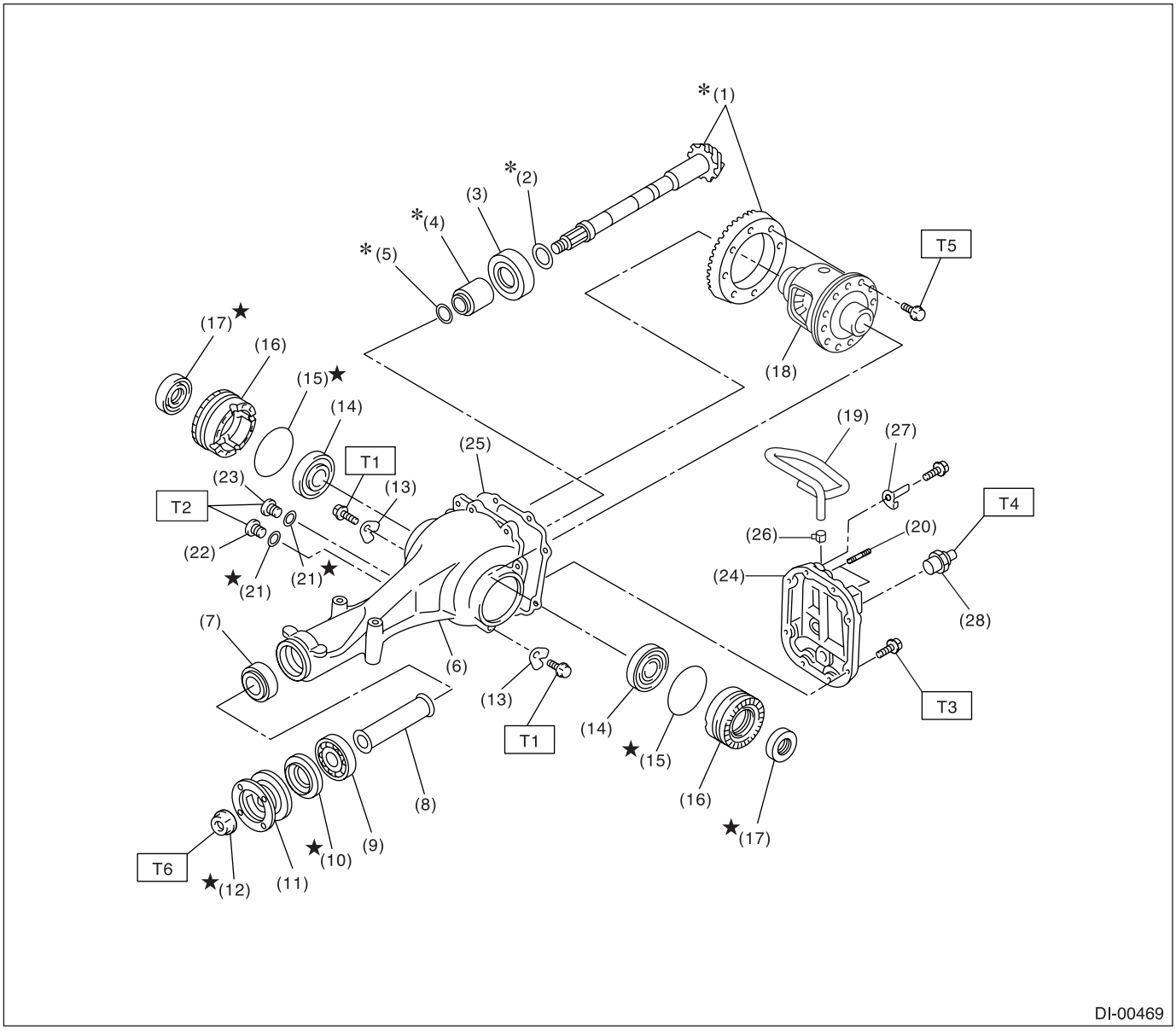
Drive pinion bearing preload	Measure with spring measurement. (Measured from the companion flange bolt) N (kgf, lb)	12.7 — 32.2 (1.3 — 3.28, 2.9 — 7.24)
	Measure with torque wrench N·m (kgf–m, ft–lb)	0.48 — 1.22 (0.045 — 0.124, 0.32 — 0.9)
Hypoid driven gear to drive pinion backlash	mm (in)	0.10 — 0.15 (0.0039 — 0.0059)

5. ADJUSTING PARTS

Drive pinion bearing preload	Measure with spring measurement. (Measured from the companion flange bolt) N (kgf, lb)	12.7 — 32.2 (1.3 — 3.28, 2.9 — 7.24)
	Measure with torque wrench N·m (kgf–m, ft–lb)	0.48 — 1.22 (0.045 — 0.124, 0.32 — 0.9)
Preload adjusting collar	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 (0.0039 — 0.0059)

B: COMPONENT

1. REAR DIFFERENTIAL (VA2-TYPE)

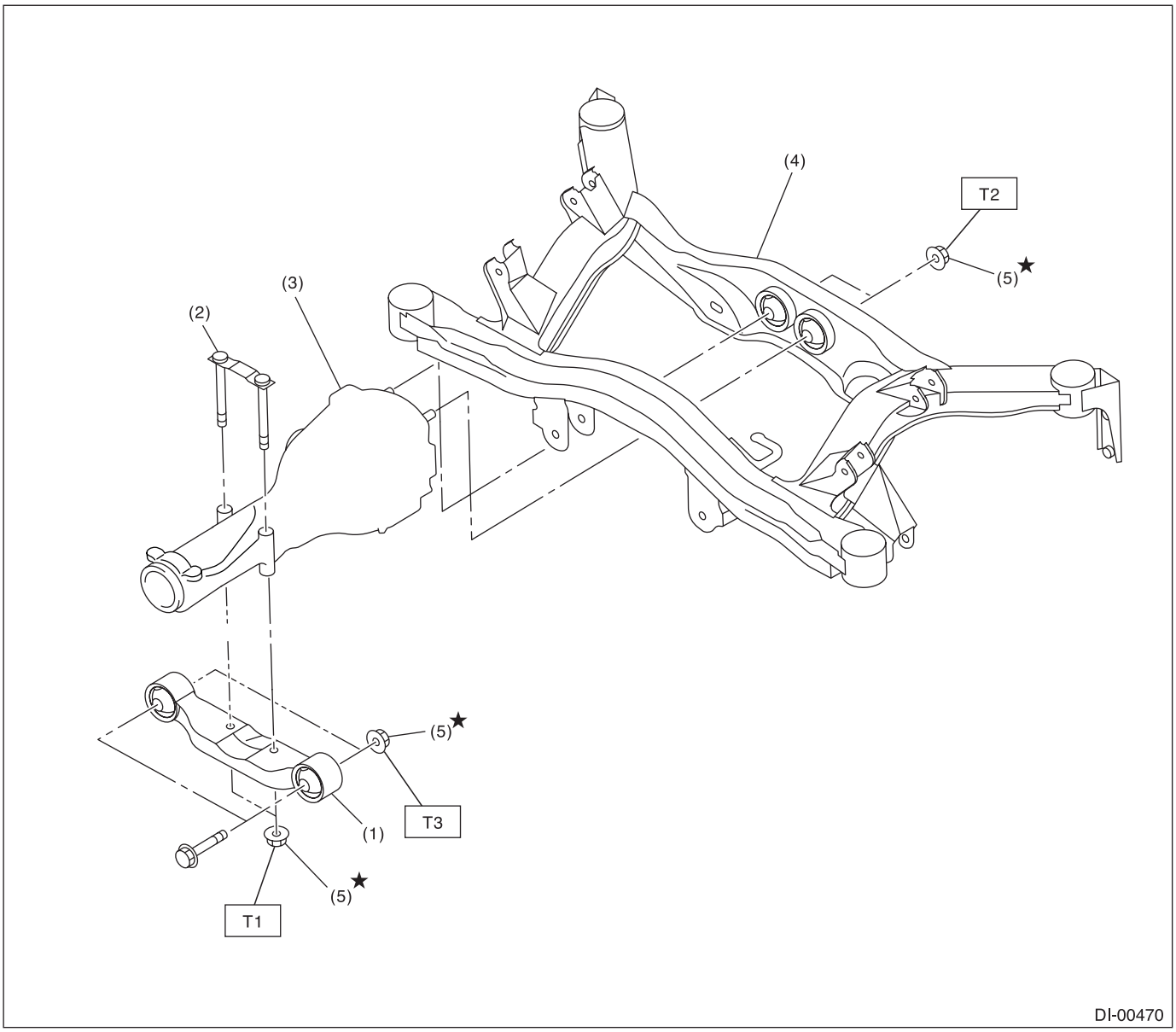


DI-00469

(1) Hypoid driven gear and drive pinion set
(2) Pinion height adjusting washer
(3) Rear bearing
(4) Bearing preload adjusting collar
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Collar
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self–locking nut
(13) Lock plate
(14) Side bearing
(15) O–ring
(16) Axle shaft holder
(17) Side oil seal
(18) Differential case ASSY
(19) Air breather hose
(20) Stud bolt
(21) Gasket
(22) Oil filler plug
(23) Oil drain plug
(24) Rear cover
(25) Gasket
(26) Clip
(27) Stay ground
(28) Rear differential oil temperature switch

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*25 (2.5, 18.1)*
T2:	*29 (3.0, 21.4)*
T3:	*34 (3.5, 25.3)*
T4:	*60 (6.1, 44.3)*
T5:	*62 (6.3, 45.6)*
T6:	*191 (19.5, 141)*

2. REAR DIFFERENTIAL MOUNTING SYSTEM



(1) Rear differential front member
(2) Rear differential member plate
(3) Rear differential ASSY
(4) Sub Frame
(5) Self–locking nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 65 (6.6, 48)
T2: 70 (7.1, 51)
T3: 110 (11.2, 81)

C: CAUTION

- Wear work clothing, including a cap, protective goggles and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Be careful not to burn yourself, because each part on the vehicle is hot after running.
- Use SUBARU genuine grease etc. or equivalent. Do not mix gear oil, grease, etc. with those of different grades or from other 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 revolution 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

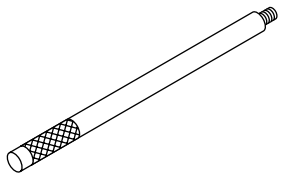
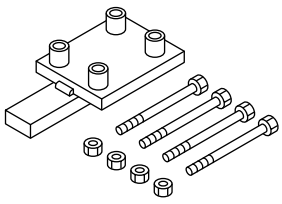
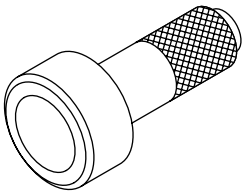
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398477701	398477701	HANDLE	Used for installing the front and rear bearing cones.
 ST-398217700	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.
 ST-498447120	498447120	INSTALLER	Used for installing the front oil seal.

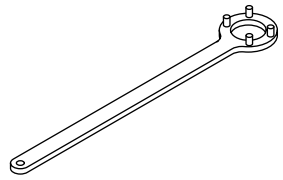
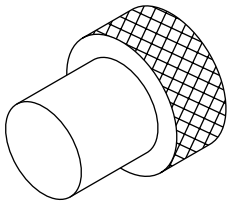
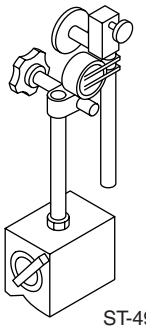
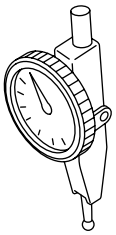
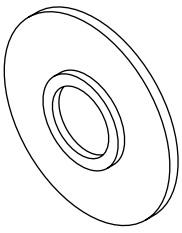
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498427200	498427200	FLANGE WRENCH	Used for stopping rotation of companion flange when removing and tightening self-lock nut.
 ST-399780104	399780104	WEIGHT	Used for installing the front bearing cone and the pilot bearing companion flange.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with MAGNET BASE (498247001).
 ST-398177700	398177700	INSTALLER	Used for installing the rear bearing cone.

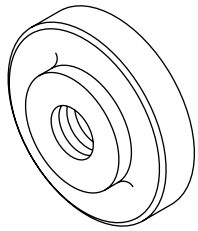
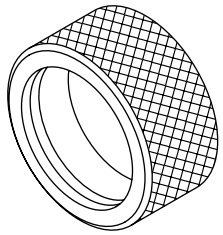
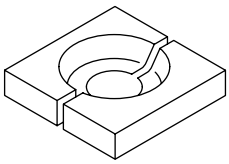
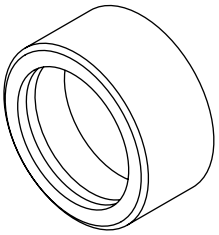
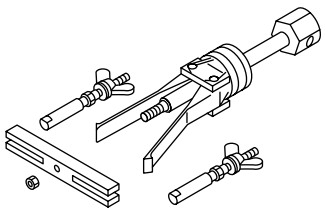
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398477703	398477703	DRIFT 2	Used for press-fitting bearing race (rear) of differential carrier.
 ST-398437700	398437700	DRIFT	Used for installing the side oil seal.
 ST-398517700	398517700	REPLACER	Used for removing rear bearing cone.
 ST-398487700	398487700	DRIFT	Used for press-fitting side bearing cone.
 ST-398527700	398527700	PULLER ASSY	Used for removing front oil seal.

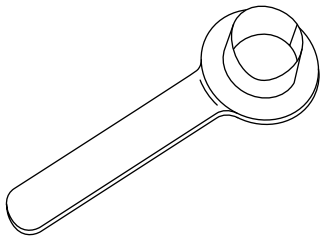
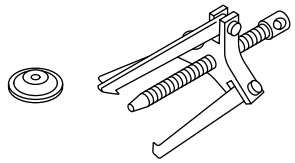
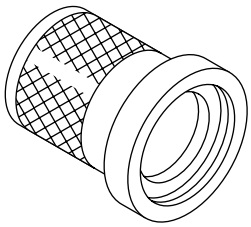
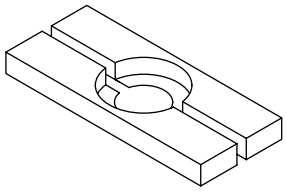
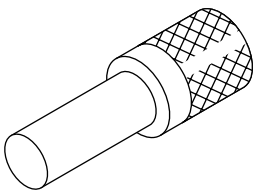
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	• Used for installing the rear drive shaft to the rear differential. • For oil seal protection
 ST-399703600	399703600	PULLER ASSY	Used for removing companion flange.
 ST-899874100	899874100	INSTALLER	Used for installing the companion flange.
 ST-498077000	498077000	REMOVER	Used for removing the differential side bearing cone.
 ST-899864100	899864100	REMOVER	Used for removing the differential side bearing.

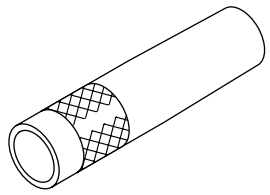
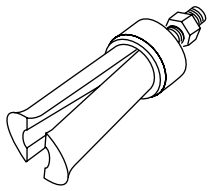
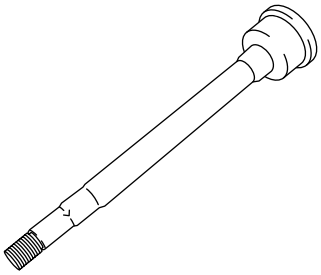
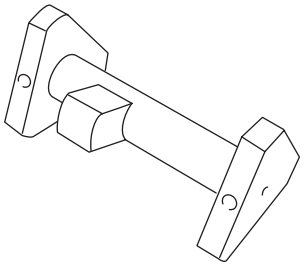
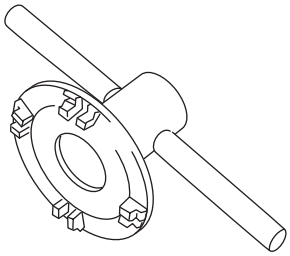
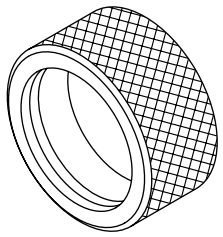
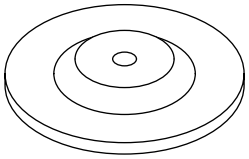
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499277200	499277200	INSTALLER	Used for installing the front bearing cone.
 ST18758AA000	18758AA000	PULLER	Used for removing side bearing cup.
 ST18678AA000	18678AA000	DUMMY SHAFT	Used for adjusting pinion height and preload.
 ST18831AA010	18831AA010	DIFFERENTIAL CARRIER GAUGE	Used for adjusting pinion height.
 ST18630AA010	18630AA010	WRENCH ASSY	Used for removing and installing the side oil seal holder.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498447100	498447100	INSTALLER	Used for installing the oil seal.
 ST-399520105	399520105	SEATS	• Used for removing the side bearing cone. • Used with PULLER SET (899524100).

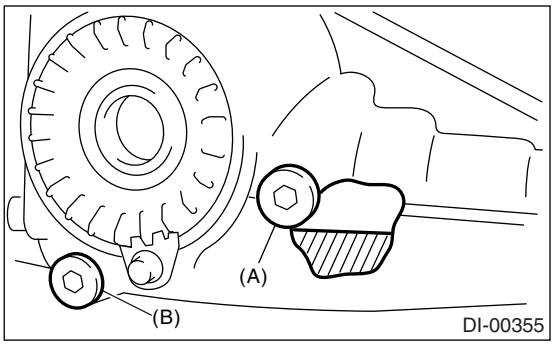
2. GENERAL TOOL

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 then check the gear oil. Replace the gear oil if it is contaminated or deteriorated. <Ref. to DI-12, REPLACEMENT, Differential Gear Oil.>
2) Check that the gear oil level is up to the bottom of the filler plug hole. If the level is low, refill up to the bottom of filler plug.

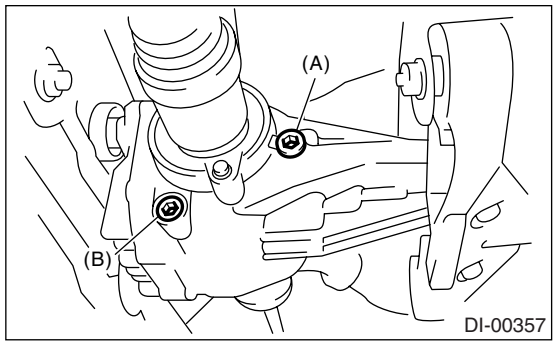


(A) Filler plug
(B) Drain plug

B: REPLACEMENT

1) Jack–up the vehicle and support it with rigid racks.
2) Remove the oil drain plug and filler plug, and drain the gear oil.

CAUTION:
Be careful not to burn your hands, because gear oil becomes extremely hot after running.



(A) Filler plug
(B) Drain plug

3) Tighten the oil drain plug.

NOTE:
Use a new metal gasket.

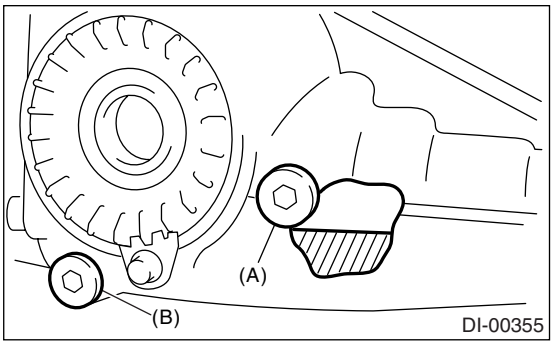
Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)

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) Drain plug

5) Install the filler plug.

NOTE:
Use a new metal gasket.

Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)

3. Front Differential Assembly

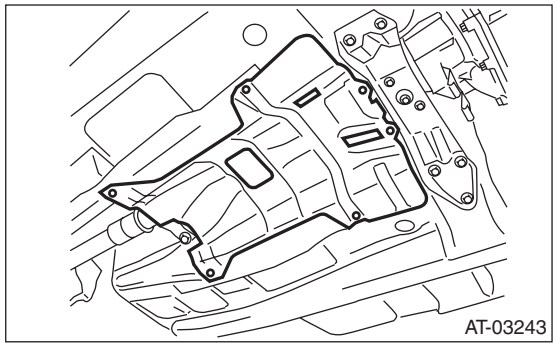
A: NOTE

Regarding the front differential, refer to the “5AT” section. <Ref. to 5AT-86, Front Differential Assembly.>

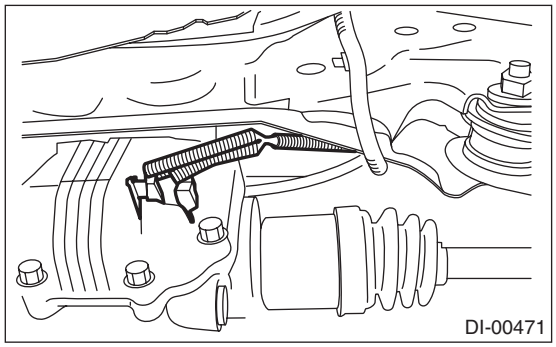
4. Rear Differential (VA–type)

A: REMOVAL

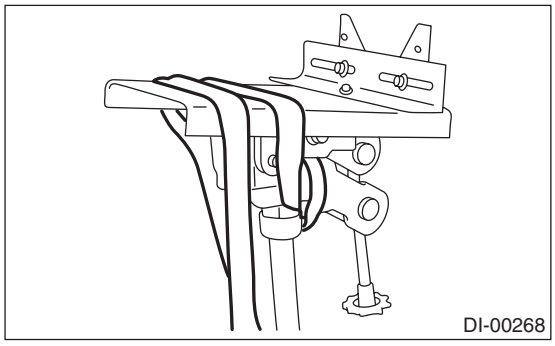
1) Disconnect the ground cable from the battery.
2) Release the parking brake.
3) Jack-up the vehicle.
4) Remove the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-6, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Muffler.>
5) Remove the heat shield cover.



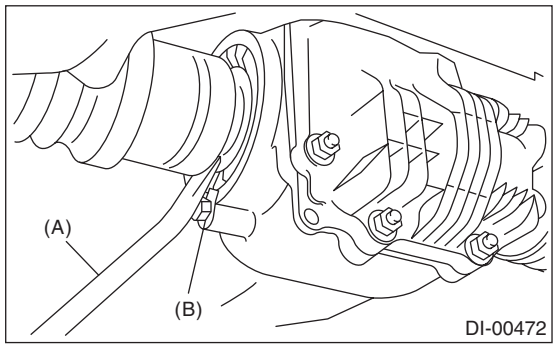
6) Remove the propeller shaft.
<Ref. to DS-10, REMOVAL, Propeller Shaft.>
7) Remove the connector from the rear differential oil temperature switch.



8) Prepare the transmission jack and band.

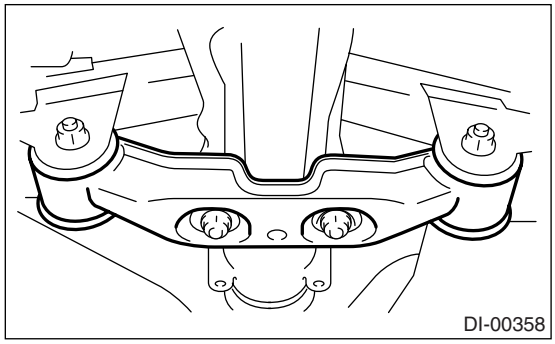


9) Remove the DOJ of rear drive shaft from rear differential.

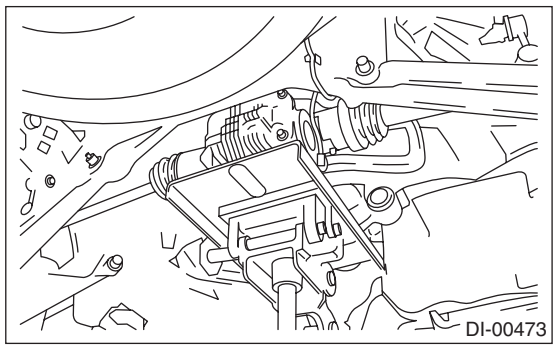


(A) Tire lever
(B) Bolt

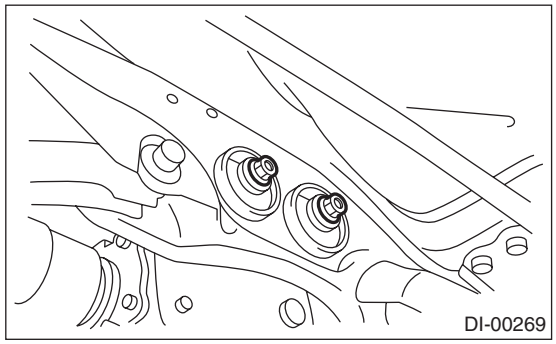
10) Remove the nuts which hold the rear differential front member.



11) Support the rear differential with the transmission jack.

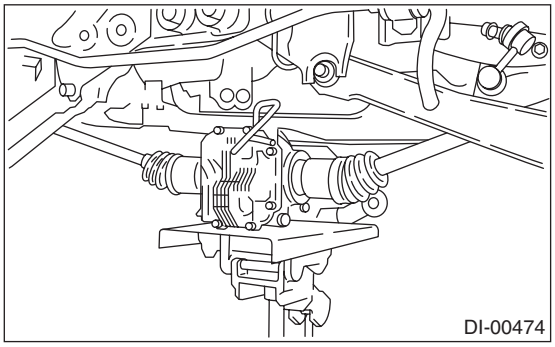


12) Loosen the self-lock nuts which hold the rear differential to rear crossmember.



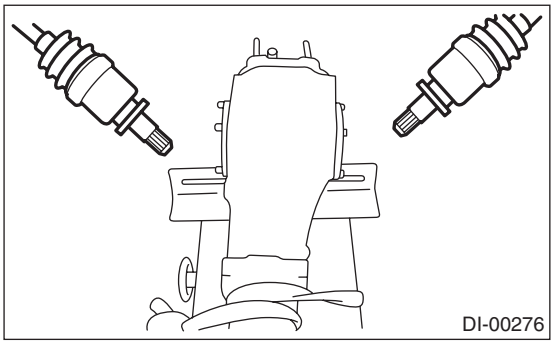
13) Remove the rear differential front member.
14) Secure the rear differential using band.
15) Remove the self-lock nuts which hold the rear differential to rear crossmember.
16) Remove the air breather hose from the sub frame.
17) Remove the rear differential stud bolt from rear crossmember bushing.

NOTE:
When removing the stud bolt, carefully adjust the angle and location of transmission jack and jack stand, if necessary

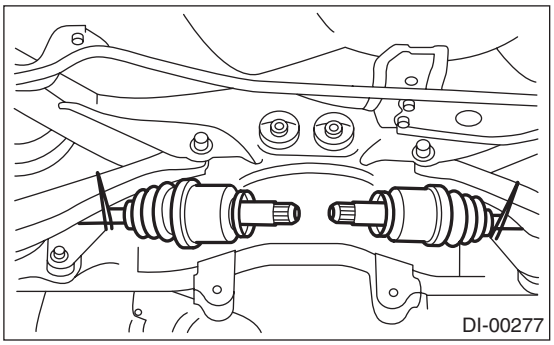


18) Pull out the axle shaft from rear differential.

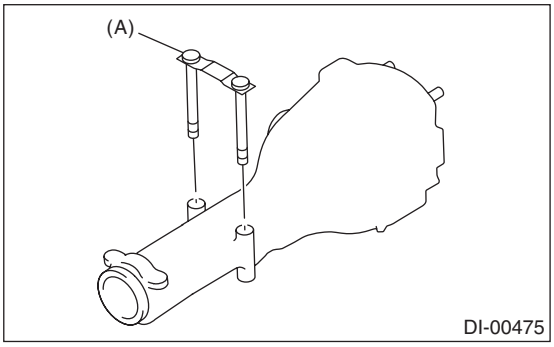
NOTE:
If it is difficult to remove the axle shaft from rear differential, remove it using tire lever.



19) Lower the transmission jack.
20) Secure the rear drive shaft to lateral link using wire.



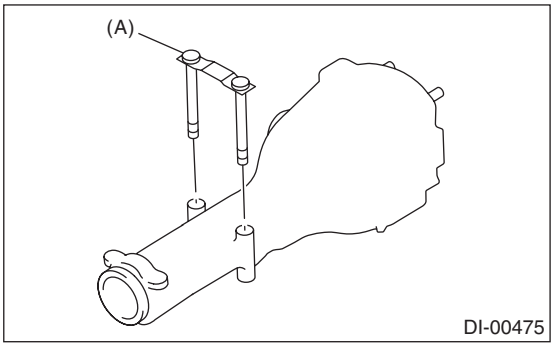
21) Remove the rear differential member plate from rear differential.



(A) Rear differential member plate

B: INSTALLATION

1) Insert the rear differential member plate into rear differential.

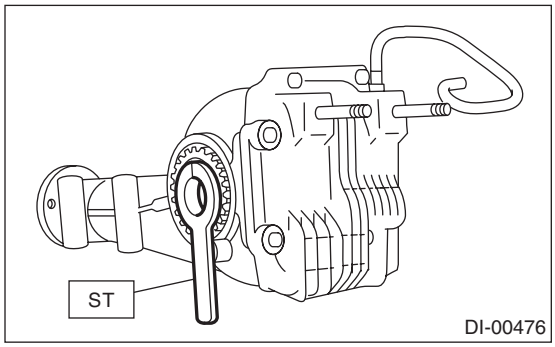


(A) Rear differential member plate

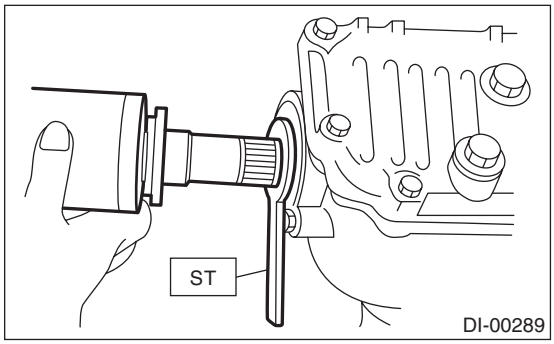
2) Set the rear differential to transmission jack.

NOTE:
Secure the rear differential to transmission jack using band.

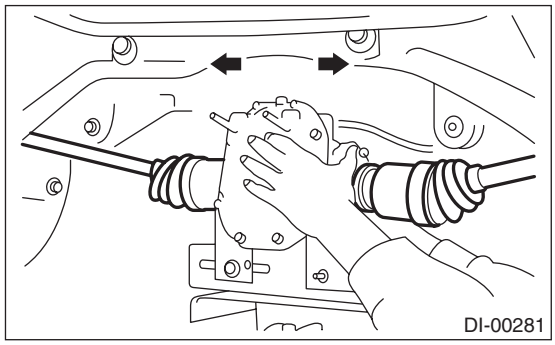
3) Install the ST to rear differential.
ST 28099PA090 OIL SEAL PROTECTOR



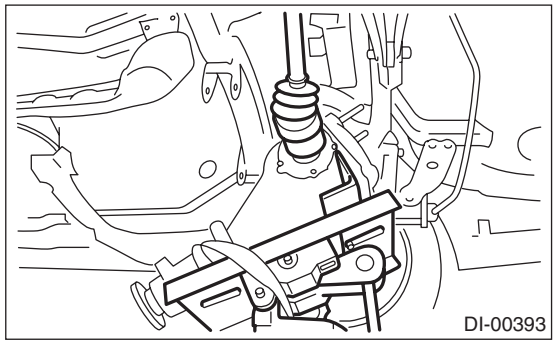
4) Insert the spline shaft until the spline portion comes inside the side oil seal.
ST 28099PA090 OIL SEAL PROTECTOR



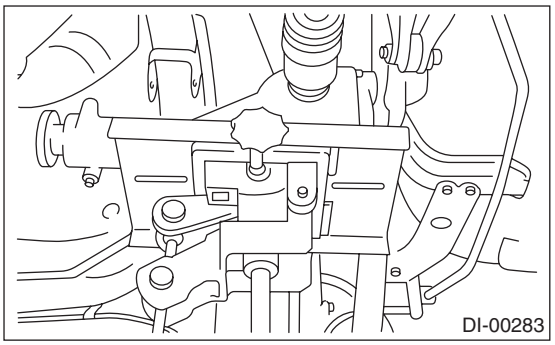
5) Remove ST from rear differential.
ST 28099PA090 OIL SEAL PROTECTOR
6) Push the rear differential to insert the axle shaft into rear differential.



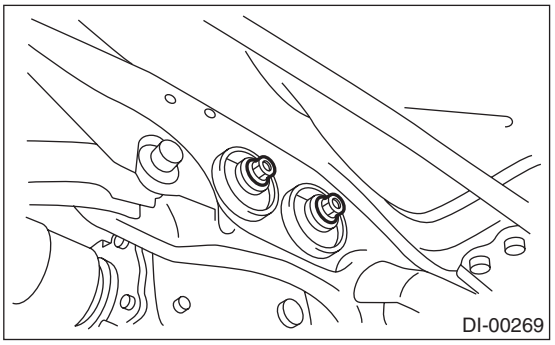
7) Adjust the transmission jack, if necessary, and insert the rear differential stud bolt into rear crossmember bushing properly.



8) After inserting the rear differential stud bolt into the rear crossmember bushing, lift up the transmission jack and align the rear differential to the its attachment position.

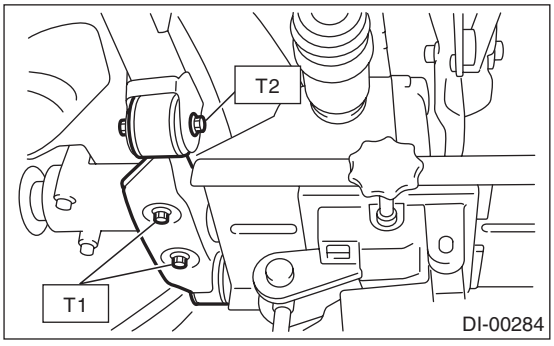


9) Tighten a new self-locking nut temporarily to rear crossmember.



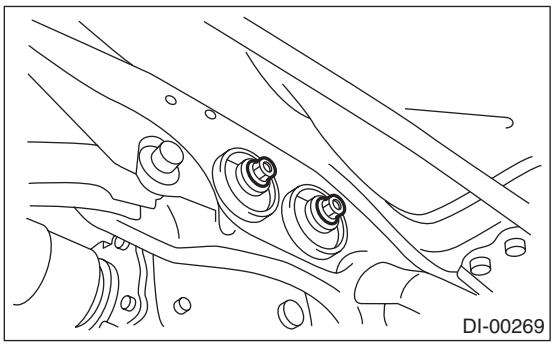
10) Remove the band from rear differential. Lift up the rear differential until the rear differential is separated from the transmission jack.
11) Install the rear differential front member with a new self-locking nut.

Tightening torque:
T1: 65 N·m (6.6 kgf-m, 48 ft-lb)
T2: 110 N·m (11.2 kgf-m, 81 ft-lb)



12) Tighten the self-locking nut.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)

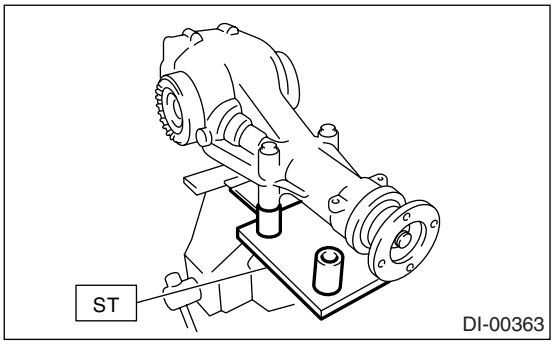


13) Lower the transmission jack.
14) Install the air breather hose to the sub frame.
15) Install the propeller shaft.
<Ref. to DS-11, INSTALLATION, Propeller Shaft.>
16) Install the heat shield cover.
17) Install the rear exhaust pipe and muffler.

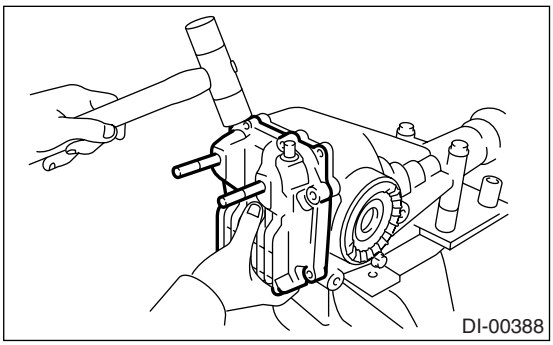
C: DISASSEMBLY

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

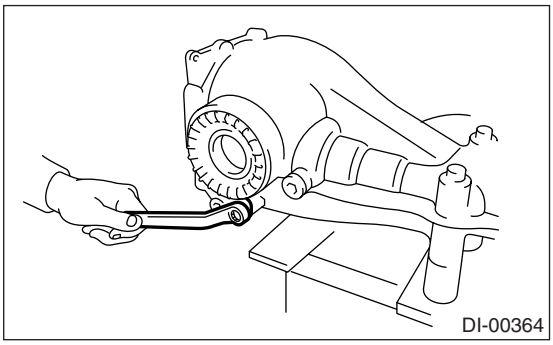
1) Remove the air breather hose.
2) Set the ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT SET



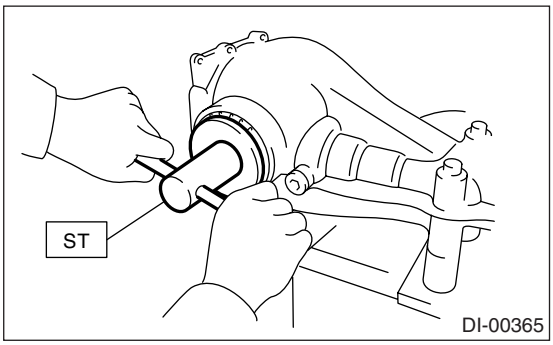
3) Drain the gear oil by removing the plug.
4) Remove the rear differential oil temperature switch.
5) Remove the rear cover by loosening retaining bolts.



6) Remove the lock plate RH and LH.

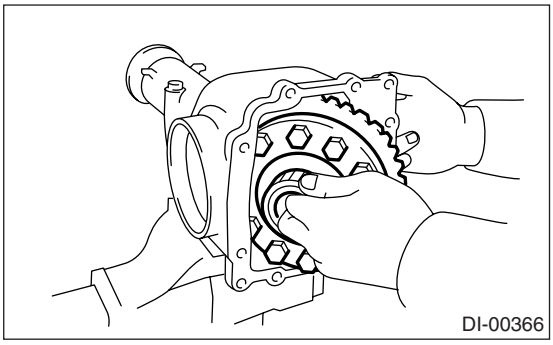


7) Remove the holder RH and LH with ST.
ST 18630AA010 WRENCH ASSY



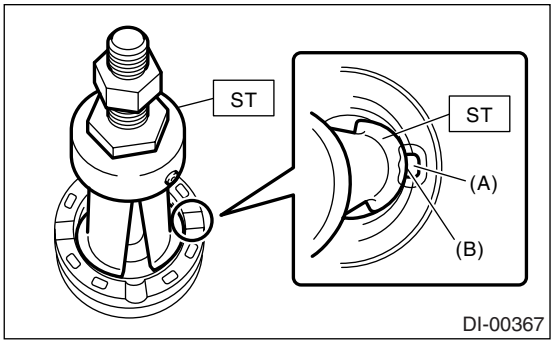
8) Pull out the differential case assembly from differential carrier.

NOTE:
Be careful so that the teeth do not to hit against the case.

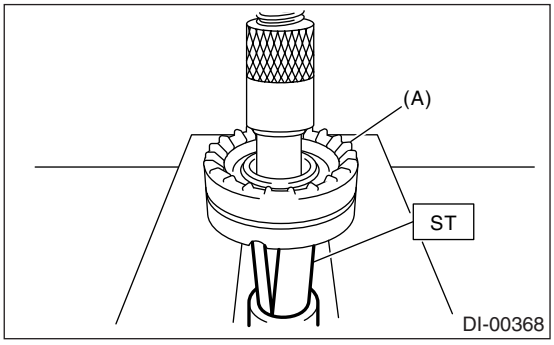


9) Remove the bearing race from holder RH and LH with ST and press.
ST 18758AA000 PULLER

NOTE:
• Make sure the bolt of puller turn manually.
• Set the puller so that its claws catch the groove of holder.



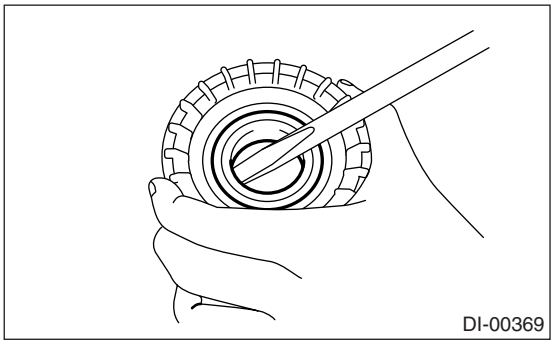
(A) Groove
(B) Claw



(A) Holder

10) Remove the oil seal from holder RH and LH using screwdriver.

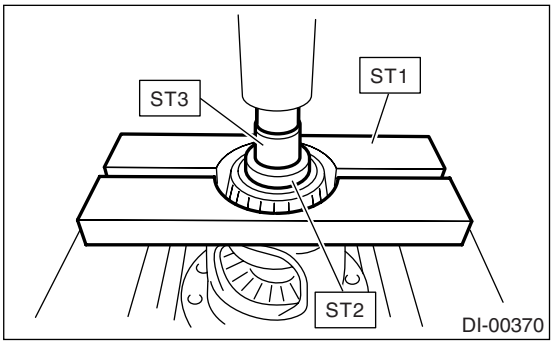
NOTE:
Perform this operation only when changing oil seal.



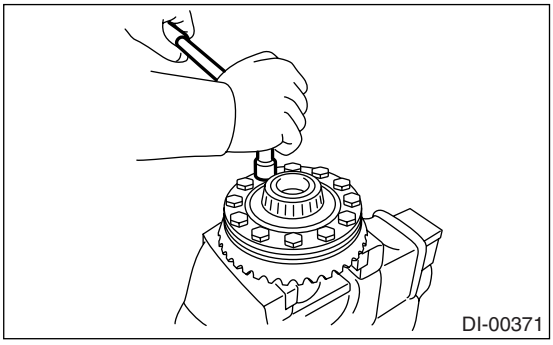
11) Extract the bearing cone with ST1, ST2 and ST3

NOTE:
• Do not attempt to disassemble the parts unless necessary.
• Never mix up the RH and LH bearing races and cones.

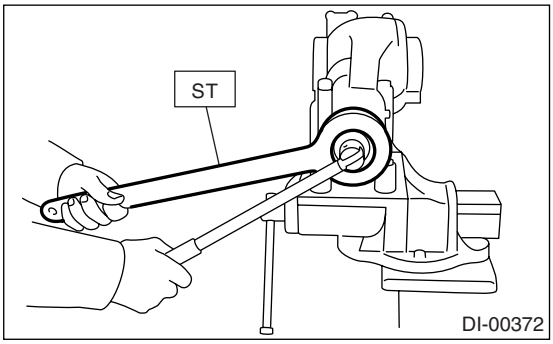
ST1 498077000 REMOVER
ST2 399520105 SEATS
ST3 899864100 REMOVER



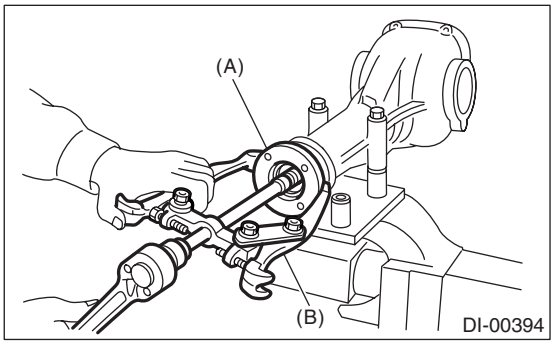
12) Remove the hypoid driven gear by loosening hypoid driven gear bolts.



13) Remove the self-locking nut while holding the companion flange with ST.
ST 498427200 FLANGE WRENCH



14) Extract the companion flange with a puller.

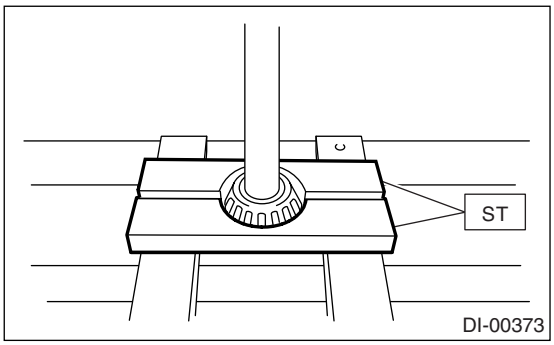


(A) Companion flange
(B) Puller

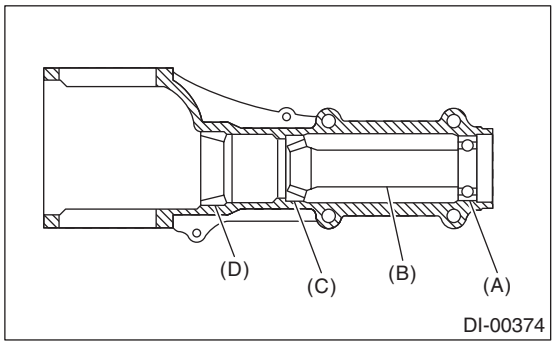
15) Removes the drive pinion shaft.
16) Remove the rear bearing cone from drive pinion by supporting the cone with ST.

NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.

ST 398517700 REPLACER

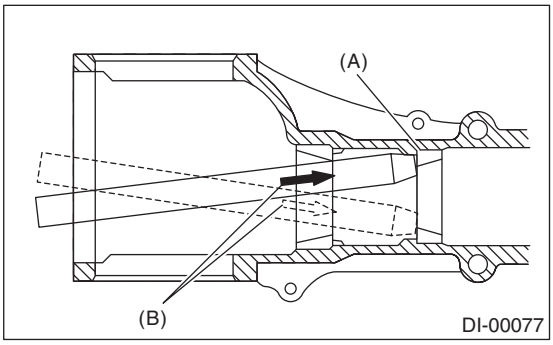


17) Remove the front oil seal from differential carrier using screwdriver.
18) Remove the pilot bearing, front bearing cone and collar.



(A) Pilot bearing
(B) Collar
(C) Front bearing
(D) Rear bearing cup

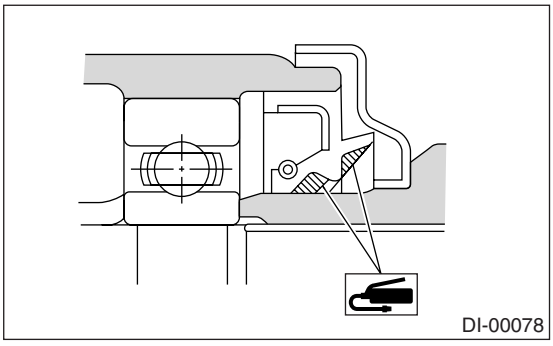
19) When replacing the bearings, hit out the front bearing cup and rear bearing cup in this order out of case using a brass bar.



(A) 2 cutout portions along diagonal lines
(B) Tap alternately with brass bar.

D: ASSEMBLY

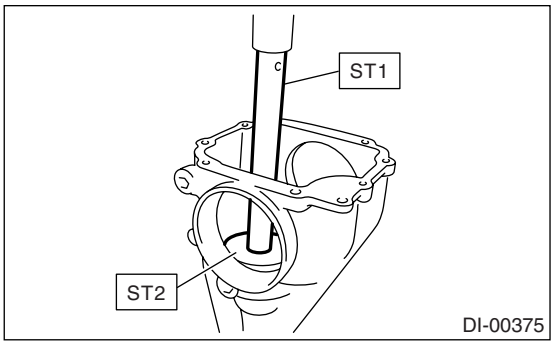
NOTE:
- Assemble in the reverse order of disassembly.
- Check and adjust each part during assembly.
- Use a new gasket.
- Keep the shims and washers in order, so that they are not improperly installed.
- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- Apply 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 with a new one at every disassembly. Apply grease 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
Adjust the bearing preload between front and rear bearings with collar and washer. Pinion height adjusting washer is not affected by this adjustment. The adjustment must not be carried out with oil seal inserted.

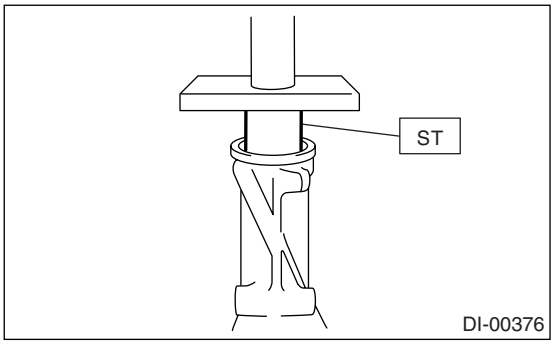
(1) Install the rear bearing race into the differential carrier using ST1 and ST2.

ST1 398477701 HANDLE
ST2 398477703 DRIFT 2



(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.

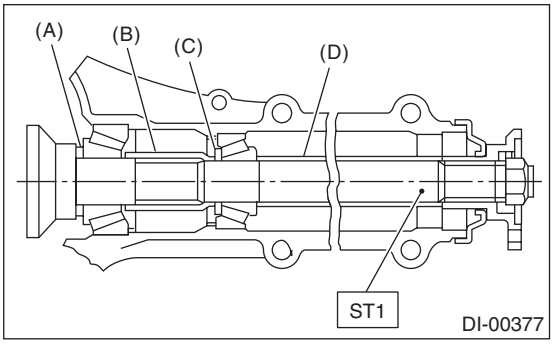
NOTE:
If tooth contact (drive pinion, hypoid driven gear) is normal in the inspection before disassembling, verify that the washer is not deformed, and then re-use the used washer.

(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 collar & washer, front bearing cone, collar, companion flange, and washer & self-locking nut.

ST1 18678AA000 DUMMY SHAFT



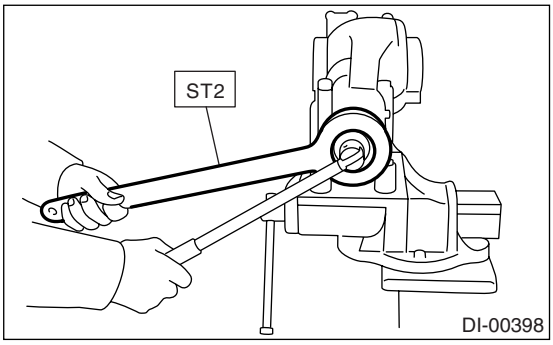
(A) Pinion height adjusting washer
(B) Preload adjusting collar
(C) Preload adjusting washer
(D) Collar

(7) Turn ST1 by hand to seat the bearing, and measure the initial load and initial torque with a spring scale while tightening the selflocking nut. Select the preload adjusting washer and collar so that the specified preload is obtained when nut is tightened to the specified torque.

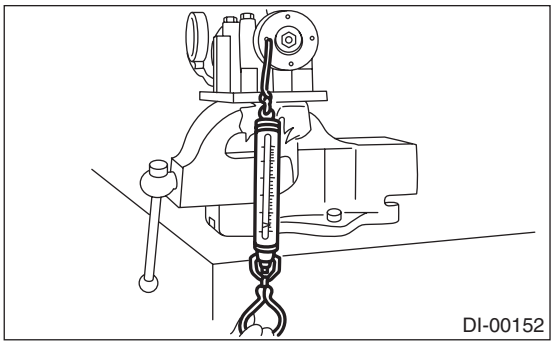
NOTE:
- Use a new self-locking nut.
- Be careful not to give excessive preload.
- When tightening the self-locking nut, lock companion flange with ST2 as shown in the figure.
- Measure the preload in direction of tangent to the flange.

ST1 18678AA000 DUMMY SHAFT
ST2 498427200 FLANGE WRENCH

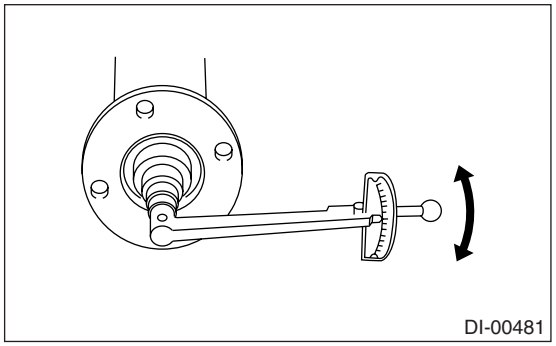
Tightening torque:
191 N·m (19.5 kgf-m, 141 ft-lb)



Initial load:
12.7—32.2 N (1.3—3.28 kgf, 2.9—7.24 lb)



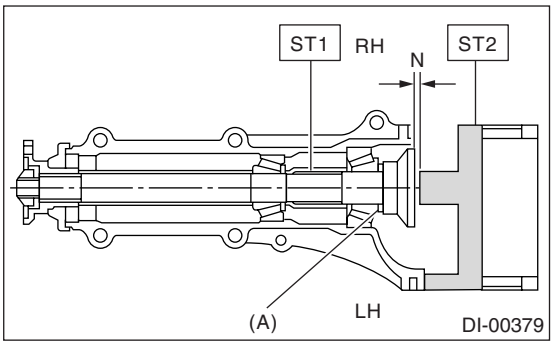
Initial torque:
0.48 — 1.22 N·m (0.045—0.124 kgf-m, 0.32—0.9 ft-lb)



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)

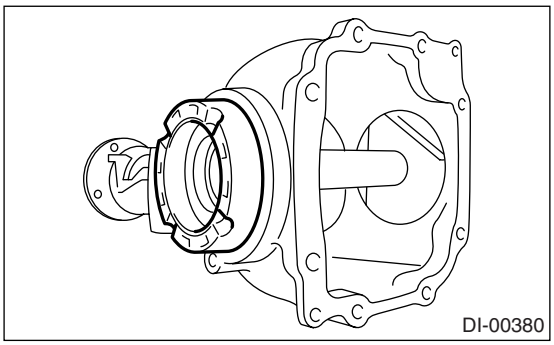
Preload adjusting collar	
Part No.	Length mm (in)
31454AA250	51.05 (2.010)
31454AA260	51.25 (2.018)
31454AA270	51.35 (2.022)
31454AA280	51.45 (2.026)
31454AA290	51.55 (2.030)
31454AA300	51.65 (2.033)
31454AA310	51.75 (2.037)
31454AA320	51.85 (2.041)
31454AA330	52.05 (2.049)

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) Install the ST2.
ST1 18678AA000 DUMMY SHAFT
ST2 18831AA010 DIFFERENTIAL CARRIER GAUGE



(A) Pinion height adjusting washer

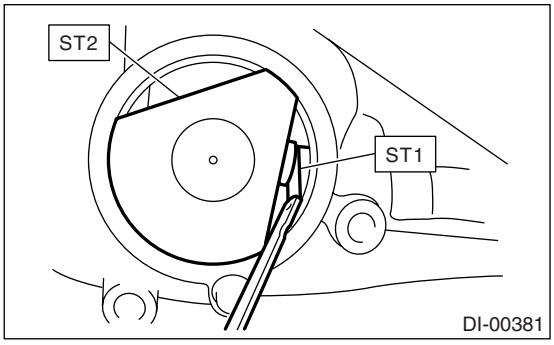
(2) Install the side holder LH to the left side of the differential carrier in reverse direction.



(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



(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.

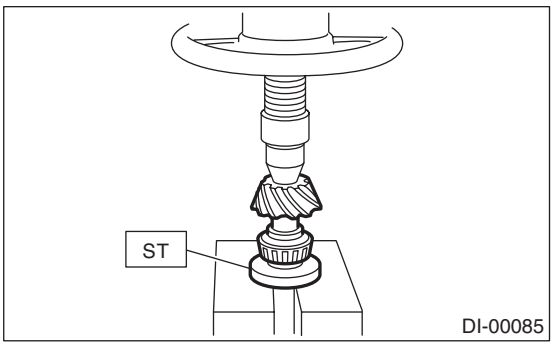
NOTE:
Adjust it using the 0 — 3 washers.
T = To + N – 0.05 mm (0.0020 in)

T	Thickness of pinion height adjusting washer mm (in)	
To	Thickness of washer temporally inserted mm (in)	
N	Clearance of thickness gauge mm (in)	
Memo:		

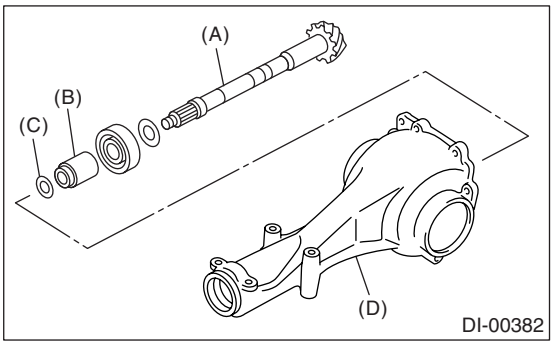
(Example of calculation)
To = 0.15 mm (0.0020 in)
N = 0.1 mm (0.0039 in)
T = 0.15 mm (0.0020 in) + 0.1 mm (0.0039 in) – 0.05 mm (0.0020 in) = 0.2 mm (0.0079 in)
Result: Thickness = 0.2 mm (0.0079 in)
Therefore use part number 32295AA370.

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

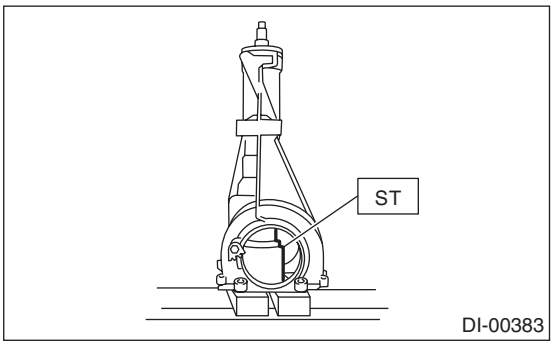


4) Insert the drive pinion into the differential carrier, and install the preselected bearing preload adjusting collar and washer.



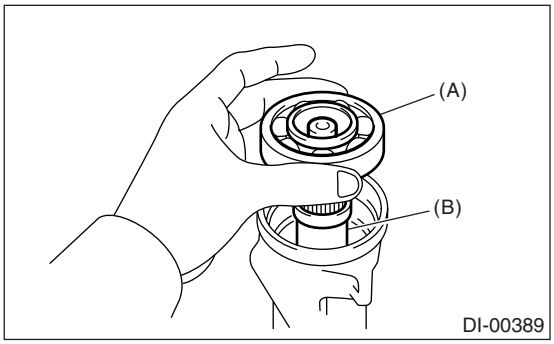
(A) Drive pinion
(B) Bearing preload adjusting collar
(C) Bearing preload adjusting washer
(D) Differential carrier

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 collar, then install the pilot bearing.

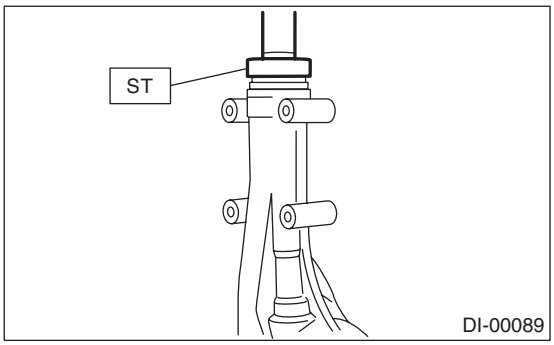


(A) Pilot bearing
(B) Collar

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 grease to the oil seal lips.

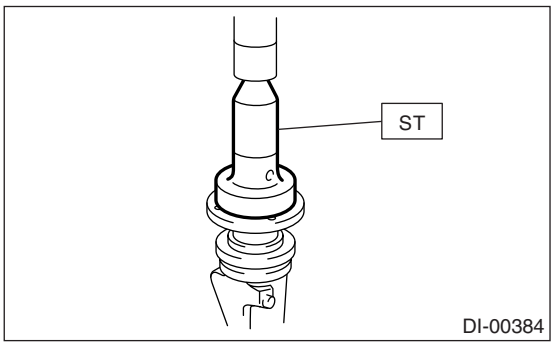
ST 499277200 INSTALLER



8) Press-fit the companion flange with ST.

NOTE:
Be careful not to damage the bearing.

ST 899874100 INSTALLER

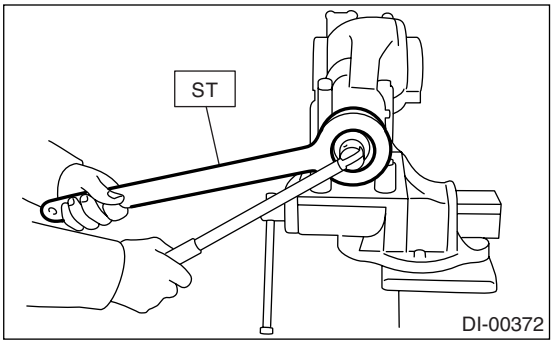


9) Apply Lock-Tite to the drive pinion shaft screw threads and on the new nut seat.

Lock Tite:
THREE BOND 1324 (Part No. 004403042)

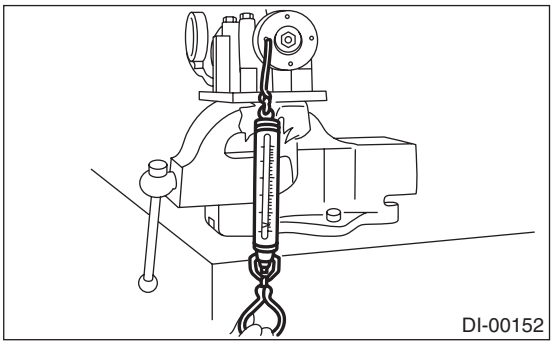
10) Attach the nut and use the ST to fix the companion flange in place, then tighten.
ST 498427200 FLANGE WRENCH

Tightening torque:
191 N·m (19.5 kgf-m, 141 ft-lb)

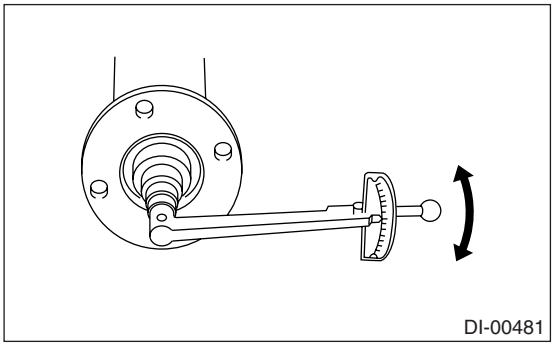


11) Measure the initial torque and initial load.

Initial load:
12.7—32.2 N (1.3—3.28 kgf, 2.9—7.24 lb)



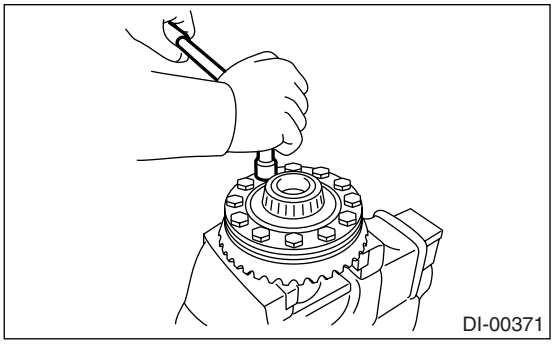
Initial torque:
0.48 — 1.22 N·m (0.045—0.124 kgf-m, 0.32—0.9 ft-lb)



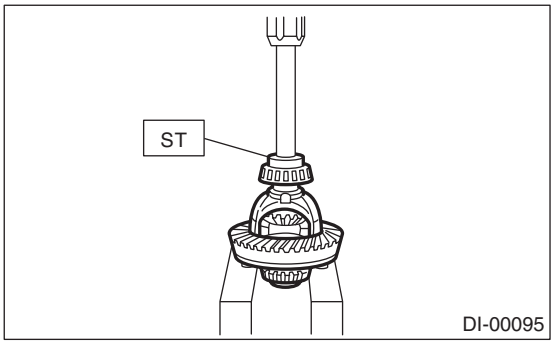
12) Install the hypoid driven gear to differential case.

NOTE:
- Tighten diagonally while tapping the bolt heads.
- 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.

Tightening torque:
62 N·m (6.3 kgf-m, 45.6 ft-lb)

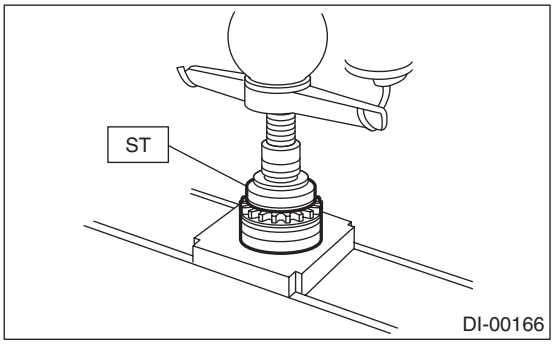

DI-00371

13) Press the side bearing into differential case using ST.
ST 398487700 DRIFT



DI-00095

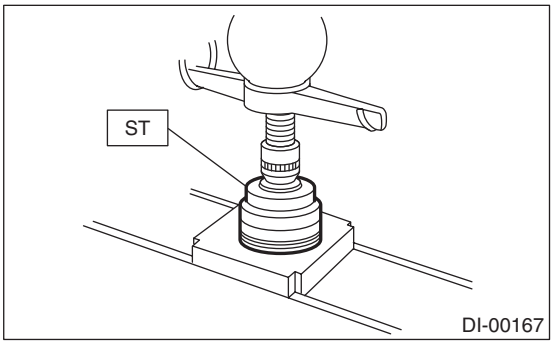
14) Assemble holders.
(1) Install the new oil seal into holder RH and LH.
ST 498447100 INSTALLER



DI-00166

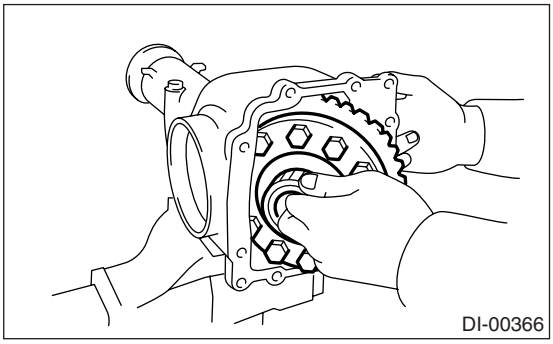
(2) Install the bearing race into holder RH and LH.
ST 398177700 INSTALLER

CAUTION:
Make sure that the RH and LH oil seals, bearing outer races and cones are properly assembled.



DI-00167

(3) Install the differential assembly into differential carrier in the reverse order of disassembly.

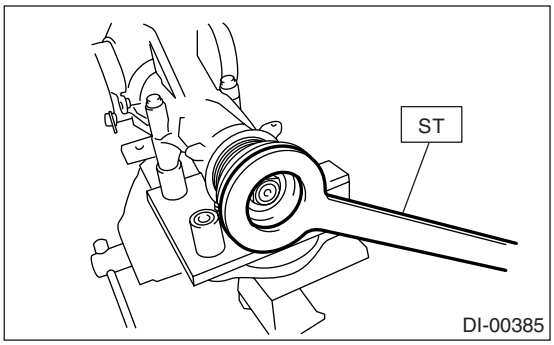

DI-00366

(4) Temporally tighten the side holders RH and LH in differential carrier to install.

15) Perform the backlash adjustment between the hypoid driven gear and drive pinion, and preload adjustment of differential side bearing.

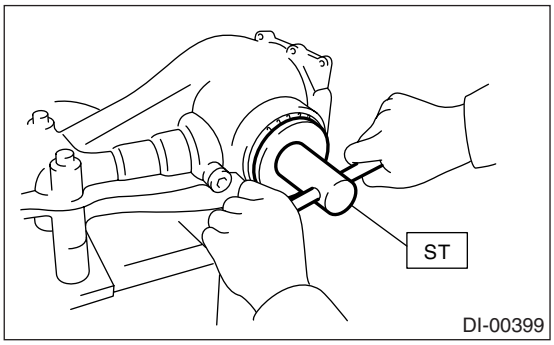
(1) Turn the drive pinion with ST for better fitting of differential side bearing.

ST 498427200 FLANGE WRENCH



(2) Screw in the side holder LH until light contact is made with ST.

ST 18630AA010 WRENCH

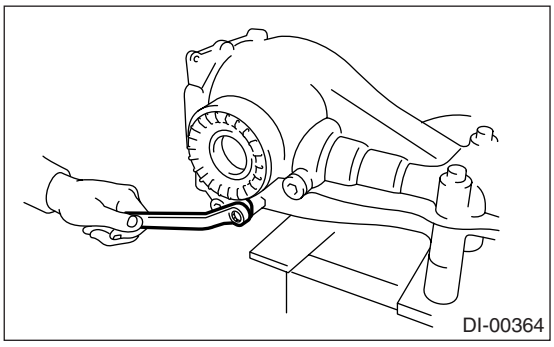


(3) Back off the holder on the hypoid driven gear side by approx.1 and 1/2 teeth, and tighten the other side holder by approx. 2 teeth (amount that the hypoid driven gear is turned back (1 and 1/2) + 1/2 teeth).

[Back off amount of side (hypoid driven gear side) holder + 1/2 tooth.] This + 1/2 tooth gives preload.

(4) Temporarily tighten the lock plate.

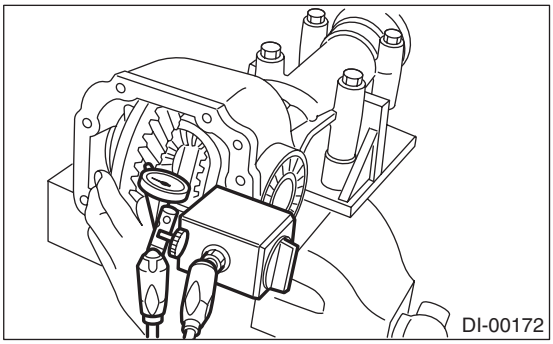
NOTE:
Turn over the lock plate to shift the holder by 1/2 tooth.



(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.

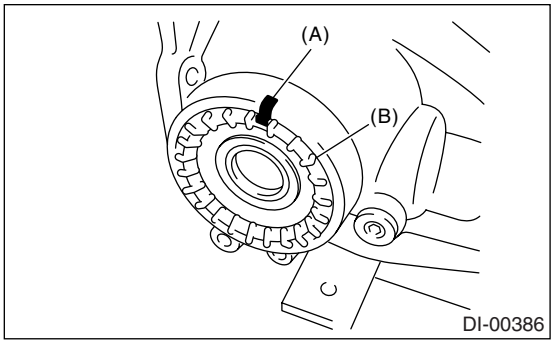
NOTE:
If measured value of backlash is not within the specified range, repeat the procedures for pinion driven gear set backlash adjustment and the differential side bearing preload adjustment.

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)



16) Put alignment marks on both the differential carrier and holder. Remove the holder side at a time.

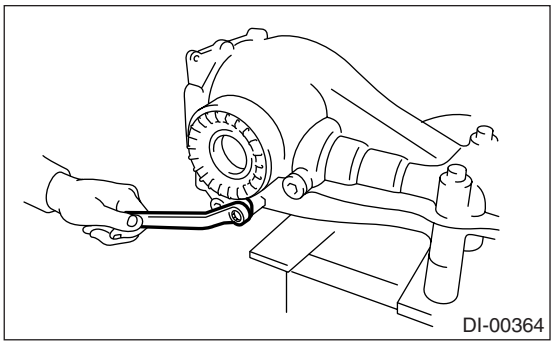
Replace them in the original position after inserting an O-ring and applying grease to the threaded portion.



(A) Alignment mark
(B) Holder

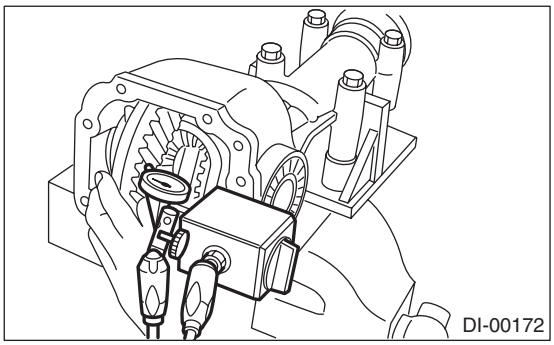
17) Tighten the bolt of lock plate to specified torque.

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



18) Recheck the hypoid driven gear to pinion backlash.

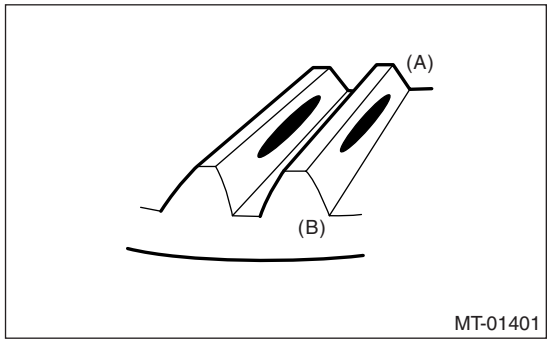
Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)



19) Checking and adjusting the tooth contact of hypoid driven gear
(1) Apply an even coat of red lead on both sides of three or four teeth on 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, readjust.

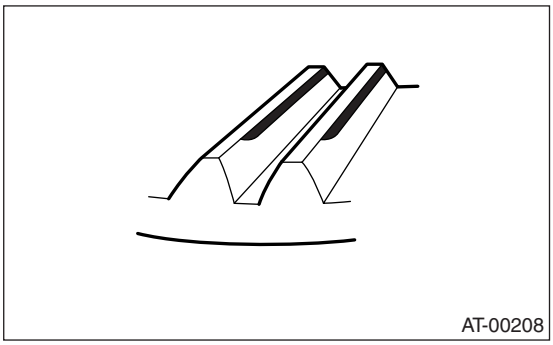
NOTE:
Be sure to wipe off the red lead completely after the adjustment is completed.

• Correct tooth contact
Check item: Tooth contact pattern is slightly shifted towards the toe side under no-load rotation. (When driving it will move toward the heel side.)

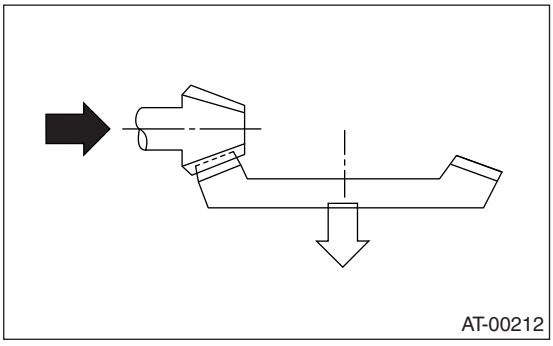


(A) Toe side
(B) Heel side

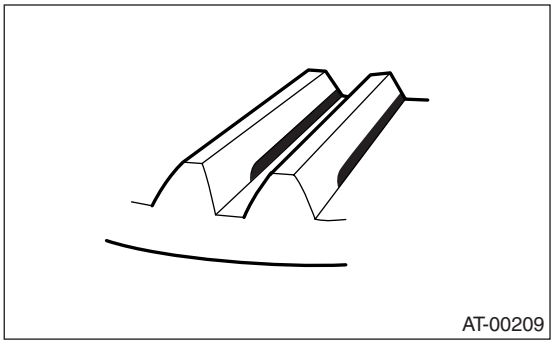
• Face contact
Check item: Backlash is too large.
Contact pattern



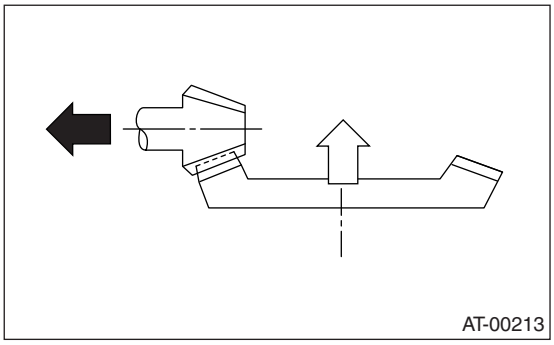
Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring drive pinion close to hypoid driven gear.



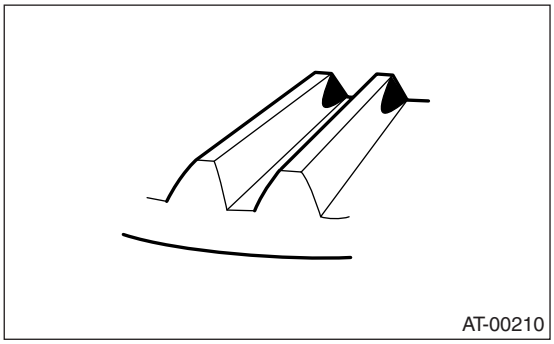
• Flank contact
Check item: Backlash is too small.
Contact pattern



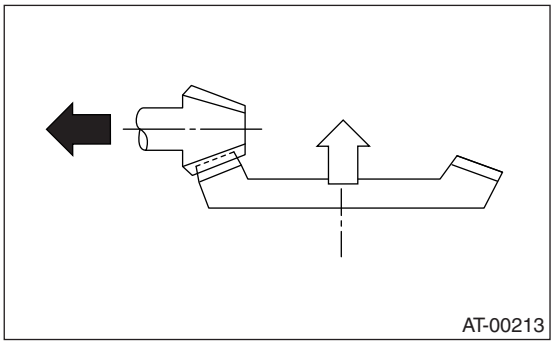
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear.



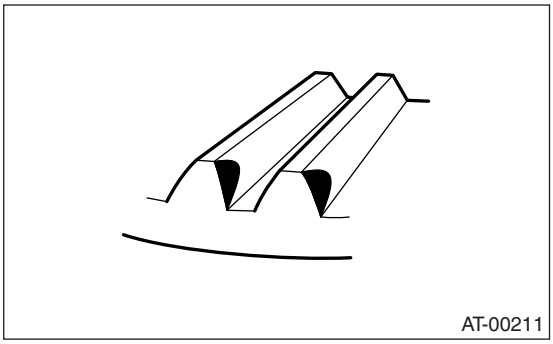
• Toe contact (inner side contact)
Check item: Teeth contact area is too small.
Contact pattern



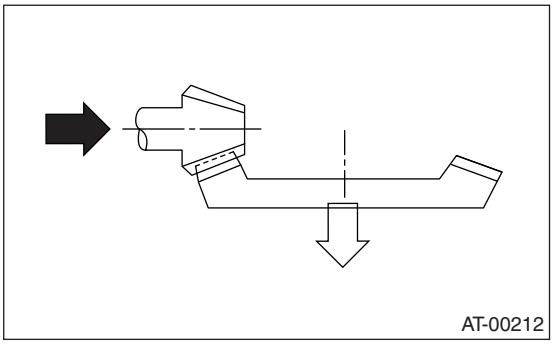
Corrective action: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from hypoid driven gear.



• Heel contact (outside end contact)
Check item: Teeth contact area is too small.
Contact pattern

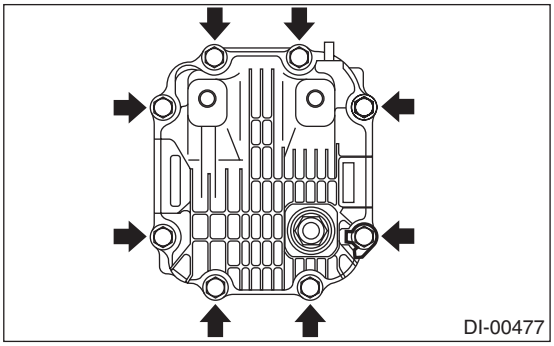


Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring drive pinion close to hypoid driven gear.



20) If proper tooth contact is not obtained, once again adjust the drive pinion height and the differential side bearing preload (already mentioned) and the hypoid gear backlash.
21) Attach a new gasket, rear cover, and ground stay to the differential carrier.

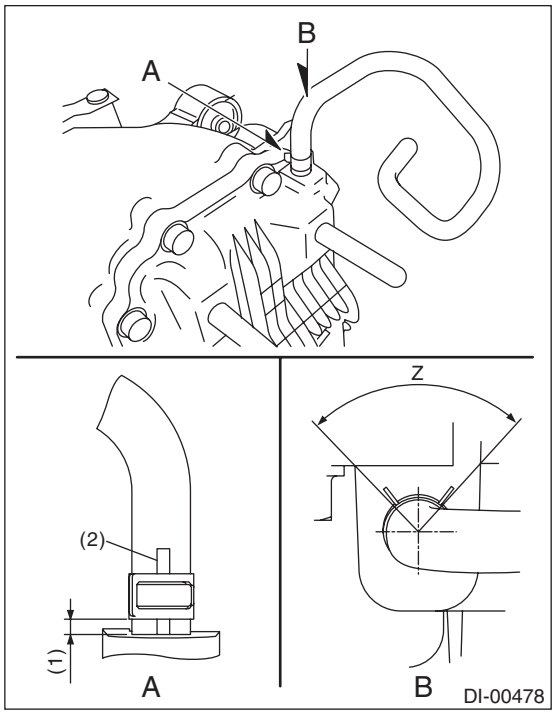
Tightening torque:
34 N·m (3.5 kgf-m, 25.1 ft-lb)



22) Using new gaskets, install the rear differential oil temperature switch.

Tightening torque:
60 N·m (6.1 kgf-m, 44.3 ft-lb)

23) 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

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 the differential case assembly if cracks, scoring or other defects are evident on tooth surface.

3) Bearing
Replace if seizure, peeling, wear, rust, dragging during rotation, noise or other defect is evident.

4) Oil seal
Replace if deformed or damaged, and at every disassembling.

5) Differential carrier
Replace if the bearing bores are worn or damaged.

6) Differential case
Replace if its sliding surfaces are worn or cracked.

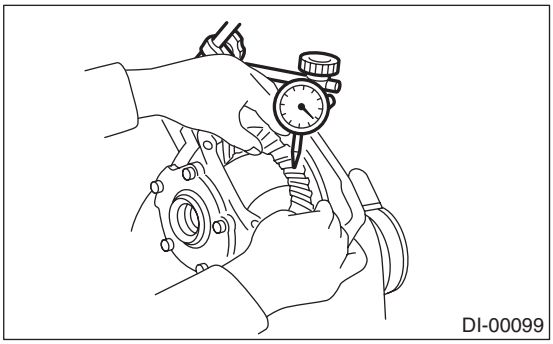
7) Companion flange
Replace if the oil seal lip contact surface shows cracking.

1. HYPOID DRIVEN GEAR BACKLASH

Using a dial gauge, check the backlash of hypoid driven gear.

Hypoid driven gear backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)

If the hypoid driven gear backlash is not within the specification, adjust the side bearing preload or repair if necessary.



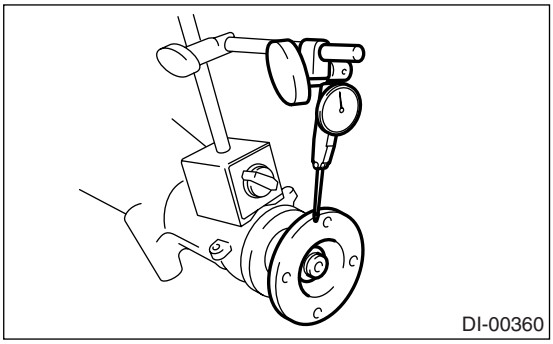
2. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Inspect the tooth contact between the hypoid driven gear and drive pinion. <Ref. to DI-19, ASSEMBLY, Rear Differential (VA–type).>

3. COMPANION FLANGE

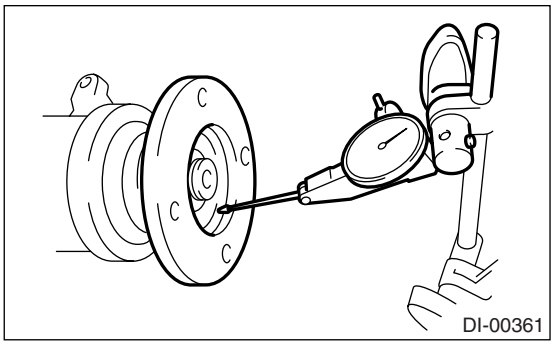
1) If rust or dirt is attached to the companion flange, remove them.
2) Set a dial gauge at a companion flange surface (mating surface of propeller shaft and companion flange), and then measure the companion flange runout.

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)

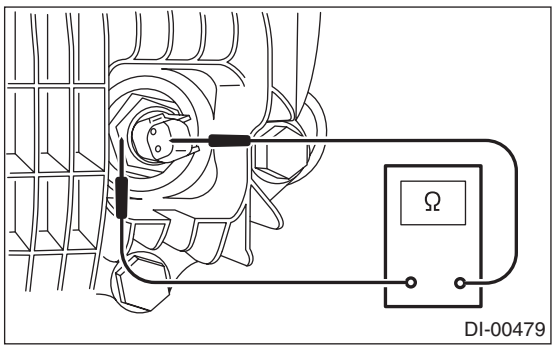


4) If either runout exceeds the limit, move the phase of companion flange and drive pinion 90° each, and find the point where the runout will be within the limit.
5) If the runout exceeds the limit when changing the phase, replace the companion flange and re-check the runout.
6) If the runout exceeds the limit after replacing the companion flange, the drive pinion may be assembled incorrectly or bearing is faulty.

4. REAR DIFFERENTIAL OIL TEMPERATURE SWITCH

Inspect the continuity of the rear differential oil temperature switch.

Specified resistance	Criteria
Less than 1 Ω	Normal
1 MΩ or more	Replacement



F: ADJUSTMENT

1. HYPOID DRIVEN GEAR BACKLASH

Adjust hypoid driven gear backlash.
<Ref. to DI-19, ASSEMBLY, Rear Differential (VA–type).>

2. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Adjust the tooth contact between hypoid driven gear and drive pinion gear.
<Ref. to DI-19, ASSEMBLY, Rear Differential (VA–type).>

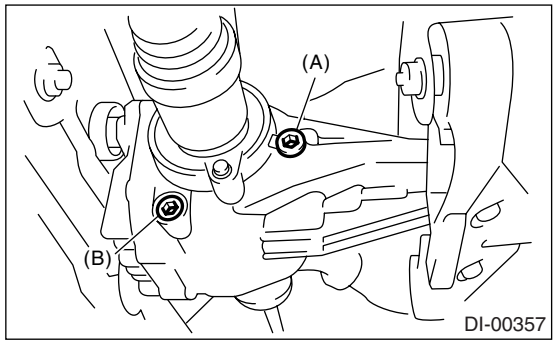
5. Rear Differential Front Oil Seal

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) Release the parking brake.
2) Remove the oil drain plug, and drain gear oil.



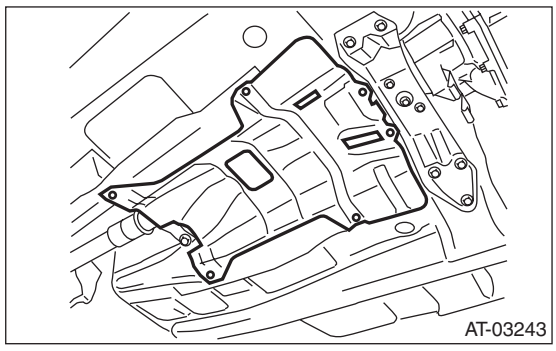
(A) Filler plug
(B) Drain plug

3) Install the oil drain plug.

NOTE:
Use a new metal gasket.

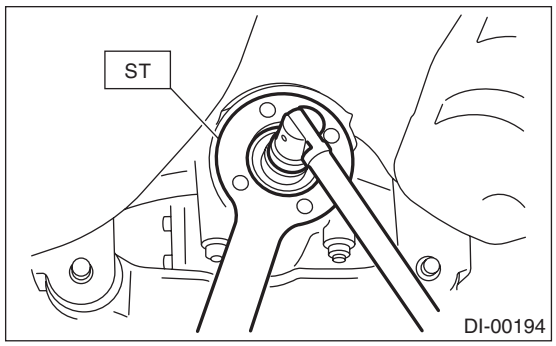
Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)

4) Jack-up the rear wheel and support the body with rigid racks.
5) Remove the rear exhaust pipe and muffler.
6) Remove the heat shield cover.

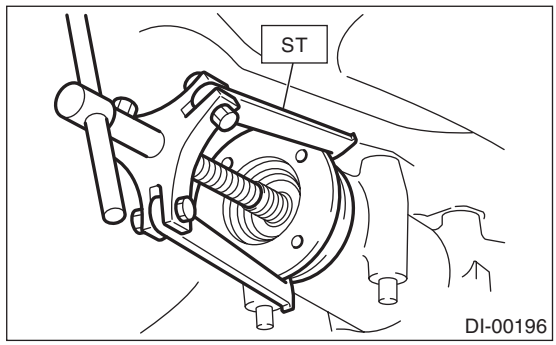


7) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>

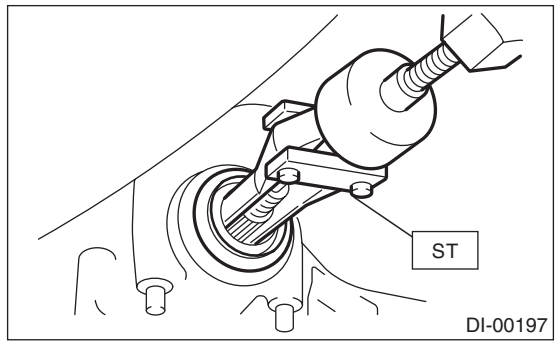
8) Remove the self-locking nut while holding the companion flange with ST.
ST 498427200 FLANGE WRENCH



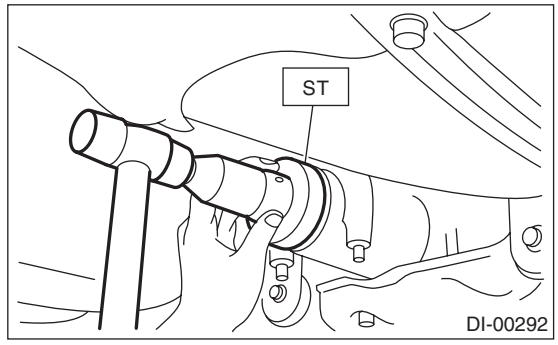
9) Extract the companion flange using ST.
ST 399703600 PULLER ASSY



10) Remove the oil seal using ST or screwdriver.
ST 398527700 PULLER ASSY



11) Install a new oil seal with ST.
ST 498447120 OIL SEAL INSTALLER



12) Install the companion flange.

NOTE:
Use a plastic hammer to install companion flange.

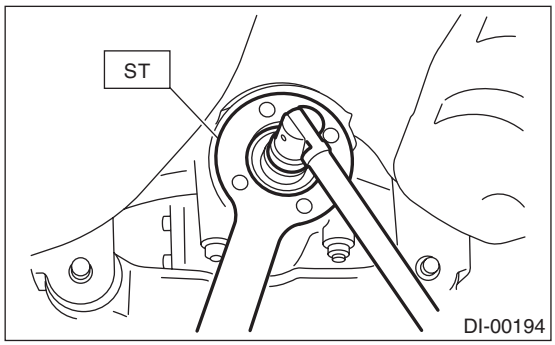
13) Apply Lock Tite to the drive pinion shaft screw threads and the nut seat surface.

Lock Tite:
THREE BOND 1324 (Part No. 004403042)

14) 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, 141 ft-lb)



15) Hereafter, reassemble in the reverse order of disassembly.

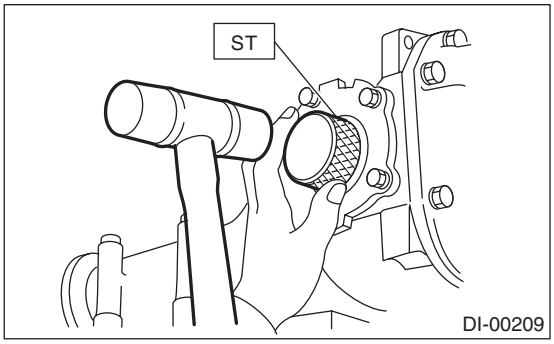
6. Rear Differential Side Oil Seal

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-14, 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

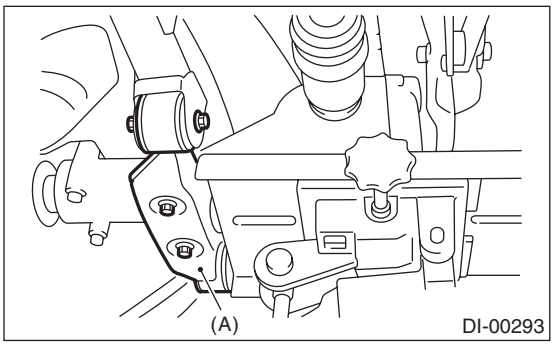


4) Install the rear differential. <Ref. to DI-15, INSTALLATION, Rear Differential (VA–type).>

7. Rear Differential Front Member

A: REMOVAL

1) Disconnect the ground cable from the battery.
2) Jack-up the vehicle.
3) Support the rear differential using transmission jack, and then remove the rear differential front member.

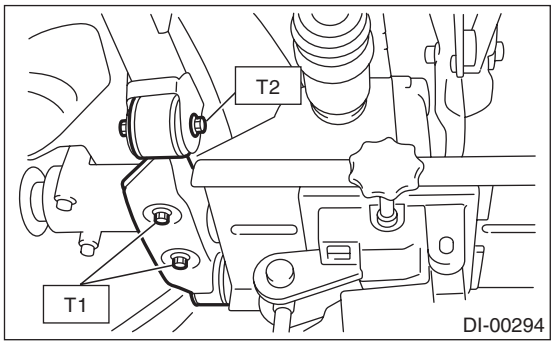


(A) Rear differential front member

B: INSTALLATION

Using new self-locking nuts, install the rear differential front member.

Tightening torque:
T1: 65 N·m (6.6 kgf-m, 48 ft-lb)
T2: 110 N·m (11.2 kgf-m, 81 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. General Diagnostic Table

A: INSPECTION

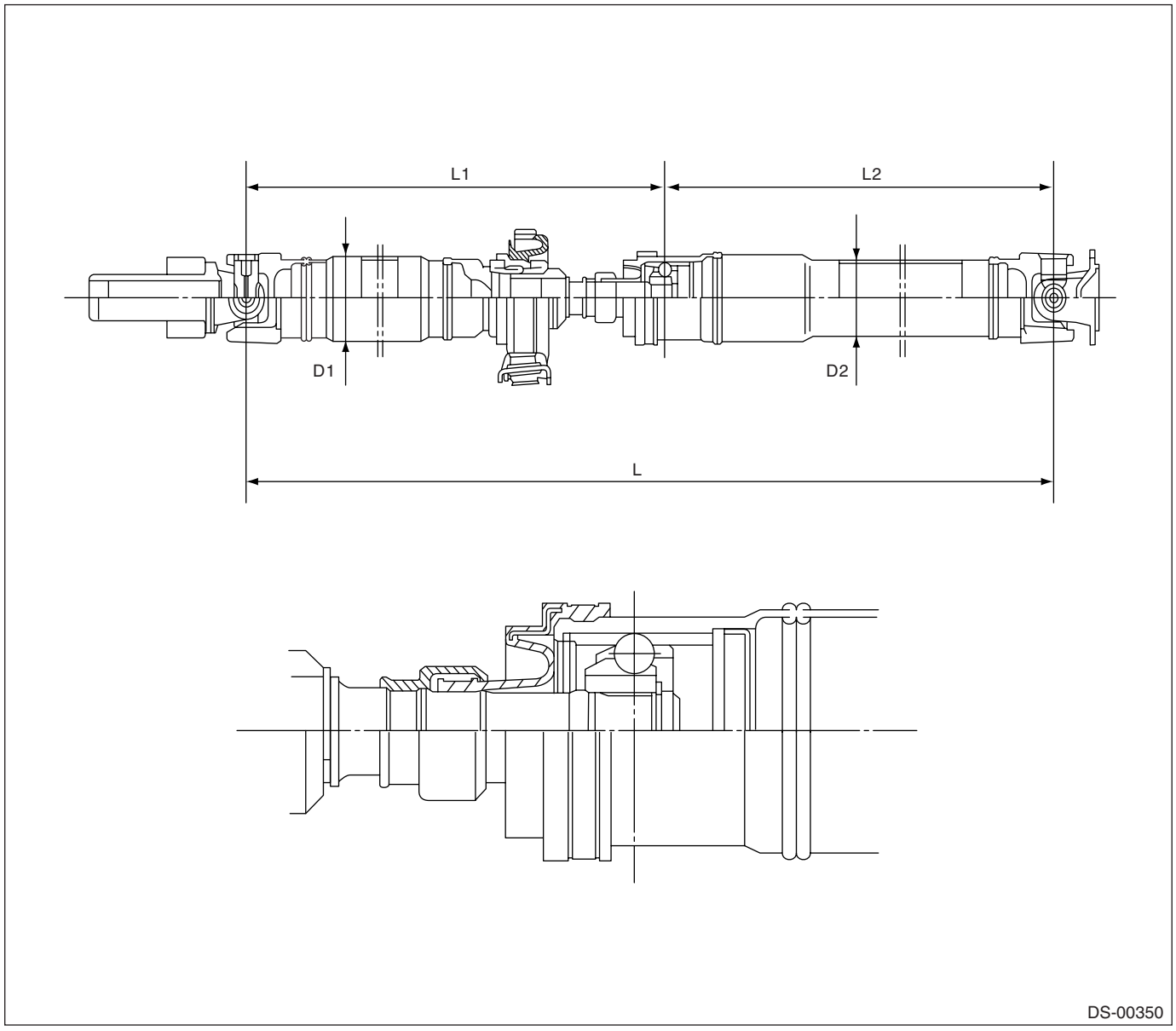
Symptom or trouble	Possible cause	Remedy
1. Oil leakage	(1) Worn, scratched, or incorrectly seated front or side oil seal. Scored, battered or excessively worn sliding surface of companion flange.	Correct or replace.
	(2) Clogged or damaged air breather.	Clean, repair or replace.
	(3) Loose bolts on 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 drain plug.	Retighten and apply liquid gasket.
	(6) Wear, damage or incorrect fitting of spindle, side retainer or oil seal.	Correct or replace.
2. Seizure NOTE: Seized or damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Insufficient backlash for hypoid gear.	Readjust or replace.
	(2) Excessive preload for side, rear or front bearing.	Readjust or replace.
	(3) Insufficient or improper oil used.	Replace seized part and fill with specified oil to specified level.
3. Damage NOTE: Damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Improper backlash for hypoid gear.	Replace.
	(2) Insufficient or excessive preload for side, rear or front bearing.	Readjust or replace.
	(3) Excessive backlash for differential gear.	Replace gear or thrust washer.
	(4) Loose bolts and nuts such as hypoid driven gear bolt	Retighten.
	(5) Damage due to overloading.	Replace.
4. Noises when starting or shifting gears NOTE: Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before 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 side bearing retainer attaching bolt.	Tighten to the specified torque.
5. Noises when cornering	(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.
6. Gear Noise 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.

1. General Description

A: SPECIFICATION

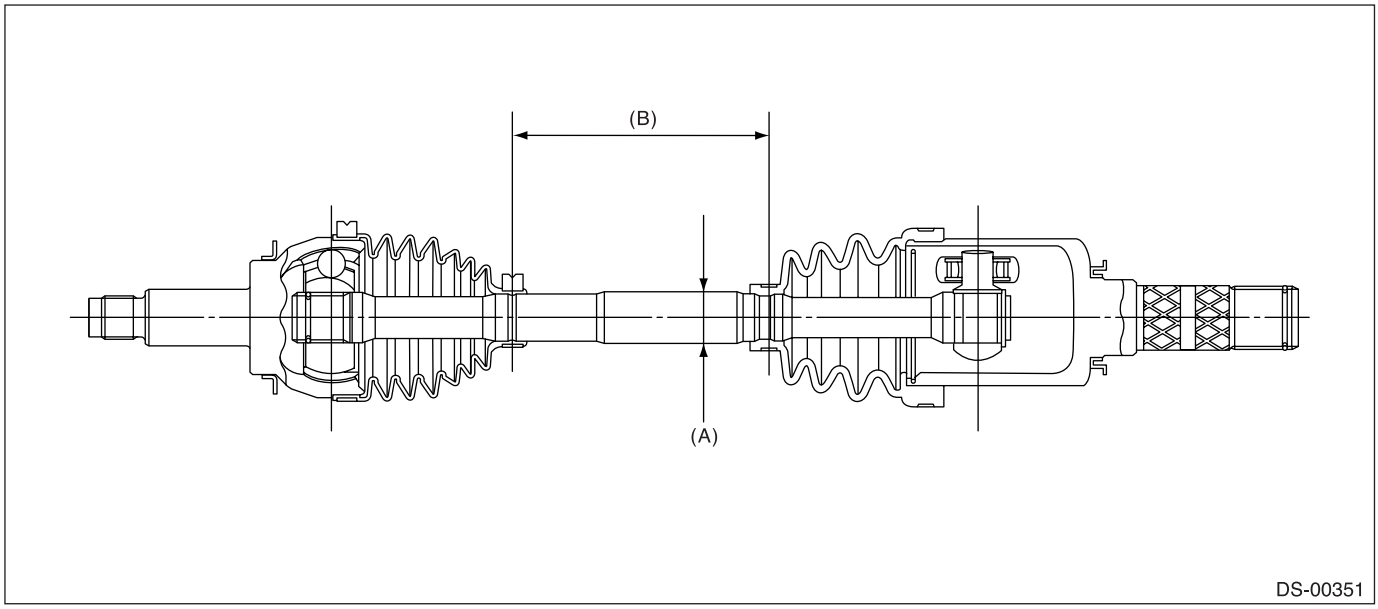
1. PROPELLER SHAFT

Propeller shaft type			EDJ
Propeller shaft length: L		mm (in)	1,399 (55.08)
Front propeller shaft Joint-to-joint length: L_1		mm (in)	645 (25.39)
Rear propeller shaft Joint-to-Joint length: L_2		mm (in)	754 (29.69)
Outer diameter of tube:	mm (in)	D_1	63.5 (2.50)
		D_2	57.5 (2.26)



2. FRONT DRIVE SHAFT ASSEMBLY

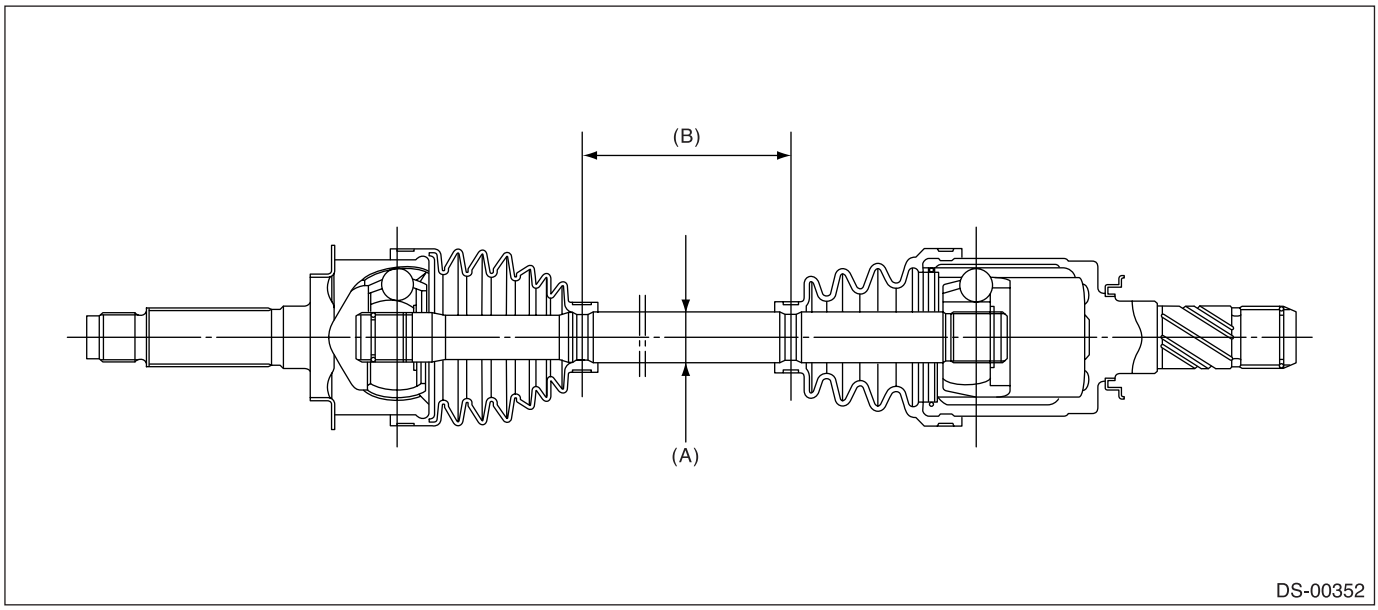
Type of drive shaft	Axle diameterϕ D mm (in)	Axle length L mm (in)
EBJ+PTJ	26 (1.0)	388.5 (15.30)



(A) Axle diameter (B) Axle length

3. REAR DRIVE SHAFT ASSEMBLY

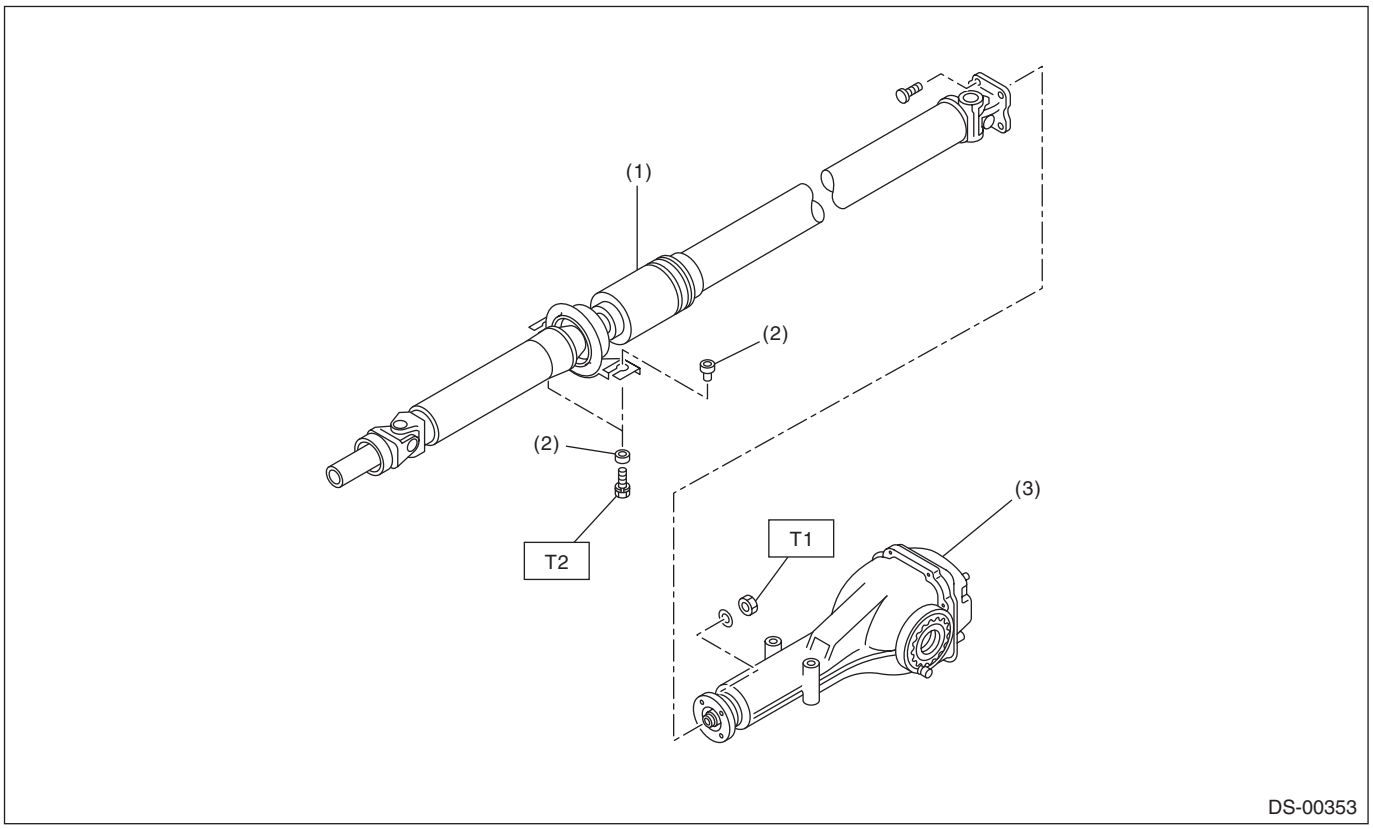
Type of drive shaft	Axle diameterϕ D mm (in)	Axle length L mm (in)
EBJ+DOJ	24 (0.94)	386.8 (15.23)



(A) Axle diameter (B) Axle length

B: COMPONENT

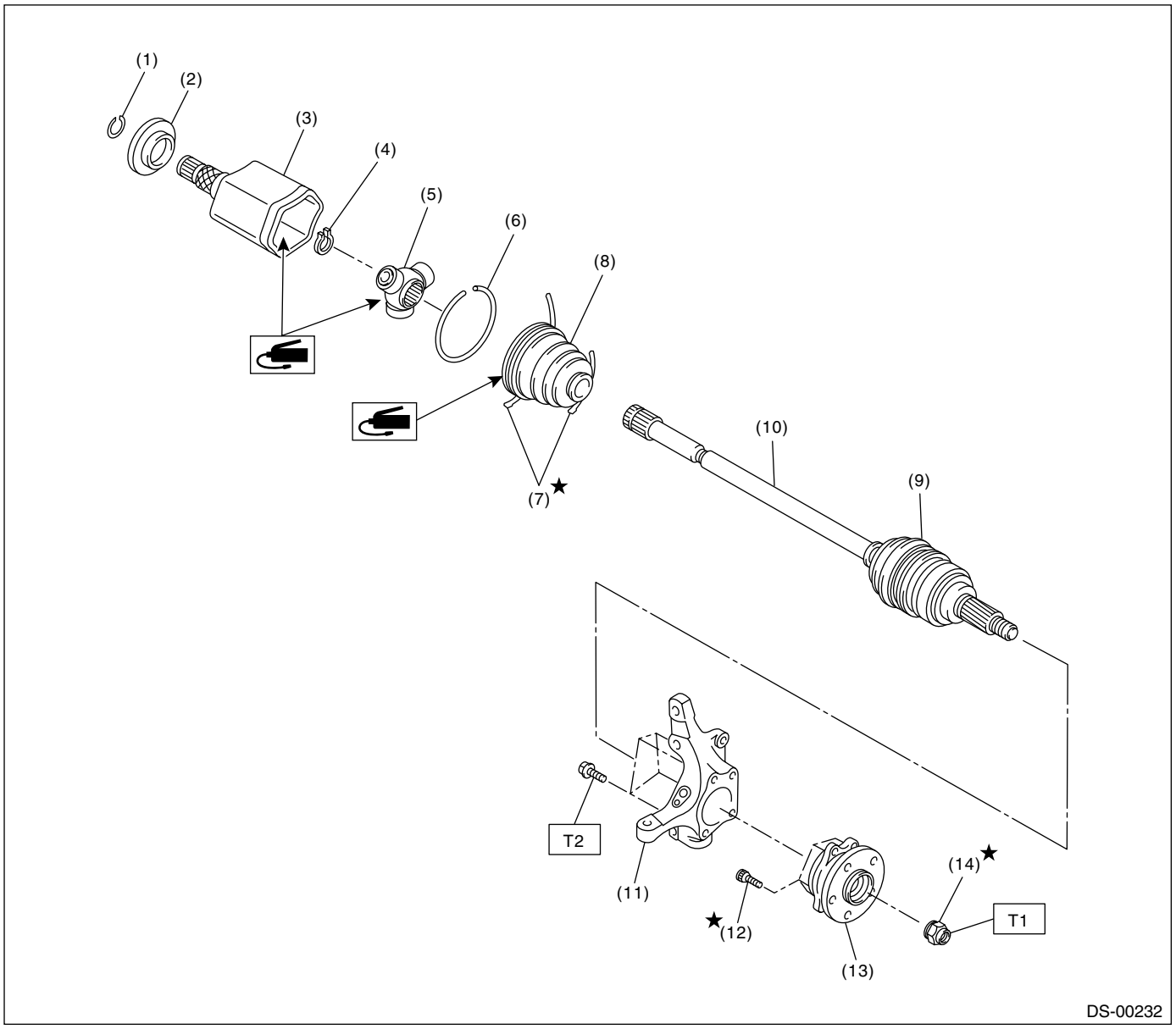
1. PROPELLER SHAFT



(1) Propeller shaft
(2) Bushing
(3) Rear differential (VA2-type)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 31 (3.2, 23.1)
T2: 52 (5.3, 38.3)

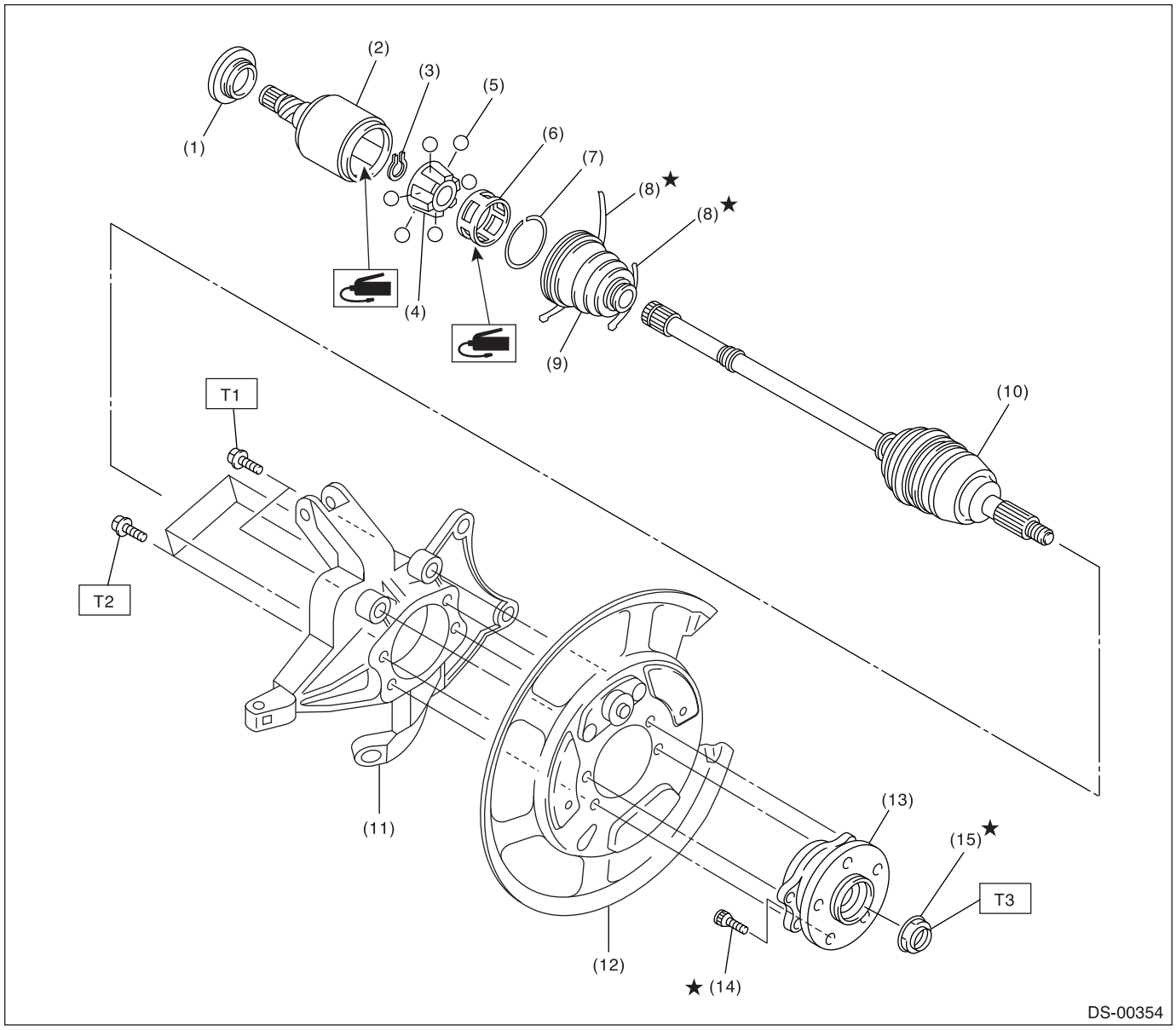
2. FRONT AXLE



(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)

3. REAR AXLE



(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 (olive color)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 75 (7.6, 55.3)
T2: 65 (6.6, 47.9)
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 work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply grease onto sliding or revolution 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.

D: PREPARATION TOOL

1. SPECIAL TOOL

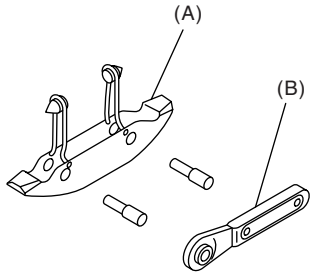
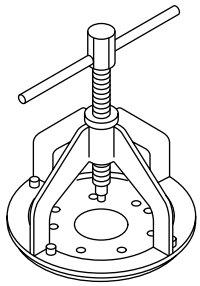
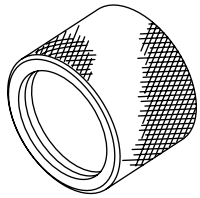
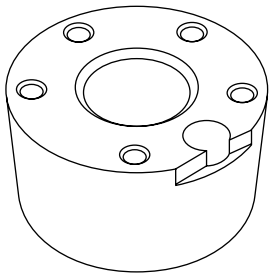
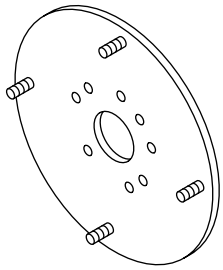
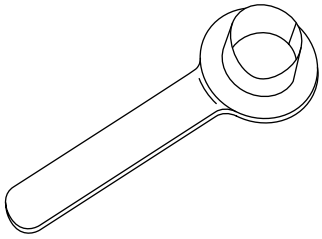
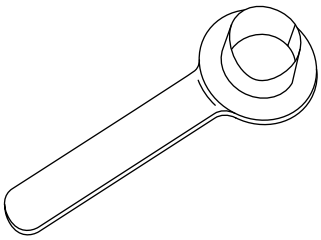
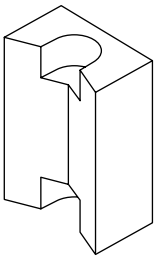
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-925091000	925091000	BAND TIGHTENING TOOL	Used for tightening the boot band. (A) Jig for the band (B) Ratchet wrench
 ST-926470000	926470000	AXLE SHAFT PULLER	Used for removing the axle shaft.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 ST28099PA080	28099PA080	HUB STAND	Used for assembling hub bolt in hub.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28099PA110	28099PA110	AXLE SHAFT PULLER PLATE	Same as plate 2 included in AXLE SHAFT PULLER (926470000).
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	• Used for installing the rear drive shaft to the rear differential. • For protecting the oil seal.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	• Used for installing front drive shaft into front differential. • For protecting the oil seal.
 ST28399AG000	28399AG000 (Newly adopted tool)	HUB STAND	Used for extracting hub bolt.

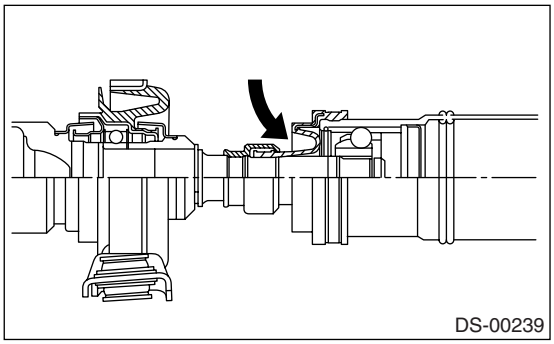
2. GENERAL TOOL

DESCRIPTION	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.

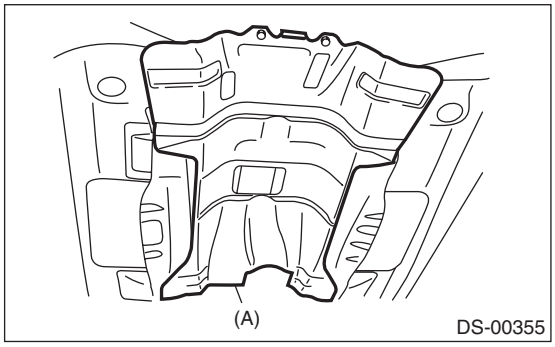
2. Propeller Shaft

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.

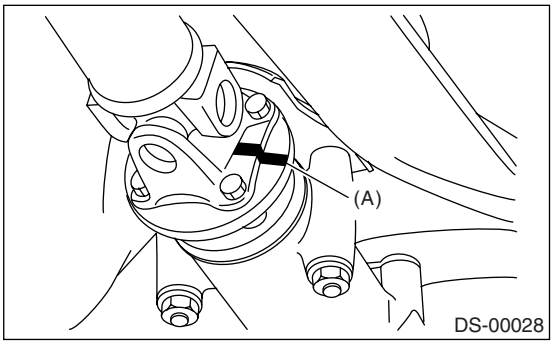


1) Disconnect the ground cable from the battery.
2) Shift the select lever or gear shift lever to neutral.
3) Release the parking brake.
4) Lift-up the vehicle.
5) Remove the center exhaust pipe.
6) Remove the rear exhaust pipe and muffler.
7) Remove the heat shield cover.



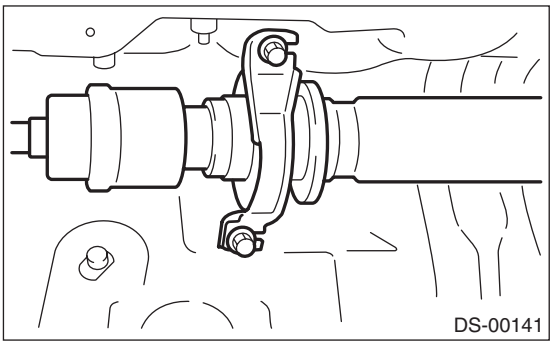
(A) Heat shield cover

8) Make matching marks on the flange yoke and rear differential before removal.



(A) Alignment mark

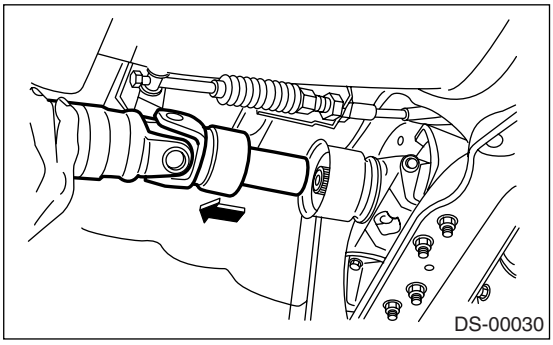
9) Remove the three bolts holding the propeller shaft to the rear differential.
10) Remove the remaining bolt.
11) Remove the two bolts which hold center bearing to vehicle body.



12) Remove the propeller shaft from transmission.

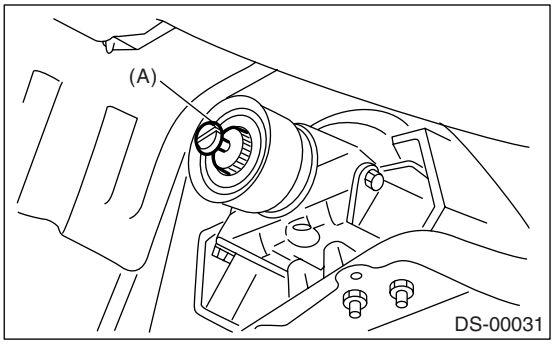
CAUTION:
• Be careful not to damage oil seals and frictional surface of the sleeve yoke.
• Cover the center exhaust pipe with a cloth to keep off any ATF or oil spilled from transmission when removing propeller shaft.

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.

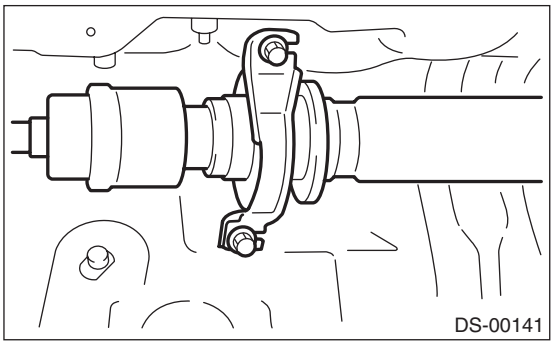


(A) Extension cap

B: INSTALLATION

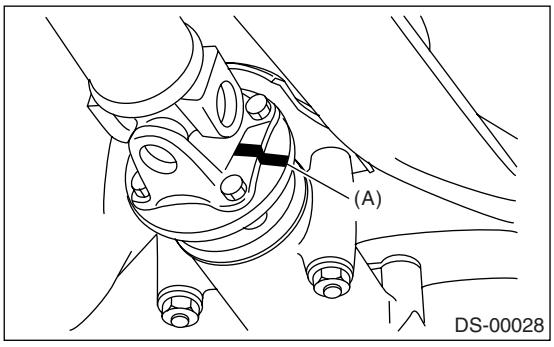
1) Insert the sleeve yoke into the transmission and attach center bearing to body.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)



2) Align the matching 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 the battery.

C: INSPECTION

NOTE:
Do not disassemble propeller shaft. Check the following and replace if necessary.
- Tube surface for dents of 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

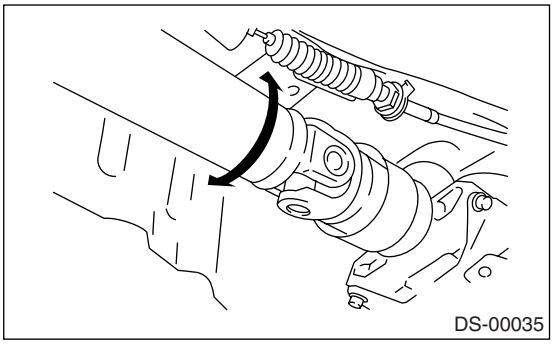
Check the following points with propeller shaft installed in vehicle.

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

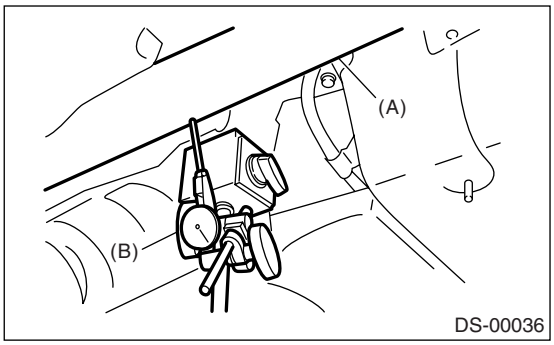
1) Remove the center exhaust pipe.
2) Remove the rear exhaust pipe and muffler.
3) Remove the heat shield cover.
4) Turn the propeller shaft by hand to see if abnormal free play exists at splines. Also move yokes to see if abnormal free play exists at spiders and bearings.



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.

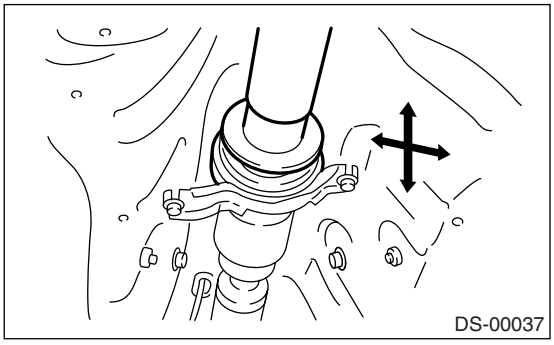
Runout:
Service limit 0.6 mm (0.024 in)



(A) Propeller shaft
(B) Dial gauge

4. CENTER BEARING FREE PLAY

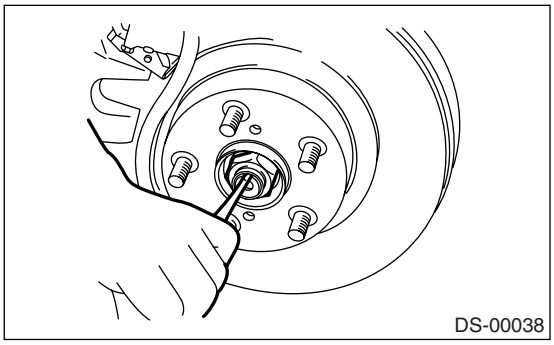
1) Remove the front and center exhaust pipes.
2) Remove the rear exhaust pipe and muffler.
3) Remove the heat shield cover.
4) Move the propeller shaft near the center bearing up, down, left, right by hand, to check for any abnormal free play of the bearings.



3. Front Axle

A: REMOVAL

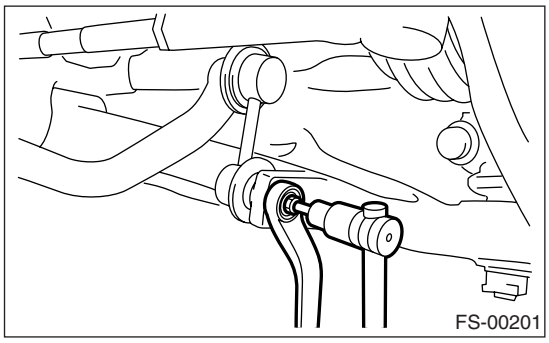
1) Disconnect the ground cable from the battery.
2) Lift-up the vehicle, and remove the front wheels.
3) Lift the crimped section of axle nut.



4) Remove the axle nut using a socket wrench while depressing the brake pedal.

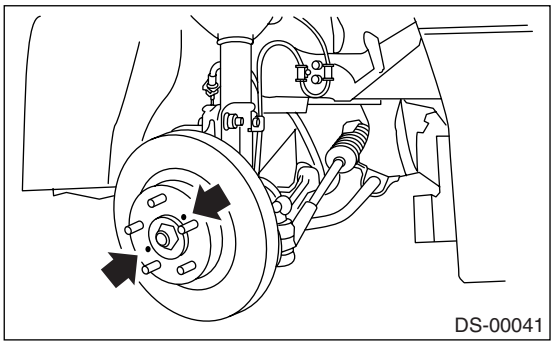
CAUTION:
Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.

5) Remove the stabilizer link.

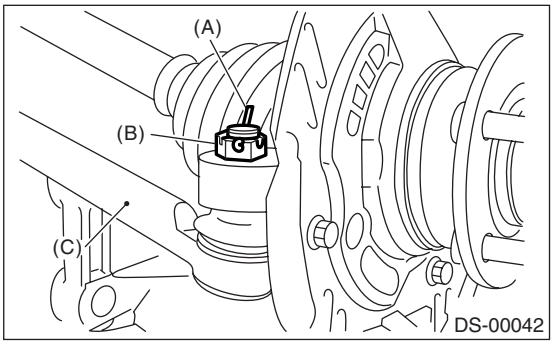


6) Remove the disc brake caliper from the front housing, and suspend it from strut using a piece of wire.
7) Remove the disc rotor from the hub.

NOTE:
If it is difficult to remove the disc rotor from the hub, drive the 8 mm of bolt into the threaded end of rotor, then remove the rotor.

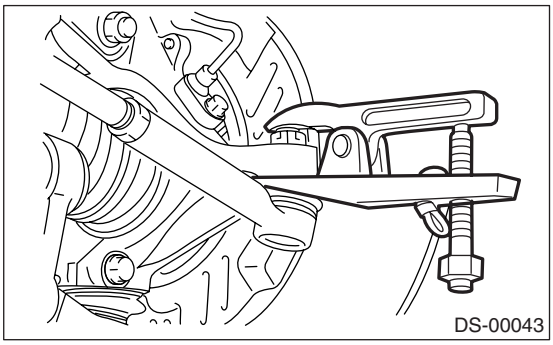


8) Remove the cotter pin and castle nut securing the tierod end to the front housing knuckle arm.



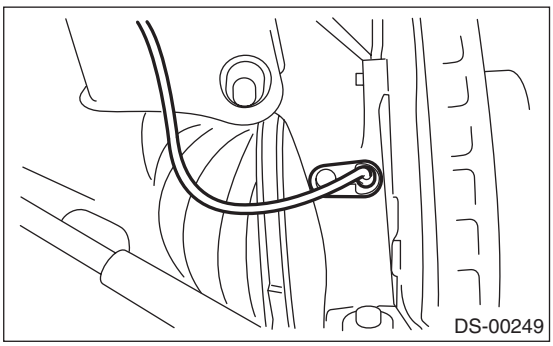
(A) Cotter pin
(B) Castle nut
(C) Tie–rod

9) Using a puller, remove the tie–rod ball joint from knuckle arm.

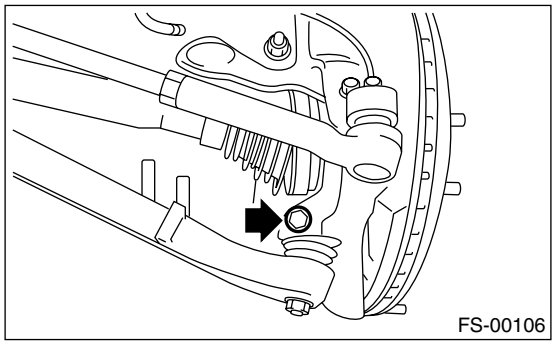


CAUTION:
When removing tie-rod, do not hit the tie-rod end with hammer.

10) Remove the ABS wheel speed sensor assembly and harness.

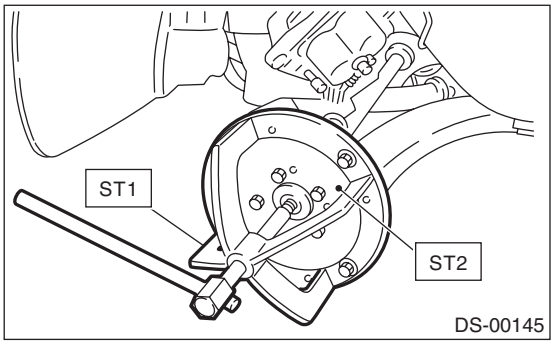


11) Remove the front arm ball joint from the front housing.

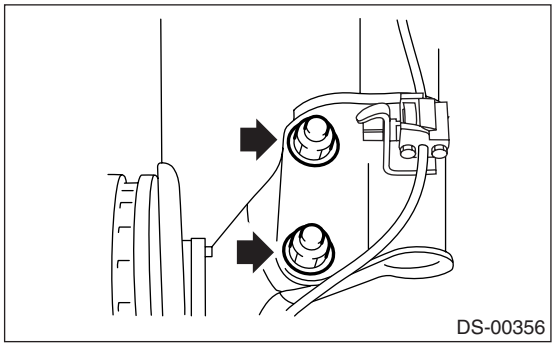


12) Remove the PTJ from transmission.
13) Remove the front drive shaft assembly from the hub. If it is hard to remove, use the ST.

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 selflocking nut.

Tightening torque:
175 N·m (17.9 kgf-m, 129 ft-lb)

2) Install the front drive shaft. <Ref. to DS-24, 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.

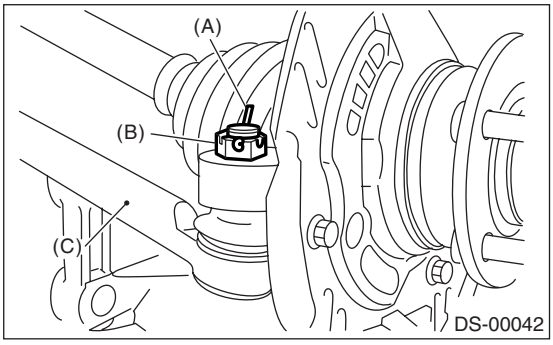
Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

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.



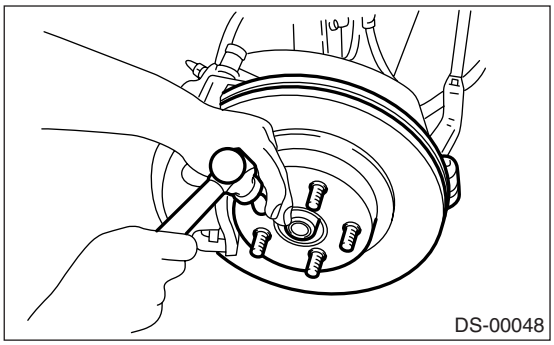
(A) Cotter pin
(B) Castle nut
(C) Tie–rod

10) While depressing the brake pedal, tighten a new axle nut (olive color) 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.

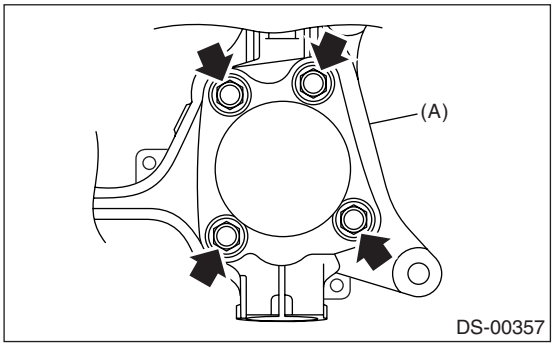


12) Install the wheel and tighten the wheel nuts to specified torque.

Tightening torque:
110 N·m (11.2 kgf-m, 81.1 ft-lb)

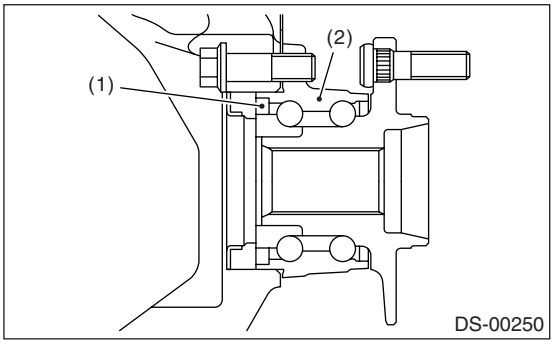
C: DISASSEMBLY

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.



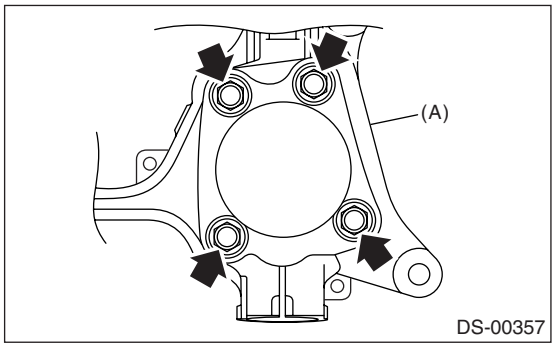
(1) Magnetic encoder
(2) Front hub unit bearing

2) Disassemble the front hub unit bearing. <Ref. to DS-20, DISASSEMBLY, Front Hub Unit Bearing.>

D: ASSEMBLY

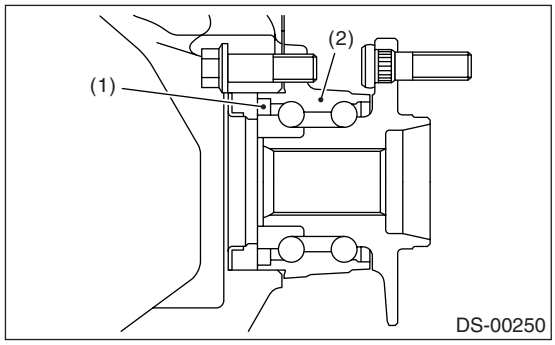
1) Assemble the front hub unit bearing. <Ref. to DS-20, ASSEMBLY, Front Hub Unit Bearing.>
2) Place the disc cover between front housing and front hub unit, and tighten the four bolts.

Tightening torque:
65 N·m (6.6 kgf-m, 47.9 ft-lb)



(A) Front housing

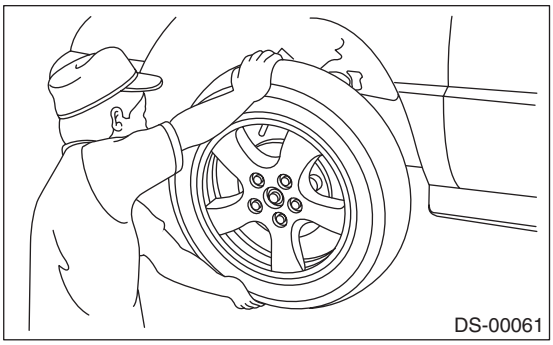
CAUTION:
• Do not get closer the tool which charged magnetism to magnetic encoder.
• Be careful not to damage the magnetic encoder.



(1) Magnetic encoder
(2) Front hub unit bearing

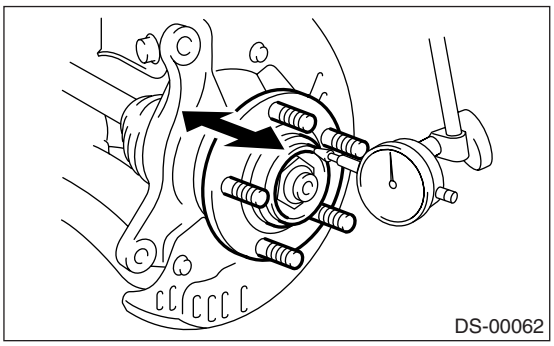
E: INSPECTION

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.

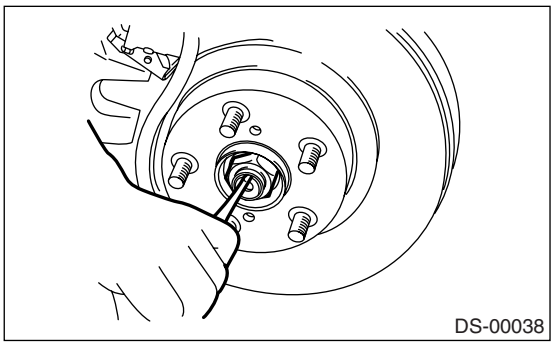
Service limit:
Maximum: 0.05 mm (0.0020 in)



4. Rear Axle

A: REMOVAL

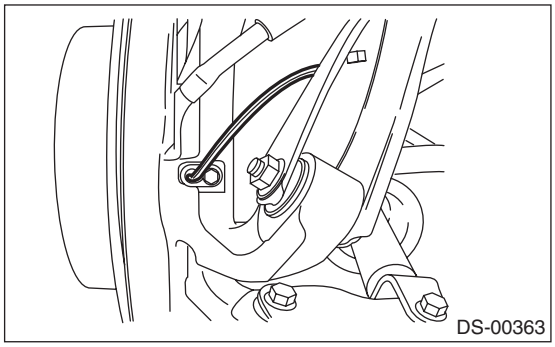
1) Disconnect the ground cable from the battery.
2) Lift-up the vehicle, and then remove the rear wheels.
3) Lift the crimped section of axle nut.



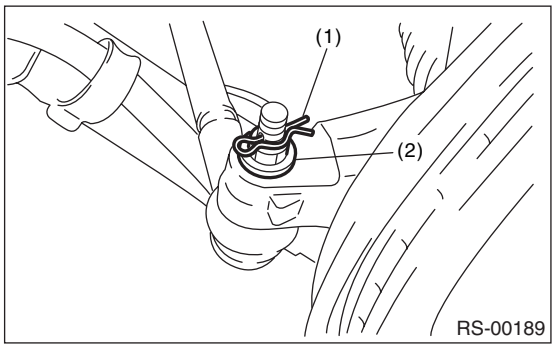
4) Remove the axle nut using a socket wrench while depressing the brake pedal.

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.

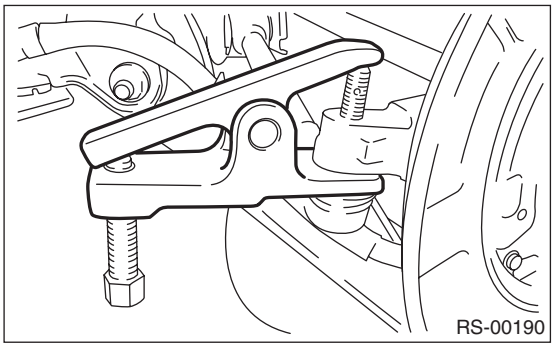


7) Remove the snap pin and nut from the front lateral link.

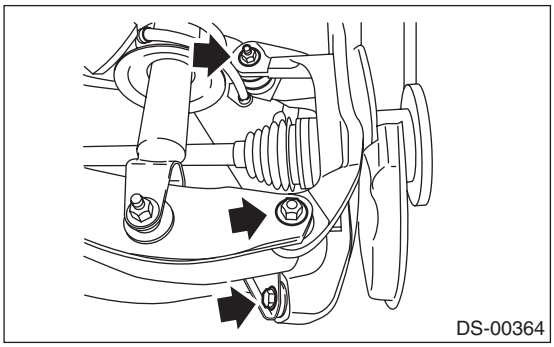


(1) Snap pin
(2) Nut

8) Using a puller, separate the rear housing and ball joint.



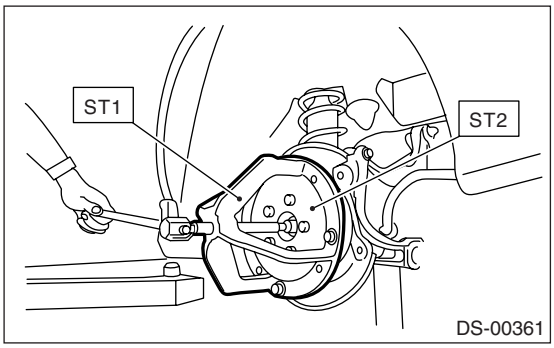
9) Detach the upper arm, trailing link, and rear lateral link from the rear housing.



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

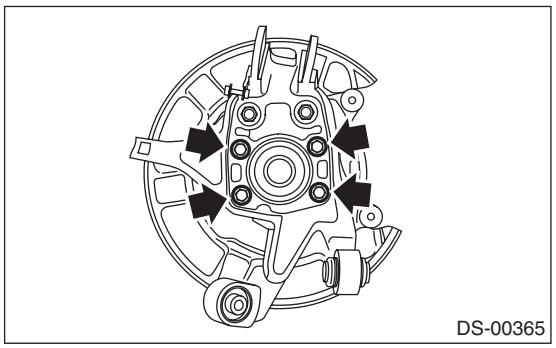
NOTE:
- Be sure to use a new self-locking nut.
- Always tighten the stabilizer bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.

Install in the reverse order of removal.

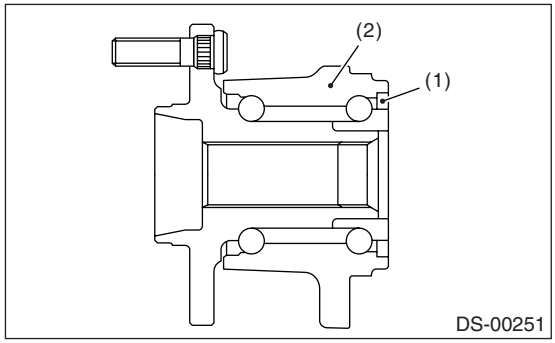
Tightening torque:
Refer to COMPONENT of General Description for tightening torque.
<Ref. to DS-4, COMPONENT, General Description.>
<Ref. to BR-4, COMPONENT, General Description.>
<Ref. to PB-2, COMPONENT, General Description.>
<Ref. to RS-3, COMPONENT, General Description.>
<Ref. to VDC-2, COMPONENT, General Description.>

C: DISASSEMBLY

1) Remove the four bolts from the rear housing, and remove the rear hub unit bearing.


DS-00365

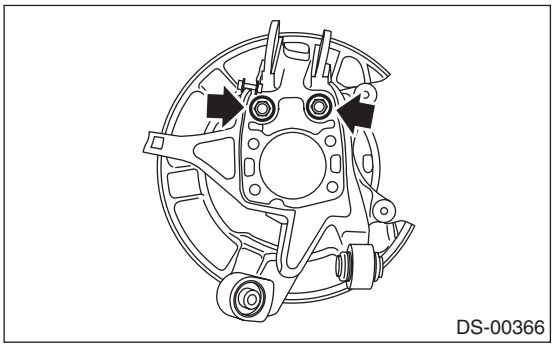
CAUTION:
• Be careful not to damage the magnetic encoder.
• Do not get closer the tool which charged magnetism to magnetic encoder.



DS-00251

(1) Magnetic encoder
(2) Rear hub unit bearing

2) Remove the two bolts from the rear housing, and remove the back plate.


DS-00366

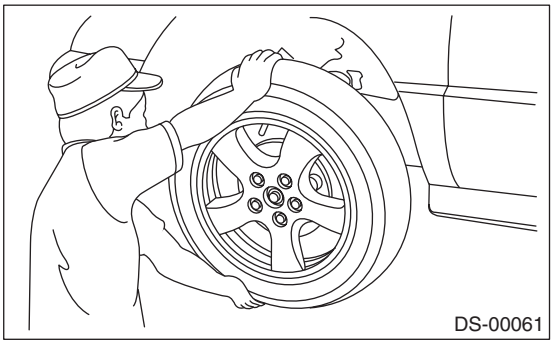
D: ASSEMBLY

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)

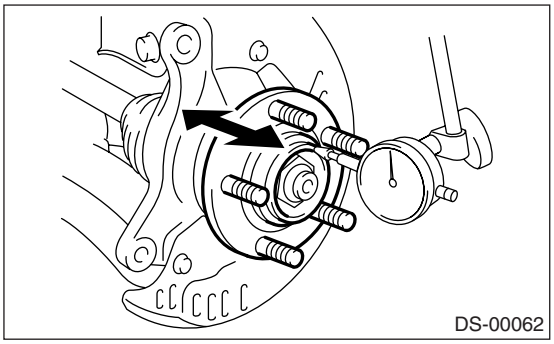
E: INSPECTION

1) Moving the rear tire up and down by hand, check there is no backlash in bearing, and check the wheel rotates smoothly.


DS-00061

2) Inspect the lean of axis direction using a dial gauge. Replace the bearing if the load range exceeds the limitation.

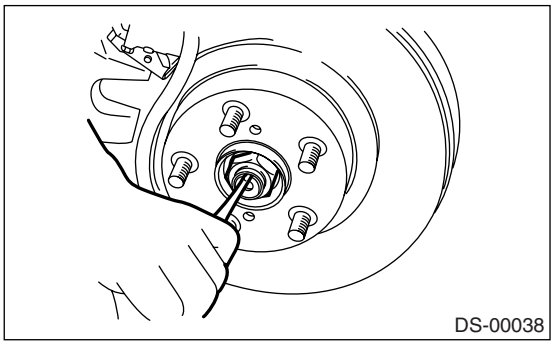
Service limit:
Maximum: 0.05 mm (0.0020 in)


DS-00062

5. Front Hub Unit Bearing

A: REMOVAL

1) Disconnect the ground cable from the battery.
2) Lift-up the vehicle, and remove the front wheels.
3) Lift the crimped section of axle nut.

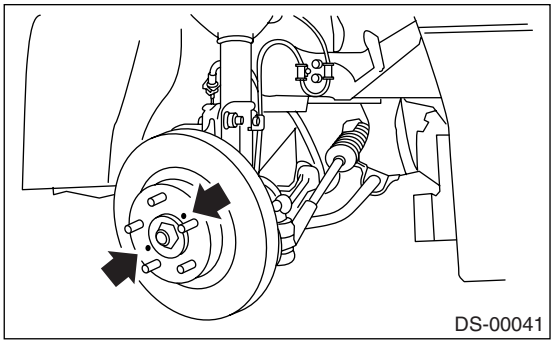


4) Remove the axle nut using a socket wrench while depressing the brake pedal.

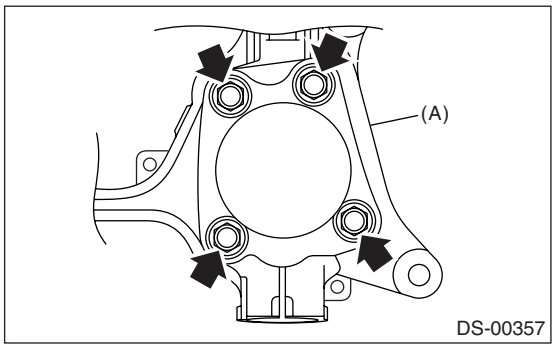
CAUTION:
Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.

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 the 8 mm of bolt into the threaded end of rotor, then remove the rotor.

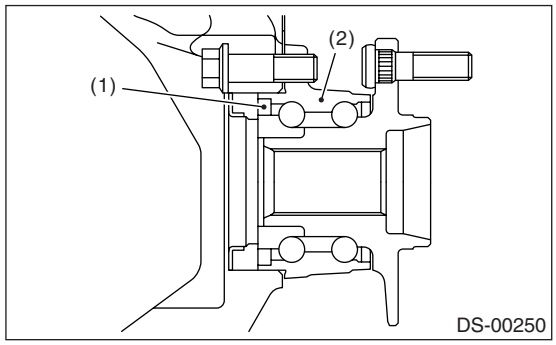


7) Remove four bolts from the front housing.



(A) Front housing

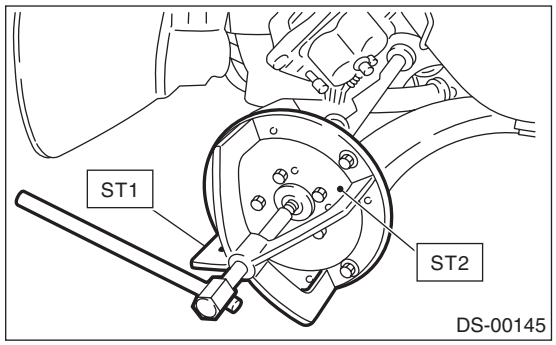
CAUTION:
• Do not get closer the tool which charged magnetism to magnetic encoder.
• Be careful not to damage the magnetic encoder.



(1) Magnetic encoder
(2) Front hub unit bearing

8) Remove the front hub unit bearing. If it is hard to remove, use the ST.

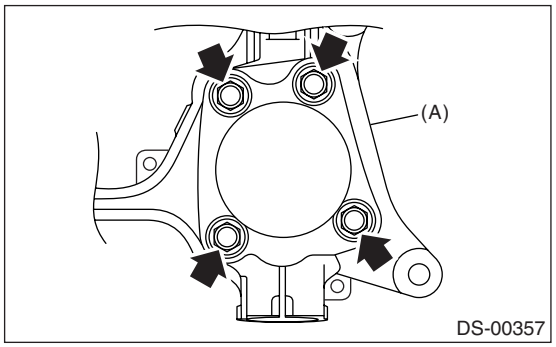
ST1	926470000	AXLE SHAFT PULLER
ST2	28099PA110	AXLE SHAFT PULLER PLATE



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-24, 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.

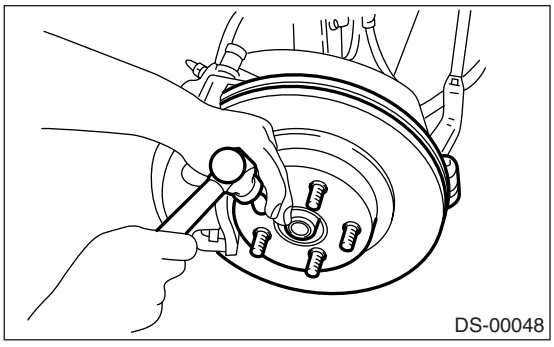
Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

6) While depressing the brake pedal, tighten a new axle nut (olive color) 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 wheel and tighten the wheel nuts to specified torque.

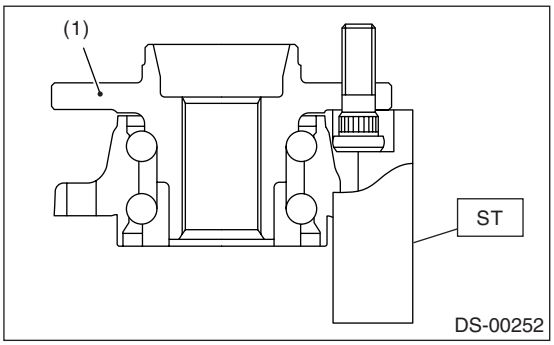
Tightening torque:
110 N·m (11.2 kgf-m, 81.1 ft-lb)

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.

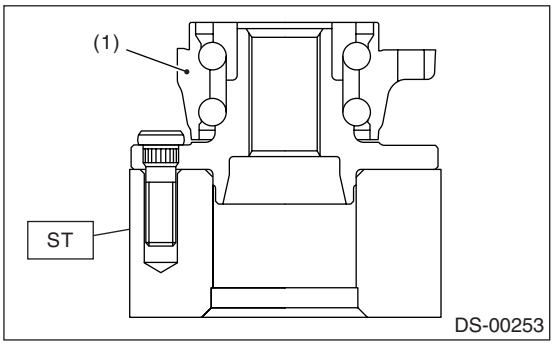
NOTE:
Since the hub unit bearing can not be disassembled, only hub bolts can be removed.



(1) Front hub unit bearing

D: ASSEMBLY

1) Attach the hub to the ST securely.
ST28099PA080 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

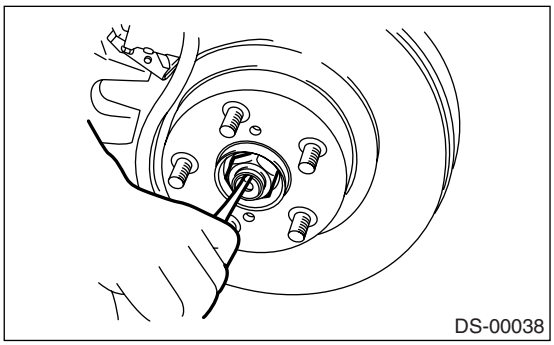
Refer to Front Axle for inspection procedures. <Ref. to DS-16, INSPECTION, Front Axle.>

CAUTION:
If there is any fault in the bearing, replace hub unit bearing.

6. Rear Hub Unit Bearing

A: REMOVAL

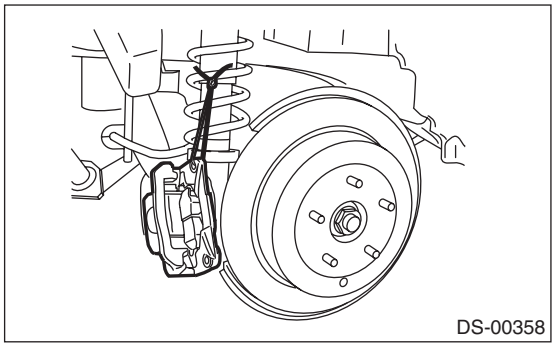
1) Disconnect the ground cable from the battery.
2) Lift-up the vehicle, and then remove the rear wheels.
3) Lift the crimped section of axle nut.



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.

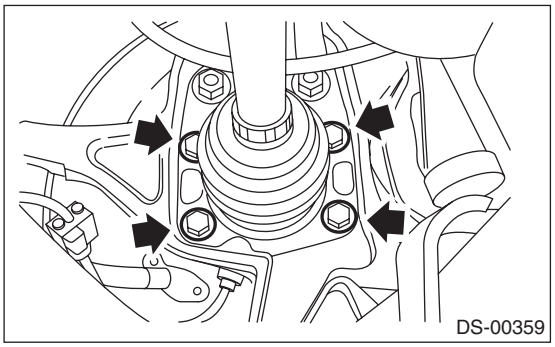
5) Release the parking brake.
6) Remove the disc brake caliper from the rear housing, and suspend it from the vehicle using a piece of rope.



7) Remove the disc rotor from the hub.

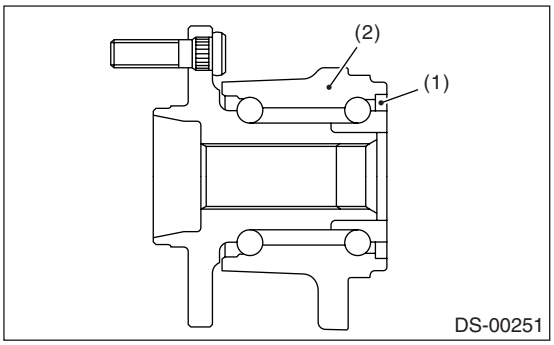
NOTE:
• Mark the mating surface of hub and disc rotor before removing the disc rotor to avoid confusing when installing.
• If it is difficult to remove the disc rotor from the hub, drive the 8 mm of bolt into the threaded end of rotor, then remove the rotor.

8) Remove the four bolts from rear arm.

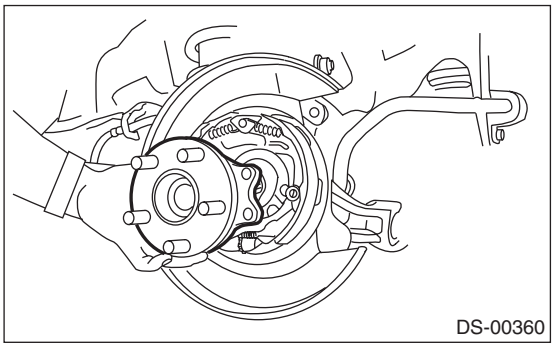


9) Remove the hub unit bearing.

CAUTION:
• Be careful not to damage the magnetic encoder.
• Do not get closer the tool which charged magnetism to magnetic encoder.

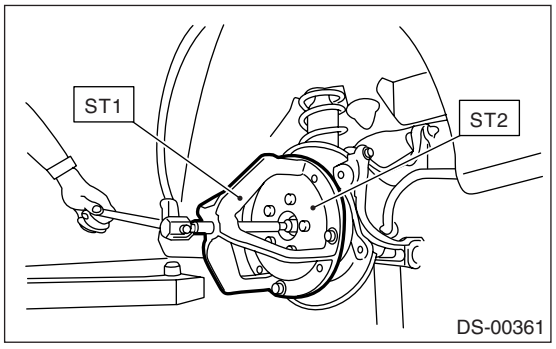


(1) Magnetic encoder
(2) Rear hub unit bearing



NOTE:
If it is hard to remove, use the ST.

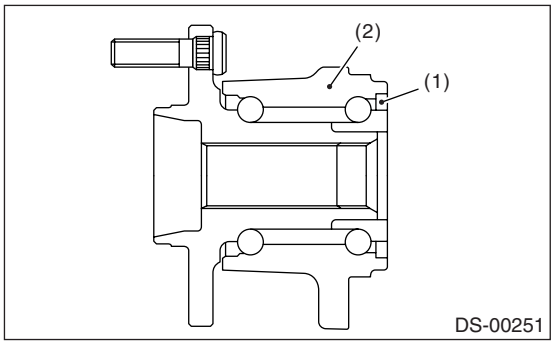
ST1 926470000 AXLE SHAFT PULLER
ST2 28099PA110 AXLE SHAFT PULLER PLATE



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.

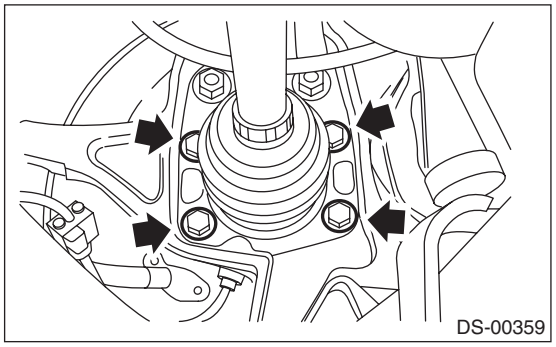
CAUTION:
• Be careful not to damage the magnetic encoder.
• Do not get closer the tool which charged magnetism to magnetic encoder.



(1) Magnetic encoder
(2) Rear hub unit bearing

2) Tighten the four bolts to the back plate.

Tightening torque:
65 N·m (6.6 kgf-m, 47.9 ft-lb)



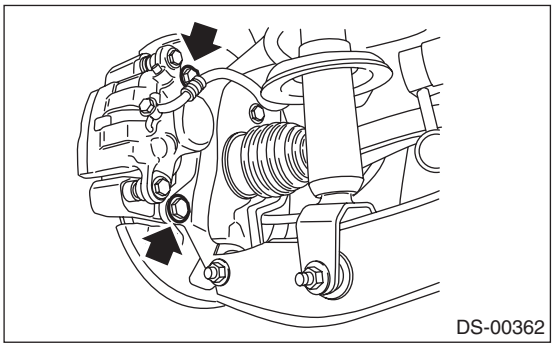
3) Remove the axle nut.

4) Draw the rear drive shaft into specified position.
5) Tighten the new axle nut temporarily.

CAUTION:
Use a new axle nut (olive color).

6) Install the disc rotor to hub.
7) Install the disc brake caliper on the rear housing.

Tightening torque:
60 N·m (6.1 kgf-m, 44.3 ft-lb)

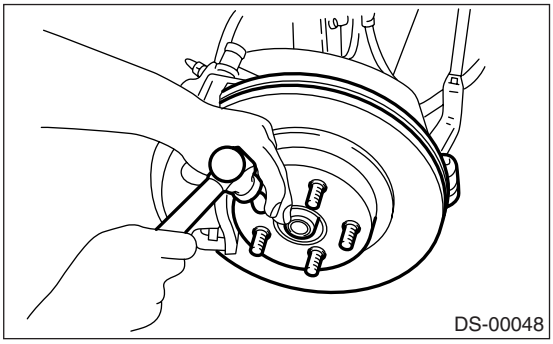


8) Adjust the parking brake lever stroke by turning the adjuster. <Ref. to PB-4, ADJUSTMENT, Parking Brake Pedal.>
9) While applying the parking brake and depressing the brake pedal, tighten a new axle nut (olive color) to the specified torque and lock it securely.

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 wheel and tighten the wheel nuts to specified torque.

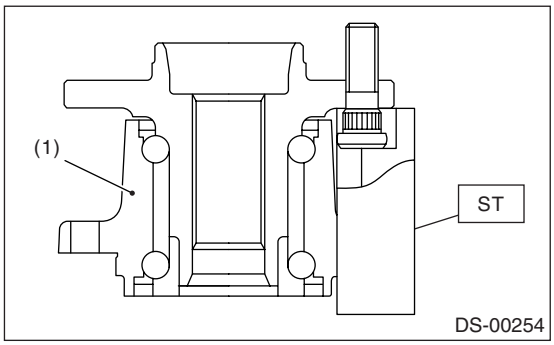
Tightening torque:
110 N·m (11.2 kgf-m, 81.1 ft-lb)

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.**

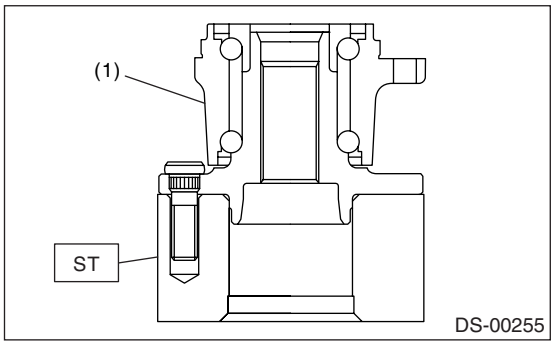
NOTE:
Since the hub unit bearing can not be disassembled, only hub bolts can be removed.



(1) Rear hub unit bearing

D: ASSEMBLY

1) Attach the hub to the ST securely.
ST28099PA080 HUB STAND



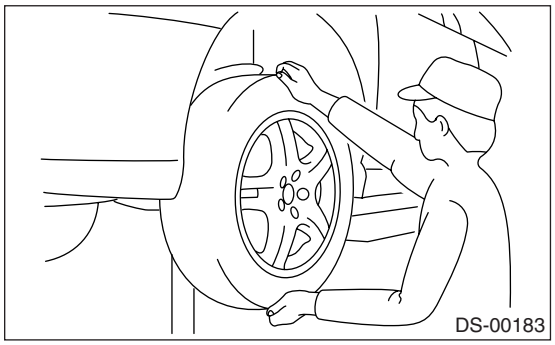
(1) Rear hub unit bearing

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.

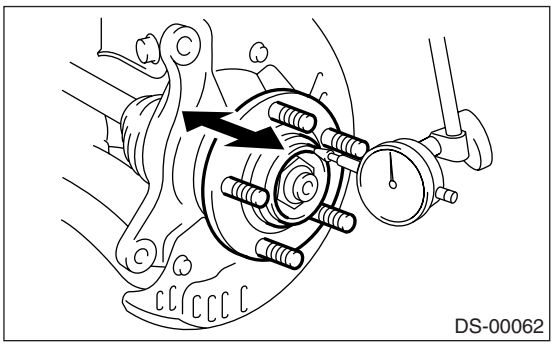
E: INSPECTION

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.

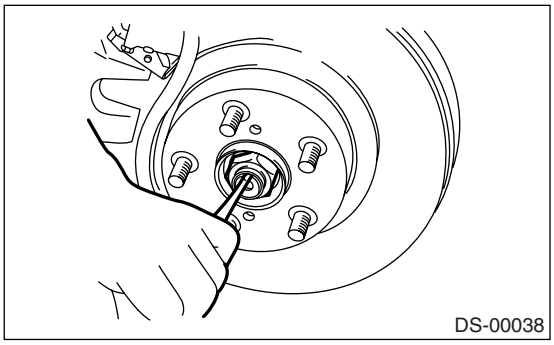
Service limit:
Maximum: 0.05 mm (0.0020 in)



7. Front Drive Shaft

A: REMOVAL

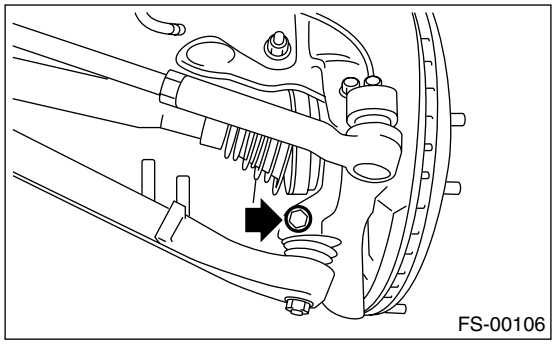
1) Disconnect the ground cable from the battery.
2) Lift-up the vehicle, and remove the front wheels.
3) Lift the crimped section of axle nut.



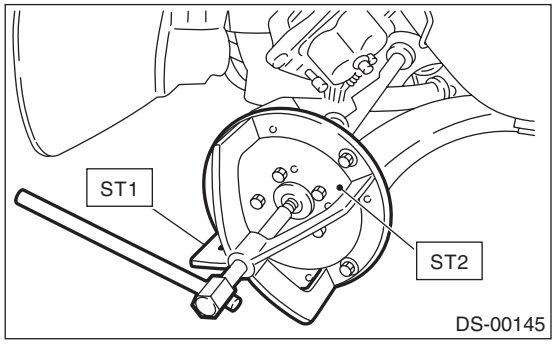
4) Remove the axle nut using a socket wrench while depressing the brake pedal.

CAUTION:
Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.

5) Remove the stabilizer link from front arm.
6) Disconnect the front arm ball joint from the front housing.



7) 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



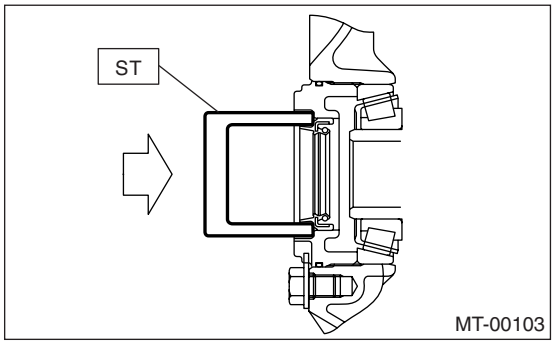
8) Using a bar, remove the front drive shaft from transmission.

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

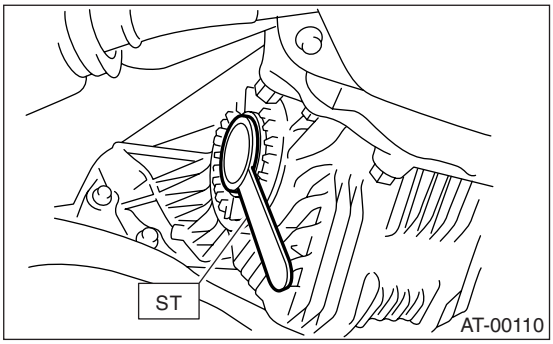
NOTE:
After pulling out the drive shaft, be sure to replace with a new oil seal.



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.

8) While depressing the brake pedal, tighten a new axle nut (olive color) to the specified torque and lock it securely.

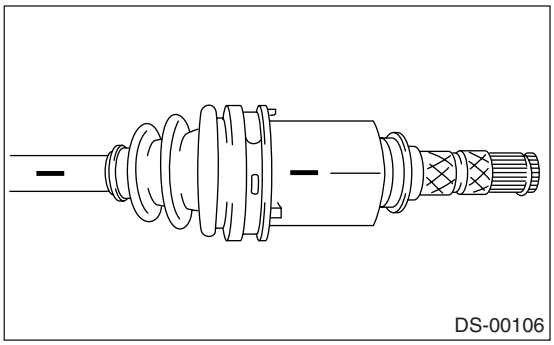
Tightening torque:
240 N·m (24.5 kgf-m, 177 ft-lb)

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.

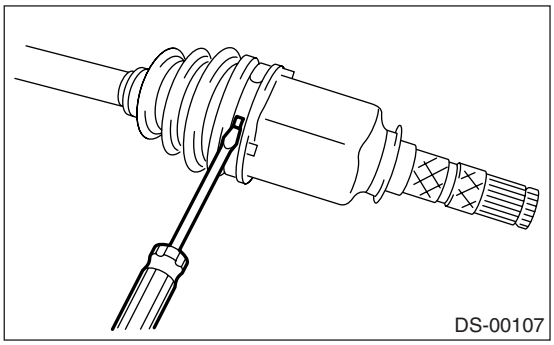
C: DISASSEMBLY

1) Place alignment marks on the shaft and outer race.

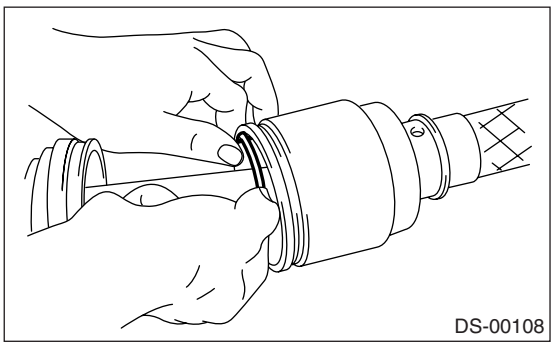

DS-00106

2) Remove the PTJ boot band and boot.

CAUTION:
Be careful not to damage the boot.


DS-00107

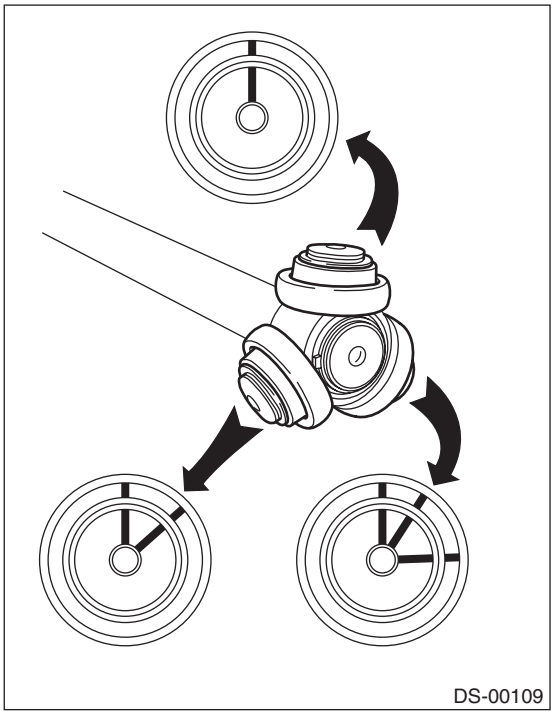
3) Remove the snap ring from PTJ outer race.


DS-00108

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.

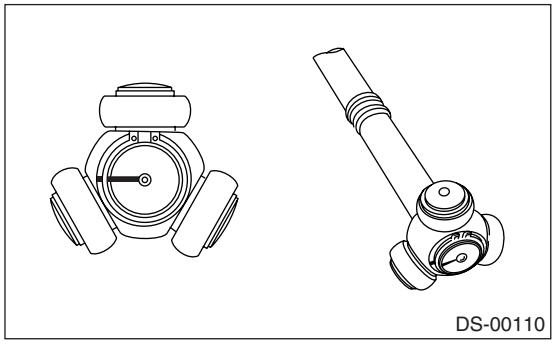
6) Place alignment marks on the roller kit and trunnion.


DS-00109

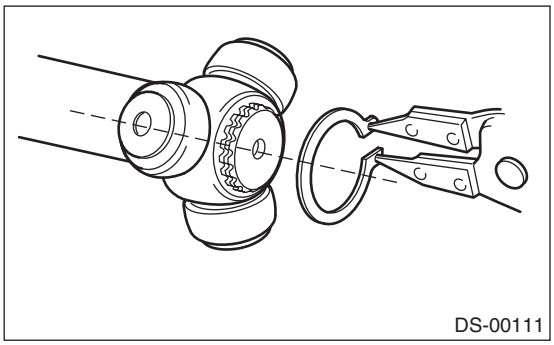
7) Remove the roller kit from trunnion.

CAUTION:
Be careful with the roller kit position.

8) Place alignment marks on the trunnion and shaft.


DS-00110

9) Remove the snap ring and trunnion.


DS-00111

CAUTION:
Be sure to wrap shaft splines with vinyl tape to protect the boot from scratches.

10) Remove the PTJ boot.

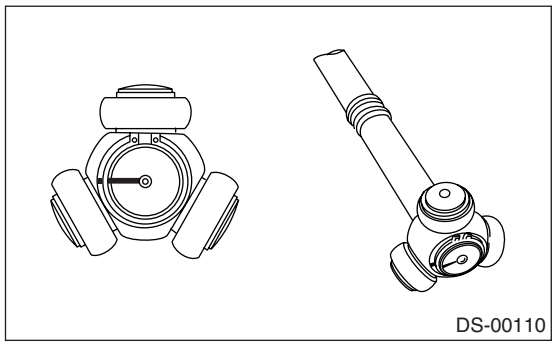
NOTE:
The BJ is a non-disassembly part, so the axle disassembly stops here.

D: ASSEMBLY

NOTE:
Use specified grease.

PTJ side:
NKG302 (Part No. 28395AG02A)

1) Place the PTJ boot at the center of shaft.
2) Align alignment marks and install the trunnion on the shaft.

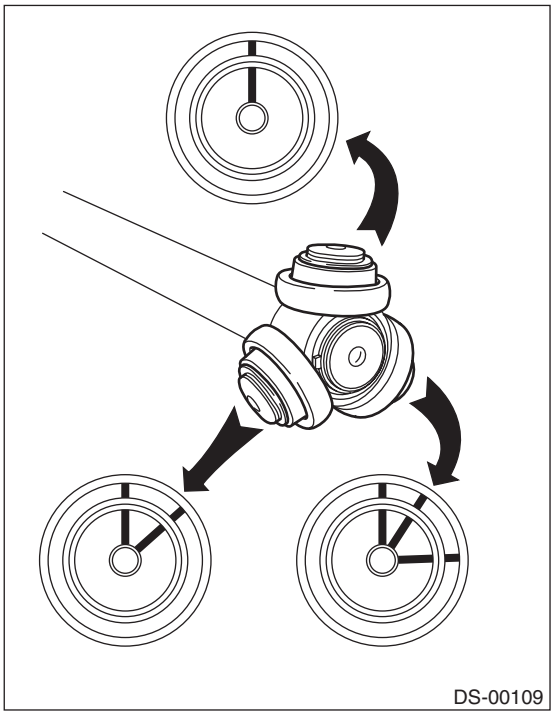

DS-00110

3) Install the snap ring to shaft.

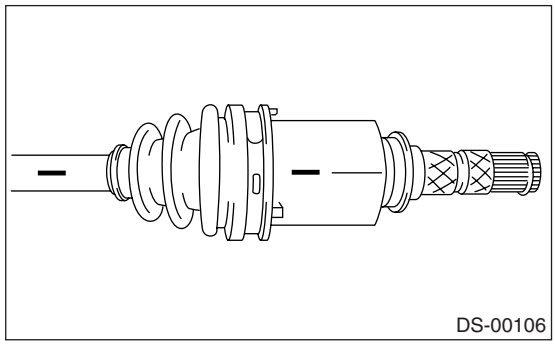
CAUTION:
Confirm that the snap ring is completely fitted in shaft groove.

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.


DS-00109

7) Align the alignment marks of the shaft and outer race, and install the outer race.


DS-00106

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.
10) Install the PTJ boot taking care not to twist it.

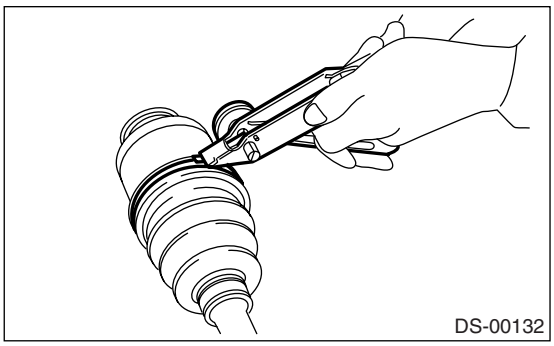
CAUTION:
• The large end of PTJ boot and the boot groove shall be cleaned completely so as to be free from grease and other substances.
• When installing PTJ boot, position outer race of PTJ at center of its travel.

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.

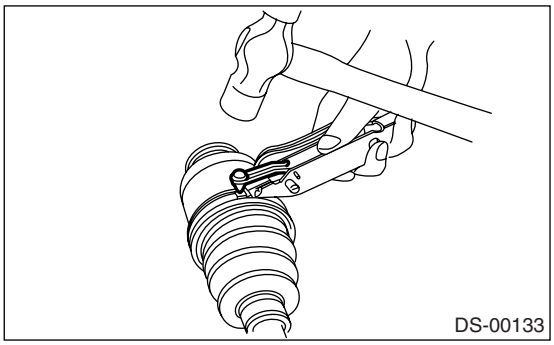
13) Tighten the band using the ST.
ST 925091000 BAND TIGHTENING TOOL

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

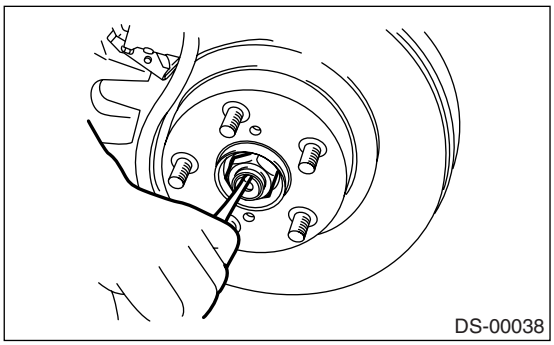
Check for wear, warping, breakage and scratches.
- Grease

Check for discoloration and fluidity.

8. Rear Drive Shaft

A: REMOVAL

1) Disconnect the ground cable from the battery.
2) Lift-up the vehicle, and then remove the rear wheels.
3) Lift the crimped section of axle nut.



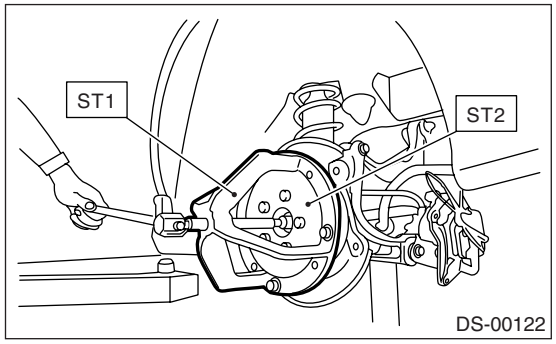
4) While applying the parking brake, remove the axle nut using a socket wrench.

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-14, 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

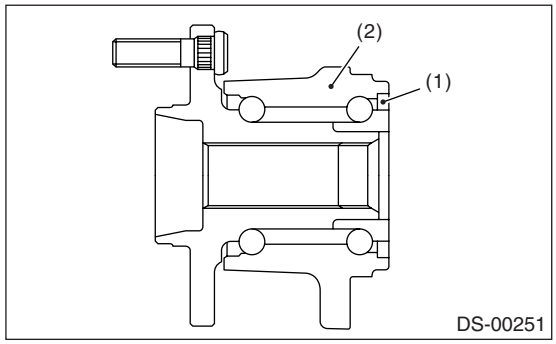
CAUTION:
• Do not hammer drive shaft when removing.
• Do not damage the oil seal and magnetic encoder.



B: INSTALLATION

1) Insert the EBJ into 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.

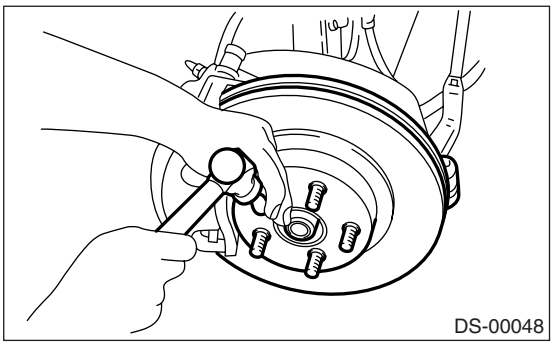
CAUTION:
Do not hammer drive shaft when installing it.

3) Tighten the axle nut temporarily.
4) Install the rear differential assembly.
VA-type
<Ref. to DI-15, INSTALLATION, Rear Differential (VA–type).>
5) While applying the parking brake and depressing the brake pedal, tighten a new axle nut (olive color) 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.



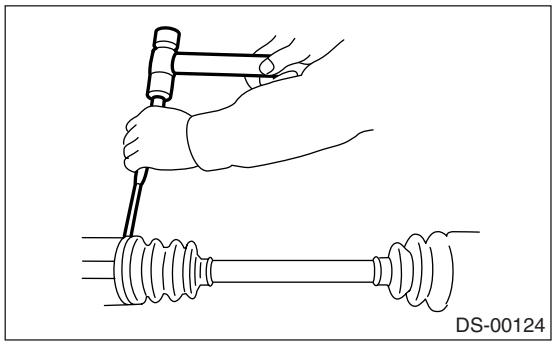
7) Install the wheel.

Tightening torque:
110 N·m (11.2 kgf-m, 81.1 ft-lb)

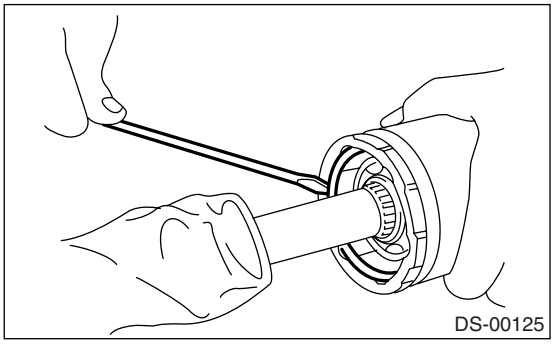
C: DISASSEMBLY

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.



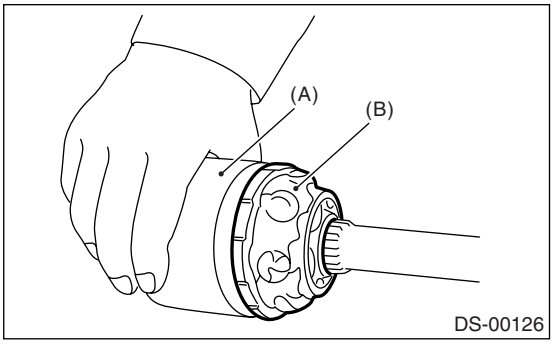
3) Remove the boot band on the small end of DOJ boot in the same manner.
4) Remove the larger end of DOJ boot from DOJ outer race.
5) Pry and remove the round circlip at the neck of DOJ outer race with a screwdriver.



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.

12) Remove the EBJ boot using the same procedures as for the DOJ boot.

NOTE:
The EBJ is a non-disassembly part, so the axle disassembly stops here.

D: ASSEMBLY

NOTE:
Use specified grease.

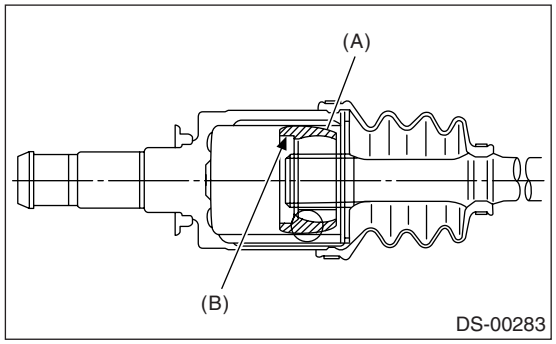
DOJ side:
NKG205 (Part No. 28495AG00A)

1) Install the EBJ boot to the specified position, and fill it with 60 to 70 g (2.12 to 2.47 oz) of specified grease.
2) Place the DOJ boot at the center of shaft.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

3) Insert the DOJ cage onto shaft.

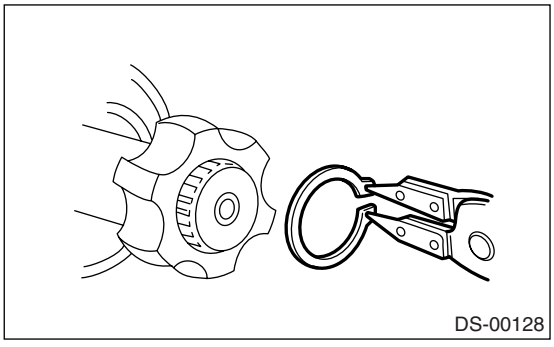
NOTE:
Insert the cage with the cutout portion facing the shaft end, since the cage has an orientation.



(A) Cage
(B) Cutout portion

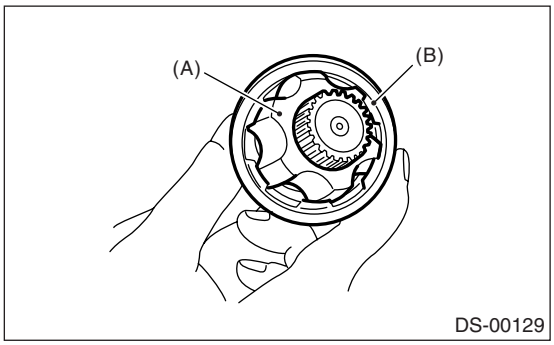
4) Install the DOJ inner race on shaft and fix the snap ring in place with pliers.

NOTE:
Confirm that the snap ring is completely fitted in the shaft groove.



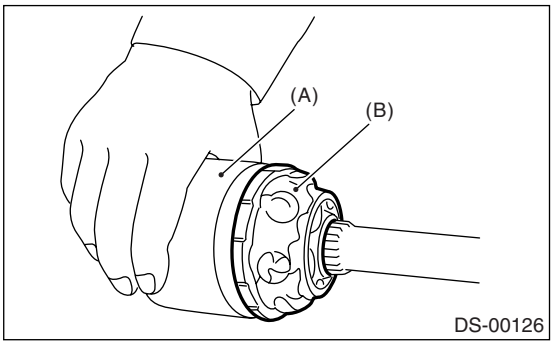
5) Install the cage to inner race fixed upon shaft.

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

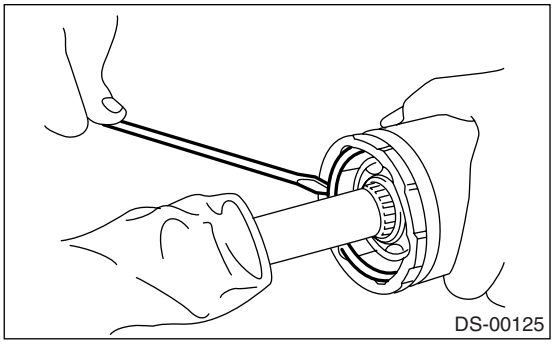
6) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the inner side of the DOJ outer race.
7) Apply a thin coat of specified grease to the cage pocket and six ball bearings.
8) Insert the six ball bearings into the cage pocket.
9) Align the outer race track and ball positions, and place the shaft, inner race, cage and ball bearings in the original positions and then fix outer race in place.



(A) Outer race
(B) Grease

10) 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.


DS-00125

11) Apply an even coat of the specified grease [20 to 30 g (0. 71 to 1. 06 oz)] to the entire inner surface of boot. Also apply grease to the shaft.
12) Install the DOJ boot taking care not to twist it.

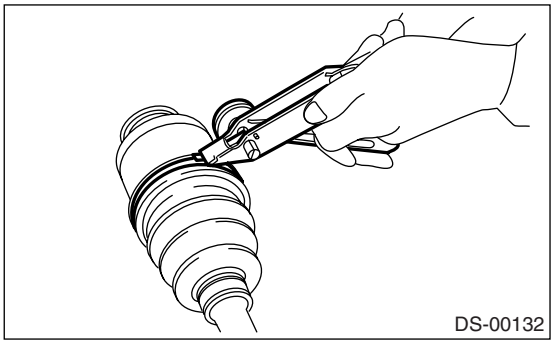
NOTE:
• The inside of the larger end of DOJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
• When installing the DOJ boot, position the outer race of DOJ at center of the stroke.

13) Put a new band through the clip and wind twice in the band groove of the boot.
14) 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.

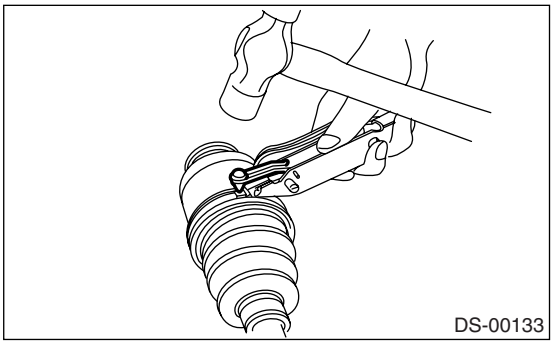
15) Tighten the band using the ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten the band until it cannot be moved by hand.


DS-00132

16) 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.


DS-00133

17) 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.

18) Install the EBJ boot using the same procedures as for the DOJ boot.
19) 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.

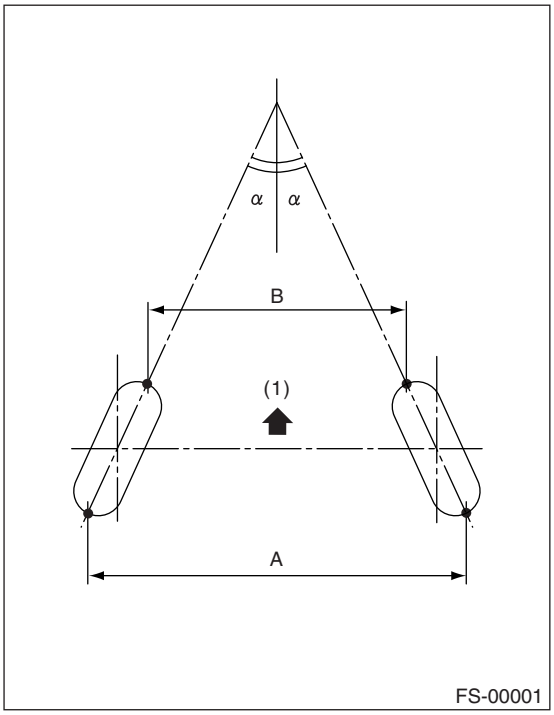
Symptom	Possible cause	Corrective action
Noise or vibration from propeller shaft	Center bearing	Check the center bearing. <Ref. to DS-12, CENTER BEARING FREE PLAY, INSPECTION, Propeller Shaft.>
	Runout of propeller shaft	Check for deflection of the propeller shaft. <Ref. to DS-12, RUNOUT OF PROPELLER 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.>
Abnormal wheel vibration	Wheel is out of balance.	Check the wheel balance. <Ref. to WT-8, ADJUSTMENT, Wheel Balancing.>
	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-21, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-12, INSPECTION, Rear Shock Absorber.>
	Front drive shaft	Check the front drive shaft. <Ref. to DS-27, INSPECTION, Front Drive Shaft.>
	Rear drive shaft	Check the rear driveshaft. <Ref. to DS-31, INSPECTION, Rear Drive Shaft.>
	Front hub unit bearing	Check the front hub unit bearing. <Ref. to DS-20, INSPECTION, Front Hub Unit Bearing.>
	Rear hub unit bearing	Check the rear hub unit bearing. <Ref. to DS-23, INSPECTION, Rear Hub Unit Bearing.>
Noise from the underbody	Wheel is out of balance.	Check the wheel balance. <Ref. to WT-8, ADJUSTMENT, Wheel Balancing.>
	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-21, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-12, INSPECTION, Rear Shock Absorber.>

1. General Description

A: SPECIFICATION

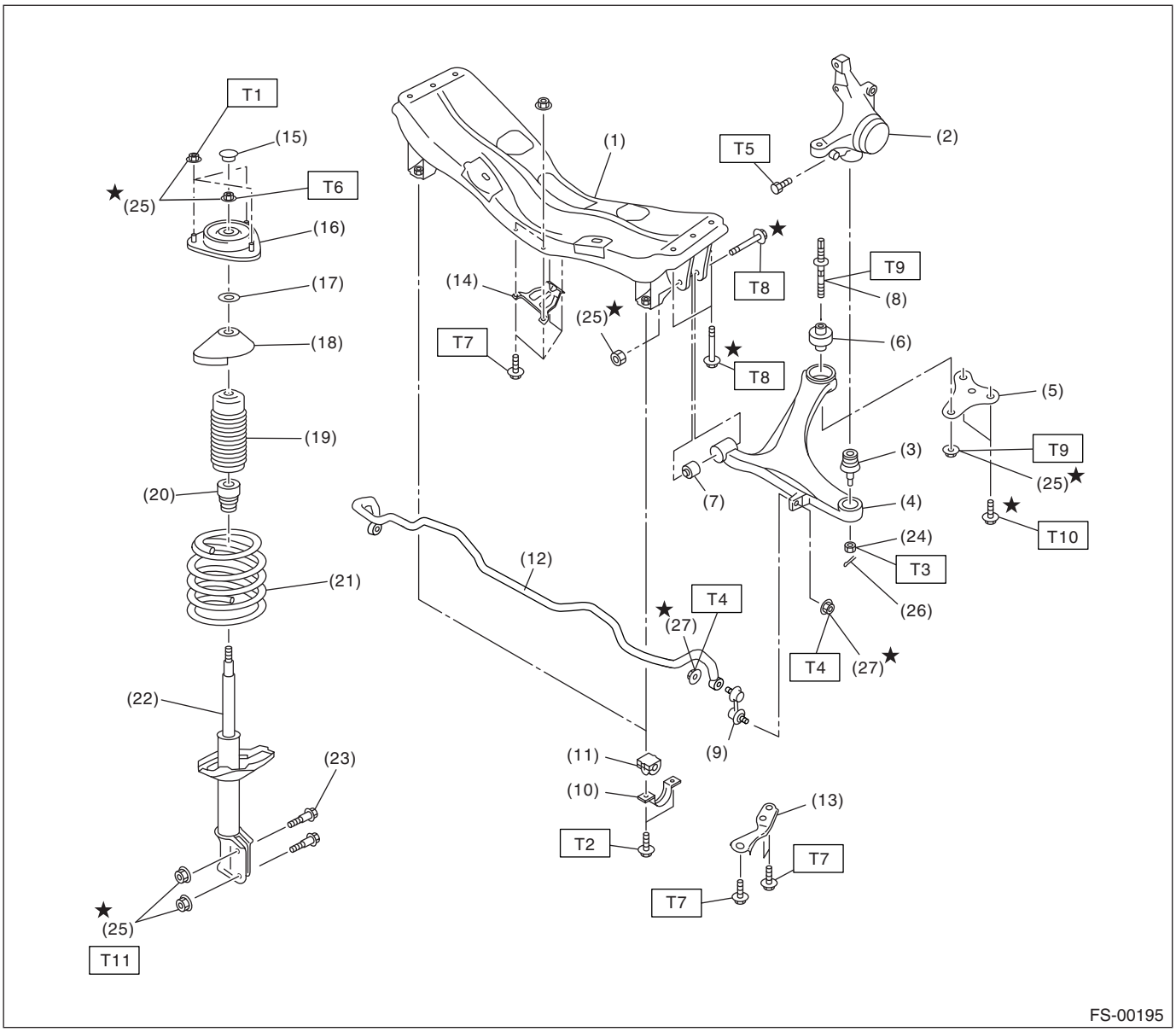
Front	Wheel arch height [Tolerance: $^{+12\ mm}_{-24\ mm}$ ($^{+0.47\ in}_{-0.94\ in}$)] mm (in)		442 (17.4)
	Camber (Tolerance: Differences between RH and LH: 45′ or less)		0°00′
	Caster (Referential Value)		4°04′
	Steering angle (Tolerance: ±1.5°)	Inner wheel	37.0°
		Outer wheel	32.0°
	Toe–in mm (in)		0±3 (0±0.12) Toe angle (sum of both wheels): 0°±0°14′
	Kingpin angle (Referential Value)		12°12′
	Diameter of stabilizer mm (in)		25 (0.98)
Rear	Wheel arch height [Tolerance: $^{+12\ mm}_{-24\ mm}$ ($^{+0.47\ in}_{-0.94\ in}$)] mm (in)		439 (17.3)
	Camber (Tolerance: Differences between RH and LH: 45′ or less)		–0°31′
	Toe–in mm (in)		2±2 (0.08±0.08) Toe angle (sum of both wheels): 0°±0°14′
	Thrust angle (Tolerance: ±0°30′)		0°
	Diameter of stabilizer mm (in)		16 (0.63)

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 ones as required.



(1) Front
A – B = Positive: Toe-in, Negative: Toe–out
α = Individual toe angles

B: COMPONENT



(1) Front crossmember
(2) Housing
(3) Ball joint
(4) Front arm
(5) Arm support plate
(6) Rear bushing
(7) Front bushing
(8) Stud bolt
(9) Stabilizer link
(10) Stabilizer clamp
(11) Stabilizer bushing
(12) Front stabilizer
(13) Crossmember support plate
(14) Jack–up plate
(15) Dust seal
(16) Strut mount
(17) Spacer
(18) Upper spring seat
(19) Dust cover
(20) Front helper
(21) Front coil spring
(22) Front strut
(23) Adjusting bolt
(24) Castle nut
(25) Self–locking nut
(26) Cotter pin
(27) Flange nut (with WAX)

Tightening torque: N·m (kgf-m, ft-lb)

T1:	***20 (2.0, 14.5)***
T2:	***25 (2.5, 18.1)***
T3:	***45 (4.6, 33.2)***
T4:	***60 (6.1, 44.3)***
T5:	***50 (5.1, 36.9)***
T6:	***55 (5.6, 40.6)***
T7:	***60 (6.1, 44.3)***
T8:	***95 (9.7, 70.1)***
T9:	***145 (14.8, 106.9)***
T10:	***150 (15.3, 110.6)***
T11:	***175 (17.8, 129.1)***

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 work clothing, including a cap, protective goggles and protective shoes during operation.
- 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. with that of another grade or from other 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

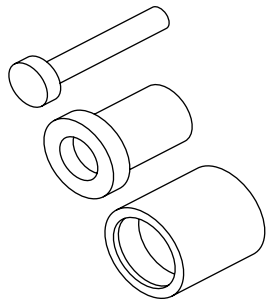
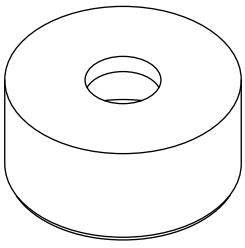
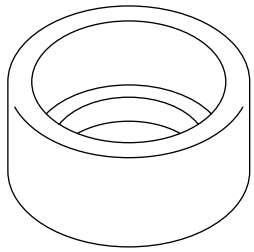
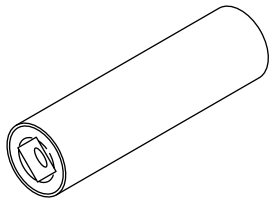
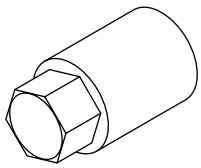
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927680000	927680000	INSTALLER & REMOVER SET	Used for replacing front arm front bushing.
 ST20299AG000	20299AG000	REMOVER	Used for replacing front arm rear bushing. Used with BASE (20999AG010).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST20299AG010	20299AG010	BASE	Used for replacing front arm rear bushing. Used with REMOVER (20999AG000).
 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.

2. Wheel Alignment

A: INSPECTION

Check the following items before performing the wheel alignment measurement.
Check items before measuring wheel alignment:

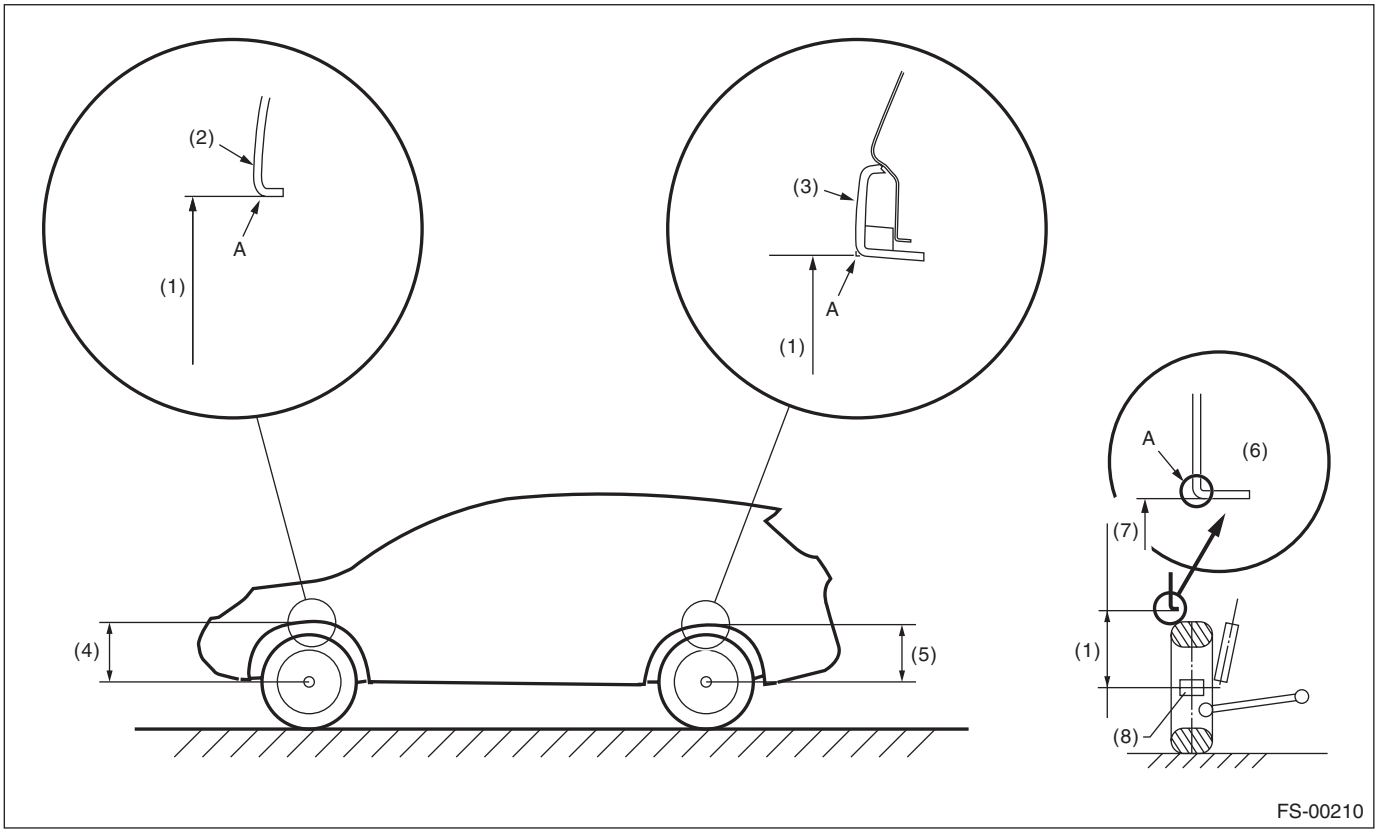
- Tire inflation pressure
- Uneven wear of RH and LH tires, or difference of sizes
- Tire runout
- Excessive play and wear of ball joint
- Excessive play and wear of tie rod end
- Excessive play of wheel bearing
- Right and left wheel base imbalance
- Deformation and excessive play of steering link
- Deformation and excessive play of suspension parts

Check, adjust and measure the wheel alignment in accordance with the procedures indicated in the figure.

Wheel arch height (front and rear wheels) <Ref. to FS-7, WHEEL ARCH HEIGHT, INSPECTION, Wheel Alignment.>
↓
Camber (front and rear wheels) <Ref. to FS-8, CAMBER, INSPECTION, Wheel Alignment.>
↓
Caster (front wheel) <Ref. to FS-9, CASTER, INSPECTION, Wheel Alignment.>
↓
Steering angle <Ref. to FS-10, STEERING ANGLE, INSPECTION, Wheel Alignment.>
↓
Front wheel toe–in <Ref. to FS-10, FRONT WHEEL TOE–IN, INSPECTION, Wheel Alignment.>
↓
Rear wheel toe–in <Ref. to FS-10, REAR WHEEL TOE–IN, INSPECTION, Wheel Alignment.>
↓
Thrust angle <Ref. to FS-12, THRUST ANGLE, INSPECTION, Wheel Alignment.>

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 more than 5 m (16 ft).
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.



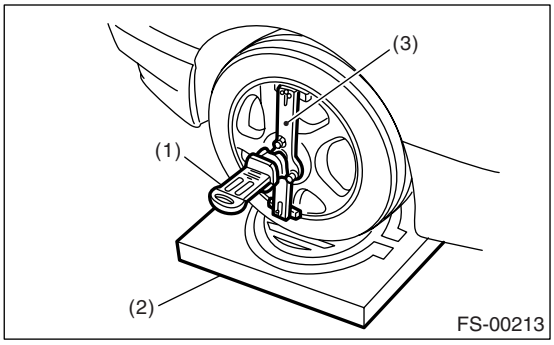
(1) Wheel arch height
(2) Front fender
(3) Rear quarter
(4) Front wheel arch height
(5) Rear wheel arch height
(6) Flange bend line
(7) Point of measurement
(8) Tip end of spindle

Wheel arch height specification mm (in) (Tolerance: $^{+12\ mm}_{-24\ mm}$ ($^{+0.47\ in}_{-0.94\ in}$))	
Front	442 (17.4)
Rear	439 (17.3)

2. CAMBER

• INSPECTION

1) Place the front wheel on the turning radius gauge. Make sure the ground contact surfaces of front and rear wheels are at the same height.
2) Set the adapter at the center of wheel, and then attach 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°00′±0°45′

• FRONT CAMBER ADJUSTMENT

1) When adjusting the camber, adjust it to the following value.

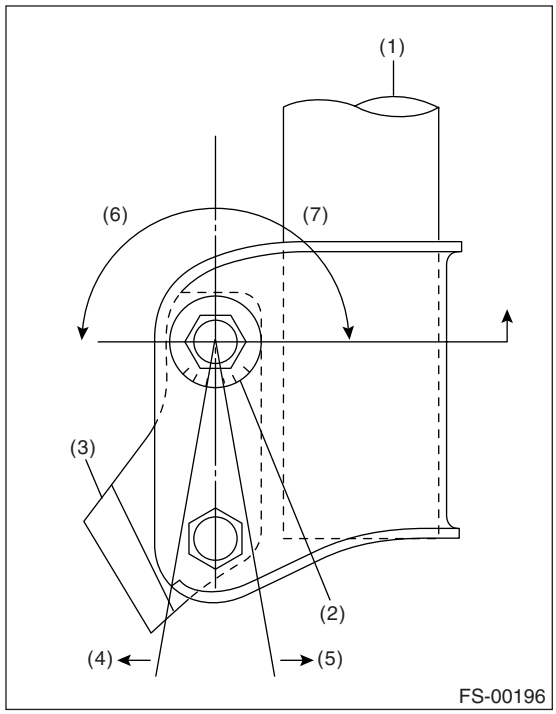
Camber (Difference between RH and LH 45′ or less)
0°00′±0°30′

2) Loosen the two self–locking nuts located at the lower front section of the strut.

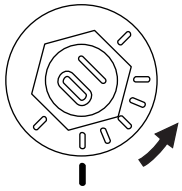
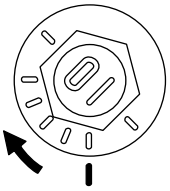
NOTE:
When the adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn the self–locking nut.

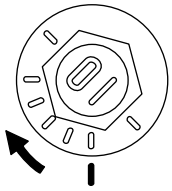
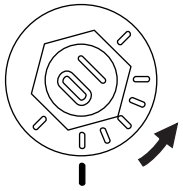
3) Turn the camber adjusting bolt so that the camber is set at specification.

NOTE:
Moving the adjusting bolt by one scale changes the camber by approximately 0°15′.



(1) Strut
(2) Adjusting bolt
(3) Housing
(4) Outer
(5) Inner
(6) Camber is increased.
(7) Camber is decreased.

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

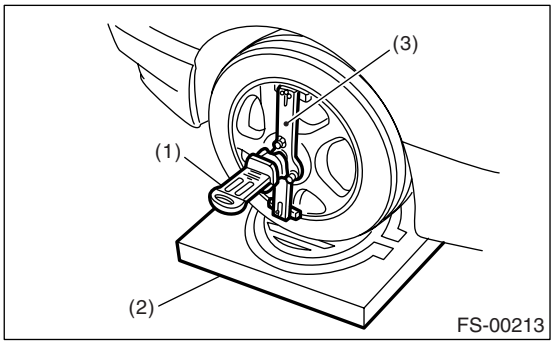
4) Tighten two new self–locking nuts.

Tightening torque:
175 N·m (17.9 kgf-m, 129 ft-lb)

3. CASTER

• INSPECTION

1) Place the front wheel on the turning radius gauge. Make sure the ground contact surfaces of front and rear wheels are at the same height.
2) Set the adapter at the center of wheel, and then attach 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
4°04′(Reference)

4. STEERING ANGLE

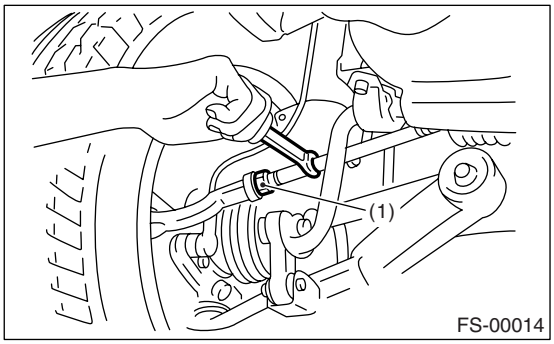
• INSPECTION

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

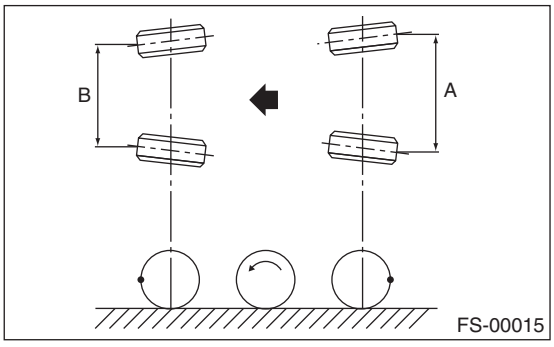
Toe-in:
0±3 mm (0±0.12 in)

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 = Toe–in

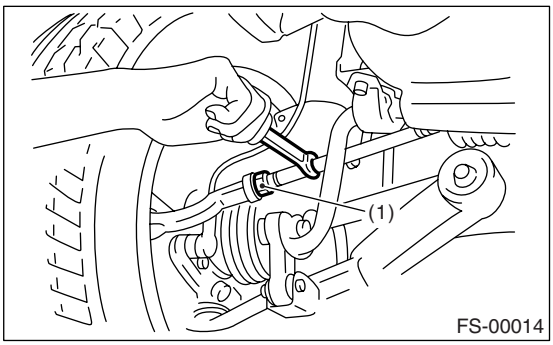


• ADJUSTMENT

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±2 mm (0.08±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.>

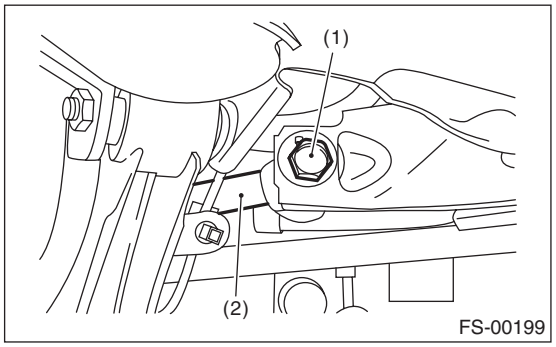
• **ADJUSTMENT**

When adjusting, adjust it to the following value.

Toe-in:
2±1.5 mm (0.08±0.06 in)

1) Loosen the self-locking nut on the inner side of the front lateral link.

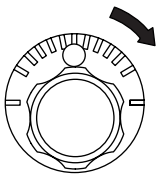
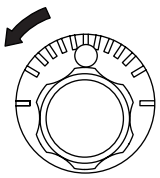
NOTE:
When loosening or tightening the adjusting bolt, hold the bolt head and turn the self–locking nut.

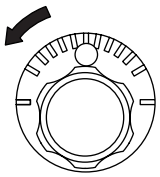
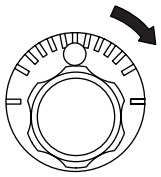


(1) Adjusting bolt
(2) Front lateral link

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.

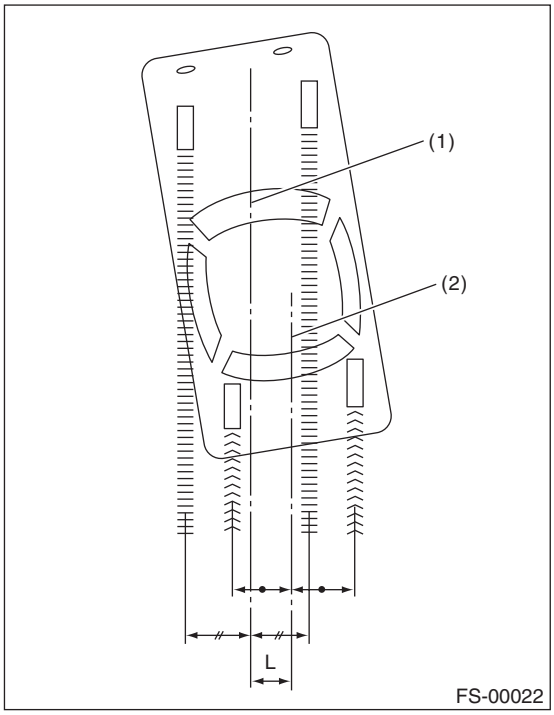
Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

7. THRUST ANGLE

• INSPECTION

1) Park the vehicle on a level surface.
2) Move the vehicle 3 to 4 meters (10 to 13 feet) 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°±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)

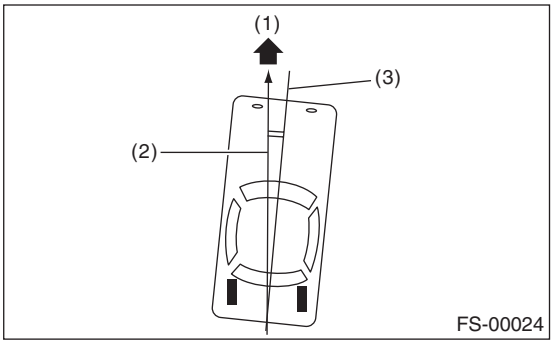
• ADJUSTMENT

When adjusting, adjust it to the following value.

Thrust angle:
0°±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)).

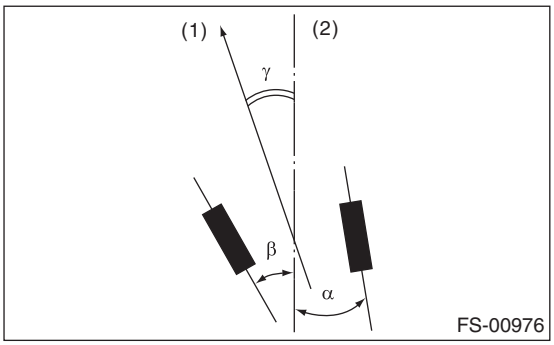
NOTE:
Thrust angle is a mean value of left and right wheel toe angles in relation to the vehicle body center line. Vehicle is driven straight in the thrust angle direction while slanting in the oblique direction depending on the degree of the mean thrust angle.



(1) Front
(2) Thrust angle
(3) Body center line

Thrust angle: $r = (\alpha - \beta)/2$

α: Rear RH wheel toe–in angle
β: Rear LH wheel toe–in angle
Substitute only the positive toe–in values from each wheel into α and β in the equation.

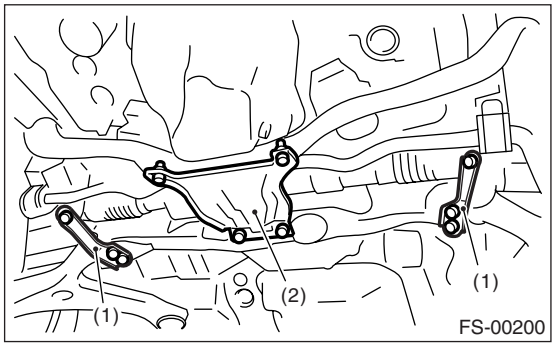


(1) Front
(2) Body center line

3. Front Crossmember Support Plate

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the front under cover. <Ref. to EI-17, REMOVAL, Front Under Cover.>
3) Remove the bolt and remove front crossmember support plate.



(1) Crossmember support plate
(2) Jack–up plate

B: INSTALLATION

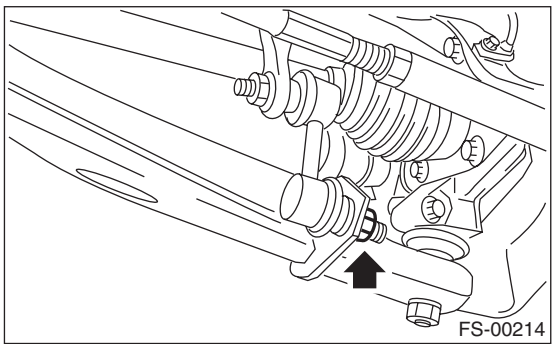
Install in the reverse order of removal.

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)

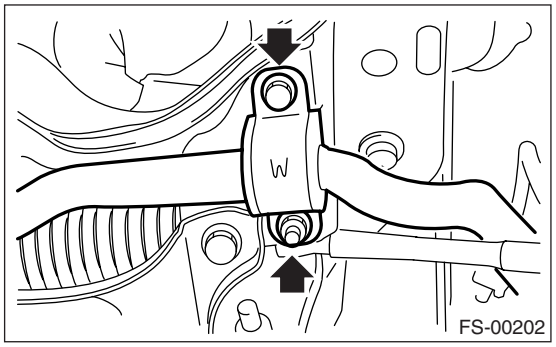
4. Front Stabilizer

A: REMOVAL

1) Lift-up the vehicle, and then remove the front wheels.
2) Remove the front under cover. <Ref. to EI-17, REMOVAL, Front Under Cover.>
3) Remove the front crossmember support plate. <Ref. to FS-13, REMOVAL, Front Crossmember Support Plate.>
4) Remove the stabilizer link.



5) Remove the stabilizer link.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
- Use a new flange nut (with WAX).
- 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)

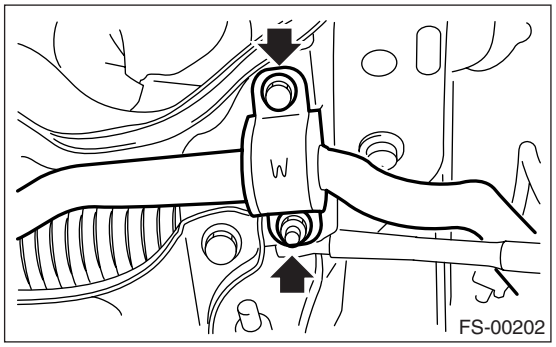
C: INSPECTION

1) Check the bushing for cracks, fatigue or damage.
2) Check the stabilizer link for damage.

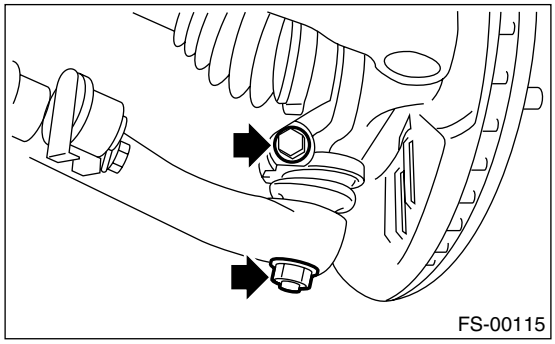
5. Front Ball Joint

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 front arm.
4) Remove the bolt installing ball joint to 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)

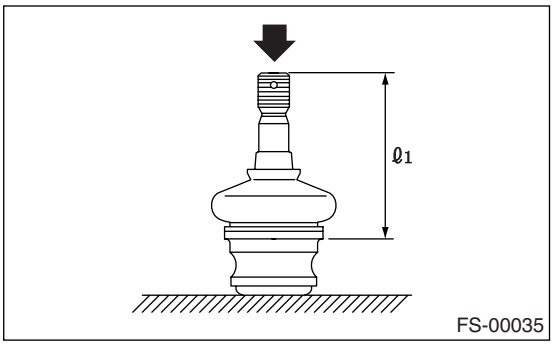
3) Retighten the castle nut further up to 60° until the hole in the ball stud is aligned with a slot in castle nut. Then, insert a new cotter pin and bend it around the castle nut.
4) Install the stabilizer bracket.

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

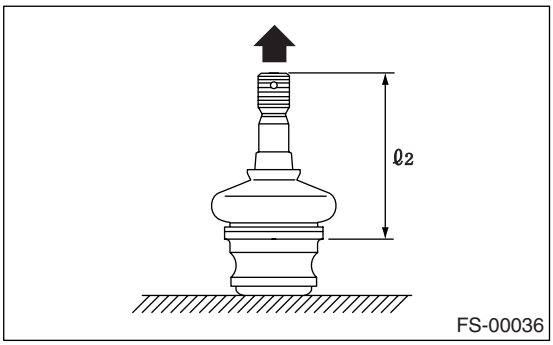
5) Install the front wheels.

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 ℓ_1.



(2) With 980 N (100 kgf, 220lb) loaded in direction shown in the figure, measure the length ℓ_2.



(3) Determine free play using the following formula.
$S = \ell_2 - \ell_1$
(4) Replace with a new part if the play exceeds specification.

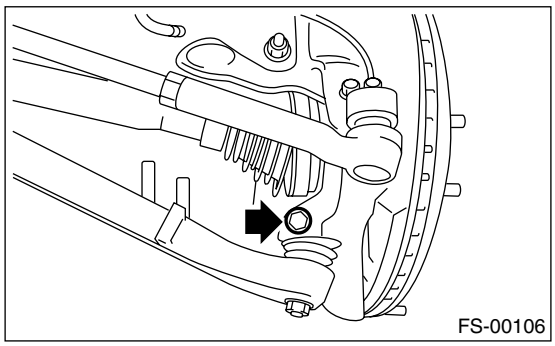
FRONT BALL JOINT
Specification for replacement S:
Less than 0.3 mm (0.012 in)

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.

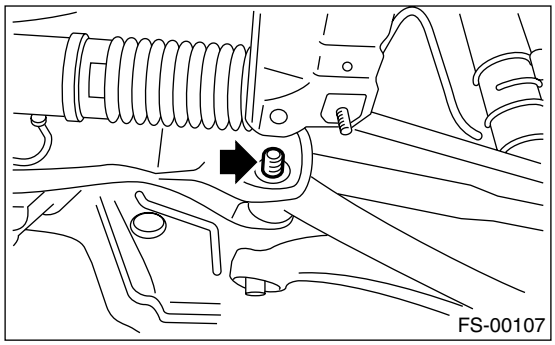
6. Front Arm

A: REMOVAL

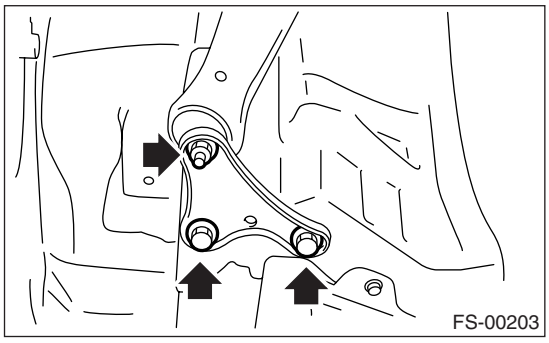
1) Lift-up the vehicle, and then remove the front wheels.
2) Remove the front crossmember support plate. <Ref. to FS-13, REMOVAL, Front Crossmember Support Plate.>
3) Remove the front stabilizer. <Ref. to FS-14, REMOVAL, Front Stabilizer.>
4) Remove the ball joint of front arm.



5) Remove the nut securing the front arm to crossmember. (Do not remove the bolt.)

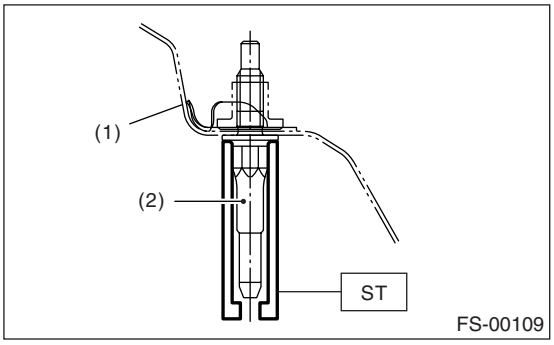


6) Remove the front arm support plate.



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 ones 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:
145 N·m (14.8 kgf-m, 106.9 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-14, 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.

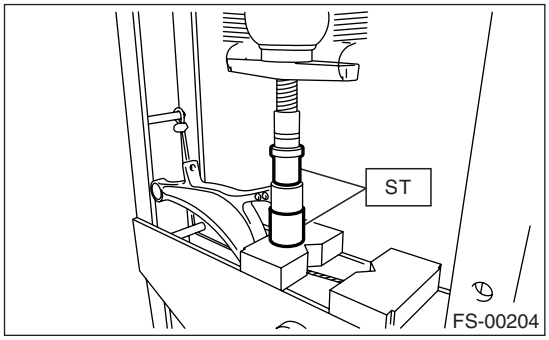
Tightening torque:
95 N·m (9.7 kgf-m, 70.1 ft-lb)

NOTE:
Inspect the wheel alignment and adjust if necessary.

C: DISASSEMBLY

1. FRONT BUSHING

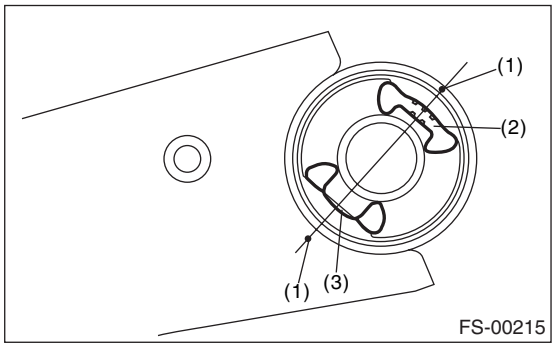
Using the ST and a press, remove the front bushing.
ST 927680000 INSTALLER & REMOVER SET



2. REAR BUSHING

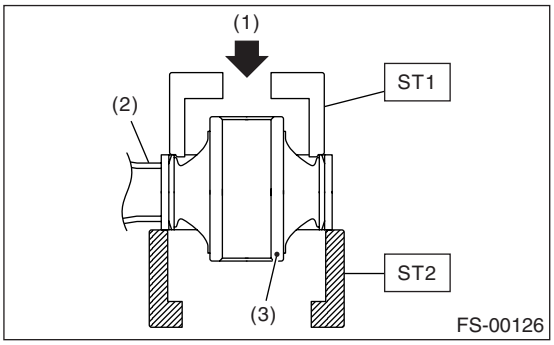
1) Put an alignment mark on the front arm based on the center of rear bushing recess portion.

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 REMOVER
ST2 BASE



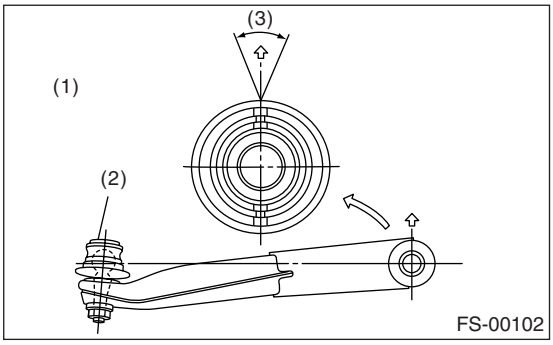
(1) Press
(2) Front arm
(3) Rear bushing

D: ASSEMBLY

1. FRONT BUSHING

Assemble in the reverse order of disassembly.

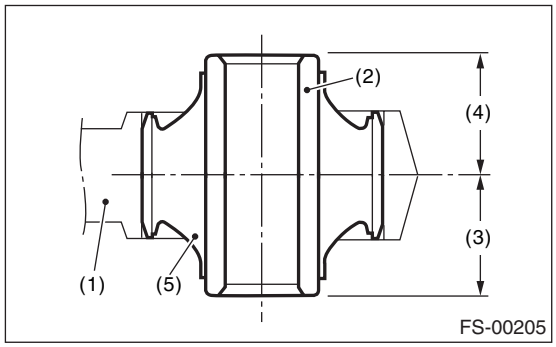
CAUTION:
Install the front bushing in proper direction as shown in the figure.



(1) Face the bushing toward the center of ball joint.
(2) Ball joint
(3) ±3°

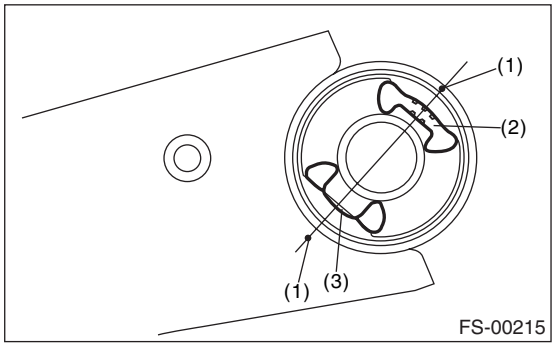
2. REAR BUSHING

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.



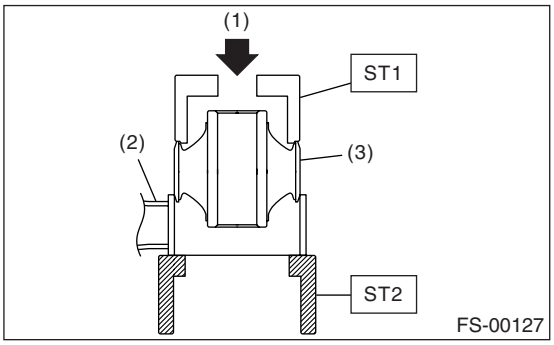
(1) Front arm
(2) Bushing inner cylinder
(3) Longer
(4) Shorter
(5) Identification paint

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

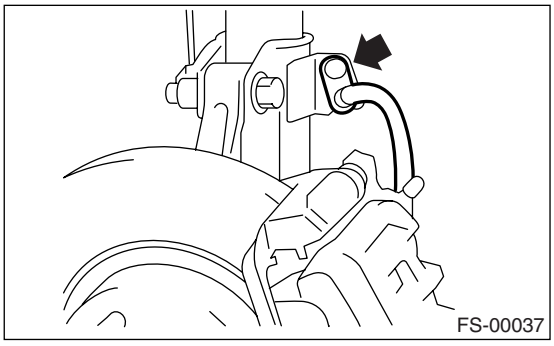
E: INSPECTION

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.

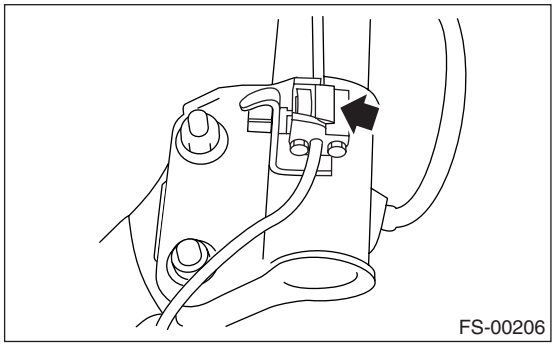
7. Front Strut

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.



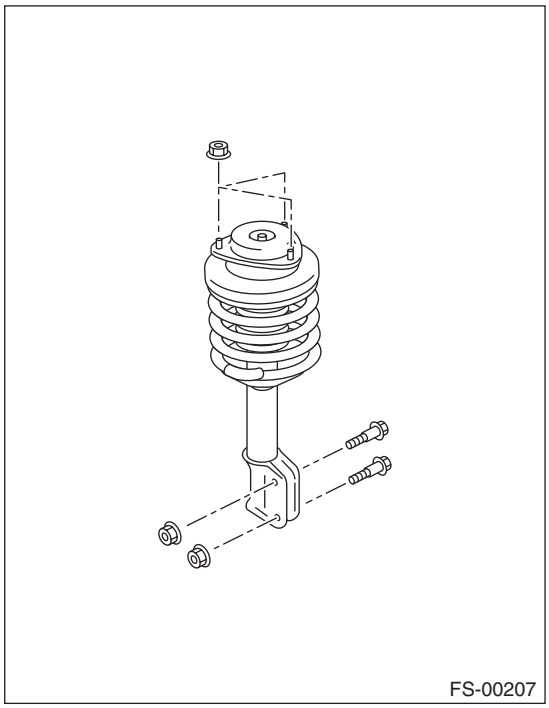
4) Remove the clip securing the ABS wheel speed sensor harness.



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:
175 N·m (17.9 kgf-m, 129 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.

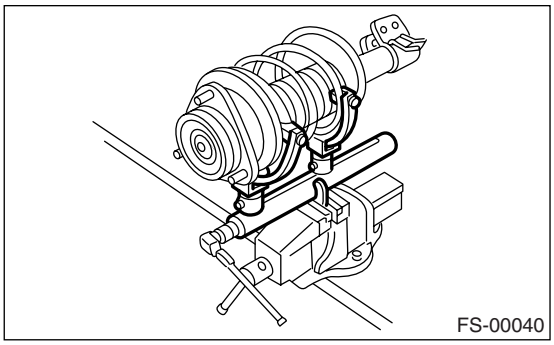
Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

5) Install the front wheels.

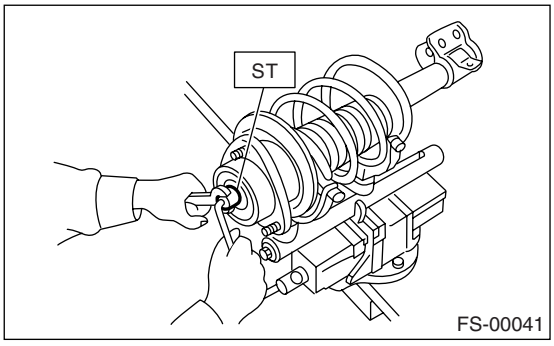
NOTE:
Inspect the wheel alignment and adjust if necessary.

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.

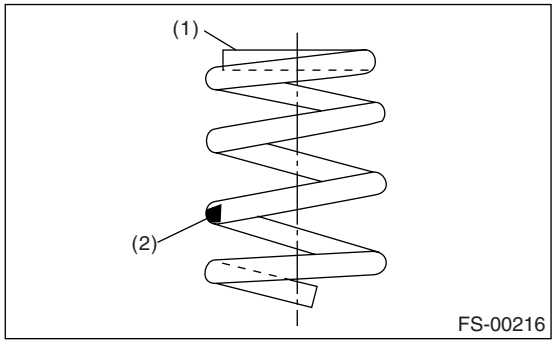
D: ASSEMBLY

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 more than 10 mm (0.39 in) in the former step, purge air from the strut.
3) Air purging procedure
   (1) Place the strut vertically with the piston rod facing up.
   (2) Fully extend the piston rod.
   (3) With the piston rod fully extended, place the piston rod side down. The strut must stand vertically.
   (4) Fully 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”

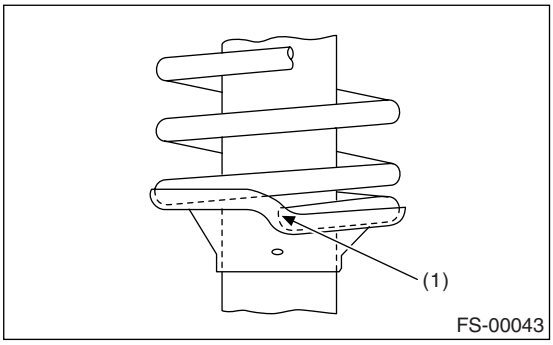
4) Using a coil spring compressor, compress the coil spring.

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 paint

5) Set the coil spring correctly so that its end face seats well in the spring seat as shown in the figure.

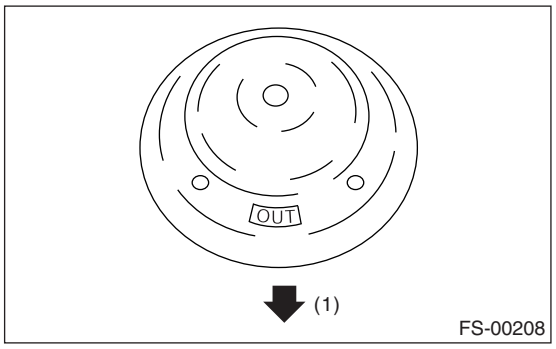


(1) Coil spring end face

6) Install the helper and dust cover to the piston rod.

7) Pull the piston rod fully upward, and install the spring seat.

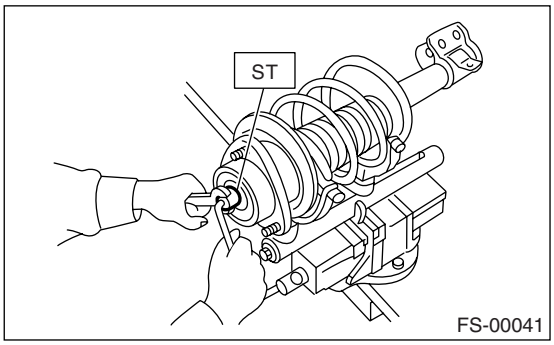
NOTE:
Position the upper spring seat as shown in the figure.



(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)



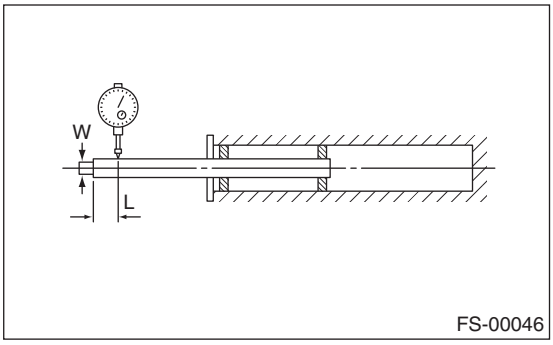
10) Loosen the coil spring carefully.

E: INSPECTION

Check the removed part for wear, damage and cracks, and then repair or replace it if defective.

1. DAMPER 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 one if defective.

3. DUST COVER

If any cracks or damage are found, replace it with a new one.

4. COIL SPRING

If a permanent strain is found, replaced it with a new part.

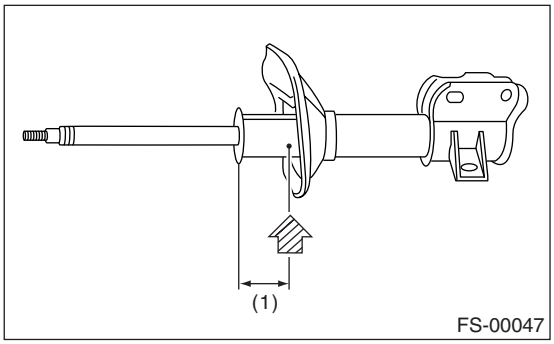
5. HELPER

Replace it with a new one 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.

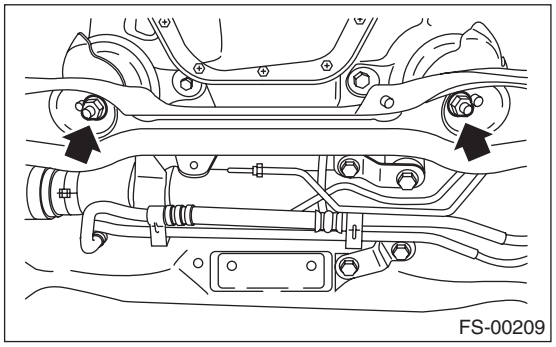


(1) 40 mm (1.57 in)

8. Front Crossmember

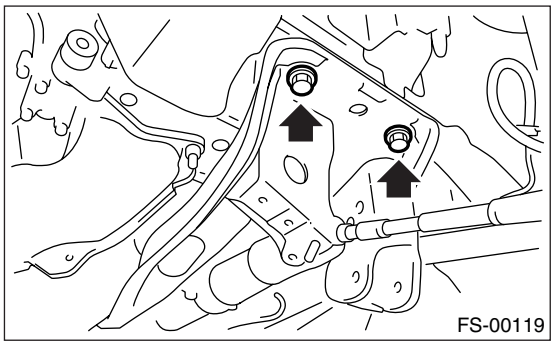
A: REMOVAL

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-13, REMOVAL, Front Crossmember Support Plate.>
4) Remove the front stabilizer. <Ref. to FS-14, REMOVAL, Front Stabilizer.>
5) Disconnect the tie-rod end from housing.
6) Remove the front arm. <Ref. to FS-16, REMOVAL, Front Arm.>
7) Remove the nuts attaching the engine mount cushion rubber to crossmember.


FS-00209

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 the 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.


FS-00119

B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
• 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 stabilizer 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:
85 N·m (8.7 kgf-m, 62.7 ft-lb)
Front arm to Crossmember:
95 N·m (9.7 kgf-m, 70.1 ft-lb)
Front arm to Support plate:
145 N·m (14.8 kgf-m, 106.9 ft-lb)
Support plate to Body:
150 N·m (15.3 kgf-m, 110.6 ft-lb)
Tie–rod end to housing:
27.0 N·m (2.75 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 damper 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	Adjust or replace the coil springs with new ones.
(4) Fault in operation of damper strut or shock absorber	Replace.
(5) Damage or deformation of strut mount or shock absorber mount	Replace.
(6) Unsuitable length (maximum or minimum) of damper 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 damper strut or shock absorber	Replace.

3. NOISE

Possible cause	Corrective action
(1) Wear or damage of damper 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 damper 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.

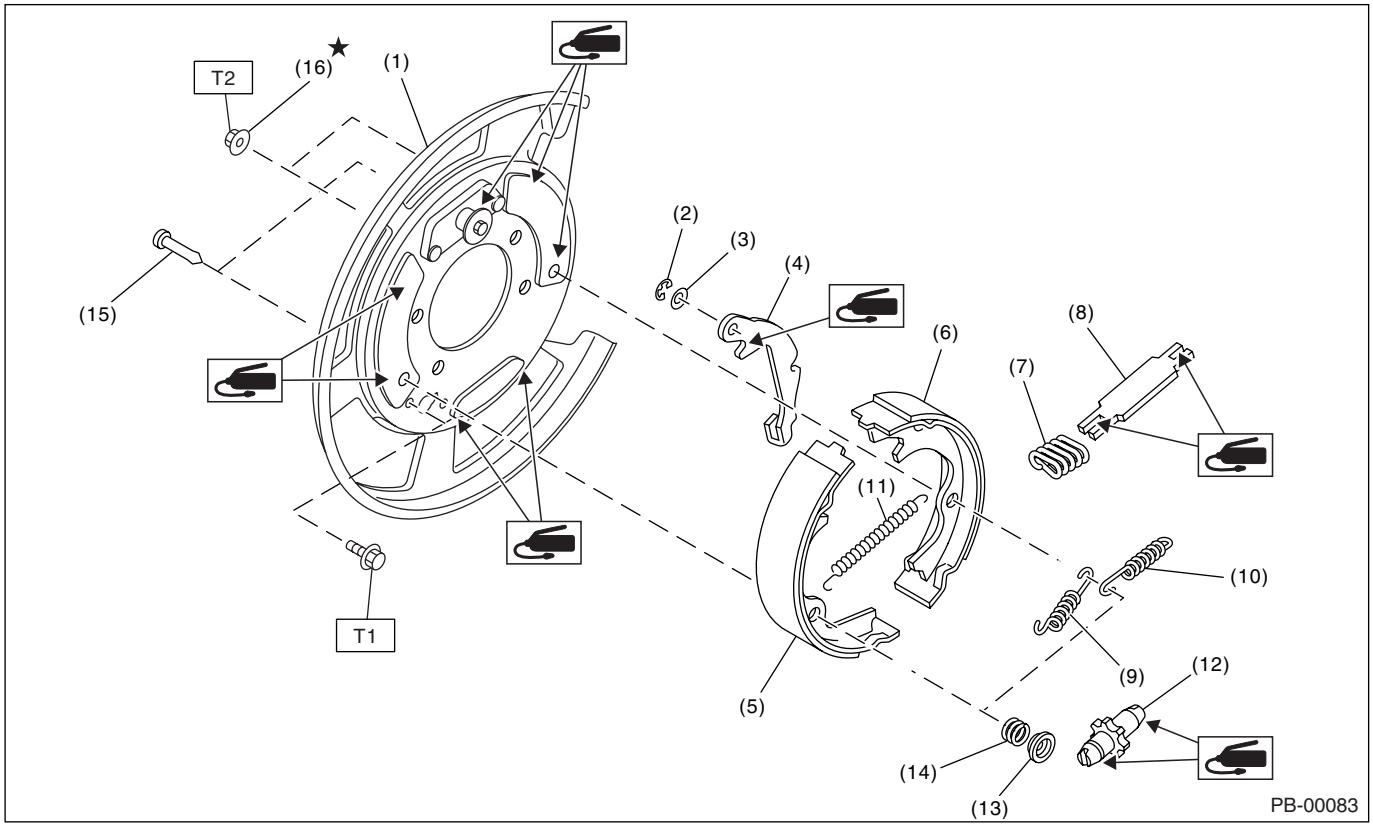
1. General Description

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

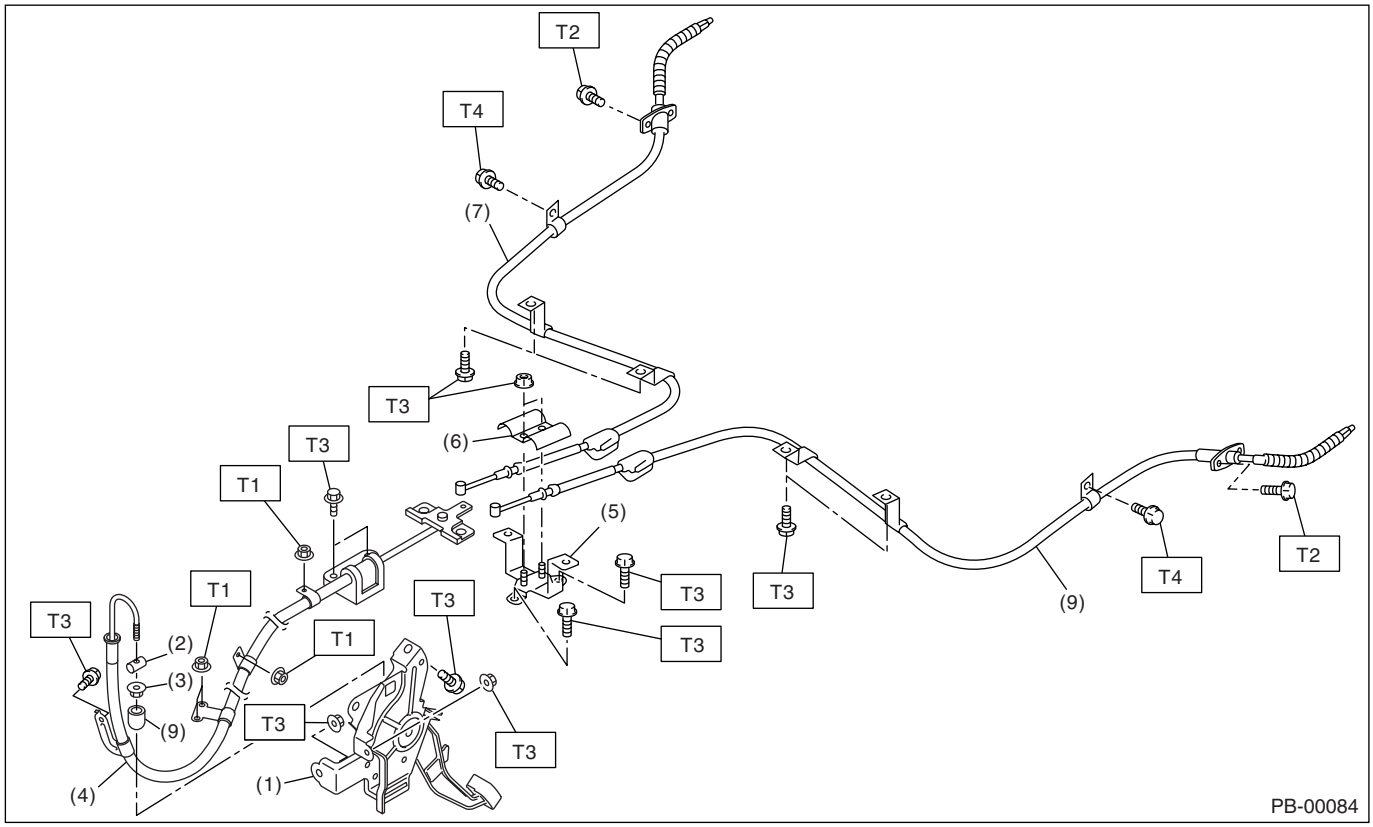
1. PARKING BRAKE (REAR DISC BRAKE)



(1) Back plate
(2) Retainer
(3) Spring washer
(4) Lever
(5) Parking brake shoe (Primary)
(6) Parking brake shoe (Secondary)
(7) Strut spring
(8) Strut
(9) Primary return spring
(10) Secondary return spring
(11) Adjusting spring
(12) Adjuster
(13) Brake shoe cup
(14) Brake shoe spring
(15) Shoe hold pin
(16) Self locking nut (with WAX)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.9)
T2: 75 (7.6, 55.33)

2. PARKING BRAKE CABLE



(1) Parking brake pedal
(2) Spacer
(3) Adjusting nut (Self-locking nut)
(4) Front parking brake cable
(5) Bracket
(6) Clamp
(7) Rear parking brake cable RH
(8) Rear parking brake cable LH
(9) Adjuster cap

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, 13.0)
T4: 33 (3.4, 24.3)

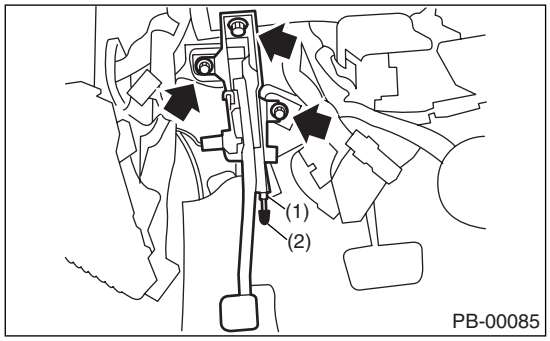
C: CAUTION

- Wear work clothing, including a cap, protective goggles and protective shoes during operation.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Be careful not to burn yourself, because each part on the vehicle is hot after running.
- Use SUBARU genuine grease etc. or equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or 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.

2. Parking Brake Pedal

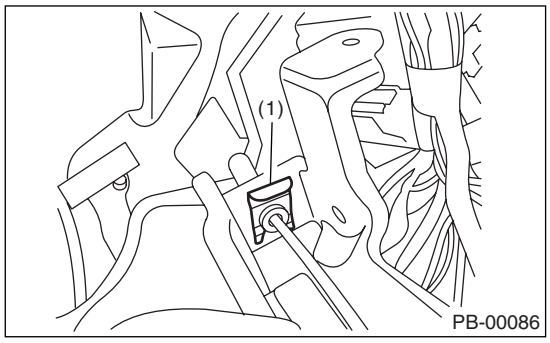
A: REMOVAL

1) Set the wheel stoppers to tires.
2) Remove the instrument panel lower cover. <Ref. to EI-36, 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, 13.0 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

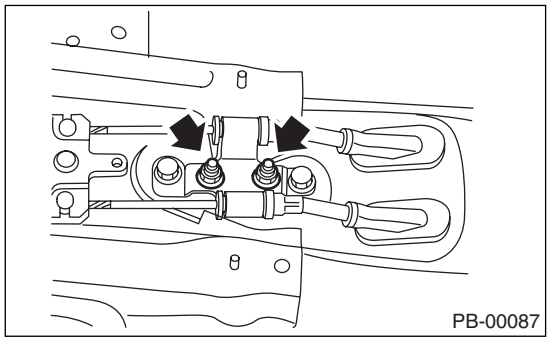
Adjust the parking brake pedal stroke. <Ref. to PB-9, PEDAL STROKE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

3. Parking Brake Cable

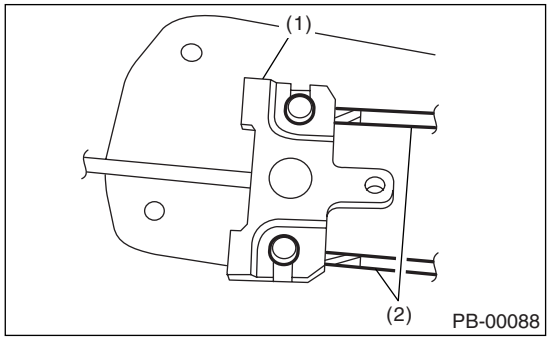
A: REMOVAL

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.

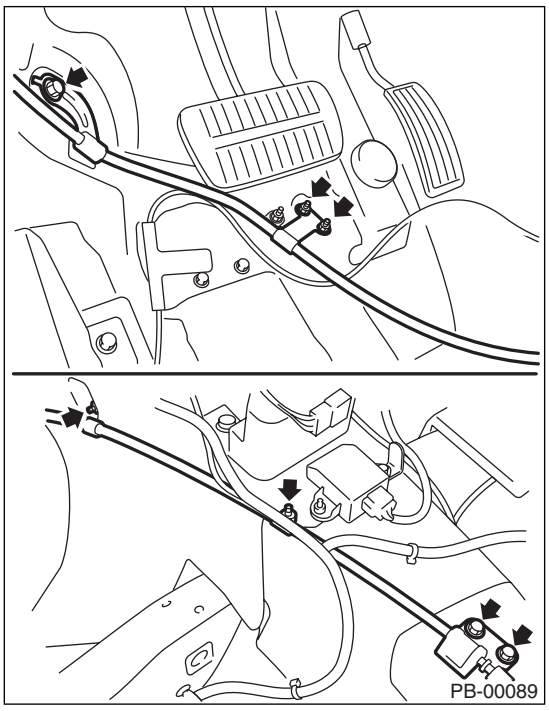


6) Remove the cable end from the equalizer.



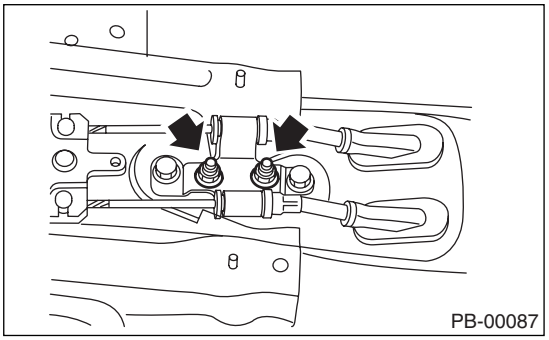
(1) Equalizer
(2) Cable end

7) Remove the parking brake cable bracket on the driver's side floor, and remove the front parking brake cable.

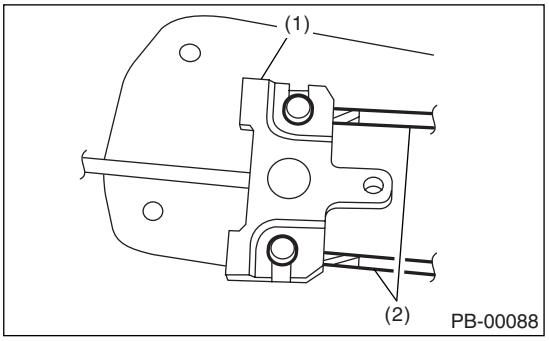


2. REAR PARKING BRAKE CABLE

1) Set the vehicle on a lift.
2) Remove the console box.
3) Roll up the floor mat and remove the clamps.

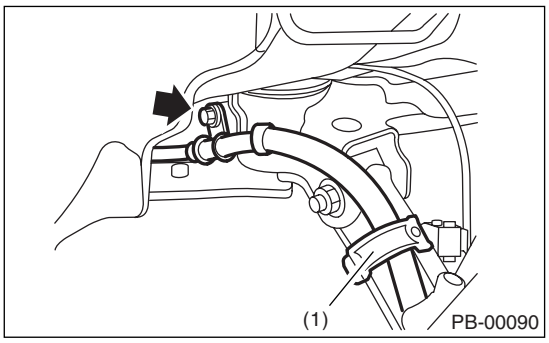


4) Remove the cable end from the equalizer.



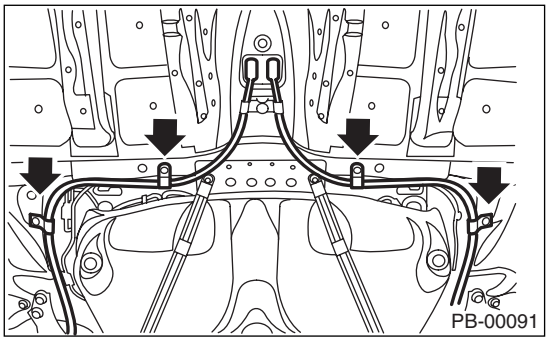
(1) Equalizer
(2) Cable end

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.>

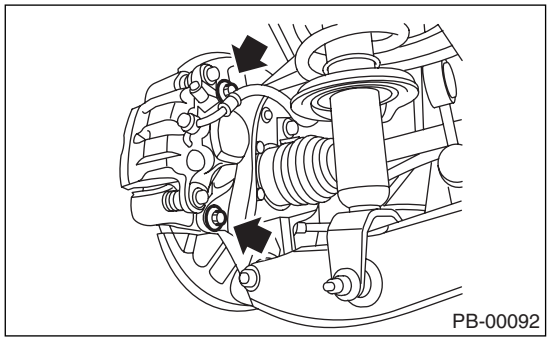
C: INSPECTION

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

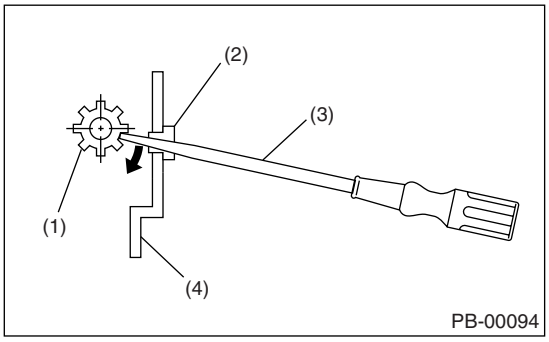
1) Release the parking brake.
2) Lift-up the vehicle, and then remove the rear wheels.
3) Remove the two mounting bolts and remove the disc brake caliper assembly.



4) Suspend the rear disk brake caliper assembly so that the brake hose is not stretched.
5) Remove the rear disk brake rotor.

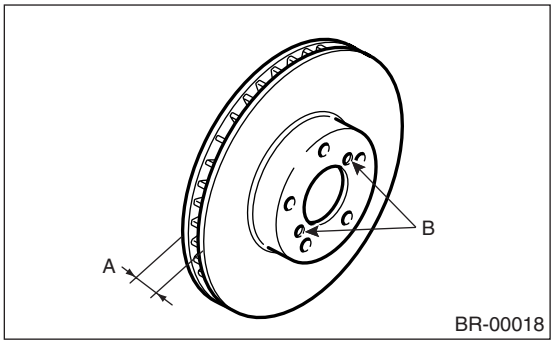
NOTE:
If the disc rotor is difficult to remove, try the following two methods in order.

(1) Turn the adjusting screw using a flat tip screwdriver until the brake shoe moves adequately away from the disc rotor.

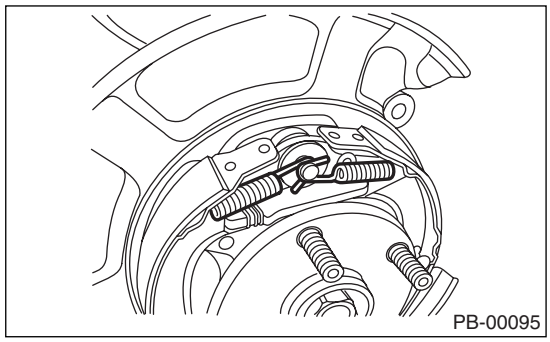


(1) Adjuster
(2) Adjusting hole cover (rubber)
(3) Flat tip screwdriver
(4) Disc rotor

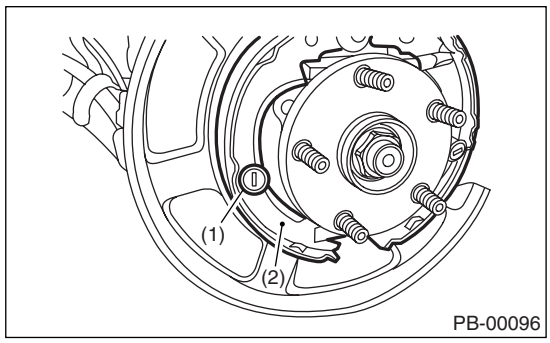
(2) If disc rotor is seized up on the hub, drive the disc rotor out by pushing two 8-mm bolts in holes B on the rotor.



6) Remove the shoe return spring.



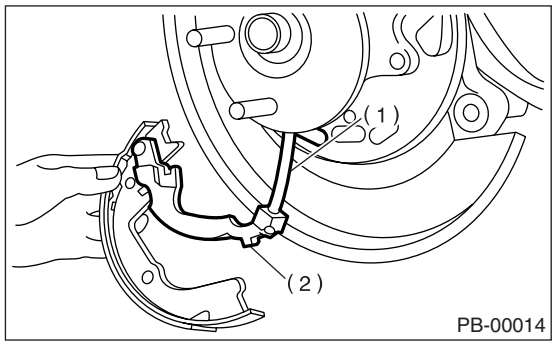
7) Remove the brake shoe cup and brake shoe spring, then remove the primary brake shoe.



(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.

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.

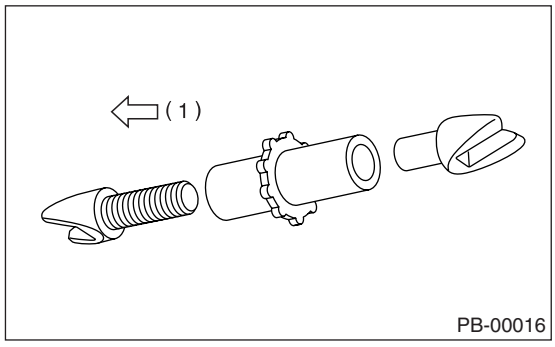
1) Apply brake grease to the following locations.

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 in the reverse order of removal.

NOTE:
- Install the strut spring of both right and left wheel facing vehicle front.
- Install the adjuster assembly so that the screw section will be towards the rear of the vehicle.



(1) LH

3) Adjust the parking brake. <Ref. to PB-9, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>
4) 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, re-adjust 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.

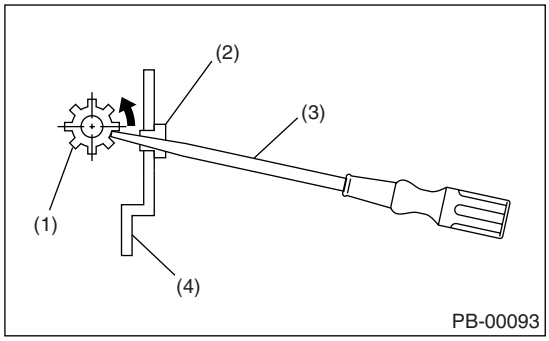
Lining thickness:
Standard:
4.0 mm (0.157 in)
Service limit:
1.5 mm (0.059 in)

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 disk 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.

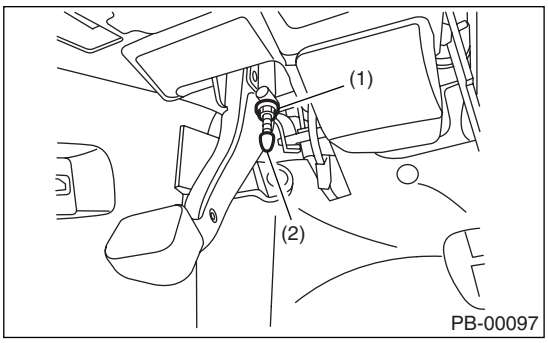
CAUTION:
Check there is no brake drag.

5) Install the adjusting hole cover to the disk 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.

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.

1. General Description

A: SPECIFICATION

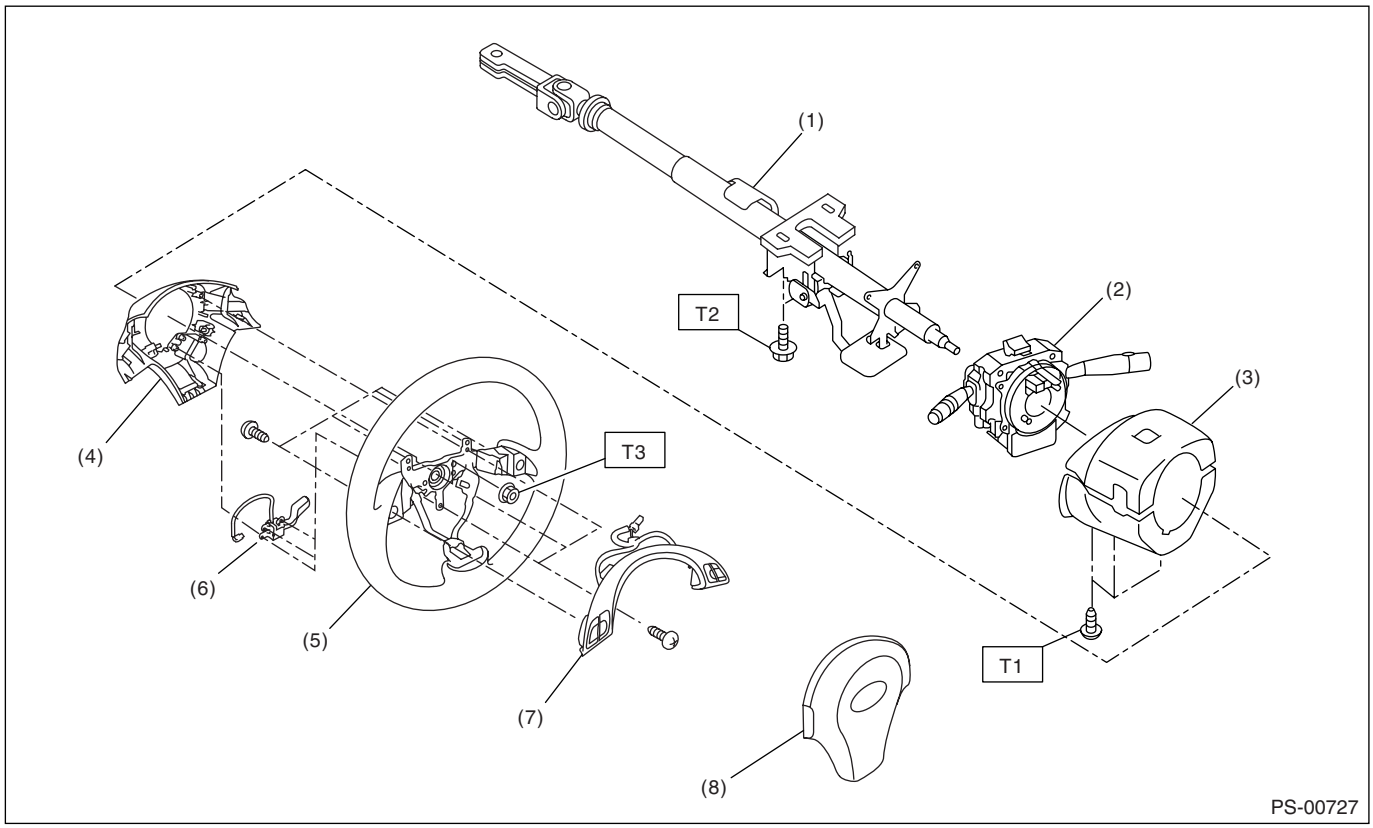
Whole system	Minimum turning radius m (ft)		5.7 (18.7)
	Steering angle	Inner wheel	37.0°±1.5°
		Outer wheel	32.0°±1.5
	Steering wheel diameter mm (in)		375 (14.76)
	Lock to lock turn		3.44
Gearbox	Type		Rack and Pinion, Integral
	Backlash		0 (Automatic adjusting)
	Valve (Power steering system)		Rotary valve
Pump (Power steering system)	Type		Vane pump
	Oil tank		Installed on body
	Specific output cm^3 (cu in)/rev.		9.6 (0.586)
	Relief pressure kPa (kg/cm^2, psi)		8,800 — 9,400 (90 — 96, 1,276 — 1,363)
	Hydraulic fluid control		Engine RPM 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)	Description		ATF DEXRON III or equivalent
	Capacity ℓ (US qt, Imp qt)	Oil tank	0.2 (0.2, 0.2)
		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 gear-box (Power steering system)	Sliding resistance		N (kgf, lb)	400 (41, 90) or less Difference between right and left sliding resistance: Less than 20%
	Rack shaft play in the radial direction	Right–turn steering	mm (in)	0.19 (0.0075) or less
		Left–turn steering	mm (in)	Horizontal movement: 0.6 (0.024) or less Vertical movement: 0.4 (0.016) or less
	Input shaft play	In radial direction	mm (in)	0.18 (0.0071) or less
		In axial direction	mm (in)	0.27 (0.0106) or less
	Rotation resistance		N (kgf, lb)	Maximum allowable value: 10.5 (1.07, 2.36) or less Difference between right and left sliding resistance: Less than 20%
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^2, 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	Manufacturer
ATF DEXRON III or equivalent	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

B: COMPONENT

1. STEERING WHEEL AND COLUMN

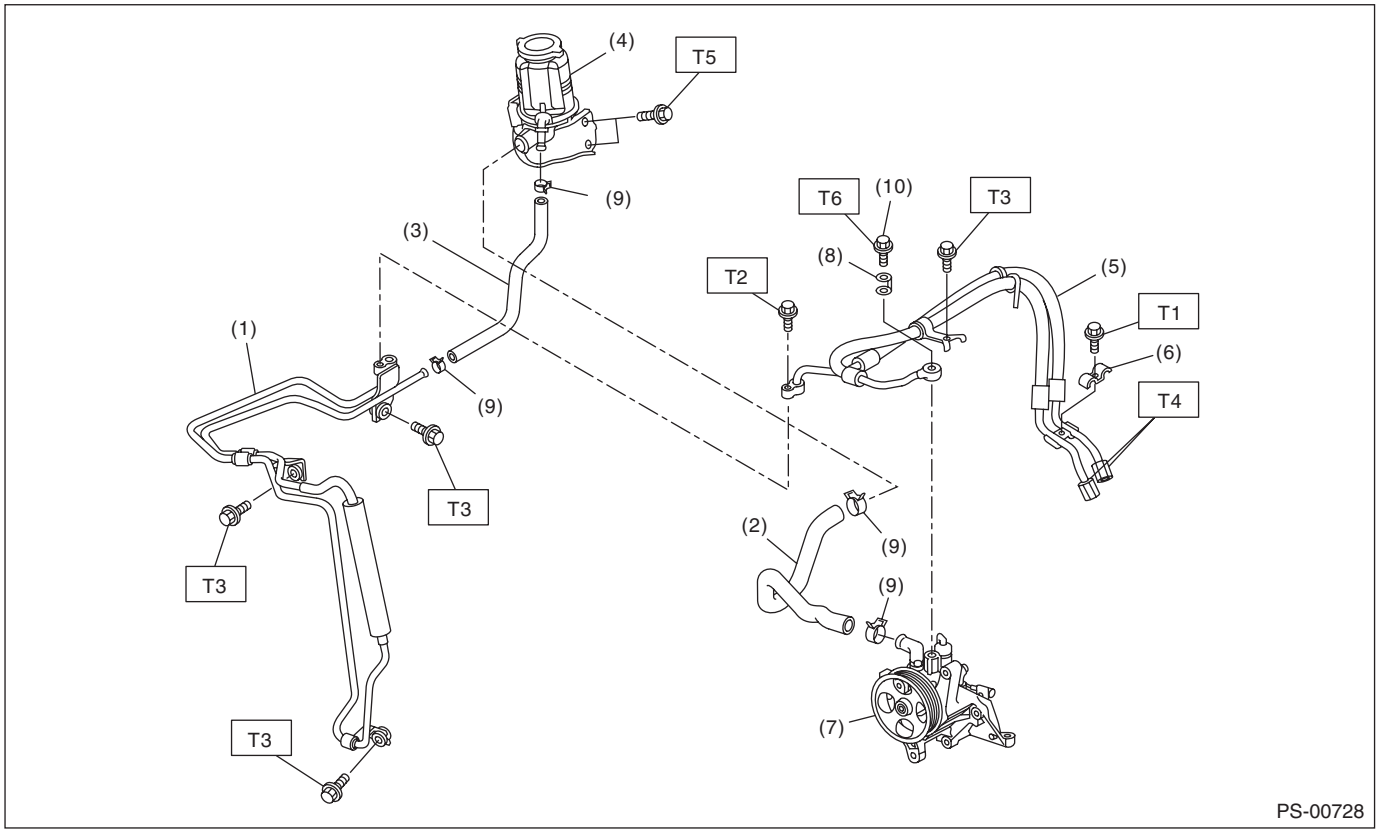


(1)	Steering shaft	(5)	Steering wheel
(2)	Steering roll connector	(6)	Satellite switch
(3)	Column cover	(7)	Cruise control switch
(4)	Steering wheel lower cover	(8)	Airbag module

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.2 (0.12, 0.9)
T2: 25 (2.5, 18.1)
T3: 45 (4.6, 33.2)

2. POWER ASSISTED SYSTEM

- Hose and tank

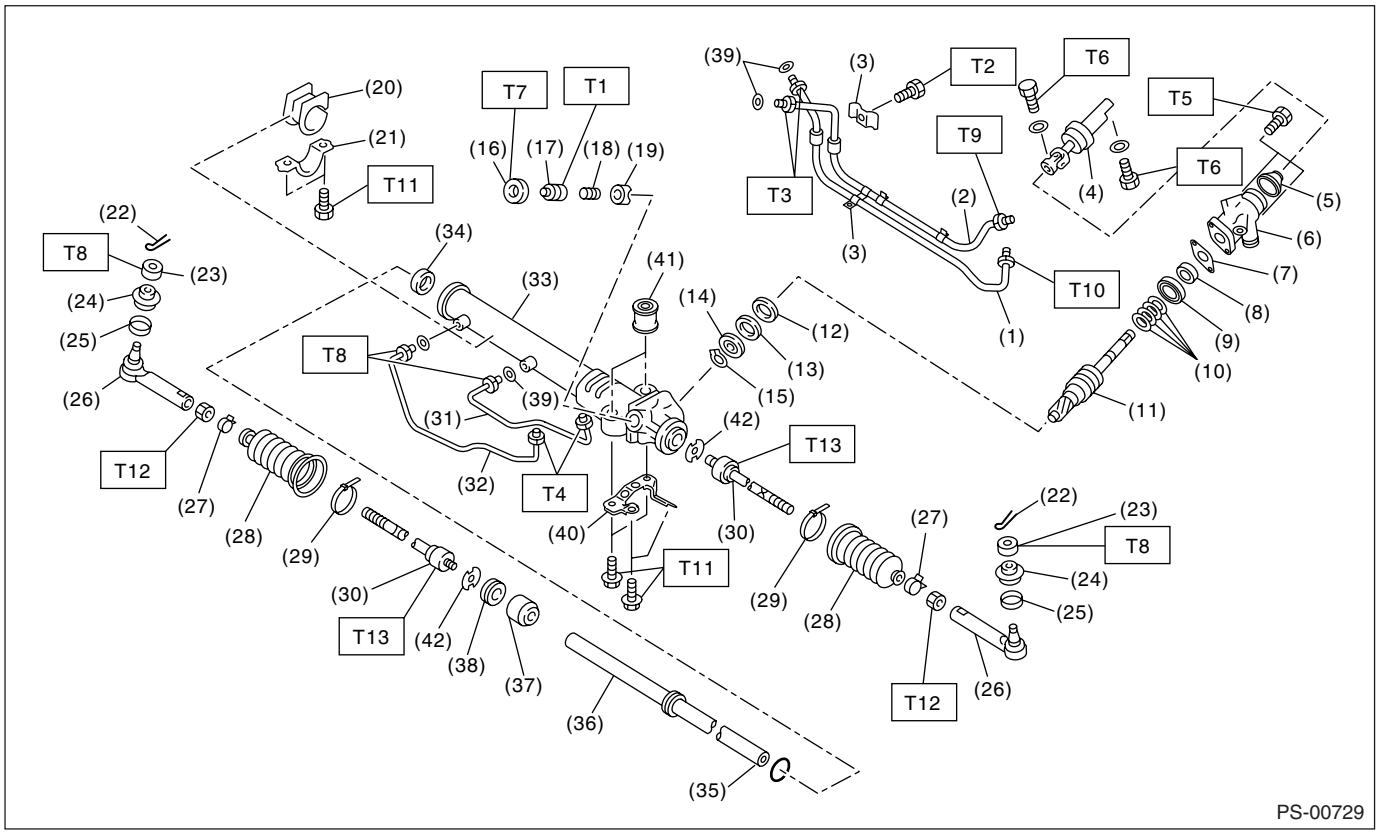


(1)	Oil cooler pipe	(8)	Eye bolt gasket
(2)	Suction hose	(9)	Clip
(3)	Return hose	(10)	Eye bolt
(4)	Reservoir tank		
(5)	Hose		
(6)	Clamp E		
(7)	Oil pump		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.82, 5.9)
T2: 10 (1.02, 7.4)
T3: 13 (1.32, 9.6)
T4: 15 (1.5, 10.8)
T5: 33 (3.37, 24.3)
T6: 40 (4.08, 29.5)

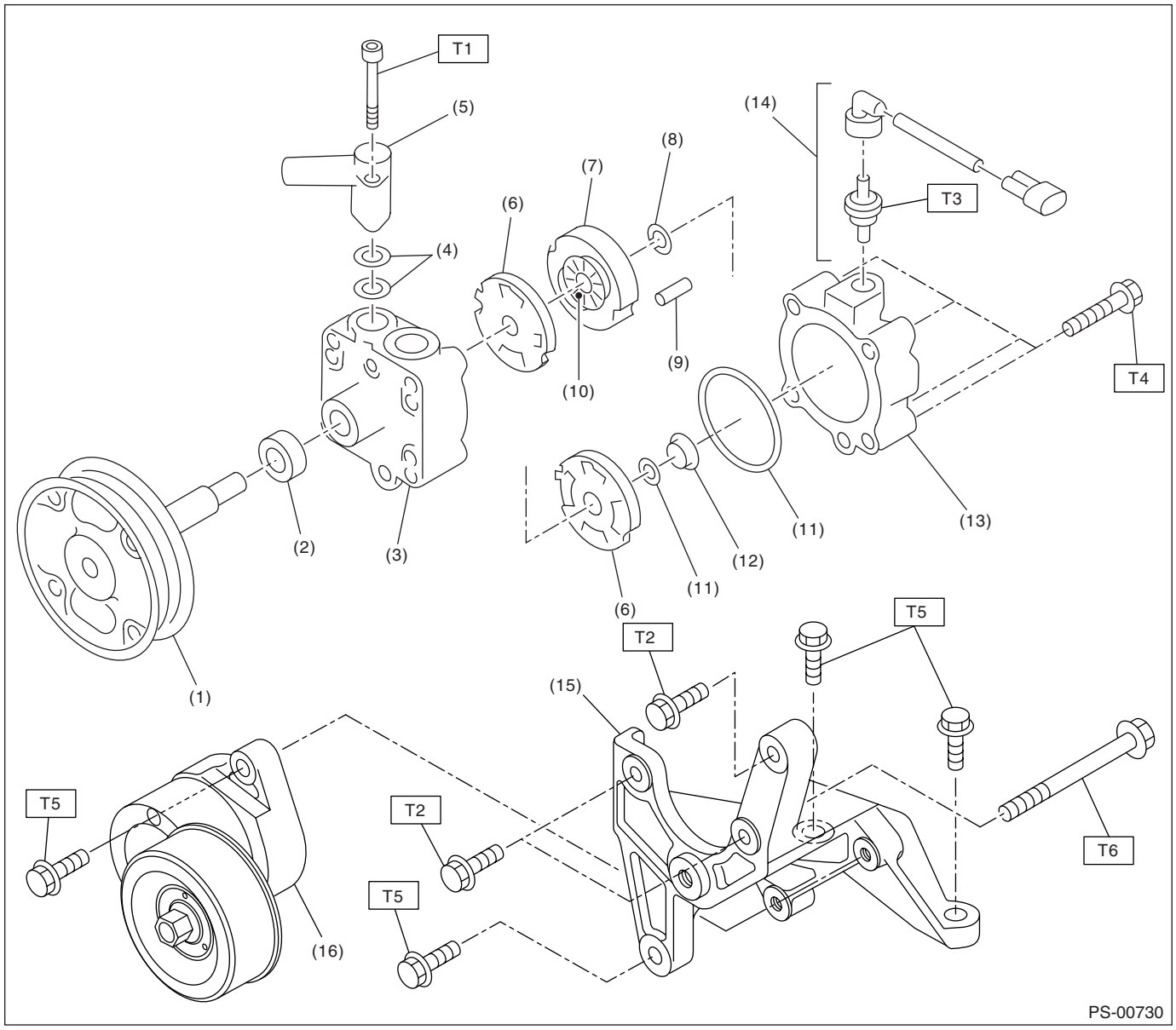
- Gearbox



(1) Pipe C
(2) Pipe D
(3) Clamp plate
(4) Universal joint
(5) Dust seal
(6) Valve housing
(7) Gasket
(8) Oil seal
(9) Bushing
(10) Seal ring
(11) Pinion & valve ASSY
(12) Oil seal
(13) Back–up washer
(14) Ball bearing
(15) Snap ring
(16) Lock nut
(17) Adjusting screw
(18) Spring
(19) Sleeve
(20) Adapter
(21) Clamp
(22) Cotter pin
(23) Castle nut
(24) Dust cover
(25) Clip
(26) Tie–rod end
(27) Clip
(28) Boot
(29) Band
(30) Tie–rod
(31) Pipe B
(32) Pipe A
(33) Steering body
(34) Oil seal
(35) Piston ring
(36) Rack
(37) Rack bushing
(38) Holder
(39) O–ring
(40) Bracket
(41) Bushing
(42) Lock washer

Tightening torque: N·m (kgf-m, ft-lb)
T1: 3.9 (0.4, 2.9)
T2: 10 (1.02, 7.4)
T3: 15 (1.5, 10.8)
T4: 17 (1.7, 12.5)
T5: 20 (2.0, 14.8)
T6: 24 (2.4, 17.4)
T7: 25 (2.5, 18.1)
T8: 27 (2.75, 19.9)
T9: 29 (3.0, 21.4)
T10: 37 (3.8, 27.3)
T11: 60 (6.1, 44.1)
T12: 85 (8.7, 62.7)
T13: 130 (13.3, 95.9)

3. OIL PUMP



(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 (3.37, 24.3)
T6: 36.8 (3.75, 27.1)

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 work clothing, including a cap, protective goggles and protective shoes during operation.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Be careful not to burn yourself, because each part on the vehicle is hot after running.
- Use SUBARU genuine power steering fluid, grease etc. or the equivalent. Do not mix fluid, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or 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

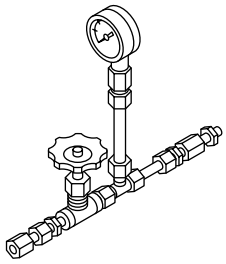
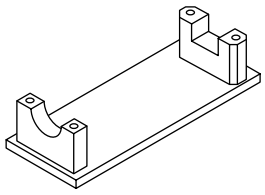
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-925711000	925711000	PRESSURE GAUGE	Used for measuring oil pressure.
 ST-926200000	926200000	STAND	• Used when inspecting characteristic of gearbox assembly and disassembling it. • Used with BOSS D (34199AG000).

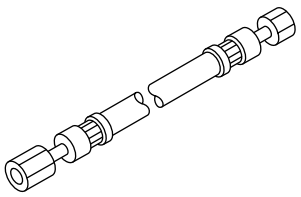
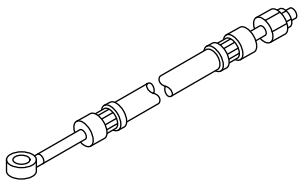
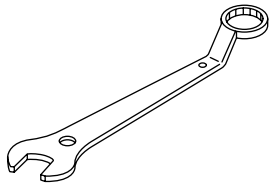
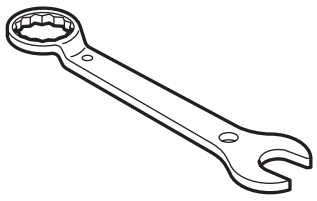
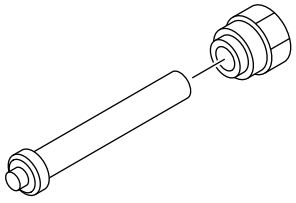
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34099AC010	34099AC010	ADAPTER HOSE A	Used with PRESSURE GAUGE (925711000).
 ST34099AC020	34099AC020	ADAPTER HOSE B	Used with PRESSURE GAUGE (925711000).
 ST-926230000	926230000	SPANNER	For the lock nut when adjusting backlash of gearbox.
 ST34099PA100	34099PA100	SPANNER	Used when measuring the rotating resistance of gearbox assembly.
 ST-926420000	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.

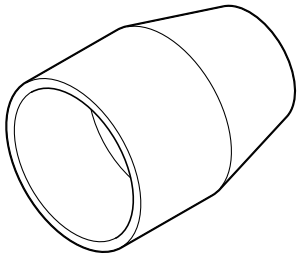
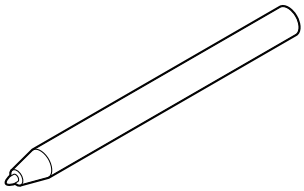
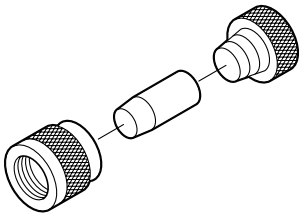
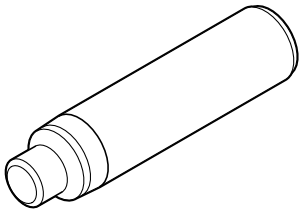
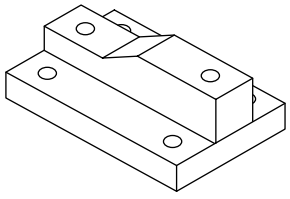
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-926250000	926250000	GUIDE	Used for installing the holder assembly into the rack housing.
 ST34099FA060	34099FA060	PUNCH HOLDER	Used for crimping.
 ST-927490000	927490000	INSTALLER A, B, C	Used for installing the oil seal to the rack assembly.
 ST34199XA030	34199XA030	INSTALLER & REMOVER 44	Used for removing and installing the rack oil seal (outer & inner).
 ST34199AG000	34199AG000	BOSS D	• Used when inspecting characteristic of gearbox assembly and disassembling it. • Used with STAND (926200000).

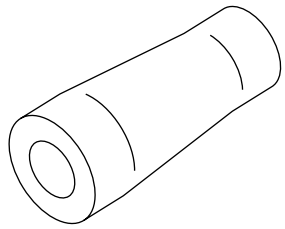
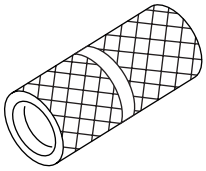
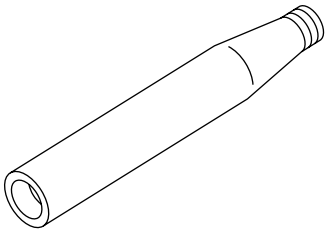
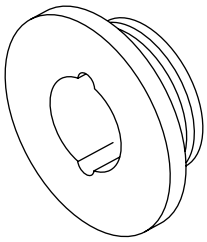
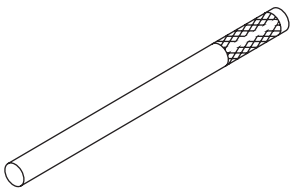
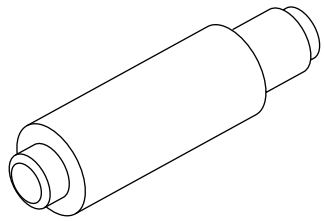
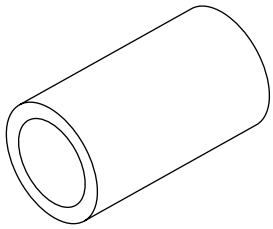
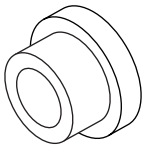
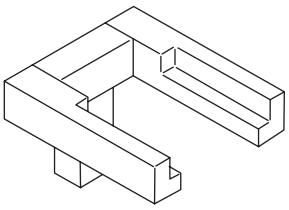
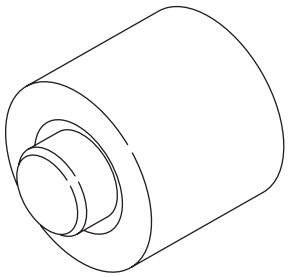
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199XA010	34199XA010	Guide 44	Used for installing seal ring of rack.
 ST34199AG070	34199AG070	FORMER	Used for forming seal ring of pinion.
 ST34199AG020	34199AG020	GUIDE	Used for installing seal ring of pinion.
 ST34199AG060	34199AG060	GUIDE G (26)	• Used for forming seal ring of rack. • Used with FORMER PISTON (34199XA020).
 ST34199AE050	34199AE050	OIL SEAL REMOVER	Used for removing oil seal.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199AG090	34199AG090	INSTALLER & REMOVER	• Used for installing oil seal of valve housing. • Used for installing ball bearing of valve housing. • Used for removing oil seal and ball bearing from valve housing.
 ST34199XA020	34199XA020	FORMER PISTON 44	• Used for forming seal ring of rack. • Used with Guide G (26)(34199AG060).
 ST34199XA000	34199XA000	INSTALLER 44	Used for pressing-fit oil seal of gearbox cylinder.
 ST34199AE020	34199AE020	MOUNT	Used to remove the oil pump.
 ST34199AE030	34199AE030	INSTALLER	Used for installing the oil seal to the oil pump.

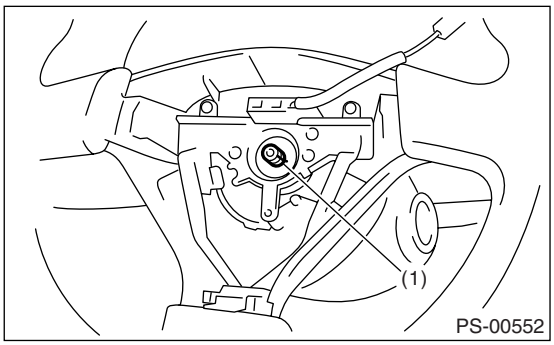
2. Steering Wheel

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-15, REMOVAL, Driver's Airbag Module.>

WARNING:
Always refer to "Air Bag System" before performing service on the air bag 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 "Air Bag System" before performing service on the air bag 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.

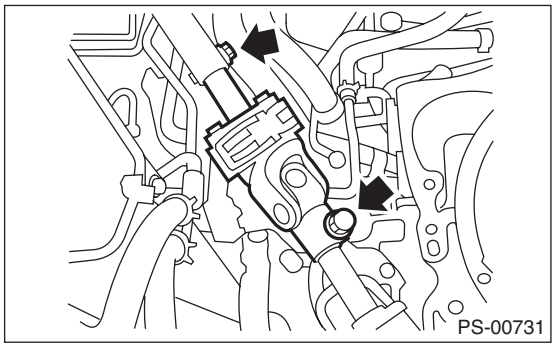
C: INSPECTION

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.

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 bolt.

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

CAUTION:
Excessively large tightening torque of universal joint bolts may lead to heavy steering wheel operation.

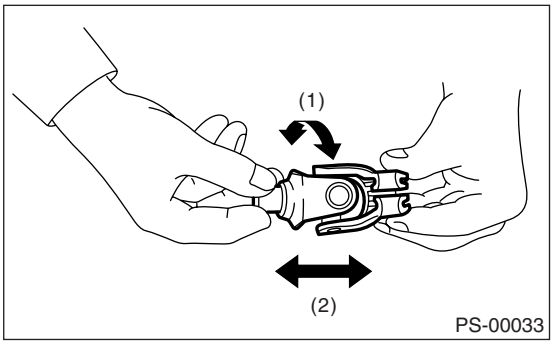
Clearance between coupling of universal joint to AT level gage:
15 mm (0.59 in) or more

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.

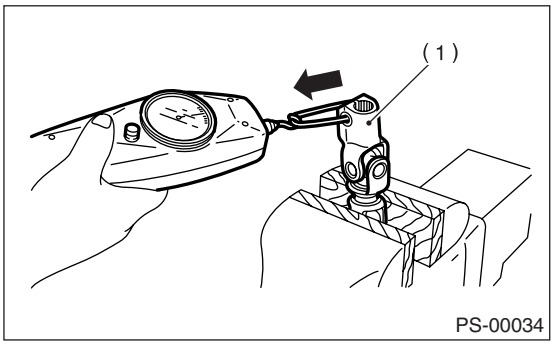
Service limit:
Universal joint play: 0 mm (0 in)
Maximum swing torque: 0.3 N (0.03 kgf, 0.07 lb)



(1) Swing torque
(2) Play

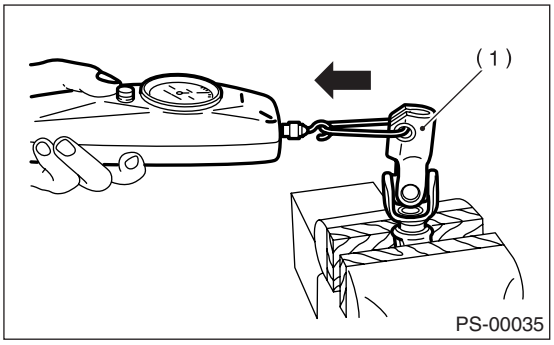
Measure the swing torque of universal joint.

Service limit:
Maximum load: 3.8 N (0.39 kgf, 0.86 lb) or less



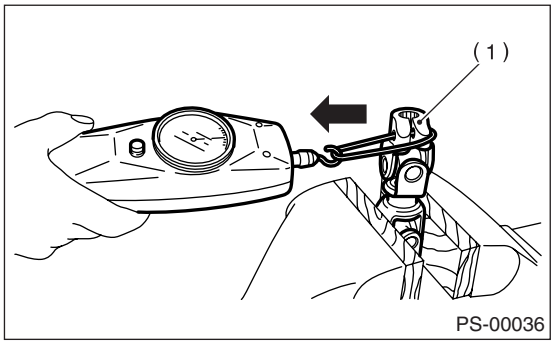
(1) Yoke (Gearbox side)

Service limit:
Maximum load: 3.8 N (0.39 kgf, 0.86 lb) or less



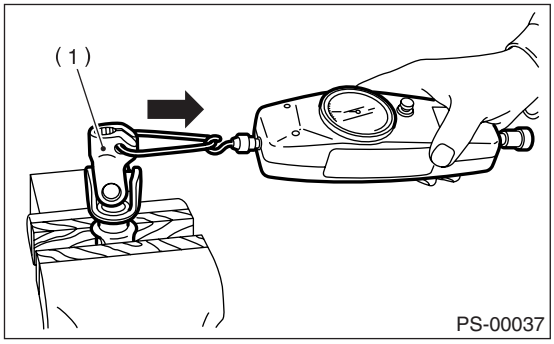
(1) Yoke (Gearbox side)

Service limit:
Maximum load: 7.3 N (0.74 kgf, 1.64 lb) or less



(1) Yoke (Steering column side)

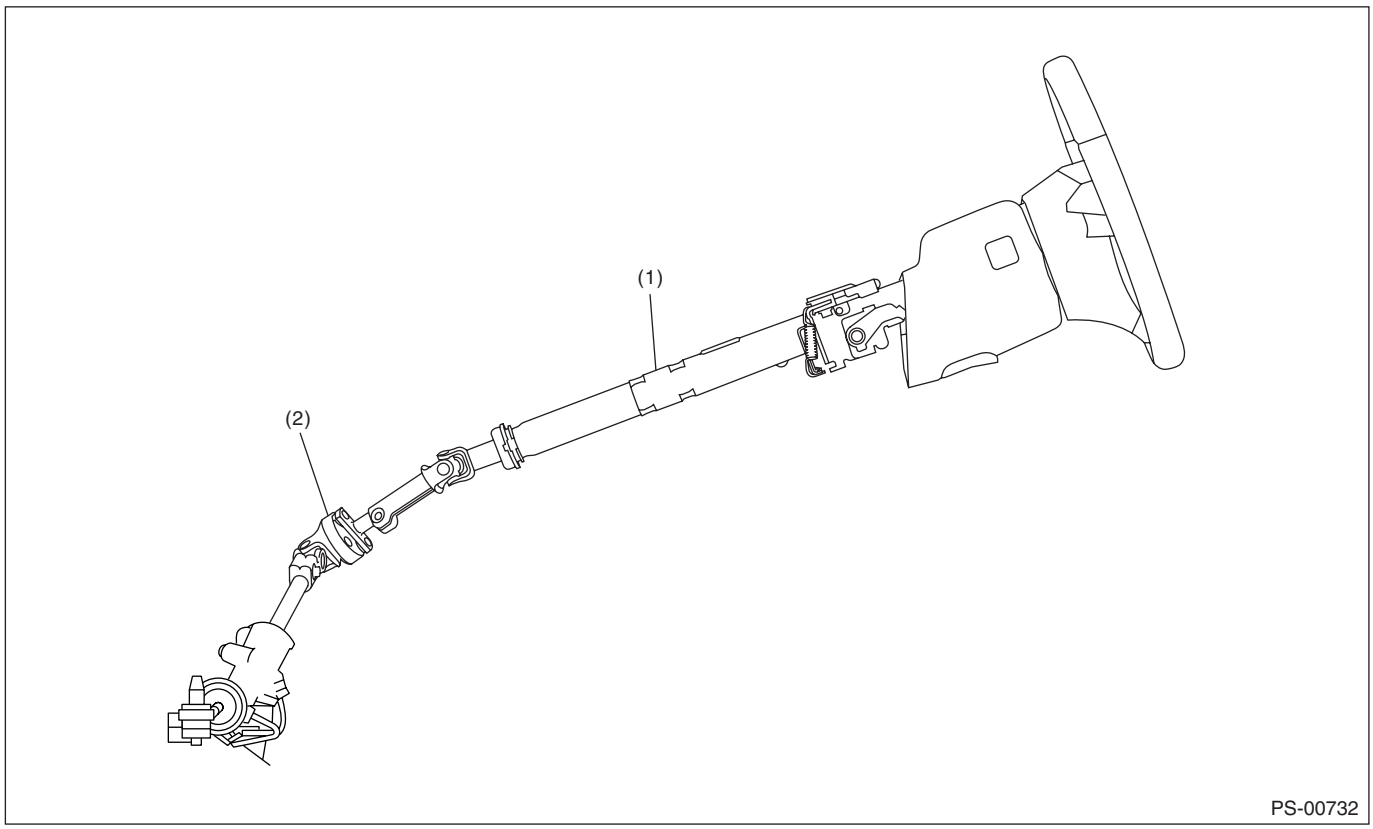
Service limit:
Maximum load: 7.3 N (0.74 kgf, 1.64 lb) or less



(1) Yoke (Steering column side)

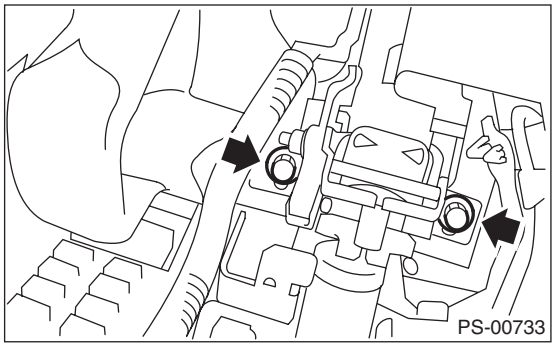
4. Tilt Steering Column

A: REMOVAL



(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.>
3) Remove the instrument panel lower cover under.
4) Remove the instrument panel lower cover upper.
5) Remove all connectors from the steering column.
6) Remove the two bolts under instrument panel securing the steering column.



7) Pull out the steering shaft assembly from the hole on toe board.

CAUTION:
• Be sure to remove the universal joint before removing steering shaft assembly installing bolts when removing steering shaft assembly or when lowering it 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:
25 N·m (2.5 kgf-m, 18.1 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.>
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, 0.9 ft-lb)

CAUTION:
Do not overtorque the screw.

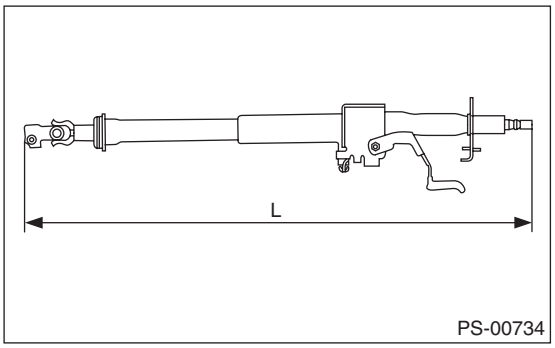
E: INSPECTION

1. BASIC INSPECTION

Measure the overall length of steering column. If not within specification, replace it.

Overall length L:

Specification
$917.5\ ^{+1.3\ mm}_{-0.3\ mm}$ ($36.12\ ^{+0.051\ in}_{-0.020\ in}$)



2. INSPECTION OF AIRBAG SYSTEM

WARNING:
Refer to "Airbag System" for airbag inspection procedure. <Ref. to AB-4, CAUTION, General Description.>

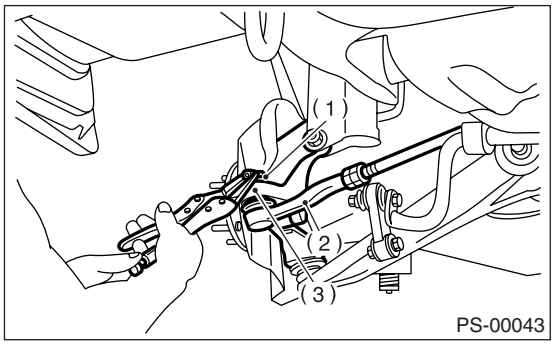
5. Steering Gearbox

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from the battery.
3) Lift-up the vehicle, and remove the front wheels.
4) Remove the under cover. <Ref. to EI-17, REMOVAL, Front Under Cover.>
5) Remove the front exhaust pipe assembly. (Non–turbo model) <Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.>

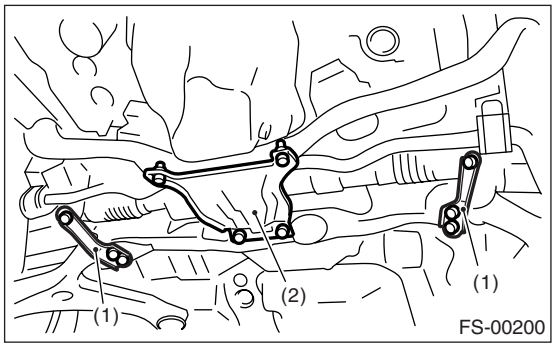
WARNING:
Be careful not to burn yourself because the exhaust pipe is hot.

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.



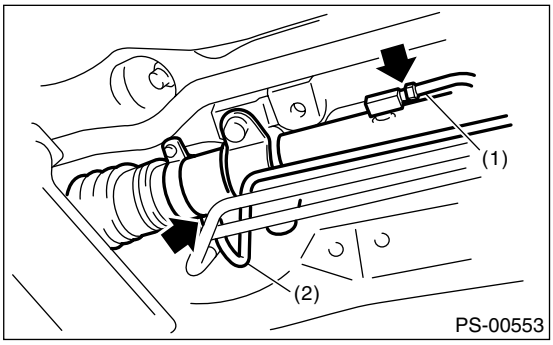
(1) Castle nut
(2) Tie–rod end
(3) Knuckle arm

7) Remove the front crossmember support plate, jack-up plate and front stabilizer. <Ref. to FS-14, REMOVAL, Front Stabilizer.>



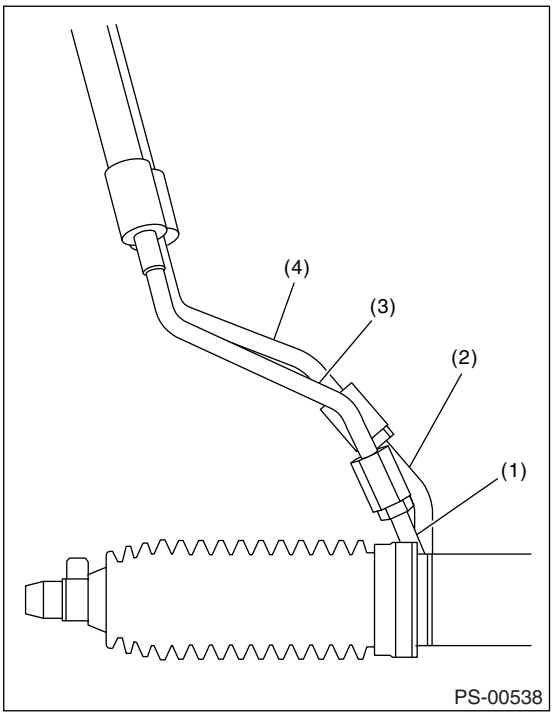
(1) Crossmember support plate
(2) Jack–up plate

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.



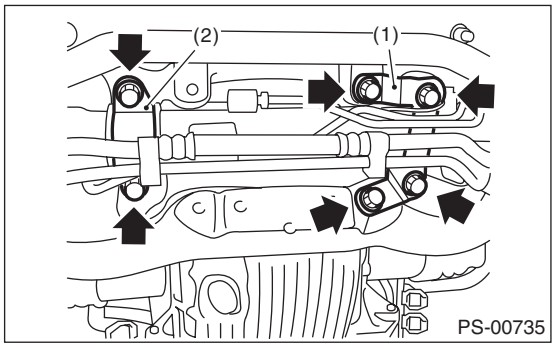
(1) Pipe A
(2) Pipe B

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

11) Remove the gear box bracket and clamp, and remove the gearbox.

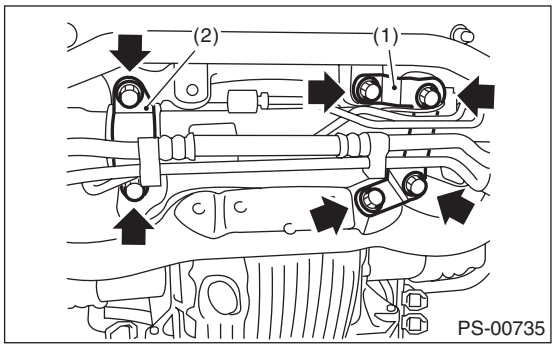


(1) Bracket
(2) Clamp

B: INSTALLATION

1) Insert the gearbox into crossmember, being careful not to damage gearbox boot.
2) Attach the gearbox bracket and clamp.

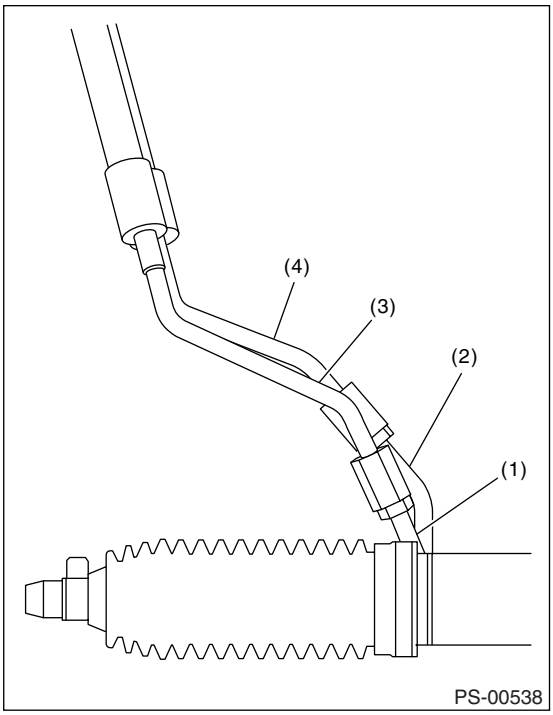
Tightening torque:
60 N·m (6.1 kgf-m, 44.1 ft-lb)



(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, 10.8 ft-lb)



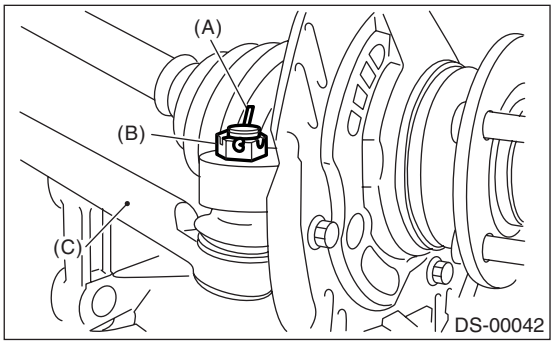
(1) Pipe C
(2) Pipe D
(3) Pressure hose
(4) Return hose

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 (2.75 kgf-m, 19.9 ft-lb)

CAUTION:
When connecting, do not hit the cap at the bottom of tie–rod end with hammer.

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

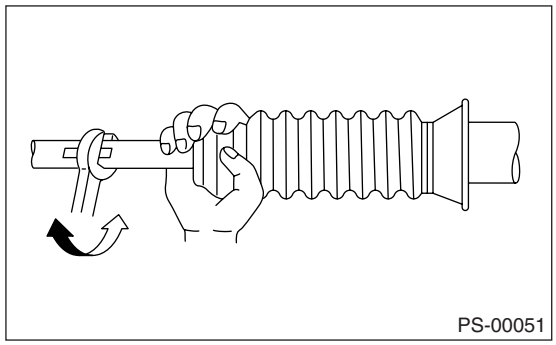
7) Install the front stabilizer. <Ref. to FS-14, INSTALLATION, Front Stabilizer.>
8) Install the front crossmember support plate and jack-up plate.
9) Install the front exhaust pipe assembly. (Non–turbo model) <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.>
10) Install the under cover. <Ref. to EI-17, INSTALLATION, Front Under Cover.>
11) Install the front wheels.
12) Tighten the wheel nuts to the specified torque.

Tightening torque:
110 N·m (11.2 kgf-m, 81.1 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 the 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

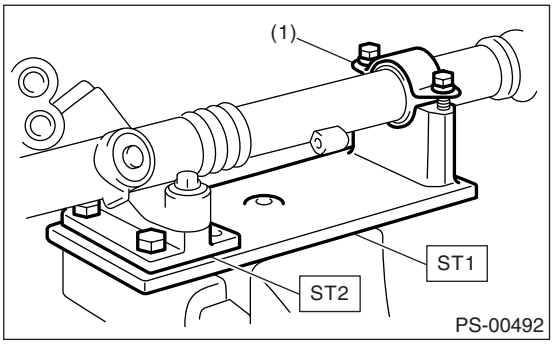
1. RACK HOUSING ASSEMBLY

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

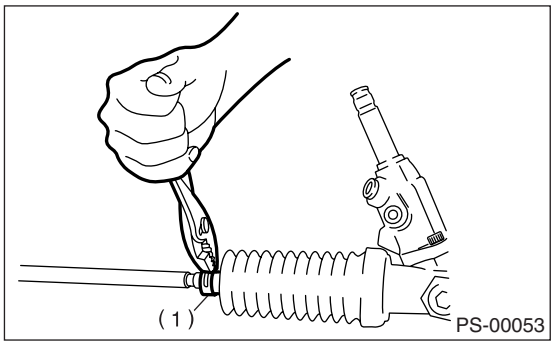
CAUTION:
Secure the gearbox in a vise using ST as shown in the figure. Do not secure the gearbox without this ST.



(1) Clamp

3) Remove the tie-rod end and lock nut from gearbox.

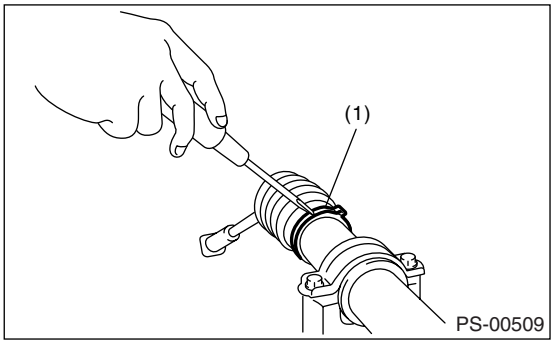
4) Remove the small clip from the boot using pliers, and then move the boot to tie-rod end side.



(1) Clip

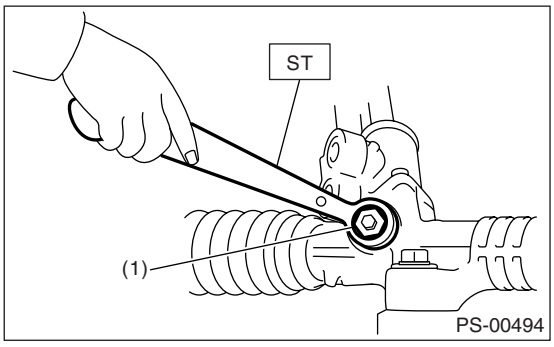
5) Using a flat tip screwdriver, remove the band from boot.

NOTE:
Replace the boot if there is damage, cracks or deterioration.



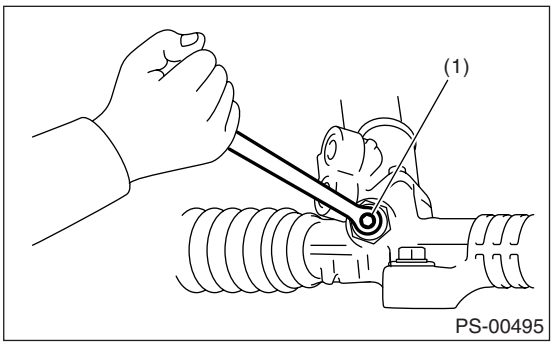
(1) Band

6) Using the ST, loosen the lock nut.
ST 926230000 SPANNER



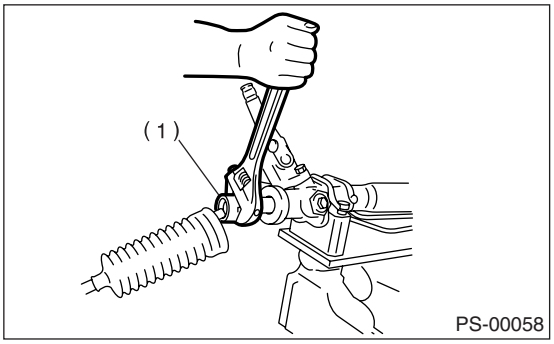
(1) Lock nut

7) Tighten the adjusting screw until it can no longer be tightened.



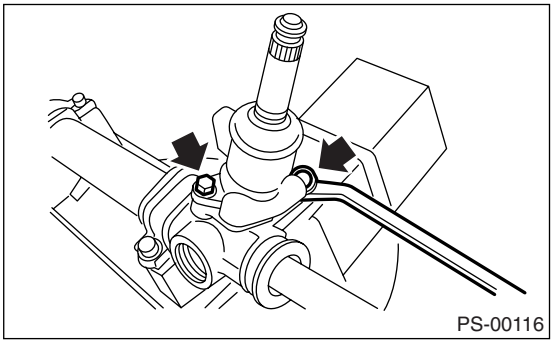
(1) Adjusting screw

8) While securing the rack with a 22 mm wrench, remove the tie-rod using 32 mm (1.26 in) wrench or adjustable wrench.

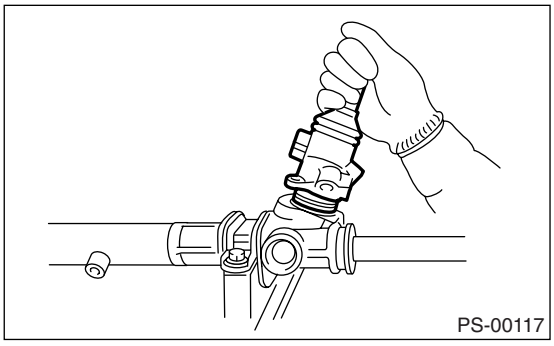


(1) Holder

9) Loosen the adjusting screw, and remove the spring and sleeve.
10) Remove the two bolts securing valve assembly.

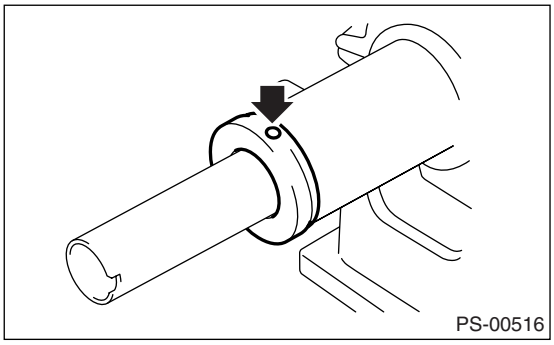


11) Carefully draw out the input shaft and remove the valve assembly.

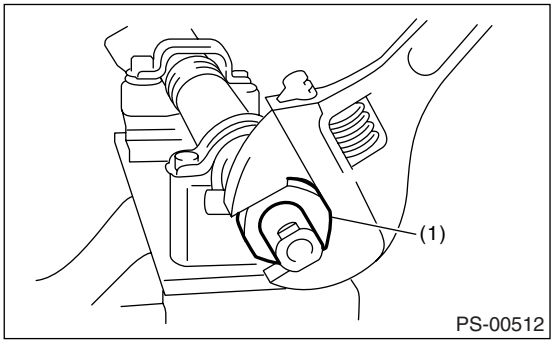


12) Using a drill, release the caulking of holder.

CAUTION:
Make a hole of 2 mm (0.08 in) depth using a drill with 3 mm (0.12 in) diameter.



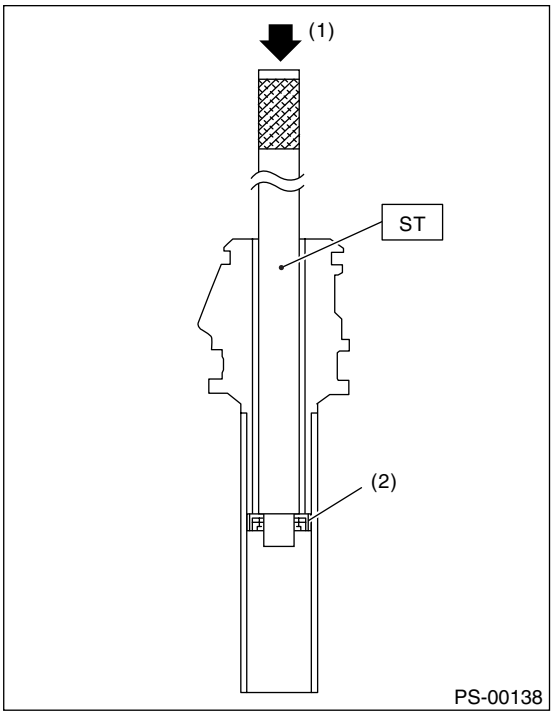
13) Remove the holder using a 36 mm wrench or adjustable wrench.



(1) Holder

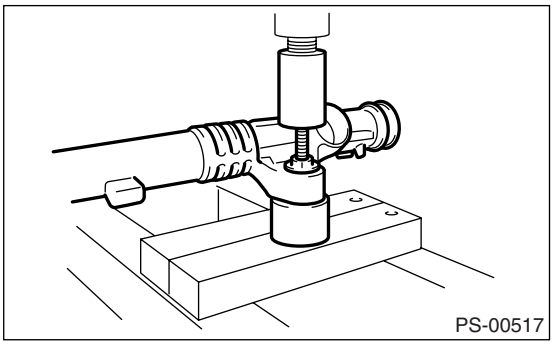
14) Remove the rack bushing and rack stopper from rack assembly.
15) Remove the oil seal from rack.

16) Insert the ST from pinion housing side and remove the oil seal using a press.
ST 34199AE050 OIL SEAL REMOVER



(1) Press
(2) Oil seal

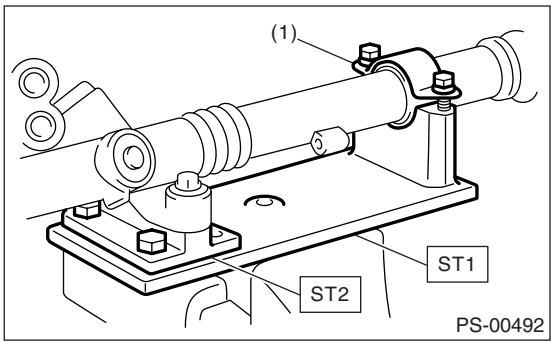
17) Using a press, remove the bushing of gearbox installation portion.



2. CONTROL VALVE

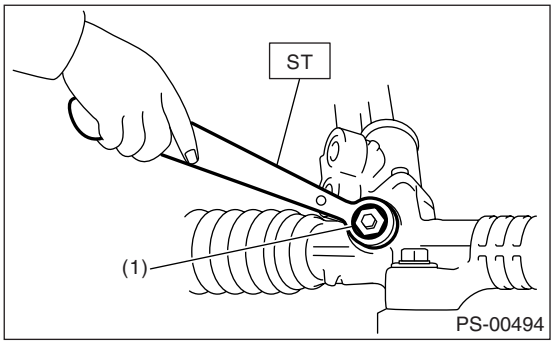
1) Disconnect the pipes A and B from gearbox.
2) Secure the gearbox removed from vehicle in a vise using ST.
ST1 926200000 STAND
ST2 34199AG000 BOSS D

CAUTION:
Secure the gearbox in a vise using ST as shown in the figure. Do not secure the gearbox without this ST.



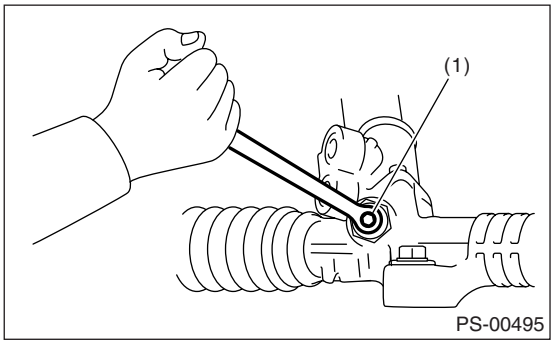
(1) Clamp

3) Using the ST, loosen the lock nut.
ST 926230000 SPANNER



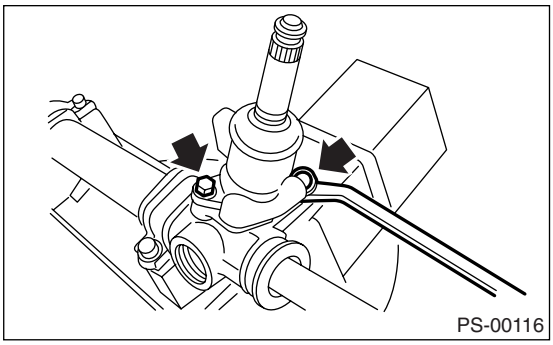
(1) Lock nut

4) Tighten the adjusting screw until it can no longer be tightened.

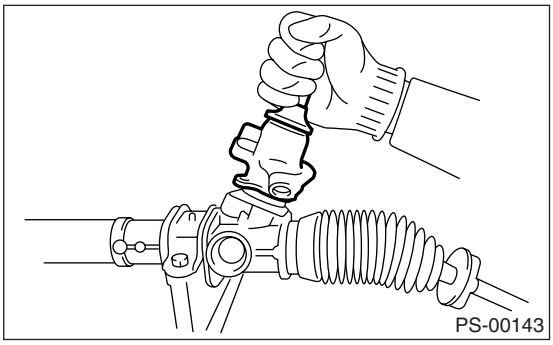


(1) Adjusting screw

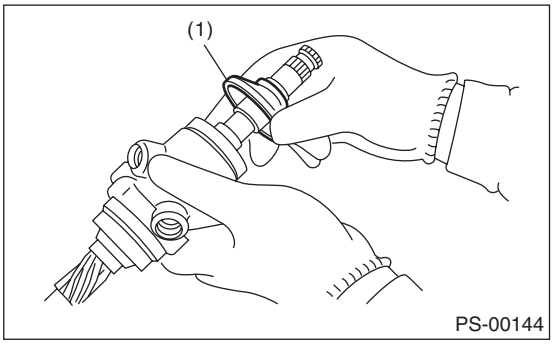
5) Loosen the adjusting screw, and remove the spring and sleeve.
6) Remove the two bolts securing valve assembly.



7) Carefully draw out the input shaft and remove the valve assembly.

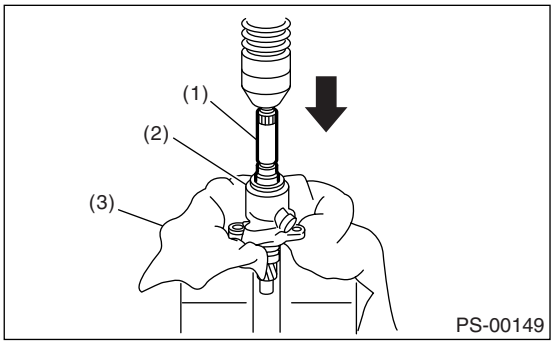


8) Put a vinyl tape around the spline portion, and slide the dust cover to remove.



(1) Dust cover

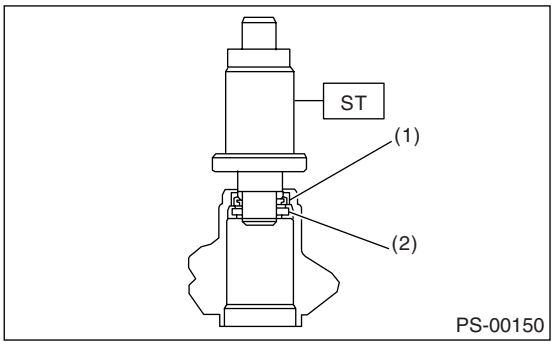
9) Using a press, remove the pinion & valve assembly from valve housing.



(1) Pinion & valve ASSY
(2) Valve housing
(3) Cloth

10) Using the ST and a press, remove the bushing and oil seal from the valve housing.
ST 34199AG090 INSTALLER & REMOVER

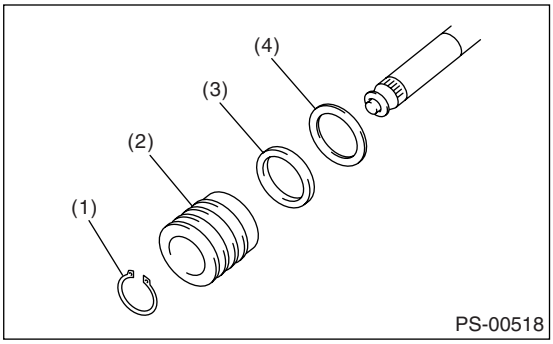
CAUTION:
• Do not apply a force to the end surface of valve housing.
• Do not reuse the oil seal after removal.



(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 & valve assembly.

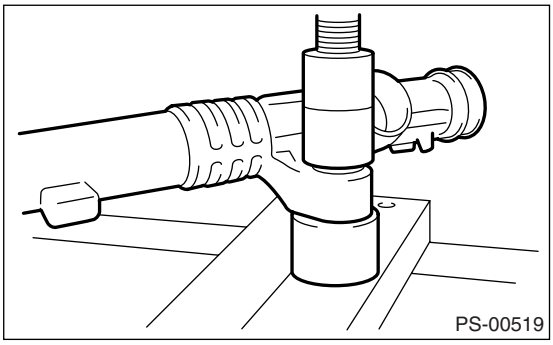


(1) Snap ring
(2) Valve
(3) Oil seal
(4) Back–up ring

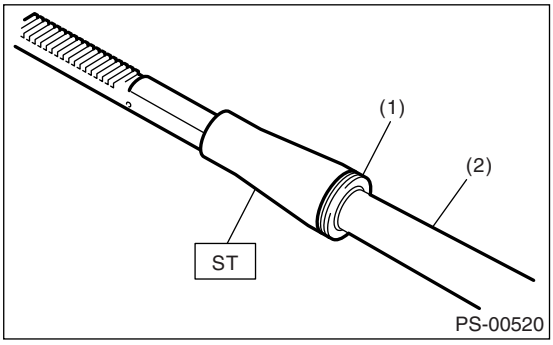
D: ASSEMBLY

1. RACK HOUSING ASSEMBLY

1) Using a press, install the bushing to gearbox installation portion.

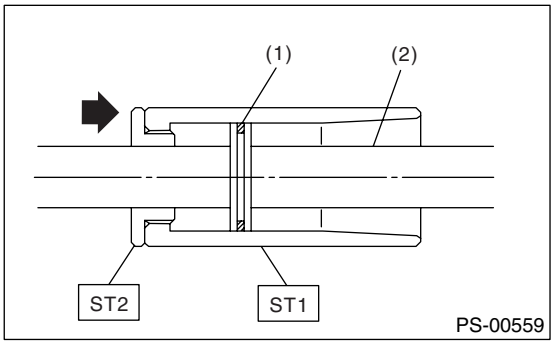


2) Insert the ST to rack.
ST 34199XA010 GUIDE 44



(1) Seal ring
(2) Rack

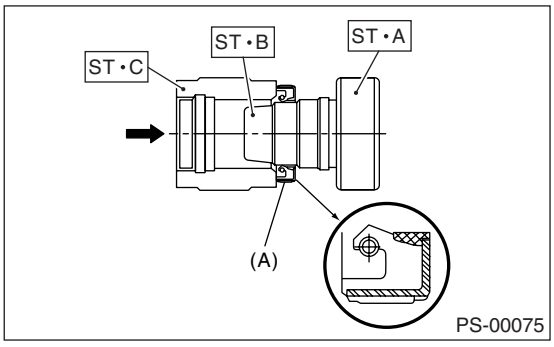
3) Install the seal ring to piston portion of rack.
(1) Using the ST, form the seal ring properly.
ST1 34199XA020 FORMER PISTON 44
ST2 34199AG060 GUIDE G (26)



(1) Seal ring
(2) Rack

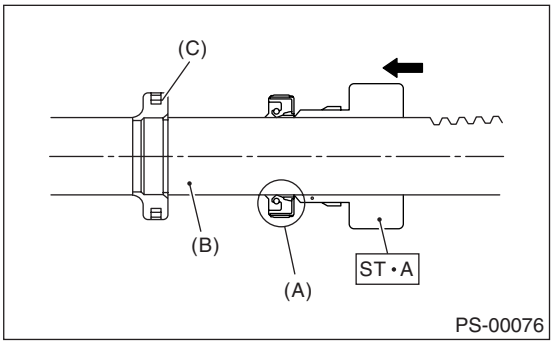
(2) Using the ST B and ST C, attach the oil seal to ST A.
ST 927490000 INSTALLER A, B, C

NOTE:
Face the oil seal in the direction as shown in the figure.



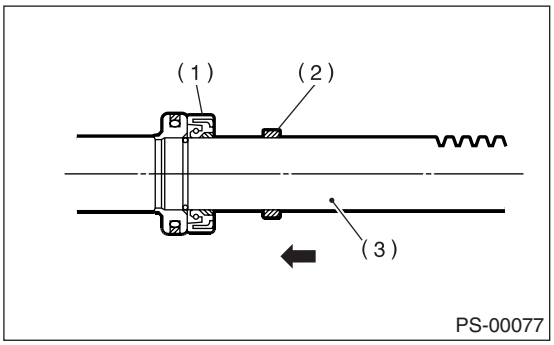
(A) Oil seal

(3) 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

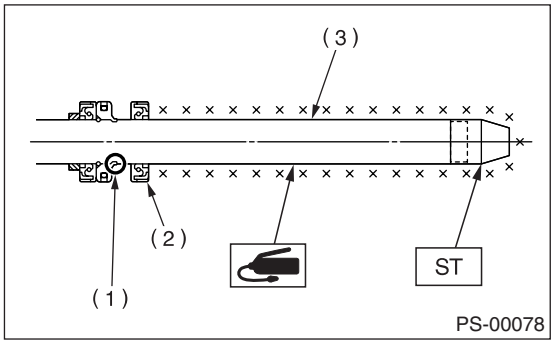
4) Install the back–up washer from the gear side of rack.



(1) Oil seal
(2) Back–up washer
(3) Rack

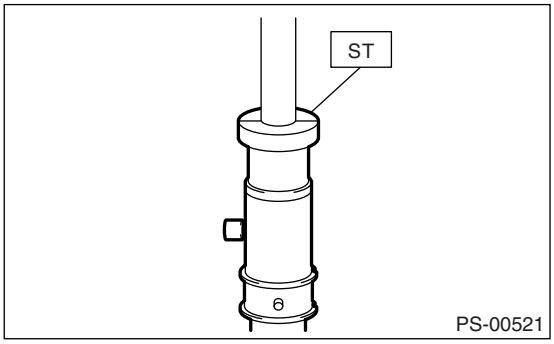
5) Install the ST on rack, equally apply a thin coat of grease to the rack and ST, and then install the oil seal.
ST 926250000 GUIDE

CAUTION:
Be careful not to scratch the oil seal lips with the inner ring section of piston.



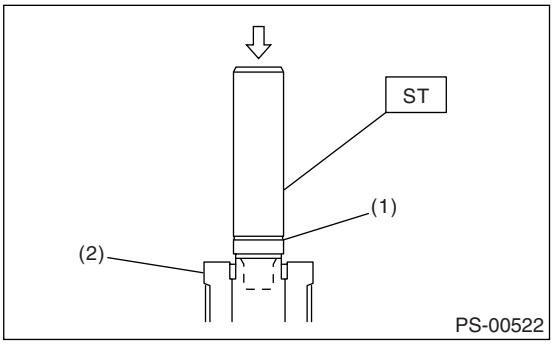
(1) Rack piston inner ring
(2) Outer side oil seal
(3) Rack

6) 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.
7) Check the threaded end of holder and gearbox cylinder end for burrs, damage, etc. Correct if faulty.
8) Insert the ST into gearbox cylinder, and then press-fit the oil seal.
ST 34199XA000 INSTALLER 44



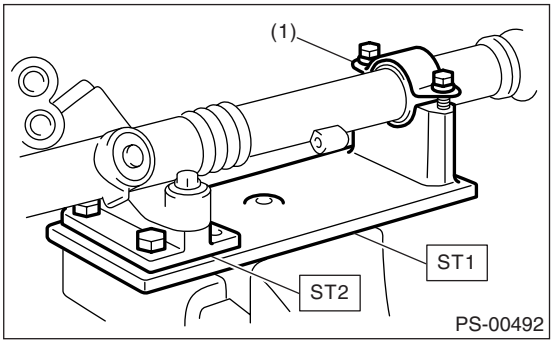
9) Temporarily tighten the holder to gearbox cylinder.
10) Set the ST to the end of rack.
ST 34199XA030 INSTALLER & REMOVER 44

11) Using a press, press-fit until the groove of ST are aligned to the end surface of holder.



(1) Groove
(2) Holder

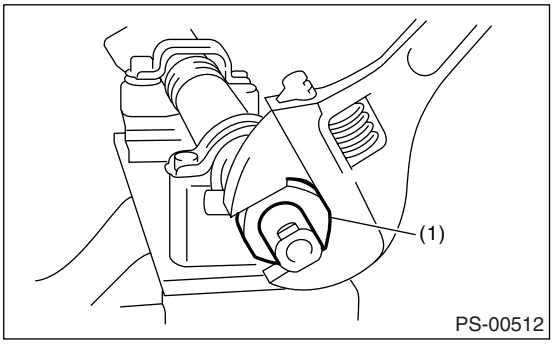
12) Secure the gearbox in a vise using ST.
ST1 926200000 STAND
ST2 34199AG000 BOSS D



(1) Clamp

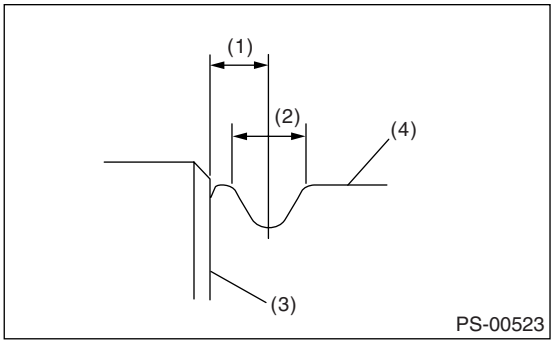
13) Tighten the holder.

Tightening torque:
85 N·m (8.7 kgf-m, 62.7 ft-lb)



(1) Holder

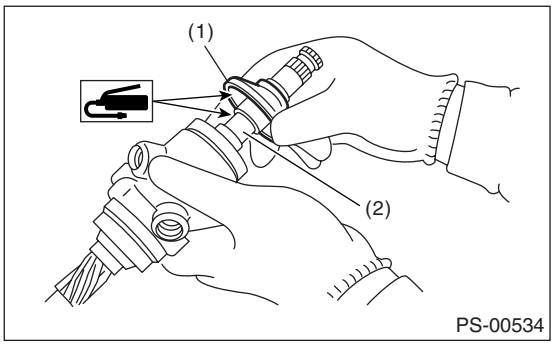
14) Using the ST, caulk so that the diameter of punch hole is 2 — 2.5 mm (0.08 — 0.10 in) and is aligned to the position of 2 mm (0.08 in) from gearbox cylinder end surface.
ST 34099FA060 PUNCH HOLDER



(1) 2 mm (0.08 in)
(2) Diameter: 2 — 2.5 mm (0.08 — 0.10 in)
(3) End of cylinder
(4) Holder

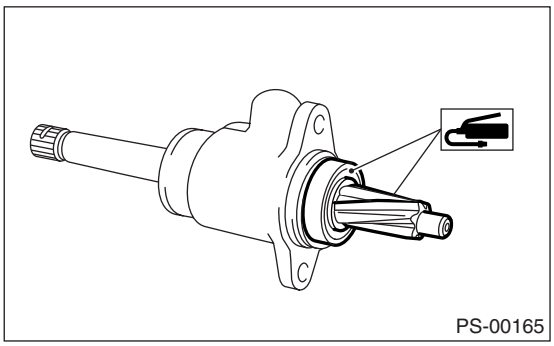
15) Put a vinyl tape around the spline portion and apply genuine grease to the dust cover and install to valve assembly.

CAUTION:
Be sure to install the dust cover to groove of shaft.

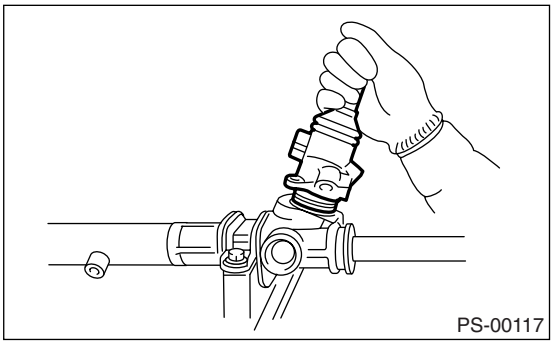


(1) Dust cover
(2) Groove

16) Apply the genuine grease to the pinion gear and bearing of valve assembly.



17) Install a new gasket on valve assembly. Insert the valve assembly into place while facing the rack teeth toward pinion.



18) 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.

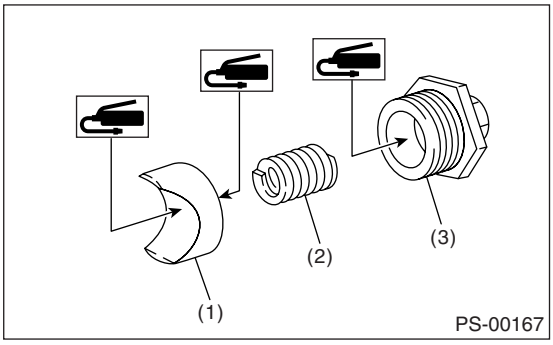
19) Temporarily install the tie-rod to rack end, and then operate the rack from lock to lock for two or three times to make it fit in. Remove any grease blocking the air vent hole.

CAUTION:
Operating the rack from lock to lock without installing tierods may damage the oil seal. Always install the LEFT AND RIGHT tierods.

20) Apply liquid gasket to more than 1/3 of entire perimeter of adjusting screw thread.

Liquid gasket:
THREE BOND 1141

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:
3.9 N·m (0.4 kgf-m, 2.9 ft-lb)

23) Tighten the adjusting screw to the specified torque, then loosen it 20°.
24) Remove the tie–rod.
25) Adjust the turning resistance of gearbox so that it is within specification using adjusting screw. <Ref. to PS-35, TURNING RESISTANCE OF GEARBOX, INSPECTION, Steering Gearbox.>
26) Apply liquid gasket to lock nut and install it into adjusting screw. While holding the adjusting screw with wrench, tighten the lock nut using ST.

Liquid gasket:
THREE BOND 1141

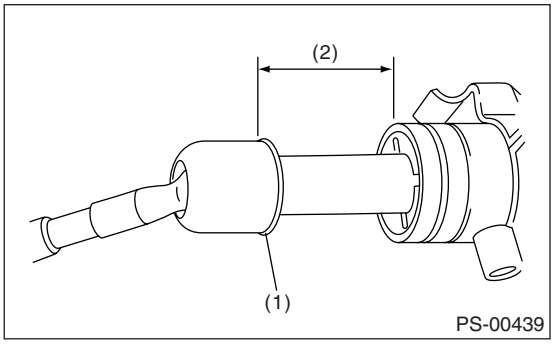
ST 926230000 SPANNER

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

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

27) Extend the rack approx. 40 mm (1.57 in) from steering body.
28) Install the tie-rod and new lock washer into rack.

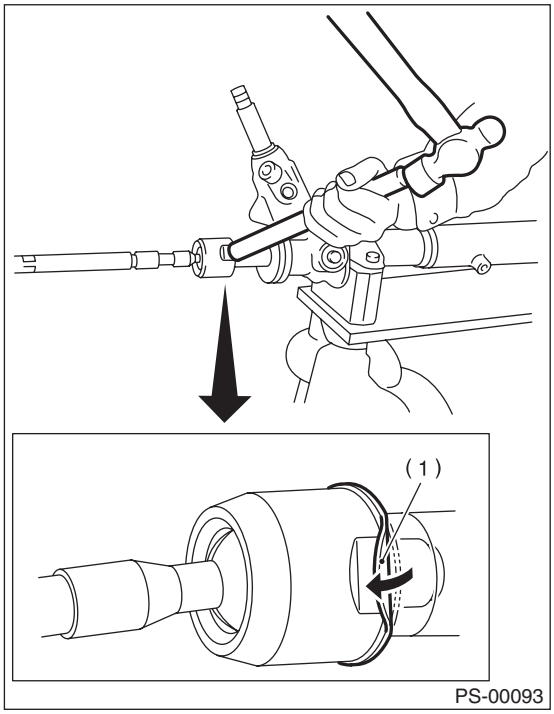
Tightening torque:
130 N·m (13.3 kgf-m, 95.9 ft-lb)



(1) Lock washer
(2) Approx. 40 mm (1.57 in)

29) Bend the lock washer and caulk it.

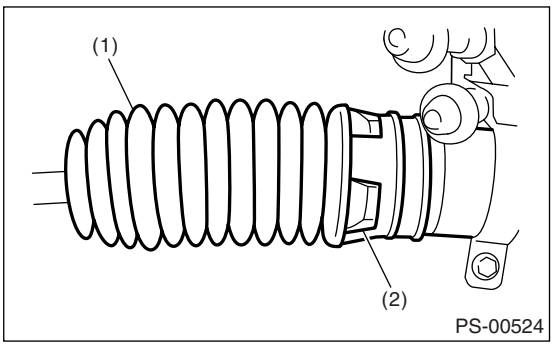
CAUTION:
Be careful not to scratch the rack when caulking lock washer.



(1) Lock washer

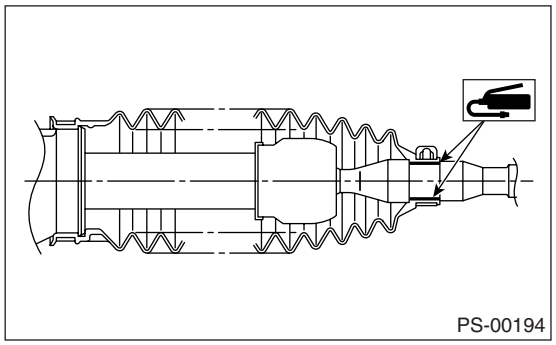
30) Apply a coat of grease to the tie–rod groove, and then install the boot to the housing.

CAUTION:
Right side boot has groove for identification, be sure to install the right and left of boot.

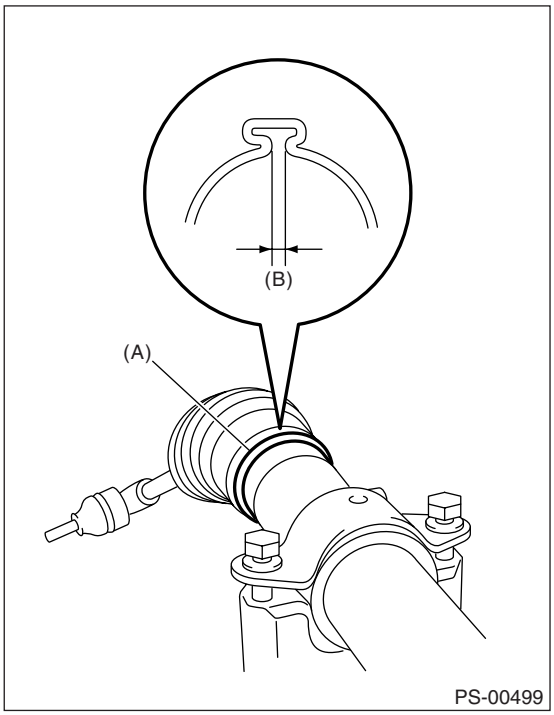


(1) Right side boot
(2) Groove for identification

NOTE:
Make sure that the boot is installed without unusual inflation or deflation.

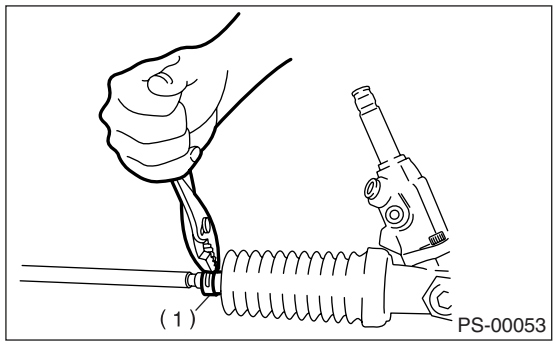


31) Install a new boot band. Using band clamp pliers, caulk it so that the clearance of caulking portion becomes 2mm (0. 079 in) or less.



(A) Boot band
(B) Less than 2 mm (0.079 in)

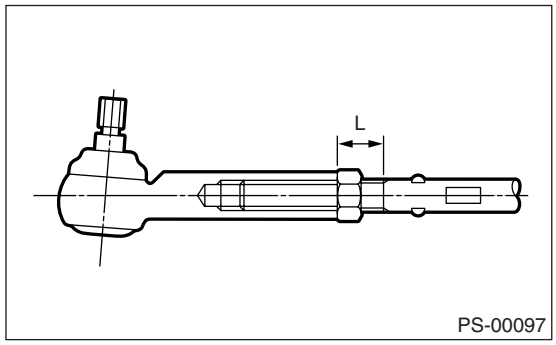
32) Fix the boot end with small clip.



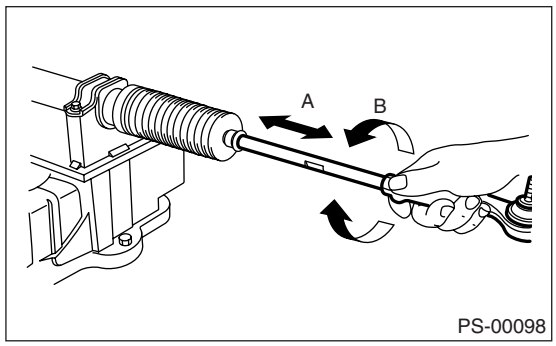
(1) Clip

33) After installing, check that the boot end is installed to the groove of the tie–rod.
34) 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:
31 mm (1.22 in)



35) Inspect the gearbox as follows:
Holding the “A” tie–rod end, repeat movement from lock to lock two or three times as quickly as possible.
Holding the “B” tie–rod end, turn a few times as slowly as possible.
Finally, make sure that the boot is installed in the specified position without inflating.



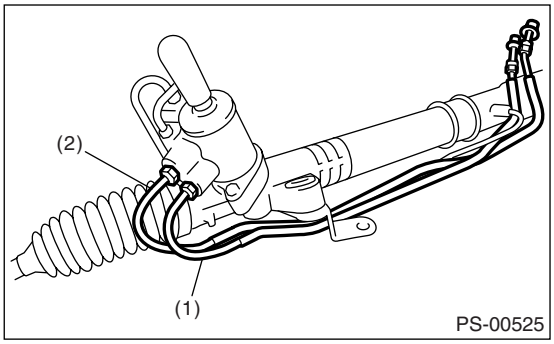
36) Remove the gearbox from ST.
ST1 926200000 STAND
ST2 34199AG000 BOSS D

37) 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)

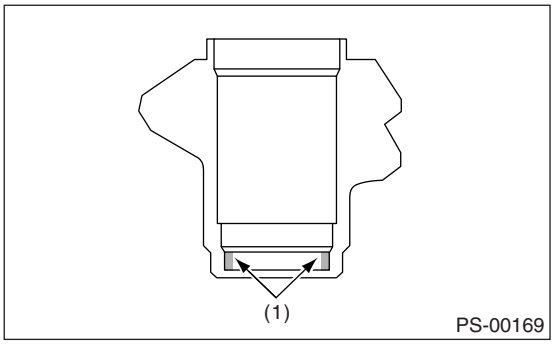


(1) Pipe C
(2) Pipe D

2. CONTROL VALVE ASSEMBLY

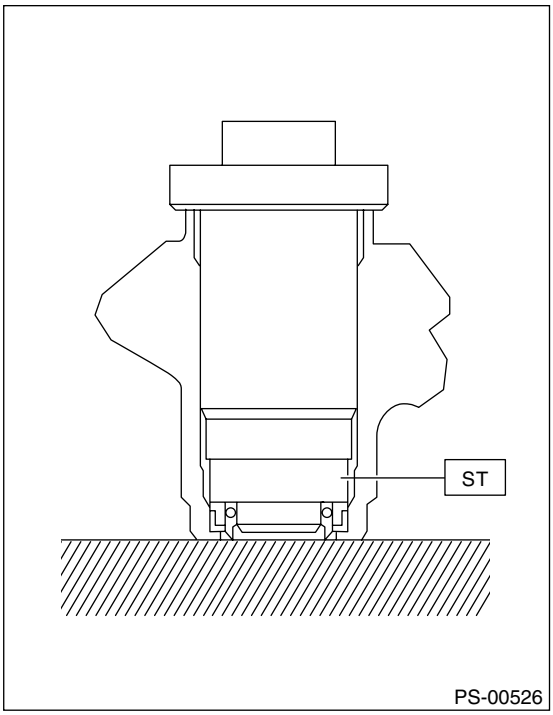
Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

1) Clean all parts and tools before reassembling.
2) Apply a coat of specified power steering fluid to the inner wall of valve housing.

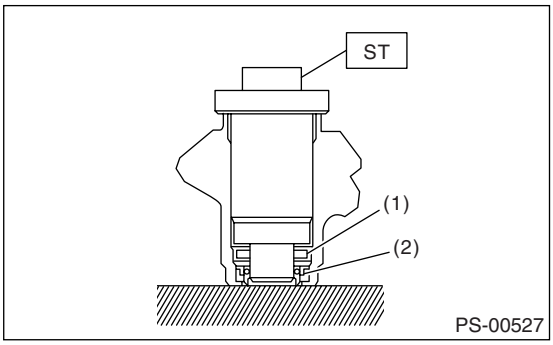


(1) Apply fluid.

3) To avoid scratching the oil seal, apply a coat of grease to the contact surface of installer and oil seal.
4) Verify the direction of oil seal. Install the oil seal to installer and position it to valve housing.
5) Press the oil seal into position using press.
ST 34199AG090 INSTALLER & REMOVER



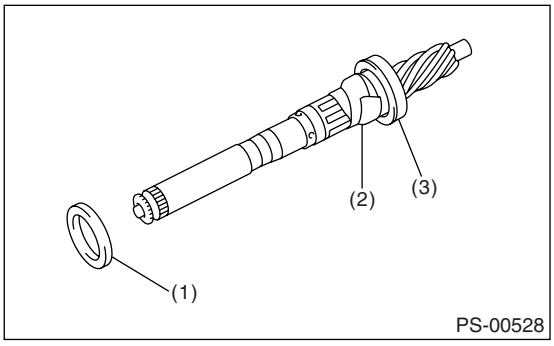
6) Install the bearing to ST and position it to housing. Using the ST and a press, install the special bearing in valve housing.
ST 34199AG090 INSTALLER & REMOVER



(1) Special bearing
(2) Oil seal

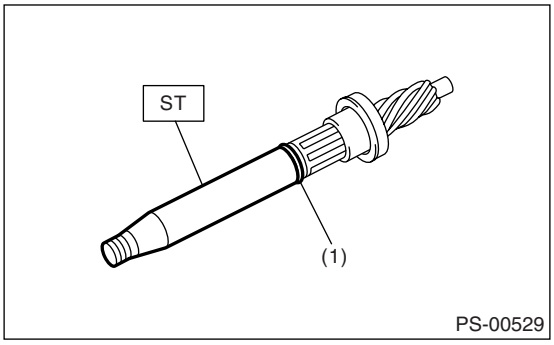
7) Apply vinyl tape to the groove of pinion.

8) Install the back-up ring and oil seal to pinion, and then remove the vinyl tape.



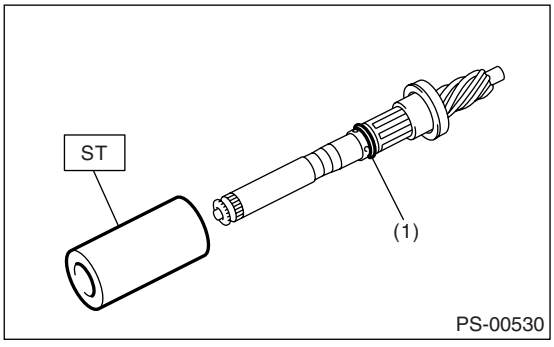
(1) Oil seal
(2) Vinyl tape
(3) Back–up ring

9) Install the ST to pinion, and install the seal ring.
ST 34199AG020 GUIDE



(1) Seal ring

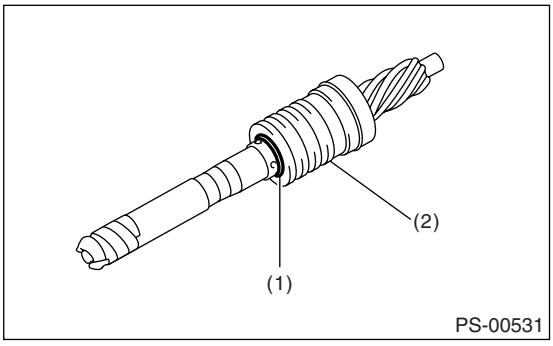
10) Remove the ST GUIDE, and form the seal ring properly using ST FORMER.
ST 34199AG070 FORMER



(1) Seal ring

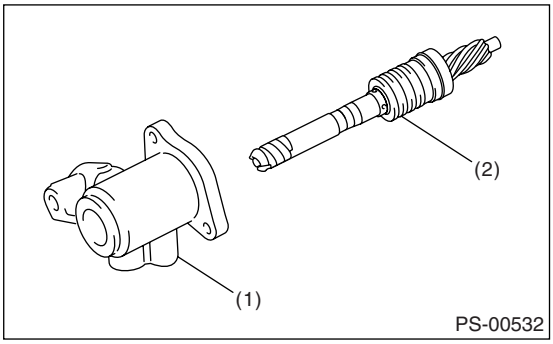
11) Put vinyl tape around pinion shaft spline to protect oil seal from damage.

12) Install the valve to pinion, and install the snap ring.



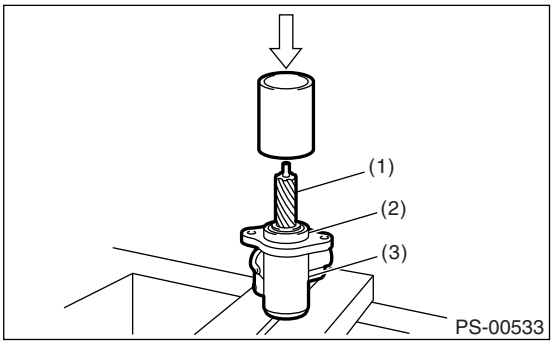
(1) Snap ring
(2) Valve

13) Attach the pinion & valve assembly into the valve housing.



(1) Valve housing
(2) Pinion & valve ASSY

14) Using a press, push the outer race of bearing and press-fit the pinion & valve assembly into housing.

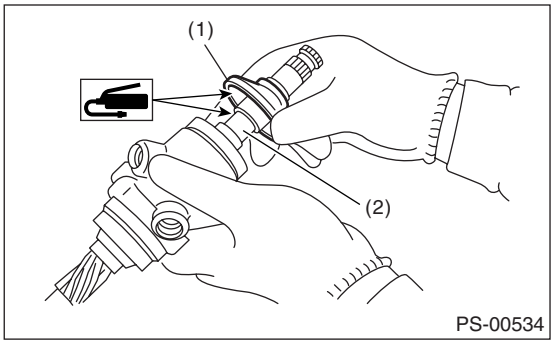


(1) Pinion & valve ASSY
(2) Bearing
(3) Housing

15) Apply the specified grease to dust cover.

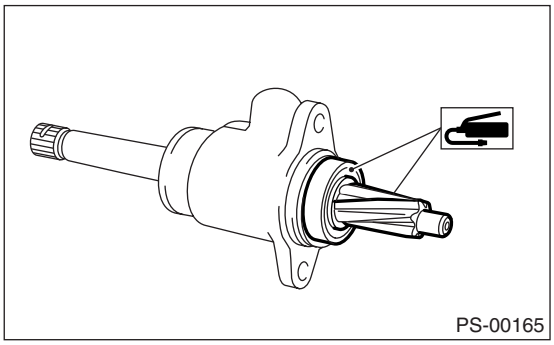
16) Install the dust cover on valve assembly.

CAUTION:
Be sure to install the dust cover to groove of shaft.

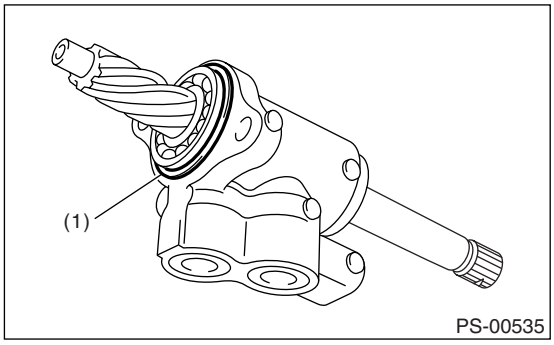


(1) Dust cover
(2) Groove

17) Apply the genuine grease to the pinion gear and bearing of valve assembly.

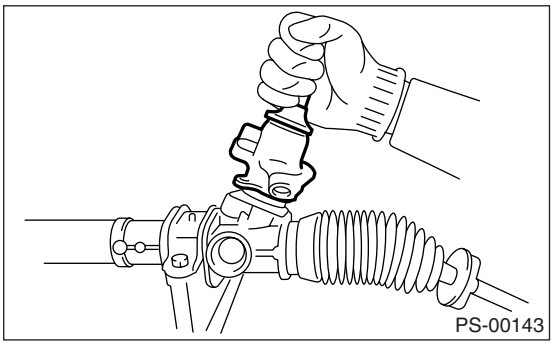


18) Install new O-ring to valve assembly.



(1) O–ring

19) Insert the valve assembly into place while facing the rack teeth toward pinion.



20) Tighten the bolts alternately to secure the valve assembly.

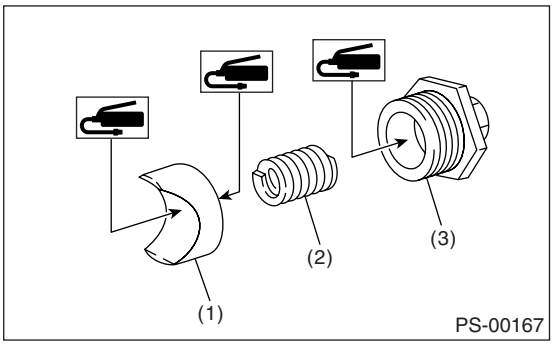
Tightening torque:
20 N·m (2.0 kgf-m, 14.8 ft-lb)

CAUTION:
Be sure to alternately tighten the bolts.

21) Apply liquid gasket to more than 1/3 of entire perimeter of adjusting screw thread.

Liquid gasket:
THREE BOND 1141 (Part No. 004403006)

22) 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

23) Tighten the adjusting screw to the specified torque.

Tightening torque:
3.9 N·m (0.4 kgf-m, 2.9 ft-lb)

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

25) Adjust the turning resistance of gearbox so that it is within specification using adjusting screw. <Ref. to PS-35, TURNING RESISTANCE OF GEARBOX, INSPECTION, Steering Gearbox.>
26) Apply liquid gasket to lock nut and install it into adjusting screw. While holding the adjusting screw with wrench, tighten the lock nut using ST.

Liquid gasket:
THREE BOND 1141

ST 926230000 SPANNER

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

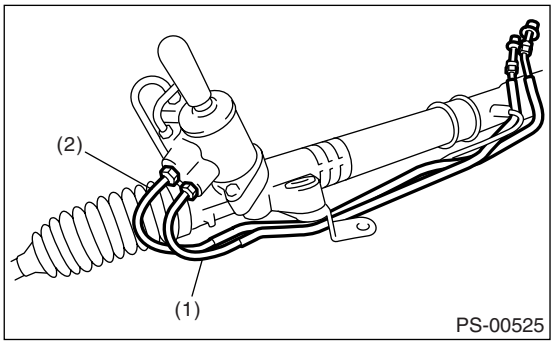
NOTE:
Hold the adjusting screw with a wrench to prevent it from turning while tightening lock nut.

27) Remove the gearbox from ST.
ST1 926200000 STAND
ST2 34199AG000 BOSS D
28) 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 one.
3	Rack & 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 cast iron portion	Replace the gearbox with a new one.
		(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 one. (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 one. (Refer to “Service limit”.)
5	Boot	Crack, damage or deterioration	Replace.
6	Tie–rod	(1) Looseness of ball joint (2) Bend of tie–rod	Replace.
7	Tie–rod end	Damage or deterioration 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

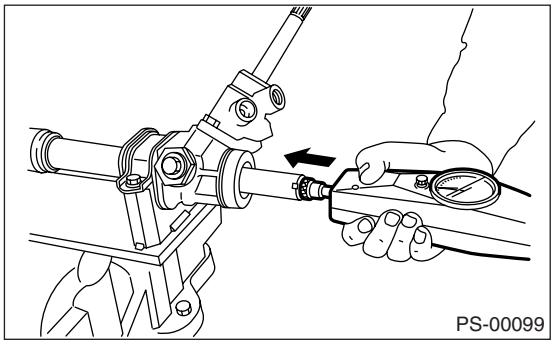
Make a measurements as follows. If it exceeds the specified service limits, adjust or replace.

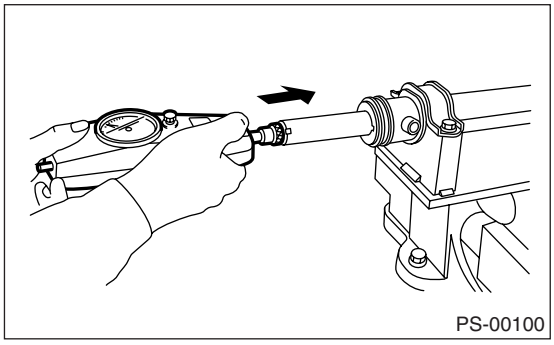
NOTE:
When making a measurement, vise the gearbox using ST. Never vise the gearbox by inserting aluminum plates etc. between vise and gearbox.

ST1 926200000 STAND
ST2 34199AG000 BOSS D

Sliding resistance of rack shaft:

Limit
Less than 400 N (41 kgf, 90 lb)


PS-00099

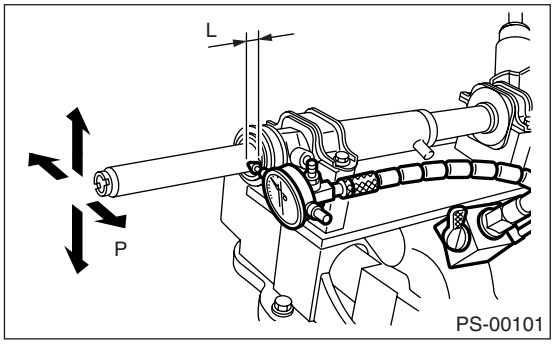

PS-00100

3. RACK SHAFT PLAY IN THE RADIAL DIRECTION

Right–turn steering:

Limit
Less than 0.19 mm (0.0075 in)

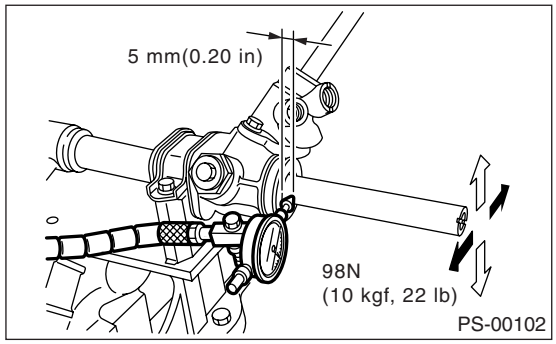
Condition
L: 5 mm (0.20 in)
P: 122.6 N (12.5 kgf, 27.6 lb)



PS-00101

Left–turn steering:

Limit
Direction ⇦ ⇨
Less than 0.6 mm (0.024 in)
Direction ⬅ ➡
Less than 0.4 mm (0.016 in)



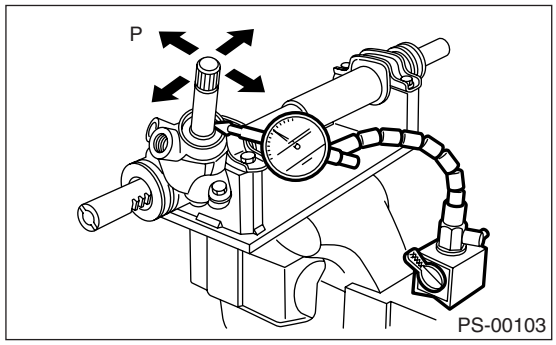
PS-00102

4. INPUT SHAFT PLAY

In radial direction:

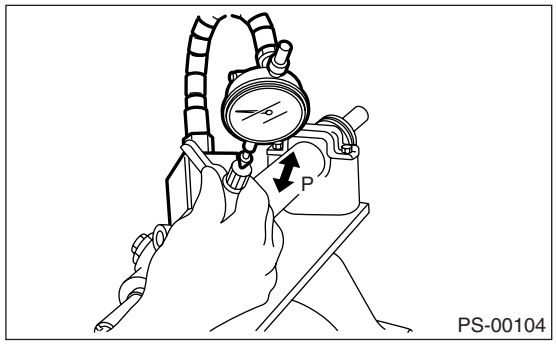
Limit
Less than 0.18 mm (0.0071 in)

Condition
P: 98 N (10 kgf, 22 lb)



PS-00103

In axial direction:
SERVICE LIMIT
Less than 0.27 mm (0.0106 in)
Condition
P: 20 — 49 N (2 — 5 kgf, 4 — 11 lb)

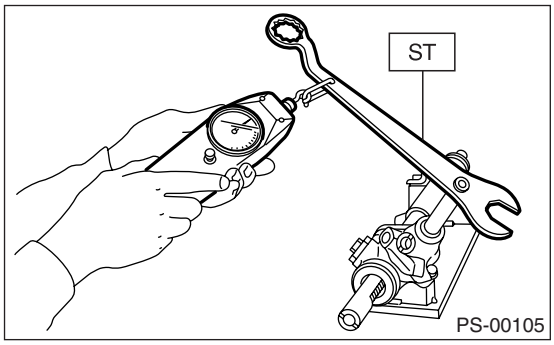


PS-00104

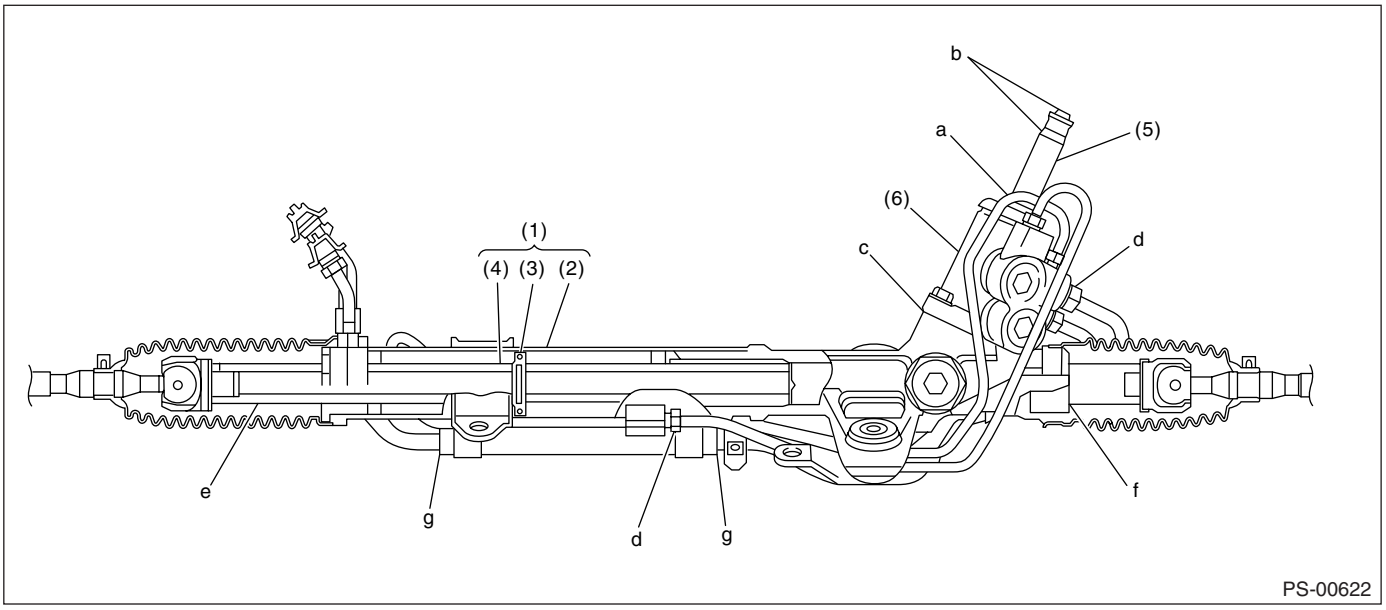
5. TURNING RESISTANCE OF GEARBOX

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



6. OIL LEAKAGE



(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 approx. 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 with a new one.
4) Cause and solution for oil leakage from “b”.
The torsion bar O–ring is damaged. Replace the valve assembly with a new one.
5) Cause and solution for oil leakage from “c”.
The oil seal is damaged. Replace the valve assembly or oil seal with a new one.
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 one.
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 thirty to forty times with the engine running, and make comparison of the leaked portion immediately after and several hours after this operation.
(1) Leakage from “e”
The cylinder seal is damaged. Replace the rack bushing with a new one.
(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 & valve assembly is damaged. Replace the pinion & valve assembly with a new one. Or replace the oil seal and the parts that are damaged during disassembly with new ones.

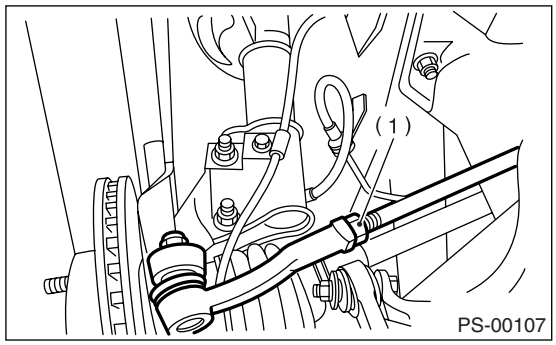
- If oil stops leaking from “f”:

The oil seal of rack housing is damaged. Replace the oil seal and parts that are damaged during disassembly with new ones.

F: ADJUSTMENT

1) Adjust the front toe.
<Ref. to FS-10, FRONT WHEEL TOE–IN, INSPECTION, Wheel Alignment.>

Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



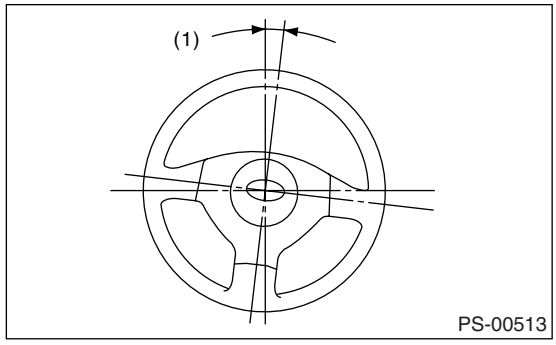
(1) Lock nut

2) Adjust the steering angle of the wheels.

Specification of steering angle:

Inner wheel	37.0°±1.5°
Outer wheel	32.0°±1.5°

3) If the steering wheel spokes are not horizontal when wheels are set in the straight ahead position, or error is more than 5° on the periphery of the steering wheel, correctly re-install the steering wheel.



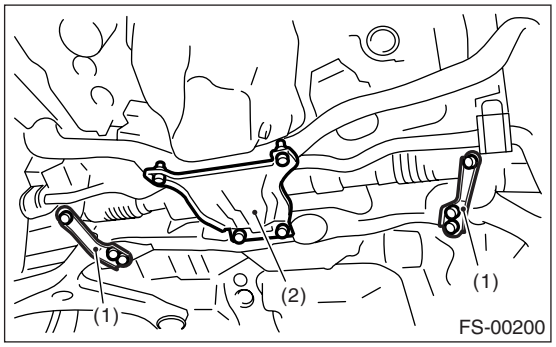
(1) Within 5°

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.

6. Pipe Assembly

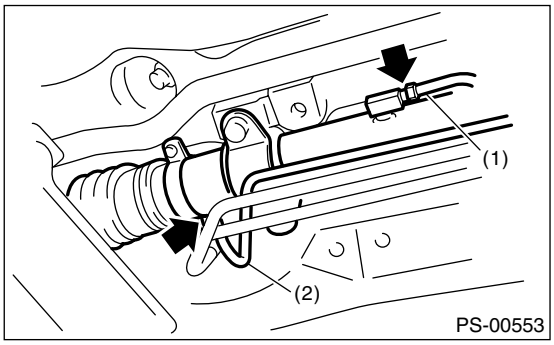
A: REMOVAL

1) Disconnect the ground cable from the battery.
2) Lift-up the vehicle, and then remove the front crossmember support plate and jack-up plate.



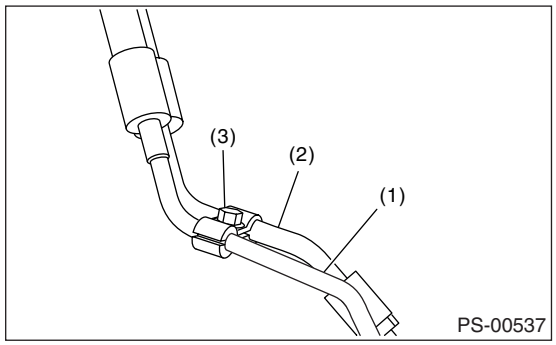
(1) Front crossmember support plate
(2) Jack–up plate

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.



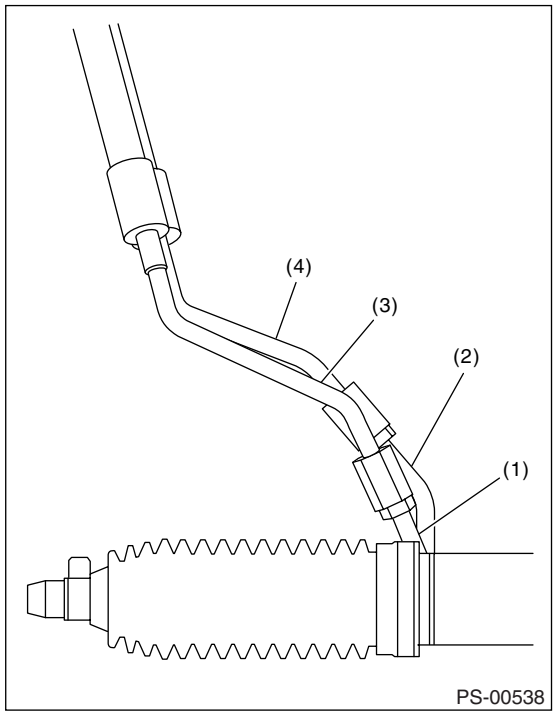
(1) Pipe A
(2) Pipe B

4) Remove the clamp E from return hose and pressure hose.



(1) Return hose
(2) Pressure hose
(3) Clamp E

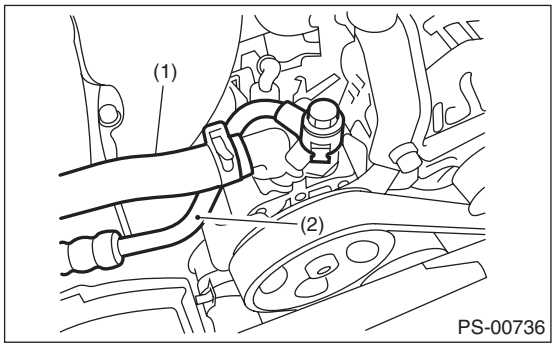
5) Disconnect the pipe D from return hose and pipe C from pressure hose.



(1) Pipe C
(2) Pipe D
(3) Pressure hose
(4) Return hose

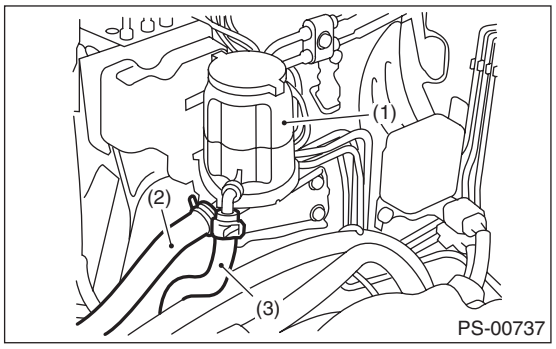
6) Remove the air intake duct. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>

7) Disconnect the suction hose and pressure hose from oil pump.



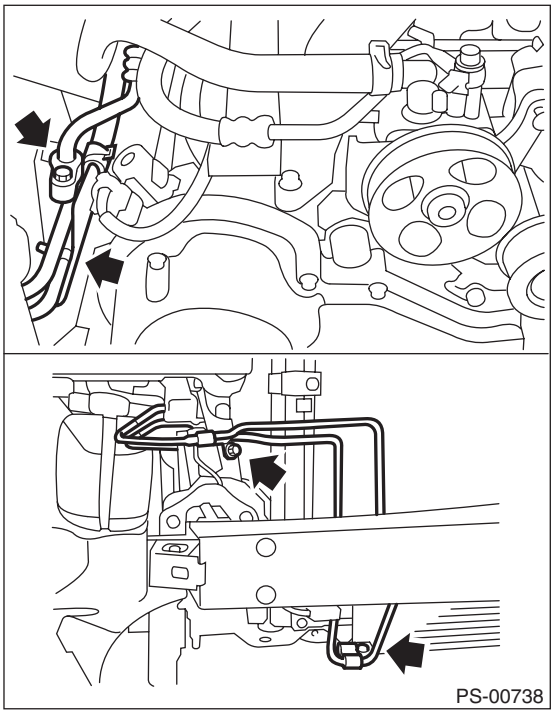
(1) Suction hose
(2) Pressure hose

8) Disconnect the suction hose and return hose from the reservoir tank.

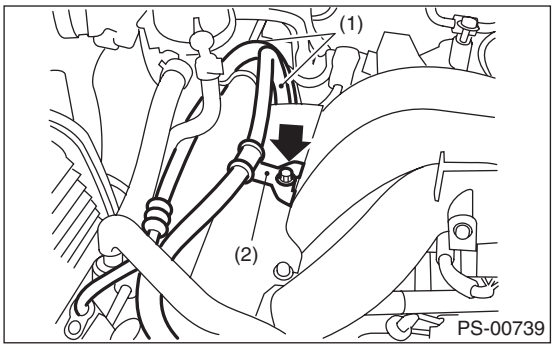


(1) Reservoir tank
(2) Suction hose
(3) Return hose

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 feeding the fluid otherwise the vane pump might be seized.

3) Finally, check the clearance between pipes or hoses as shown in the figure indicated in “General Diagnostic Table”. <Ref. to PS-53, INSPECTION OF CLEARANCE, INSPECTION, General Diagnostic Table.>

C: INSPECTION

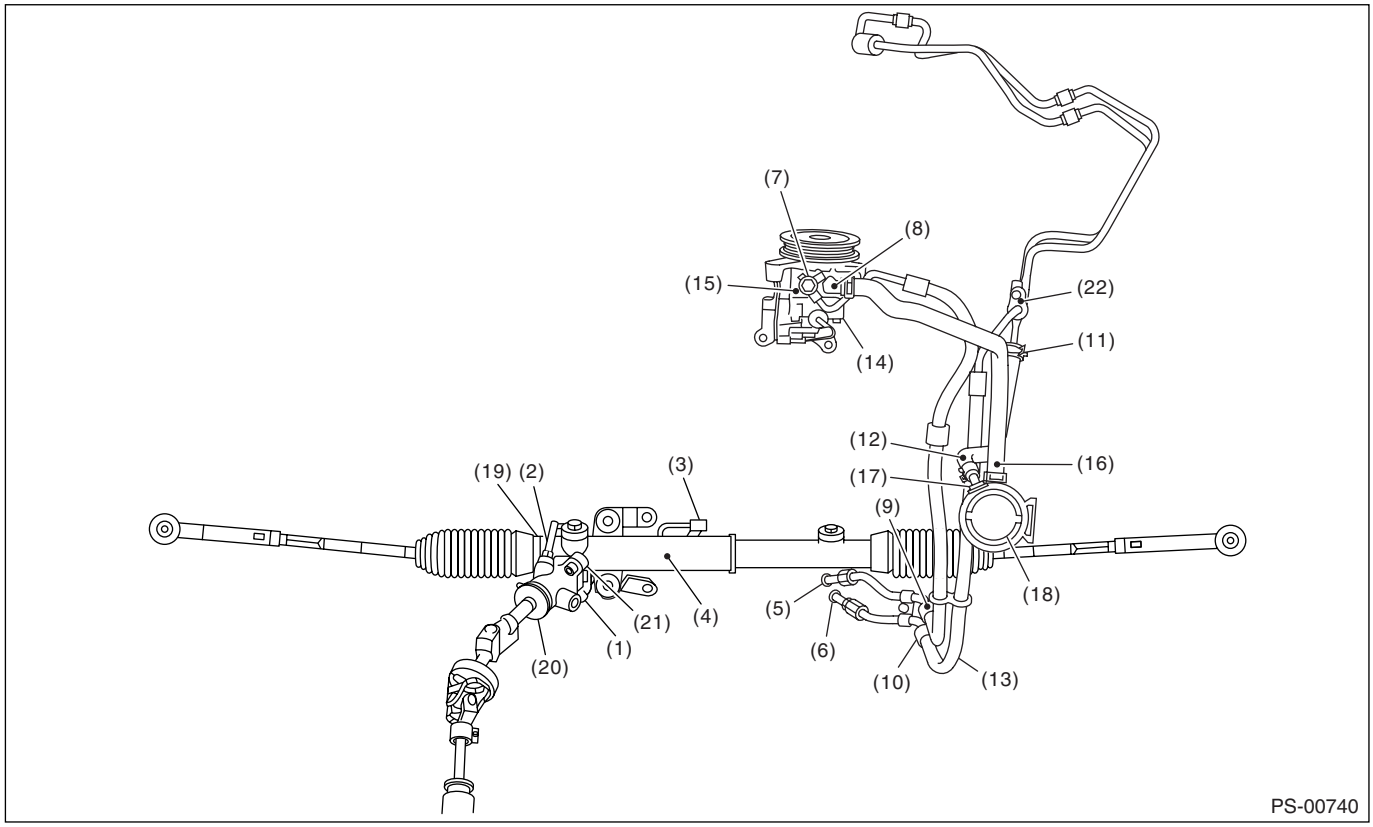
Check all disassembled parts for wear, damage or other problems. Repair or replace the defective parts as necessary.

Part	Maintenance parts	Corrective action
Pipe	• O–ring fitting surface damage • Nut damage • Pipe damage	Replace with a new part.
Clamp	• Loose clamps	Replace with a new part.
Hose	• Flare surface damage • Flare nut damage • Outer surface cracks • Outer surface wear • Clip damage • End coupling or adapter for deformation	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.
Particularly continuous work of relief valve over 5 seconds causes to reduce service lives of the hoses, the oil pump, the fluid, etc. due to over heat.

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	Retighten.
	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.
	Excessive tightening torque for return hose clip	Replace.
	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.

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.



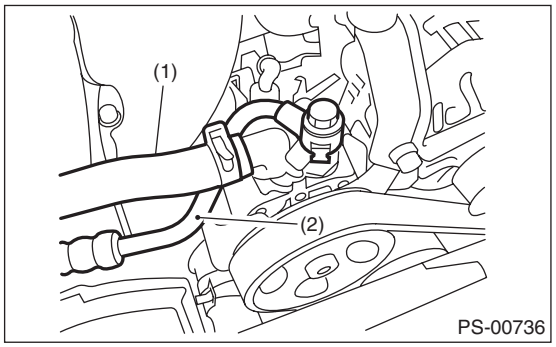
Fluid leaking area	Possible cause	Corrective action
Leakage from pipe and hose connections numbered with (1) through (8) in the figure	Insufficient tightening of flare nut, adhesion of dirt, damage to flare or flare nut or eye bolt	Loosen and retighten. Replace if ineffective.
	Improper installation of hose or clamp	Retighten or replace the clamp.
	Damaged O-ring or gasket	Replace the O-ring, gasket pipe or hose with new one, if still no improvement, replace the gearbox 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 cast iron 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 packing	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 gearbox 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 packing or oil seal	Replace the problem 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.

7. Oil Pump

A: REMOVAL

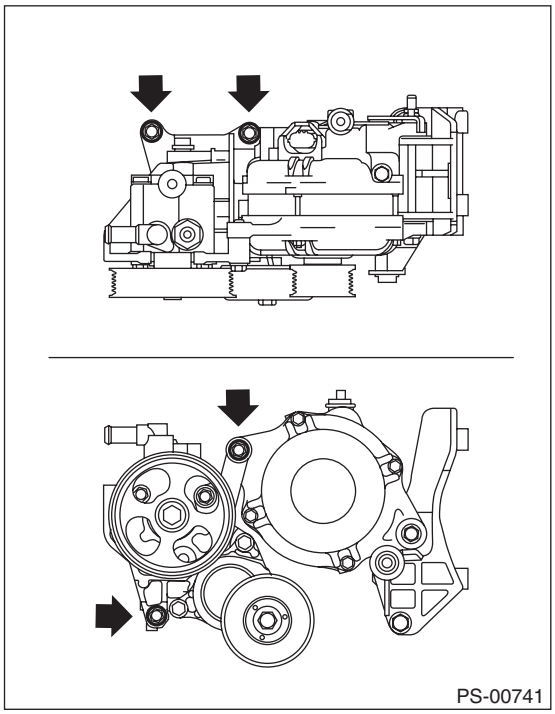
1) Disconnect the ground cable from the battery.
2) Remove the air intake duct. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
3) Remove the pulley belt cover.
4) Remove the V-belts.
5) Disconnect the connector from power steering pump switch.
6) Disconnect the pressure hose and suction hose from power 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.



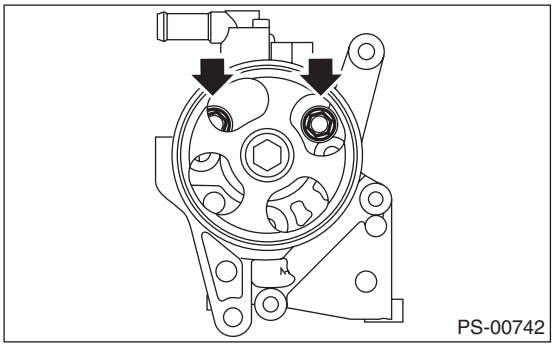
(1) Suction hose
(2) Pressure hose

7) Remove the installation bolt of the power steering pump bracket.

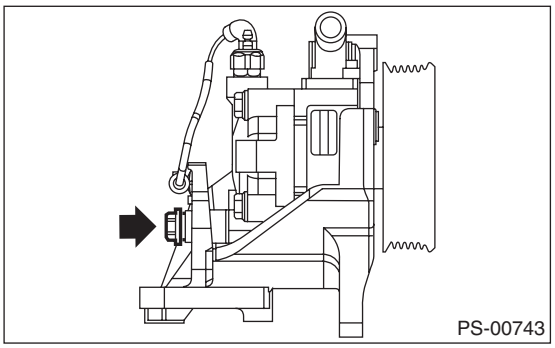


8) Place the oil pump bracket in a vise, and remove the two bolts from the front side of the oil pump.

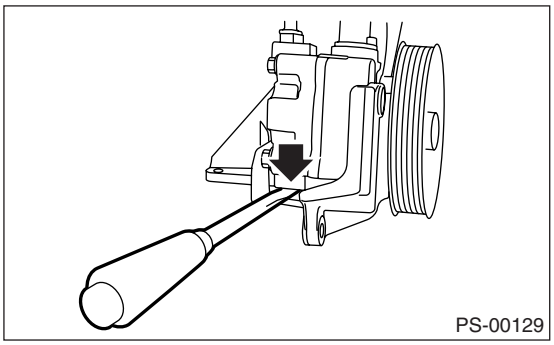
CAUTION:
When securing the oil pump bracket in a vice, hold the oil pump bracket with the least possible force between two pieces of wood.



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.



B: INSTALLATION

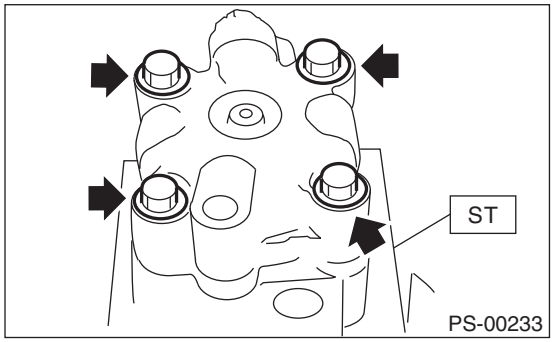
1) Install in the reverse order of removal.
2) Replace the fluid and perform air purge.

Tightening torque:
<Ref. to PS-6, OIL PUMP, COMPONENT, General Description.>

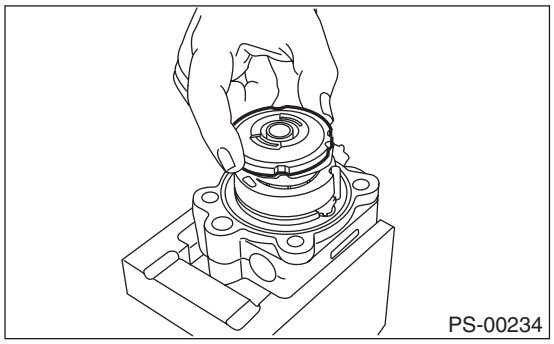
CAUTION:
Never start the engine before filling with fluid, as doing so may cause the vane pump to seize.

C: DISASSEMBLY

1) Using the ST, place the oil pump in the vise, and remove the 4 bolts holding the rear cover.
ST 34199AE020 MOUNT

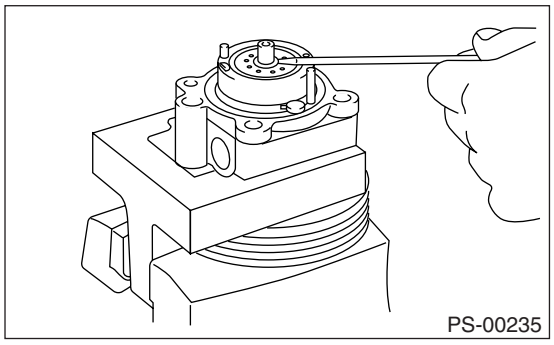


2) Remove the pressure plate.

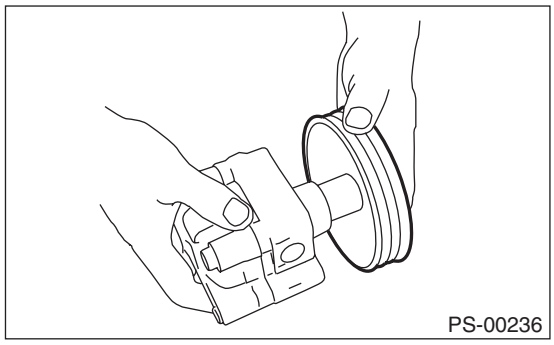


3) Use a screw driver to pry the retaining ring.

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.

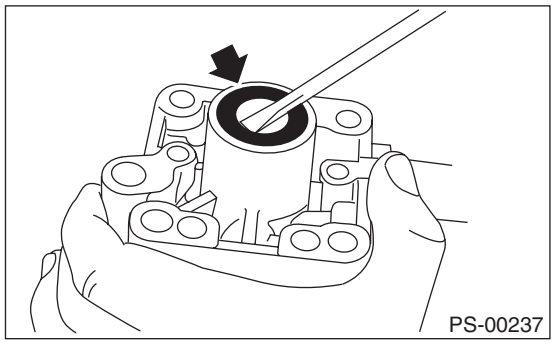


7) Place the oil pump in the vice.

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 screw driver to pry the oil seal out.

CAUTION:
Be careful not to scratch the inner surface of the casing.

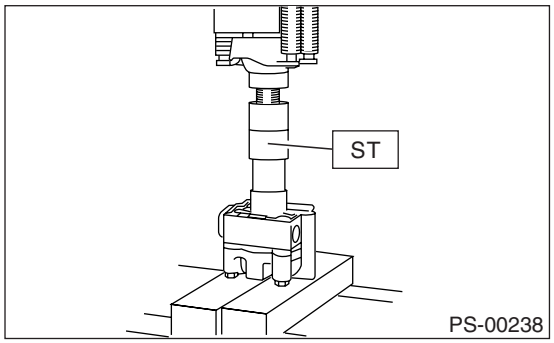


D: ASSEMBLY

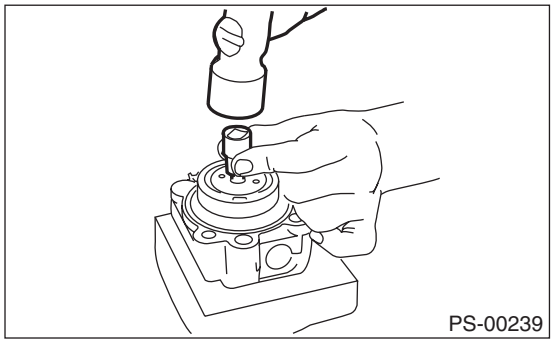
1) Caution during reassembly
   (1) When removing O–rings, oil seals and snap rings, always replace with new parts.
   (2) Thoroughly wash the parts and allow to dry. Make sure the parts do not come into contact with cleaning oil or dust.
   (3) The reassembly must be performed in a clean place. Make 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.

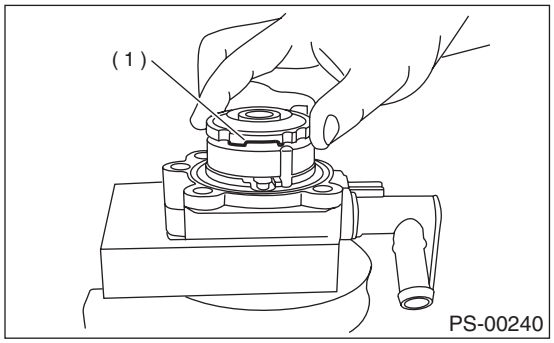
3) Temporarily tighten the rear cover to the front body.
4) Attach ST to the front body. Using the press, install the oil seal.
ST 34199AE030 INSTALLER



5) Install the pump pulley to front body.
6) Using the ST, place the oil pump in a vise.
ST 34199AE020 MOUNT
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.

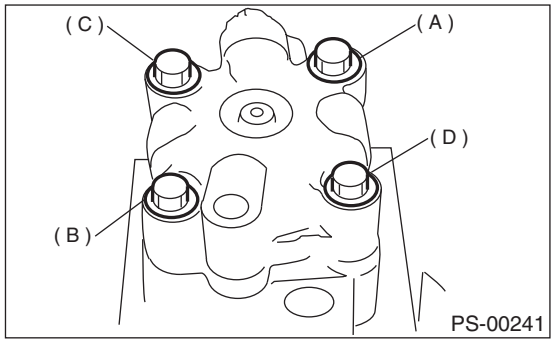


(1) Groove

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.

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 one.
		(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 one.
2	Pulley	(1) Damage	Replace with a new part.
		(2) Bend	Measure the V groove deflection. If it exceeds the service limit, replace the pulley with a new one.
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 one.
		(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 one.
4	O–ring	Cracking or deterioration	Replace with a new part.
5	Bracket	Cracking	Replace with a new part.

2. SERVICE LIMIT

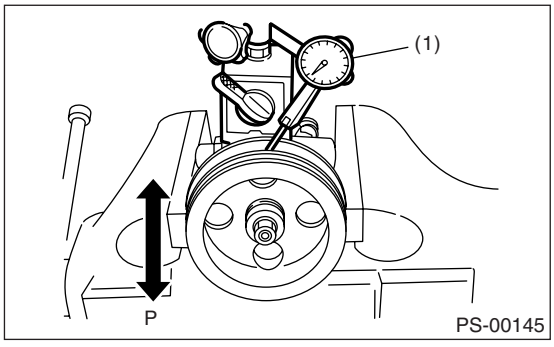
Make a measurements as follows. If it exceeds the service limit, replace with a new one.

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

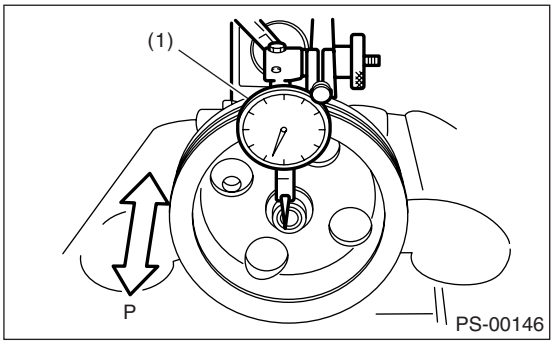
Condition:
P: When applying the force of 9.8 N (1.0 kgf, 2.2 lb)

Service limit:
Play in the radial direction (Direction ⬅ ➡)
Less than 0.2 mm (0.008 in)



(1) Dial gauge

Axial play (Direction ⇦ ⇨)
Less than 0.6 mm (0.024 in)

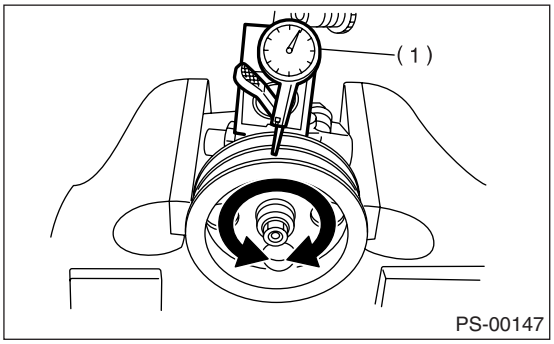


(1) Dial gauge

2) Deflection of the pulley groove

Service limit:
Less than 1.0 mm (0.039 in)

NOTE:
Read the value for one surface of V ditch, and then the value for another off the dial.

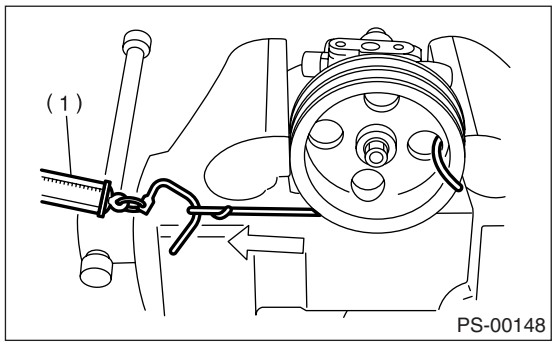


(1) Dial gauge

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 balance

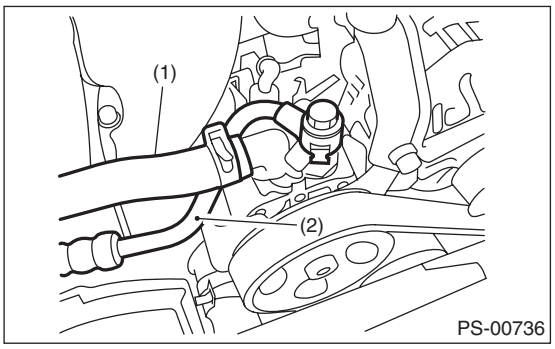
3. HYDRAULIC PRESSURE

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 a wastecloth at locations where fluid can be expected to spill. Wipe off any spilt 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

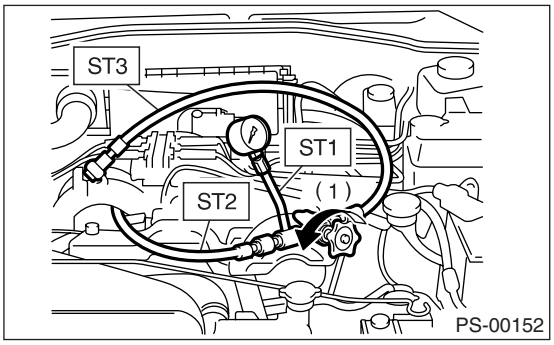
(2) Remove the air intake duct.
(3) Disconnect the pipe C from pump.
(4) Using the gasket (Part No. 34621AC021) and bolt (Part No. 34620AC010), install the ST2 to pump instead of pressure hose.



(1) Suction hose
(2) Pressure hose

(5) Install 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.
(8) Measure the regular pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A



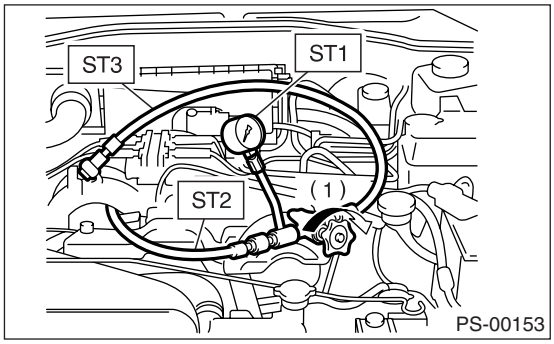
(1) Valve

Service limit:
981 kPa (10 kg/cm^2, 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

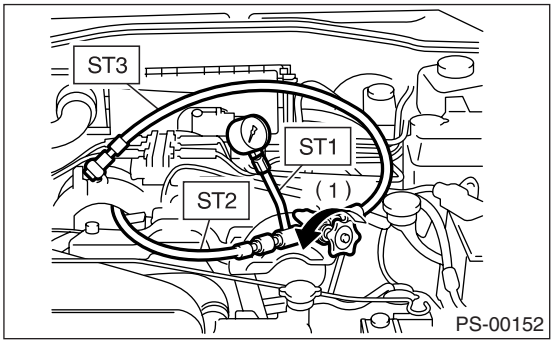
Service limit:
8,800 — 9,400 kPa (90 — 96 kg/cm^2, 1,276 — 1,363 psi)

(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^2, 1,276 — 1,363 psi)

(4) If it is out of specification, measure the steering effort. <Ref. to PS-52, 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

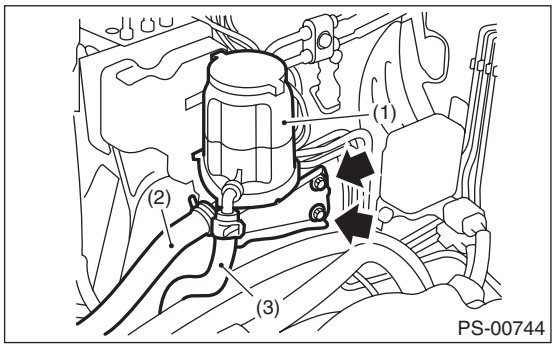
A: REMOVAL

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 (3.37 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.

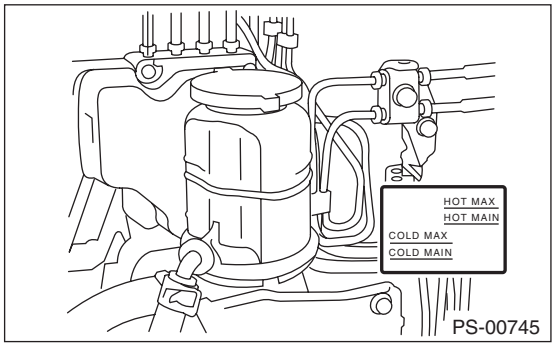
9. Power Steering Fluid

A: SPECIFICATION

Recommended power steering fluid	Manufacturer
ATF DEXRON III or equivalent	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

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.

10.General Diagnostic Table

A: INSPECTION

Trouble	Possible cause	Corrective action
• Steering effort is heavy in all ranges. • Steering effort is heavy at stand still. • Steering wheel vibrates when turning.	1. Pulley belt • Unequal length of pulley belts • Contact with oil or grease • Looseness or damage of the pulley belt • Poor uniformity of the pulley belt cross section • Pulley belt touches to pulley bottom • Poor revolution of pulleys (except oil pump pulley) • Poor revolution of oil pump pulley	Adjust or replace.
	2. Tire and wheel • Improper tire out of specifications*1 • Improper wheel out of specifications*1 • Tires not properly inflated	Replace or reinflate.
	3. Fluid • Low fluid level • Air entry in fluid • Entry of dust in the fluid • Fluid deterioration • Inadequate warm–up of fluid *2	Refill, bleed air, replace or instruct customer.
	4. Idle speed • Lower idle speed • Excessive drop of idle speed at start or when turning the steering wheel *3	Adjust or instruct customer.
	5. Measure the hydraulic pressure. <Ref. to PS-45, HYDRAULIC PRESSURE, INSPECTION, Oil Pump.>	Replace the problem parts.
	6. Measure the steering wheel effort. <Ref. to PS-52, MEASUREMENT OF STEERING EFFORT, INSPECTION, General Diagnostic Table.>	Adjust or replace.
• Vehicle leads to one side or the other. • Returning force of steering wheel to center is poor. • Steering wheel vibrates when turning.	1. Fluid line • Folded hose • Flattened pipe	Correct or replace.
	2. Tire and wheel • Flat tire • Mixed use of different tires • Mixed use of different wheels • Abnormal wear of tire • Unequal tread remaining • Unequal pressure of tire	Adjust, fix or replace.
	3. Front alignment • Improper or unequal caster • Improper or unequal toe–in • Loose suspension connections	Adjust or retighten.
	4. Others • Damaged joint assembly • Unbalanced height • Unbalanced weight	Replace, adjust or instruct customer.
	5. Measure the steering wheel effort. <Ref. to PS-52, MEASUREMENT OF STEERING EFFORT, INSPECTION, General Diagnostic Table.>	Adjust or replace.

*1 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.
*2 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.
*3 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.

1. NOISE & VIBRATION

CAUTION:
Do not keep the relief valve operated over five seconds 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 over five seconds.)	Normal
	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-39, 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.

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.

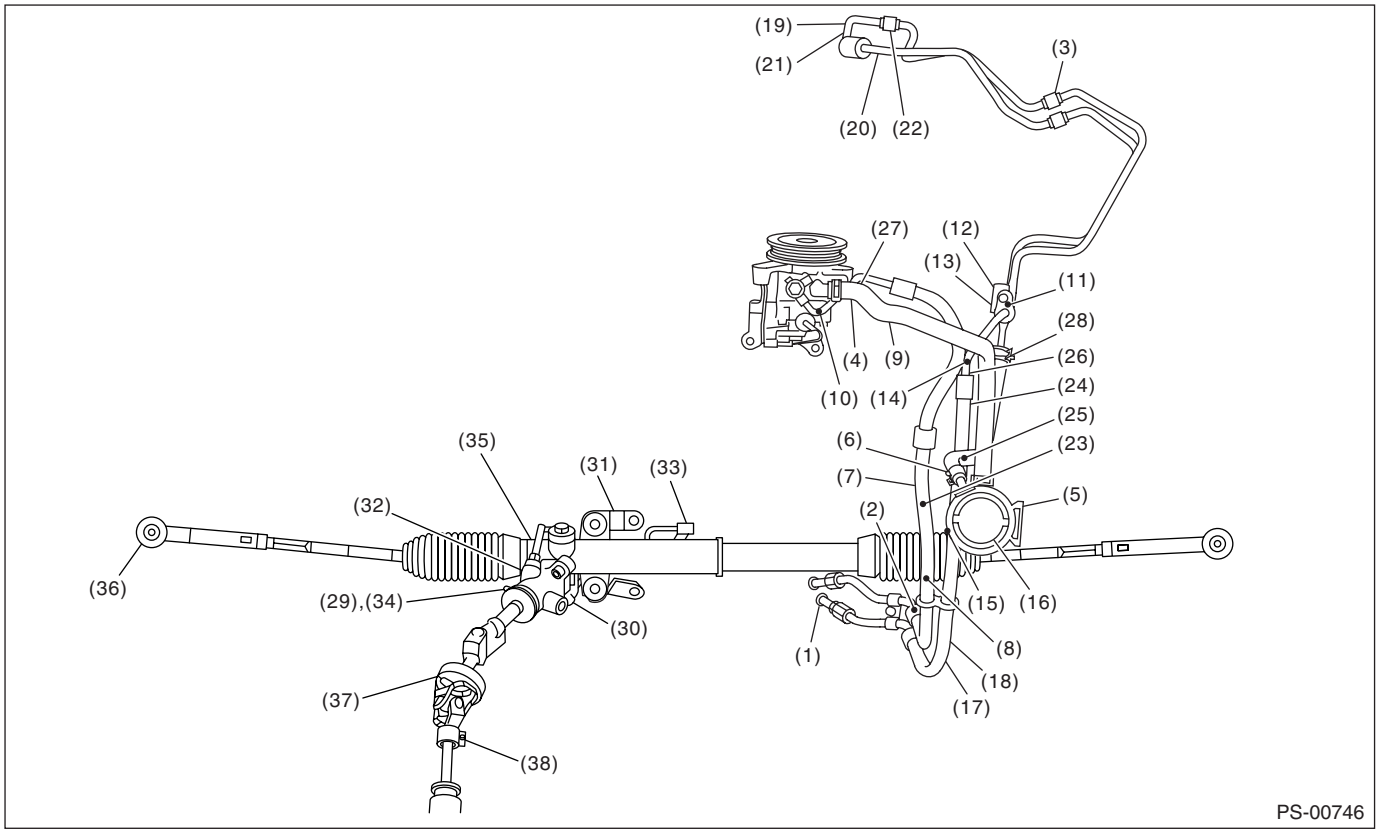
2. MEASUREMENT OF STEERING EFFORT

	Step	Check	Yes	No
1	**CHECK STEERING EFFORT.** 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 over 2,000 rpm, 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)?	Go to step **2**.	Adjust the backlash.
2	**CHECK STEERING EFFORT.** 1) Stop the engine. 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 294.2 N (30 kgf, 66.2 lb)?	Go to step **3**.	Perform the adjustment.
3	**CHECK STEERING WHEEL EFFORT.** 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**.	Check, adjust and replace if necessary.
4	**CHECK STEERING WHEEL EFFORT.** Measure the steering wheel effort.	Is the difference of steering effort between right and left less than 20%?	Go to step **5**.	Check, adjust and replace if necessary.
5	**CHECK UNIVERSAL JOINT.** 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 with a new part.
6	**CHECK UNIVERSAL JOINT.** 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 with a new part.
7	**CHECK FRONT WHEEL.** 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**.
8	**CHECK TIE–ROD ENDS.** Remove the tie–rod ends.	If the tie-rod ends of suspension have unsteady revolution or rattling?	Inspect and replace if necessary.	Go to step **9**.
9	**BALL JOINT CHECK.** Remove the ball joint.	If the ball joints of suspension have unsteady revolution or rattling?	Inspect and replace if necessary.	Go to step **10**.
10	**CHECK GEARBOX.** Measure the rotating of gearbox. <Ref. to PS-35, 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 **11**.	Readjust the backlash, and if ineffective, replace the faulty parts.
11	**CHECK GEARBOX.** Measure the sliding of gearbox. <Ref. to PS-34, LIMIT, INSPECTION, Steering Gearbox.>	Is the sliding resistance of steering gearbox less than 400 N (41 kgf, 90 lb)? Is the difference between the right and left sliding resistance 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) Air bag sensor to cooler pipe assembly	10 (0.39)
(4) Air cleaner case-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 (0.79)
(13) Oil pipe to Cooler pipe joint block	20 (0.79)
(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)
(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 gage	10 (0.39)
(38) Yoke to Brake booster	5 (0.20)

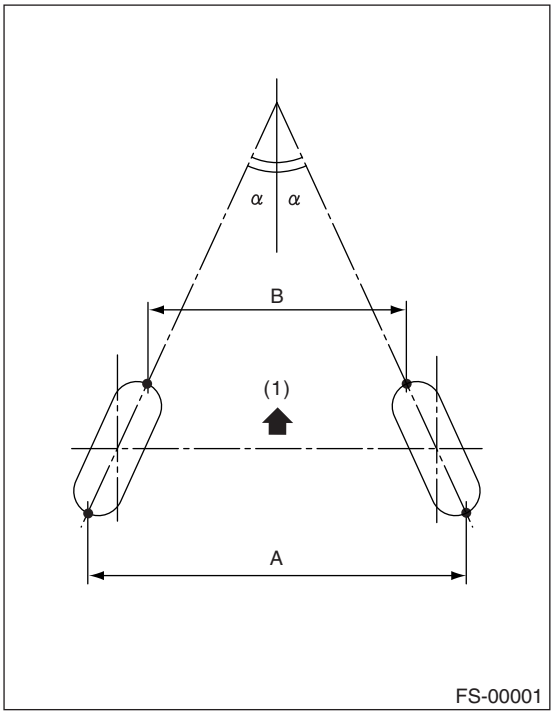

(19)
(21)
(20)
(22)
(3)
(27)
(12)
(13)
(11)
(28)
(4)
(9)
(26)
(10)
(14)
(24)
(25)
(6)
(23)
(7)
(5)
(2)
(35)
(31)
(33)
(32)
(36)
(29),(34)
(30)
(15)
(16)
(1)
(8)
(18)
(17)
(37)
(38)
PS-00746

1. General Description

A: SPECIFICATION

Wheel arch height [Tolerance: $^{+12\ mm}_{-24\ mm}$ ($^{+0.47\ in}_{-0.94\ in}$)] mm (in)	439 (17.3)
Camber [Tolerance: ±0°45′ Difference between RH and LH 45′ or less]	–0°31′
Toe–in mm (in)	2±2 (0.08±0.08) Toe angle (sum of both wheels): 0°9'±0°9'
Thrust angle [Tolerance: ±0°30′]	0°
Diameter of stabilizer mm (in)	16 (0.63)

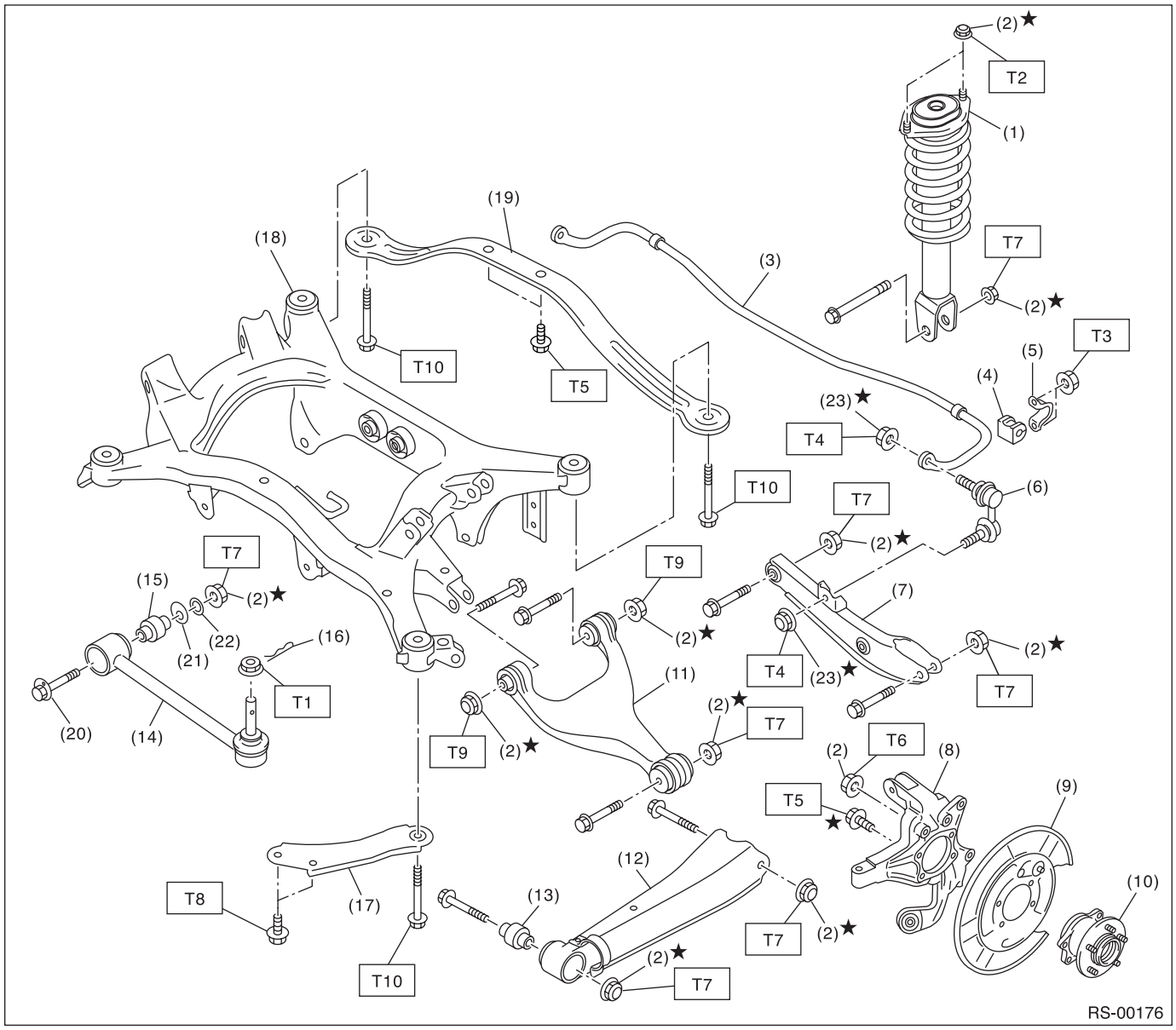
NOTE:
• Front and rear toe–in and front camber can be adjusted. Adjust if the toe–in or camber tolerance exceeds specifications.
• Other items indicated in the specifications table cannot be adjusted. If other items exceed specifications, check the suspension parts and connections for deformation, and replace with new ones as required.



(1) Front
A – B = Positive: Toe-in, Negative: Toe–out
α = Individual toe angles

B: COMPONENT

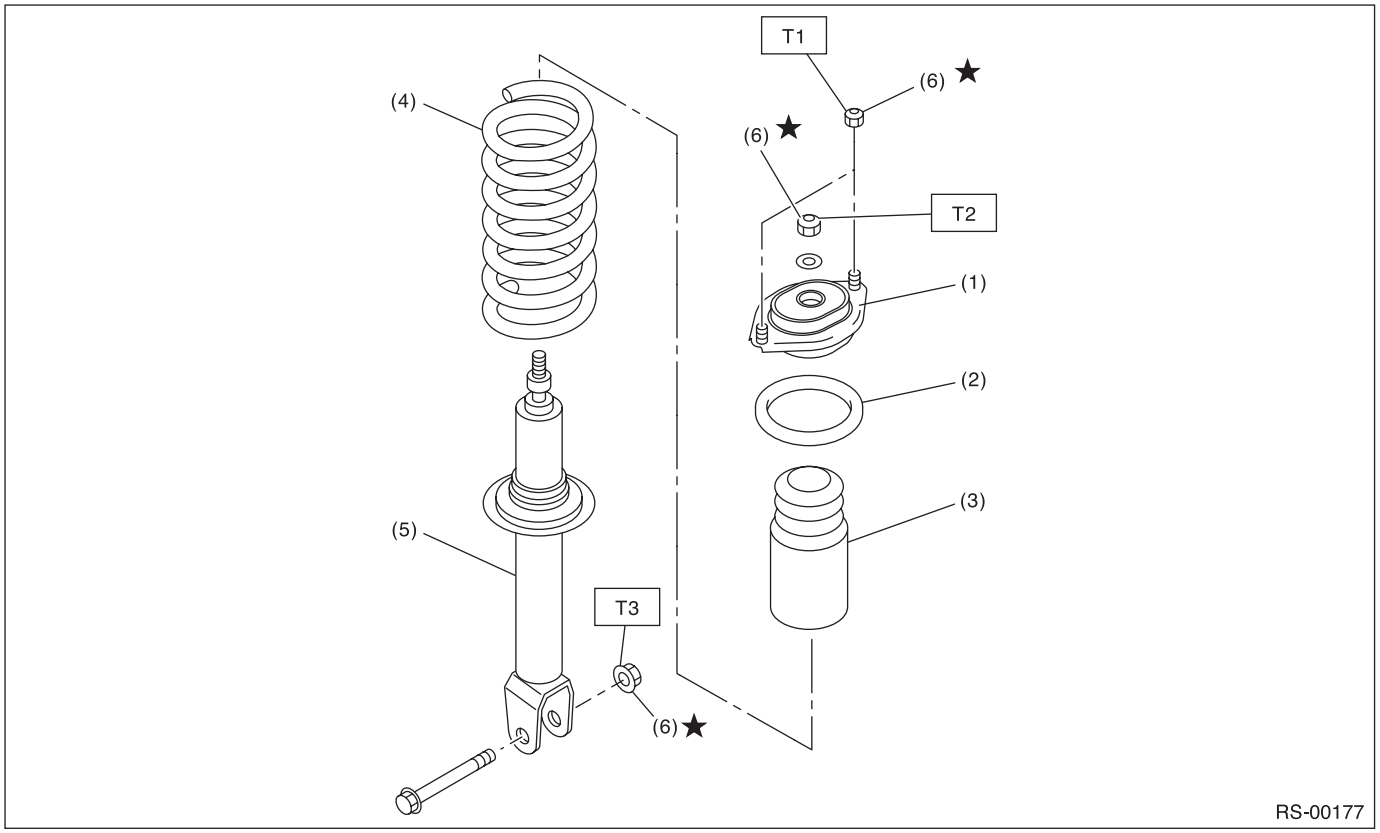
1. REAR SUSPENSION



(1) Shock absorber
(2) Self–locking nut
(3) Rear Stabilizer
(4) Stabilizer bushing
(5) Stabilizer clamp
(6) Stabilizer link
(7) Rear lateral link
(8) Rear housing
(9) Back plate
(10) Hub unit bearing
(11) Upper arm
(12) Trailing link
(13) Trailing link bushing
(14) Front lateral link
(15) Front lateral link bushing
(16) Snap pin
(17) Front sub frame support plate
(18) Rear sub frame
(19) Rear sub frame support plate
(20) Adjusting bolt
(21) Adjusting washer
(22) Washer
(23) Flange nut (WAX)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 27 (2.8, 19.9)
T2: 30 (3.1, 22.4)
T3: 35 (3.6, 25.8)
T4: 60 (6.1, 44)
T5: 65 (6.6, 48)
T6: 75 (7.6, 89)
T7: 120 (12.2, 89)
T8: 125 (12.7, 92)
T9: 150 (15.3, 111)
T10: 200 (20.4, 148)

2. SHOCK ABSORBER



(1) Mount
(2) Upper rubber sheet
(3) Dust cover
(4) Coil spring
(5) Shock absorber
(6) Self–locking nut

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 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 work clothing, including a cap, protective goggles and protective shoes during operation.
- 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. with that of another grade or from other 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 regulations concerning disposal of refuse when disposing.

D: PREPARATION TOOL

1. SPECIAL TOOL

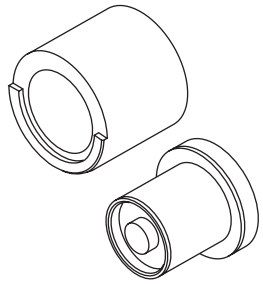
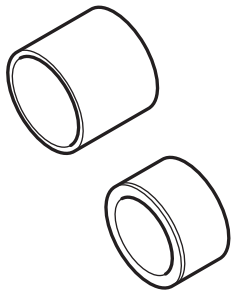
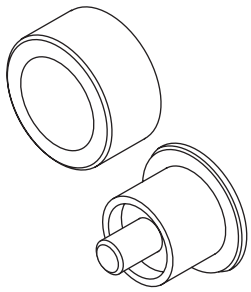
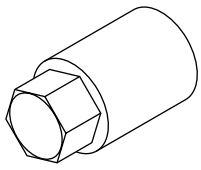
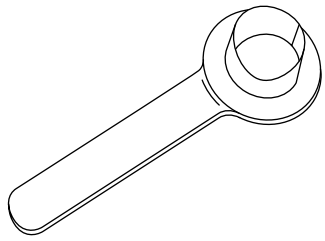
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST20099AE000	20099AE000	INSTALLER & REMOVER	Used for replacing the front lateral link bushing.
 ST20099PA010	20099PA010	INSTALLER & REMOVER	Used for replacing the rear trailing link bushing.
 ST20099AE040	20099AE040	INSTALLER & REMOVER SET	Used for replacing the rear trailing link bushing.
 ST20399AG000	20399AG000	STRUT MOUNT SOCKET	Used for removing and installing shock mount.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	• Used for installing the rear drive shaft to the rear differential. • For oil seal protection

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

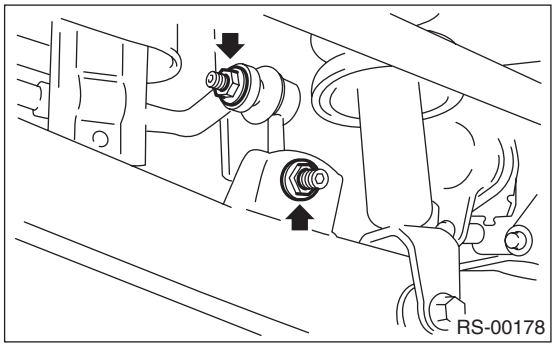
A: INSPECTION

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.>

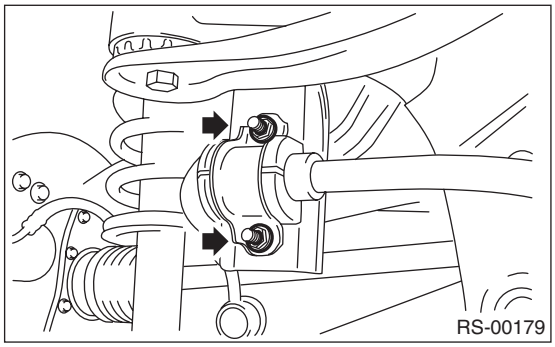
3. Rear Stabilizer

A: REMOVAL

1) Lift-up the vehicle, and then remove the rear wheels.
2) Remove the stabilizer link.



3) Remove the stabilizer link.



B: INSTALLATION

NOTE:
- Use a new flange nut (with WAX).
- Always tighten the stabilizer bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.

Install in the reverse order of removal.

Tightening torque:
Stabilizer link
60 N·m (6.1 kgf-m, 44 ft-lb)
Stabilizer clamp
35 N·m (3.6 kgf-m, 25.8 ft-lb)

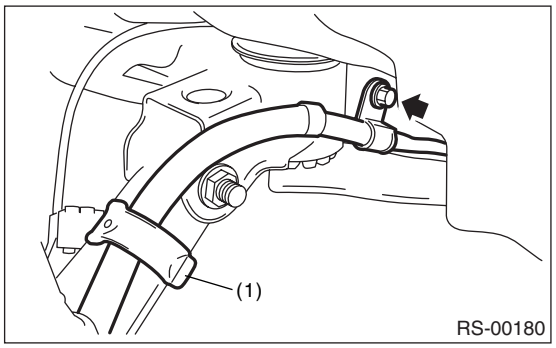
C: INSPECTION

1) Check the bushing for cracks, fatigue or damage.
2) Check the stabilizer link for damage.

4. Rear Trailing Link

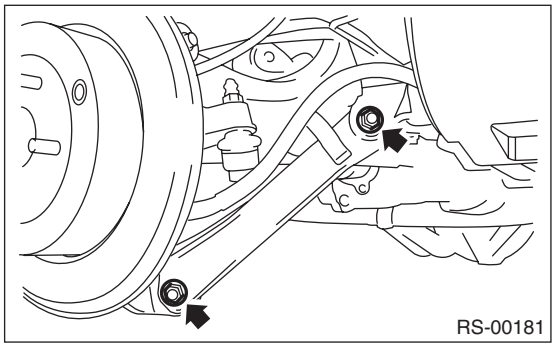
A: REMOVAL

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.



B: INSTALLATION

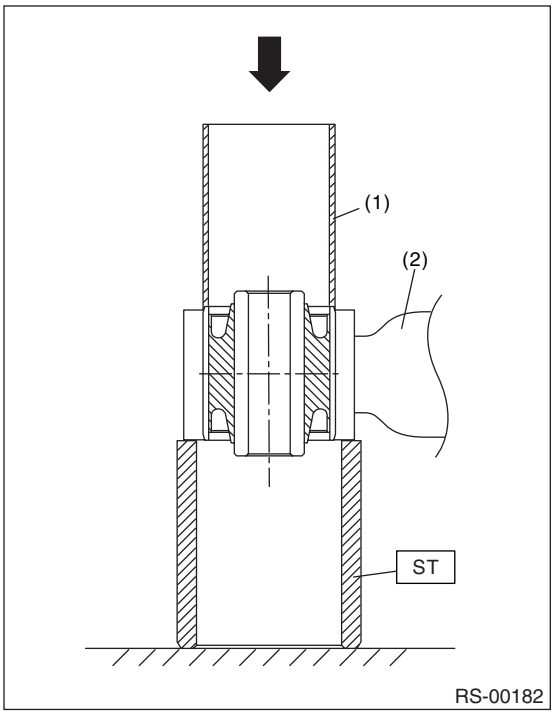
NOTE:
- Be sure to use a new self-locking nut.
- Always tighten the stabilizer bushing in the state where the vehicle is at curb weight and the wheels are in full contact with the ground.

Install in the reverse order of removal.

Tightening torque:
Trailing link
120 N·m (12.2 kgf-m, 89 ft-lb)
Parking Brake Cable bracket
33 N·m (3.4 kgf-m, 24 ft-lb)

C: DISASSEMBLY

Using the ST and a pipe, press the bushing out.
ST 20099PA010 INSTALLER & REMOVER



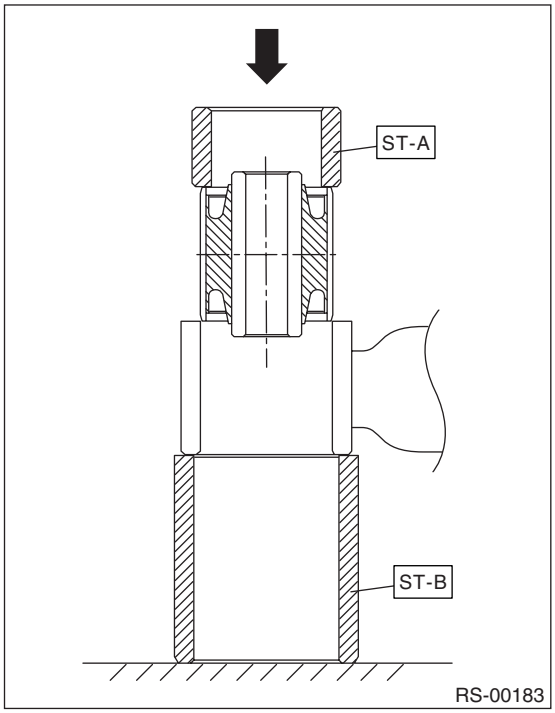
(1) 39 mm dia., 50 mm long pipe
(2) Trailing link

D: ASSEMBLY

Using the ST A and ST B, press-fit the bushing.

STA 20099AE040 INSTALLER & REMOVER SET
STB 20099PA010 INSTALLER & REMOVER

CAUTION:
Make sure to press the bushing straight in.



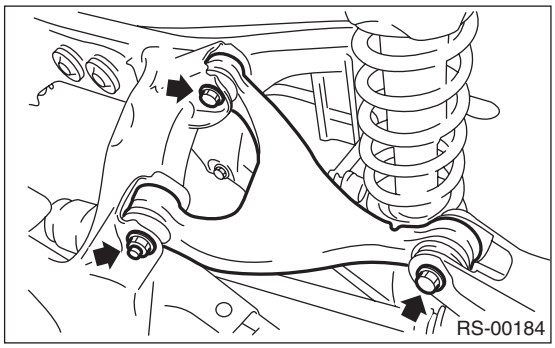
E: INSPECTION

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

NOTE:
- Use a new self-locking nut.
- Always tighten the stabilizer 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 it if necessary.

Tightening torque:
Upper arm to Rear sub frame
150 N·m (15.3 kgf-m, 111 ft-lb)
Upper arm to Rear housing
120 N·m (12.2 kgf-m, 89 ft-lb)

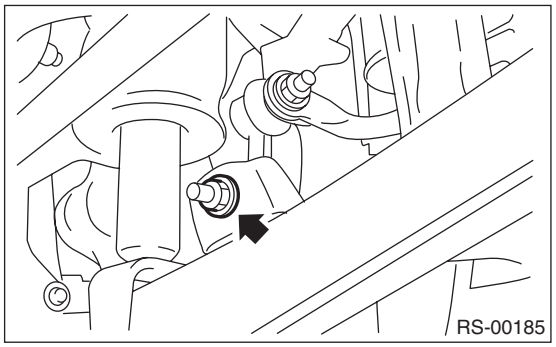
C: INSPECTION

1) Visually check the upper arm for damage and deformation.
2) Visually check the bushing for crack, damage and fatigue.

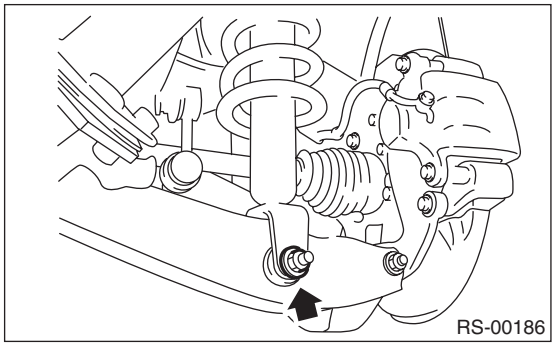
6. Rear Shock Absorber

A: REMOVAL

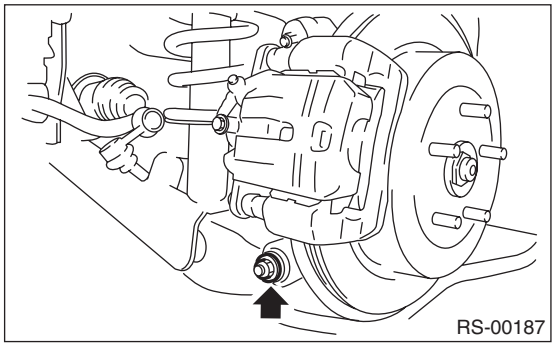
1) Remove the strut cap of quarter trim.
2) Lift-up the vehicle, and then remove the rear wheels.
3) Remove the nut and detach the rear stabilizer link.



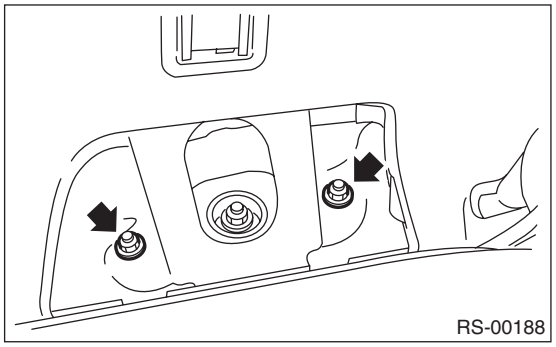
4) Remove the bolts on the bottom side of the shock absorber.



5) Detach the rear lateral link.



6) Remove the nuts of the shock absorber mount.



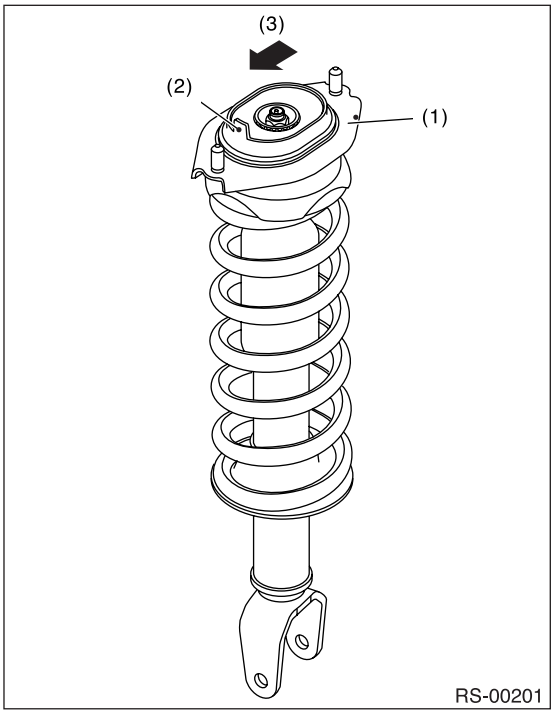
7) Remove the shock absorber.

B: INSTALLATION

NOTE:
- Be sure to use a new self-locking nut.
- Always tighten the stabilizer 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-20, DISASSEMBLY, Front Strut.>

D: ASSEMBLY

Refer to "Front Strut" for installation procedures.
<Ref. to FS-20, ASSEMBLY, Front Strut.>

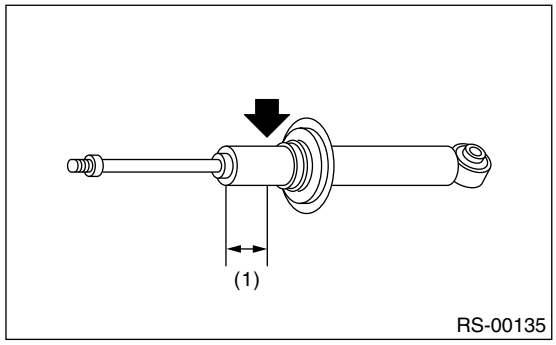
E: INSPECTION

Refer to "Front Strut" for inspection procedures.
<Ref. to FS-21, INSPECTION, Front Strut.>

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.

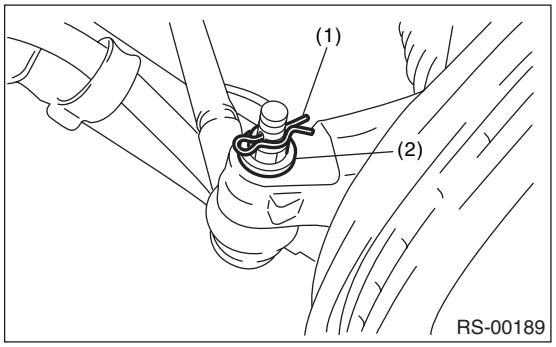


(1) 40 mm (1.57 in)

7. Front Lateral Link

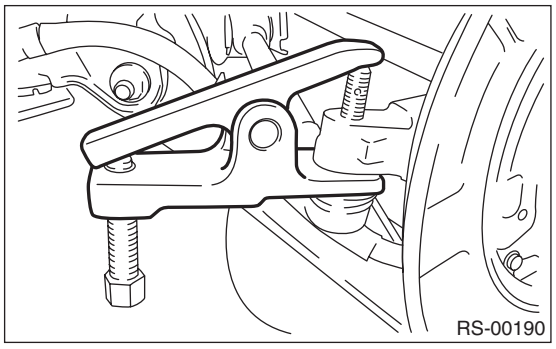
A: REMOVAL

1) Lift-up the vehicle, and then remove the rear wheels.
2) Remove the snap pin and nut.



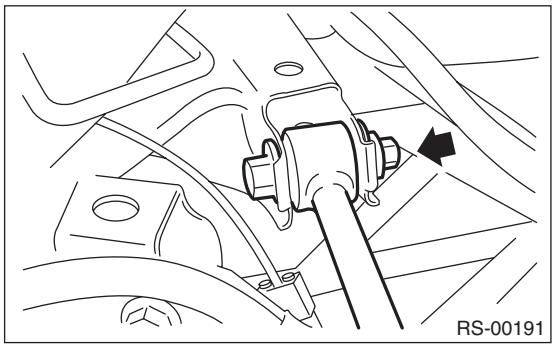
(1) Snap pin
(2) Nut

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

NOTE:
- Be sure to use a new self-locking nut.
- Always tighten the stabilizer 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 to Sub frame
120 N·m (12.2 kgf-m, 89 ft-lb)
Front lateral link to Rear axle housing.
27 N·m (2.8 kgf-m, 20 ft-lb)

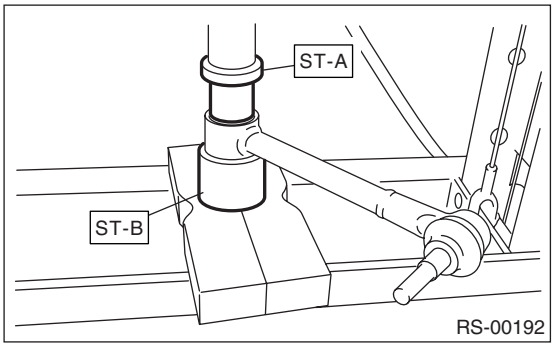
2) Inspect the wheel alignment and adjust if necessary.

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

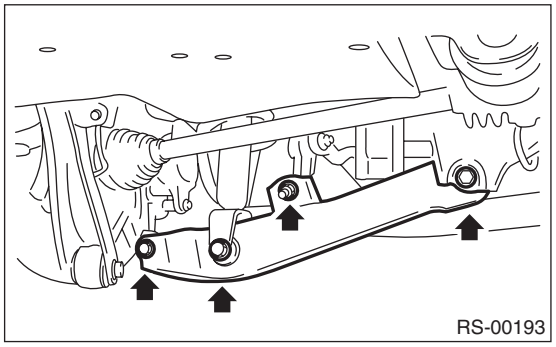
Using the ST A and ST B, press-fit the bushing.
STA 20099AE000 INSTALLER & REMOVER
STB 20099AE000 INSTALLER & REMOVER

CAUTION:
Make sure to 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

NOTE:
- Be sure to use a new self-locking nut.
- Always tighten the stabilizer 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:
Rear lateral link
120 N·m (12.2 kgf-m, 89 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.

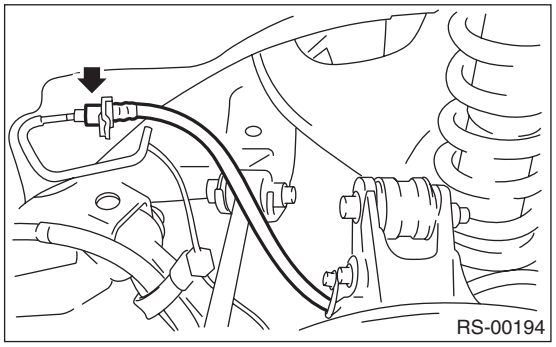
C: INSPECTION

Visually check the rear lateral link for damage and deformation.

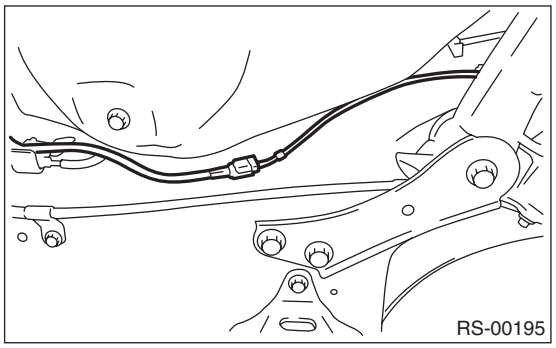
9. Rear Sub Frame

A: REMOVAL

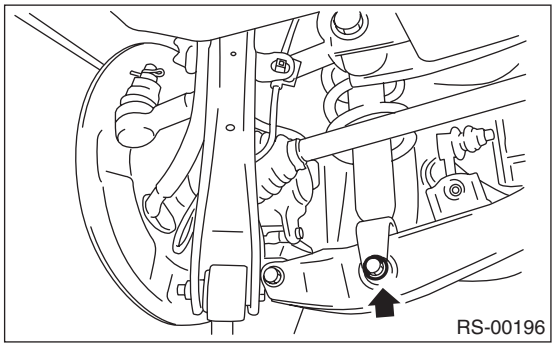
1) Separate the front exhaust pipe and rear exhaust pipe.
2) Remove the rear exhaust pipe and muffler.
3) Remove the propeller shaft.
<Ref. to DS-10, REMOVAL, Propeller Shaft.>
4) Remove the spare tire hoist. <Ref. to WT-13, REMOVAL, Spare Tire Hoist.>
5) Remove the rear parking brake cable from the 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.


RS-00194

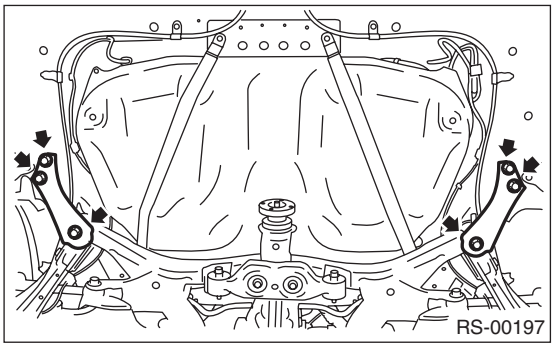
7) Disconnect the ABS wheel speed sensor connector.


RS-00195

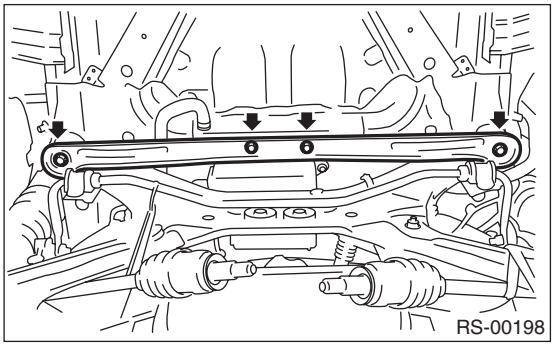
8) Remove the bolts on the bottom side of the shock absorber.


RS-00196

9) Support the sub frame using a jack.
10) Remove the front sub frame.


RS-00197

11) Remove the rear sub frame support.


RS-00198

12) Remove the rear sub frame.

B: INSTALLATION

NOTE:
- Be sure to use a new self-locking nut.
- Always tighten the stabilizer 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:
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.

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 damper 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	Adjust or replace the coil springs with new ones.
(4) Fault in operation of damper strut or shock absorber	Replace.
(5) Damage or deformation of strut mount or shock absorber mount	Replace.
(6) Unsuitable length (maximum or minimum) of damper 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 damper strut or shock absorber	Replace.

3. NOISE

Possible cause	Corrective action
(1) Wear or damage of damper 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 damper 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.

1. Basic Diagnostic Procedure

A: PROCEDURE

CAUTION:
Remove foreign matter (dust, water, oil etc.) from the tire pressure monitoring control module connector when removing or installing.

NOTE:
To check harness for broken wires or short circuits, shake trouble spot or connector.

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Check with the user regarding when the warning light lit or started blinking. 2) Before performing diagnostics, check the components which might mal-affect 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.
2	**CHECK DIAGNOSTIC TROUBLE CODE (DTC).** 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 Subaru Select Monitor to ON. NOTE: If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to TPM(diag)-11, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.> 4) Read the DTC. <Ref. to TPM(diag)-16, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Go to step **4**.	Go to step **3**.
3	**PERFORM GENERAL DIAGNOSTICS.** 1) Inspect using “General Diagnostic Table”. <Ref. to TPM(diag)-36, General Diagnostic Table.> 2) Perform the clear memory mode. <Ref. to TPM(diag)-9, CLEAR MEMORY, OPERATION, Subaru Select Monitor.> 3) Perform the inspection mode. <Ref. to TPM(diag)-17, Inspection Mode.> 4) Read the DTC. <Ref. to TPM(diag)-8, 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 foes off after turning on the ignition switch, and then go out?	Finish the diagnosis.	Check using “Diagnostic Procedure for TPM” <Ref. to TPM(diag)-14, WITHOUT DTC, INSPECTION, Subaru Select Monitor.>
4	**PERFORM DIAGNOSIS.** 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)-9, CLEAR MEMORY, OPERATION, Subaru Select Monitor.> 4) Perform the drive test. Drive the vehicle at a speed more than 40 km/h (25 MPH) for at least 10 minutes. 5) Read the DTC. <Ref. to TPM(diag)-8, 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.

2. General Description

A: CAUTION

1. SRS AIRBAG SYSTEM

Airbag system wiring harness is routed near the TPM control module.

CAUTION:
• Wiring harnesses of all airbag system are yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the tire pressure monitoring control module.

2. TIRE PRESSURE MONITORING CONTROL MODULE

• If the alteration of tire rotation, the installation position or the replacement of transmitter is performed, 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 air pressure in the tires will drop, causing the tire pressure warning light to come on, even if the pressure in the tires 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	15.5 (60)		
	Ambient temperature	–1 (30)	–12 (10)	–23 (–10)
Reference for adjusting tire pressure kPa (psi)	Front	250 (36)	265 (38)	280 (40)
	Rear	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

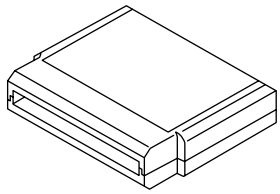
Check that amount of battery fluid, gravity and voltage are within the specifications.

Standard voltage: 12 V or more

Specific gravity: 1.260 or more

C: PREPARATION TOOL

1. SPECIAL TOOL

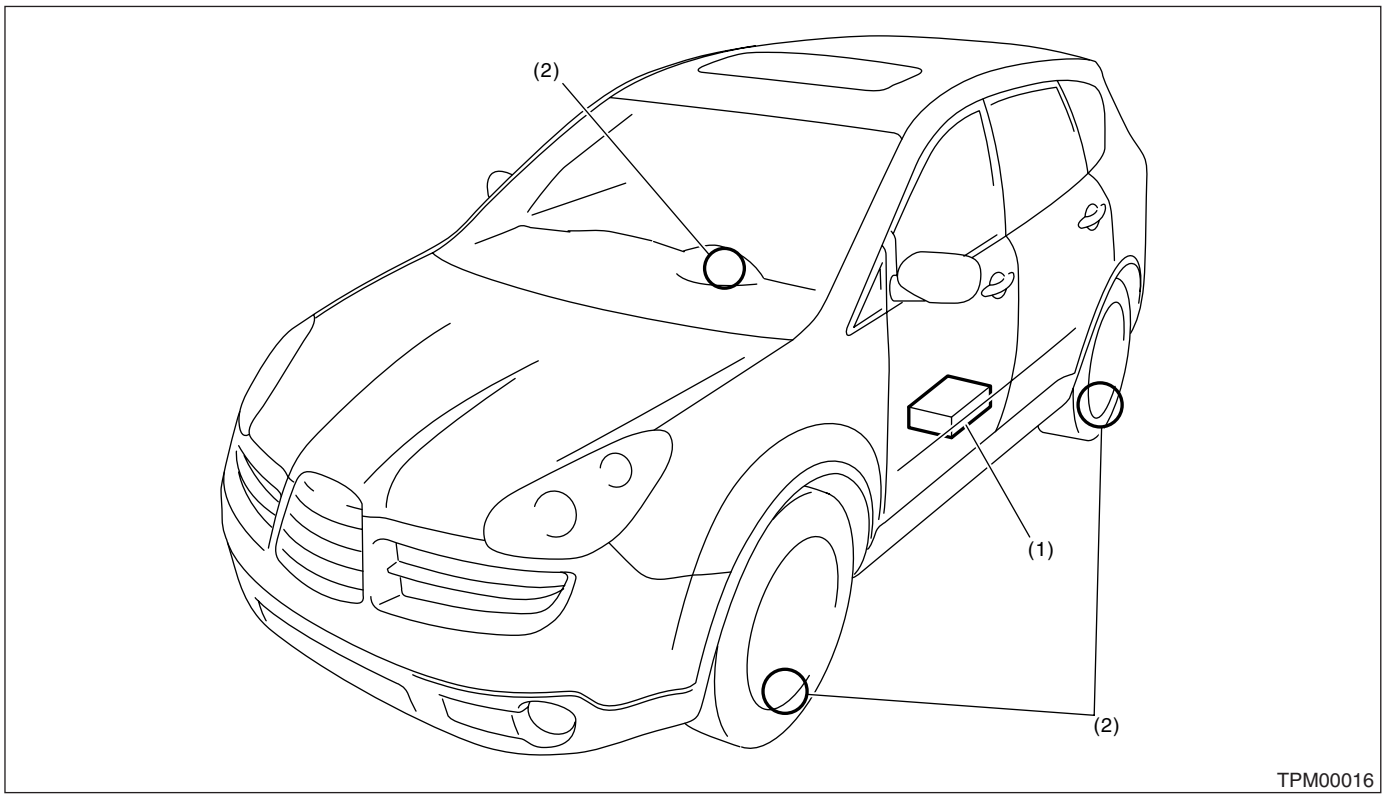
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.

2. GENERAL TOOL

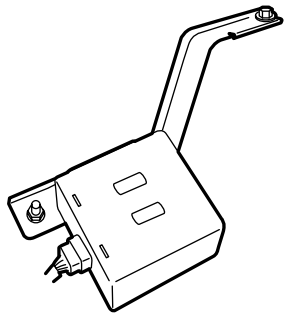
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Transmitter registration tool	Used to register the transmitter ID. Manufacturer: Kent-Moore Item number: J45294

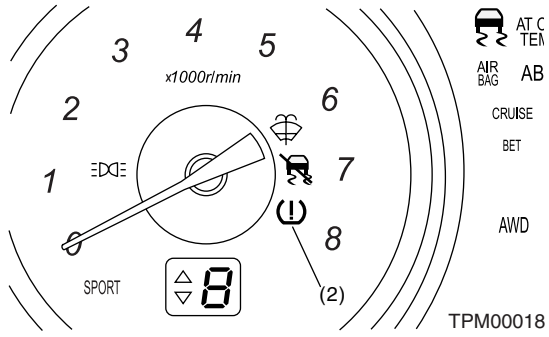
3. Electrical Component Location

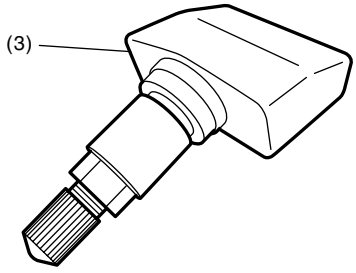
A: LOCATION



(1) Tire pressure monitoring control module
(2) Tire pressure warning light
(3) Transmitter 1 — 4





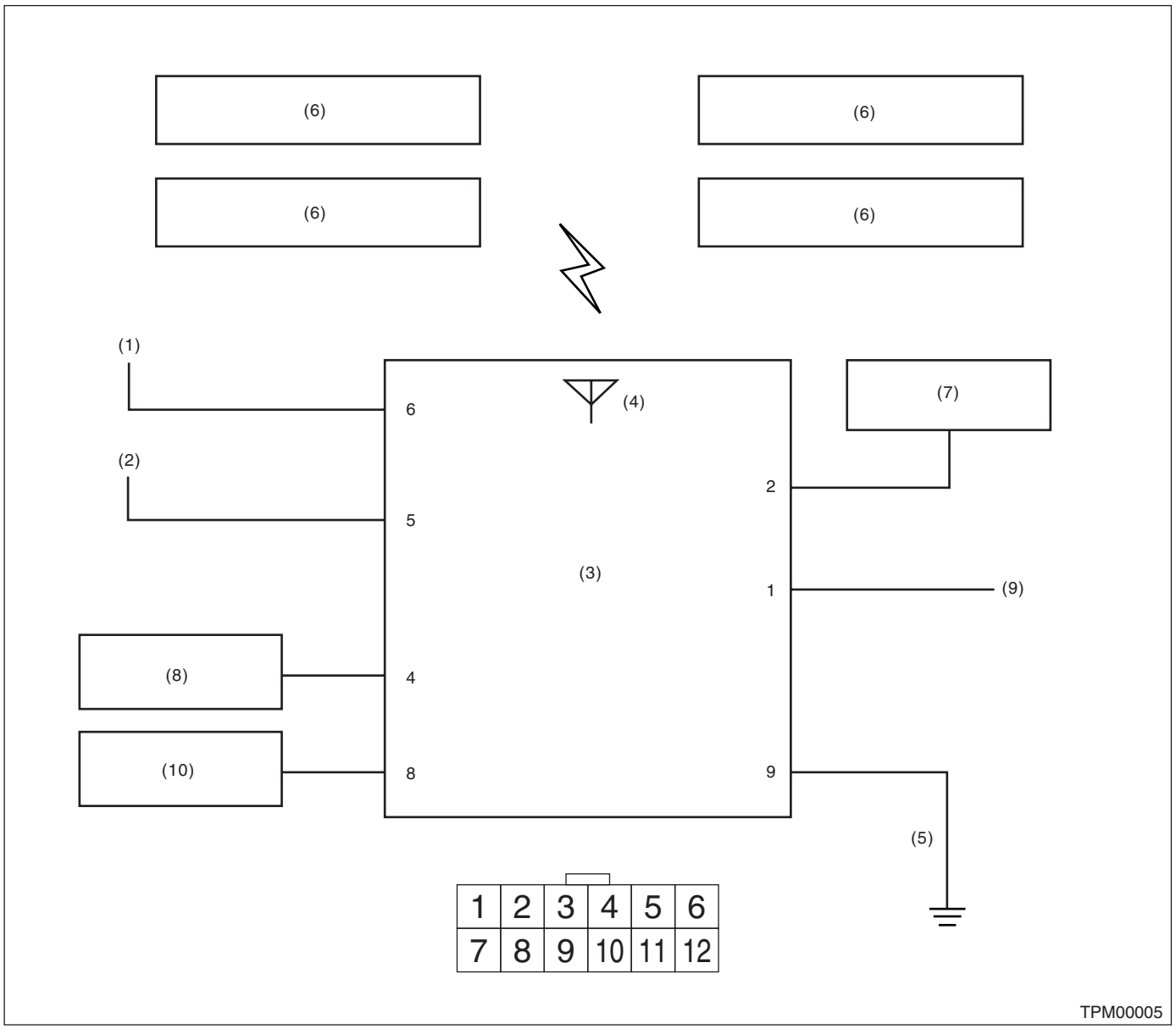


4. Control Module I/O Signal

A: ELECTRICAL SPECIFICATION

Terminal No.	Measured value	Measuring condition	Remarks
1	Select monitor communication	Serial communication	—
2	Tire pressure warning light output	When malfunction occurs, or tire pressure decreases	System failure: blinks Tire pressure decreases: turns on
4	Speed sensor signal	While driving (Pulse signal)	Change according to vehicle speed
5	Ignition power supply	IG switch ON (Battery voltage)	—
6	Battery power supply	Battery voltage	Always
8	Body integrated unit (Hazard output signal).	—	When hazard turns on.
9	GND	0 V (Always)	Always

B: WIRING DIAGRAM



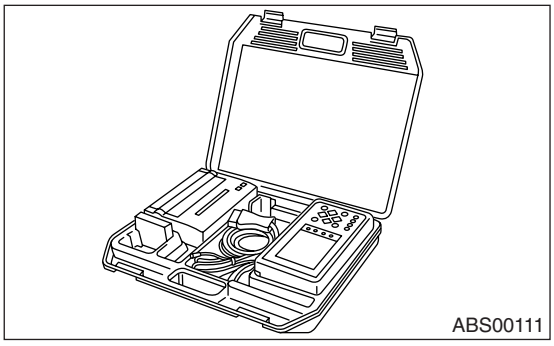
(1) Battery power supply
(2) Ignition power supply
(3) Tire pressure monitoring control module
(4) Antenna
(5) Ground
(6) Transmitter
(7) Combination meter
(8) Vehicle speed signal
(9) Subaru Select Monitor
(10) Body integrated unit

5. Subaru Select Monitor

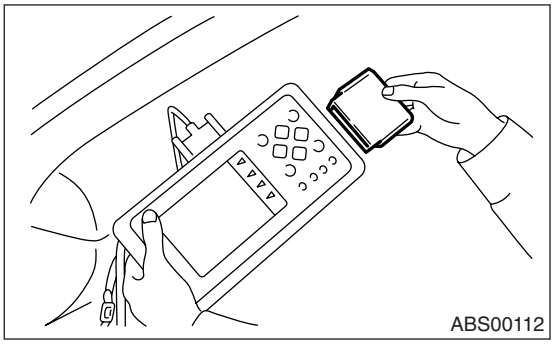
A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit. <Ref. to TPM(diag)-4, SPECIAL TOOL, PREPARATION TOOL, General Description.>

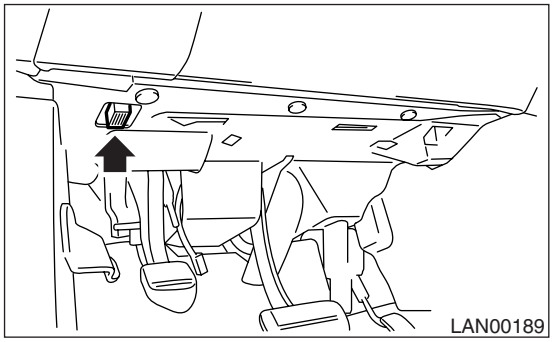


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to TPM(diag)-4, SPECIAL TOOL, PREPARATION TOOL, General Description.>



4) 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).

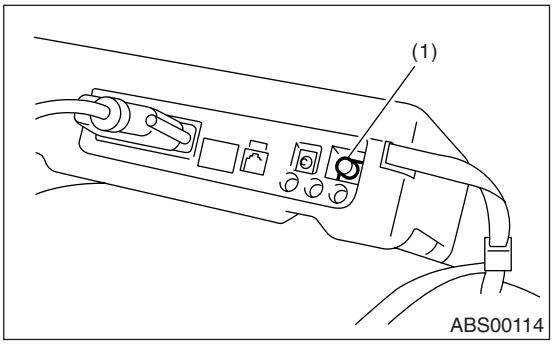


(1) Data link connector

(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON.



(1) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Tire Pressure Monitor} and press the [YES] key.
8) Press the [YES] key after the {Model Year} is displayed.
9) On the «Tire Pressure Monitor Diagnosis» screen, select the {DTC Display}, and then press the [YES] key.

NOTE:
• For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTCs, refer to List of Diagnostic Trouble Code (DTC). <Ref. to TPM(diag)-26, List of Diagnostic Trouble Code (DTC).>
• Display all the DTCs detected.
• If a particular DTC is not properly stored in memory (due to a drop in occupant detection control module power supply, etc.) when a problem occurs, the DTC which is suffixed with a question mark appears on the Subaru Select Monitor display. This shows it may be an unreliable reading.

10) If communication is not possible between the tire pressure monitoring control module and the Subaru Select Monitor, check the communication circuit. <Ref. to TPM(diag)-11, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>
11) When DTC is not displayed, check the indicator circuit and communication circuit. <Ref. to TPM(diag)-14, WITHOUT DTC, INSPECTION, Subaru Select Monitor.>

2. DATA DISPLAY

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Tire Pressure Monitor} and press the [YES] key.
3) Press the [YES] key after the {Tire Pressure Monitor} is displayed.
4) On the «Tire pressure monitor diagnosis» display screen, select the {Data Display}, and then press the [YES] key, then necessary data will be displayed.
• A list of the support data is shown in the following table.

Display	Contents to be monitored	Unit of measure
FR 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 ±8.4 kPa WAKE: Started transmitting data from a stopped state NORMAL: Conditions other than above
FL FN Code		
RR FN Code		
RL FN Code		
FR tire pressure	Value converted to tire pressure from data delivered from transmitter is displayed. (It may be different from values measured by the direct contact meter.)	kPa, psig, mmHg, inHg
FL tire pressure		kPa, psig, mmHg, inHg
RR tire pressure		kPa, psig, mmHg, inHg
RL tire 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 lights	kPa, psig, mmHg, inHg
Return pressure	Threshold where tire pressure warning light goes out	kPa, psig, mmHg, inHg

3. CLEAR MEMORY

1) On the «Main Menu», select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Tire Pressure Monitor} and press the [YES] key.
3) Press the [YES] key after the {Tire Pressure Monitor} is displayed.
4) On the «Tire Pressure Monitor Diagnosis» display screen, select the {Memory Clear} and press the [YES] key.
5) When «Done» and «Turn ignition switch OFF» are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

4. REGISTER TRANSMITTER ID

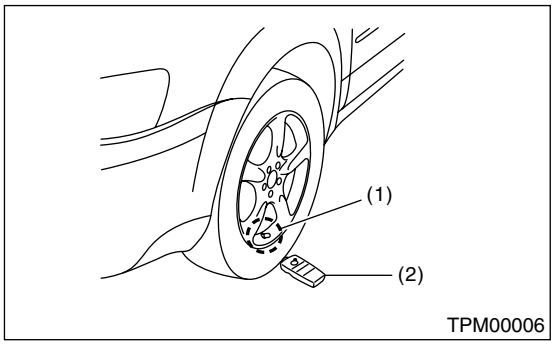
Perform the procedures below to register the transmitter.
• Transmitter replaced.
• Switched the position of the transmitter (rotated tires)
• Replaced the tire pressure monitoring control module.

NOTE:
• If registration of the transmitter ID is not possible after 2 attempts, replace the tire pressure monitoring control module. <Ref. to WT-11, TIRE PRESSURE MONITORING CONTROL MODULE, REMOVAL, Tire Pressure Monitoring System.>
• If the ignition switch and Subaru Select Monitor power are turned OFF while registering the transmitter, or if registration is not possible for more than 5 minutes, 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 the Subaru Select Monitor, on the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
3) On the «System Selection Menu» display screen, select the {Tire Pressure Monitor} and press the [YES] key.
4) Press the [YES] key after the {Tire Pressure Monitor} is displayed.
5) On the «Tire Pressure Monitor Diagnosis» display screen, select the {Transmitter ID regist confirm} and press the [YES] key.
6) {When ID registration mode execute, Registered ID is deleted Proceed?} is displayed then press the [YES] key.
7) Touch the transmitter registration tool to the side wall area near the air valve on the front left tire, and press the switch. The transmitter ID is sent to the tire pressure monitoring control module. (At that time, the tire pressure warning light blinks to confirm that the registration has started.)



(1) Air valve (transmitter)
(2) Transmitter registration tool

NOTE:
• Register the transmitter ID in the order of Left Front → Right Front → Right Rear → Left Rear.
• The transmitter registration tool is used by touching the side wall area near the transmitter.
• When registration of each tire is completed, the hazard light will blink and {ID registration completed} is displayed on the Select Monitor screen.
• 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)-10, DISPLAY TRANSMITTER (ID)., OPERATION, Subaru Select Monitor.>
9) Check the transmitter ID that was registered, then perform a driving test. <Ref. to TPM(diag)-17, PROCEDURE, Inspection Mode.>

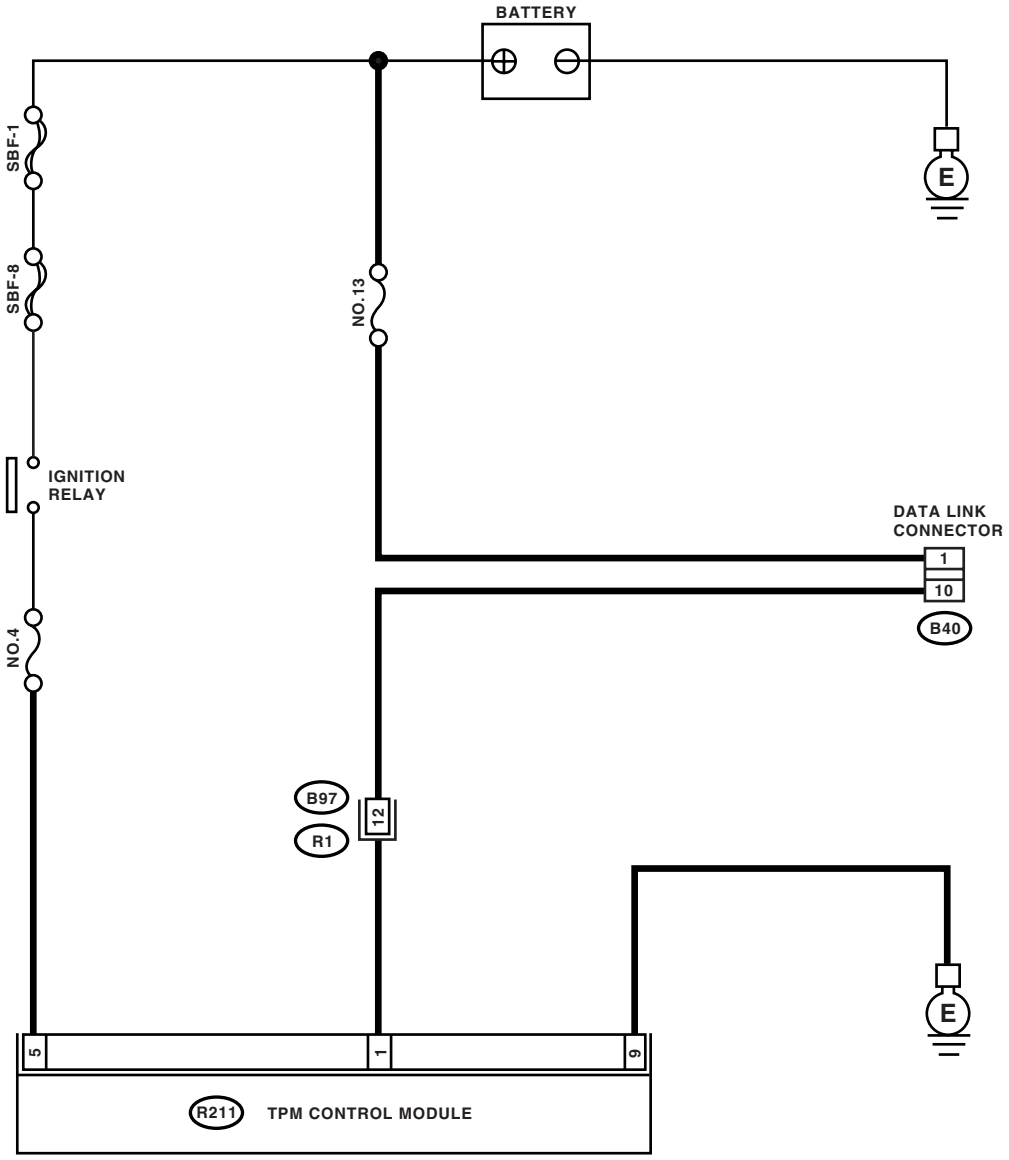
5. DISPLAY TRANSMITTER (ID).

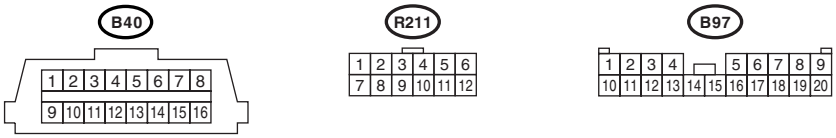
1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Tire Pressure Monitor} and press the [YES] key.
3) Press the [YES] key after the {Tire Pressure Monitor} is displayed.
4) On the «Tire Pressure Monitor Diagnosis» display screen, select the {Transmitter ID regist confirm} and press the [YES] key.
5) Select {Transmitter ID Data Monitor} and press the [YES] key to display the transmitter ID.

B: INSPECTION

1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DETECTING CONDITION:
Defective harness connector
TROUBLE SYMPTOM:
Communication is impossible between the tire pressure monitoring control module and the Subaru Select Monitor.
WIRING DIAGRAM:





TPM00007

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is the ignition switch ON?	Go to step **2**.	Turn the ignition switch to ON, and select TPM mode using Subaru Select Monitor.
2	**CHECK BATTERY.**	Is the voltage more than 11 V?	Go to step **3**.	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4**.
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other system can be executed normally.	Are the system name and model year displayed on Subaru Select Monitor?	Go to step **8**.	Go to step **5**.
5	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to OFF. 2) Disconnect the tire pressure monitoring control module connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Are the system name and model year displayed on Subaru Select Monitor?	Replace the tire pressure monitoring control module. <Ref. to WT-11, TIRE PRESSURE MONITORING CONTROL MODULE, REMOVAL, Tire Pressure Monitoring System.>	Go to step **6**.
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the tire pressure monitoring control module. 3) Measure the resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair the harness and connector between each control module and data link connector.
7	**CHECK THE TIRE PRESSURE MONITORING CONTROL MODULE OUTPUT SIGNAL.** 1) Turn the ignition switch to ON. 2) Measure the voltage between tire pressure monitoring control module and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **8**.	Repair the harness and connector between each control module and data link connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TIRE PRESSURE MONITORING CONTROL MODULE AND DATA LINK CONNECTOR.** Measure the resistance between tire pressure monitoring control module and data link connector. ***Connector & terminal*** ***(R211) No. 1 — (B40) No. 10:***	Is the resistance less than 0.5 Ω?	Go to step **9**.	Repair the harness and connector between tire pressure monitoring control module and data link connector.
9	**CHECK TIRE PRESSURE MONITORING CONTROL MODULE CONNECTOR.** Turn the ignition switch to OFF.	Is the tire pressure monitoring control module connector inserted in the tire pressure monitoring control module until it locks?	Go to step **10**.	Insert the tire pressure monitoring control module connector into the tire pressure monitoring control module.

	Step	Check	Yes	No
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. (Engine OFF) 2) Measure the ignition power voltage between tire pressure monitoring control module connector and chassis ground. ***Connector & terminal*** ***(R211) No. 5 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **11**.	Repair open circuit of the harness between the tire pressure monitoring control module and battery.
11	**CHECK HARNESS CONNECTOR BETWEEN TIRE PRESSURE MONITORING CONTROL MODULE AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the tire pressure monitoring control module. 3) Measure the resistance of harness between tire pressure monitoring control module and chassis ground. ***Connector & terminal*** ***(R211) No. 9 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **12**.	Repair open circuit of the harness of the tire pressure monitoring control module.
12	**CHECK POOR CONTACT OF CONNECTOR.**	Is there poor contact in tire pressure monitoring control module power supply, ground circuit and data link connector?	Repair the connector.	Replace the tire pressure monitoring control module. <Ref. to WT-11, TIRE PRESSURE MONITORING CONTROL MODULE, REMOVAL, Tire Pressure Monitoring System.>

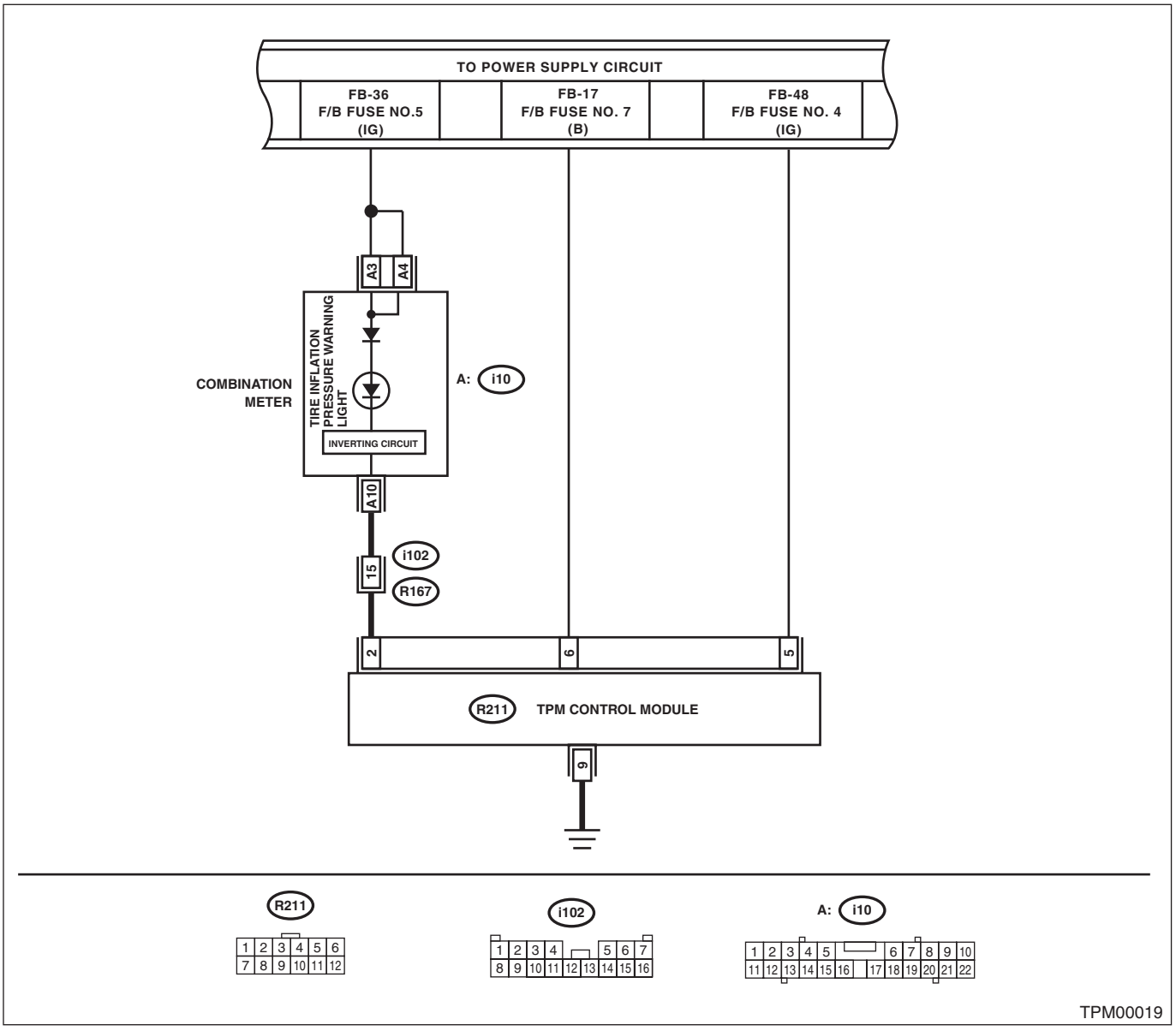
2. WITHOUT DTC

DETECTING CONDITION:
- Defective combination meter
- Defective harness

TROUBLE SYMPTOM:
- TIRE PRESSURE WARNING LIGHT DOES NOT GO OFF
- “NO TROUBLE CODE” will be displayed on the Subaru Select Monitor.

NOTE:
When the tire pressure warning light is OFF and “NO TROUBLE CODE” is displayed on Subaru Select Monitor, the system is in a normal condition.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**DATA CHECK SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the data of the “Tire pressure warning light”.	Is “ON” displayed?	Replace the tire pressure monitoring control module. <Ref. to WT-11, TIRE PRESSURE MONITORING CONTROL MODULE, REMOVAL, Tire Pressure Monitoring System.>	Go to step **2**.
2	**CHECK WIRING HARNESS.** Measure the resistance between tire pressure monitoring control module and combination meter connector. ***Connector & terminal*** ***(i10) No. 10 — (R211) No. 2:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair the harness and connector between tire pressure monitoring control module and combination meter.
3	**CHECK POOR CONTACT OF CONNECTOR.**	Is there poor contact in the tire pressure monitoring control module connector and combination meter connector?	Repair the connector.	Check the combination meter.

6. Read Diagnostic Trouble Code (DTC)

A: OPERATION

For details about reading of DTCs, refer to “Subaru Select Monitor”. <Ref. to TPM(diag)-8, Subaru Select Monitor.>

7. Inspection Mode

A: PROCEDURE

Reproduce the malfunction occurrence condition as possible. Drive the vehicle at a speed more than 40 km/h (25 MPH) for at least ten minutes.

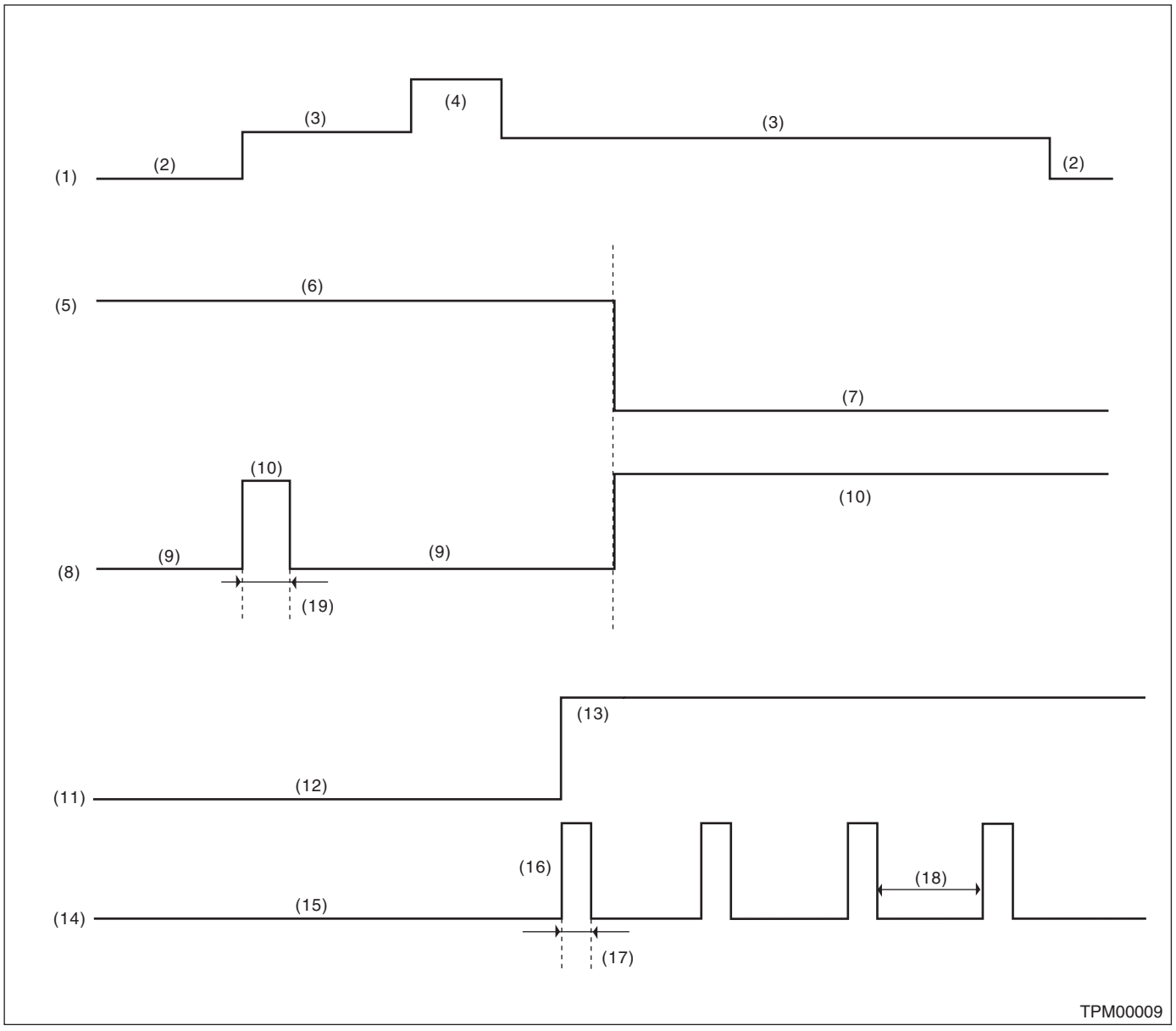
8. Clear Memory Mode

A: OPERATION

For details concerning DTC clear operation, refer to “Subaru Select Monitor”. <Ref. to TPM(diag)-8, Subaru Select Monitor.>

9. Tire Pressure Warning Light/Trouble Indicator Light Illumination Pattern (DTC)

A: INSPECTION



(1) Ignition switch
(2) OFF
(3) ON
(4) Start
(5) Tire pressure
(6) Meet the specification
(7) 188 kPa (1.9 kgf/cm^2, 27 psi) or less
(8) Tire pressure warning light
(9) Light OFF
(10) Light ON
(11) System status
(12) Normal
(13) Defective
(14) Tire pressure warning light
(15) Light OFF
(16) Blink
(17) 1 second
(18) 3 seconds
(19) 2 seconds

1) When the tire pressure warning light does not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.
2) When tire pressure warning light does not go off, check the tire pressure monitoring control module/warning light circuit and the combination meter circuit. <Ref. to TPM(diag)-22, TIRE PRESSURE WARNING LIGHT DOES NOT COME OFF, Tire Pressure Warning Light/Trouble Indicator Light Illumination Pattern (DTC).>

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 malfunction of the system, the past malfunctions are displayed.)

B: TIRE PRESSURE WARNING LIGHT DOES NOT ILLUMINATE

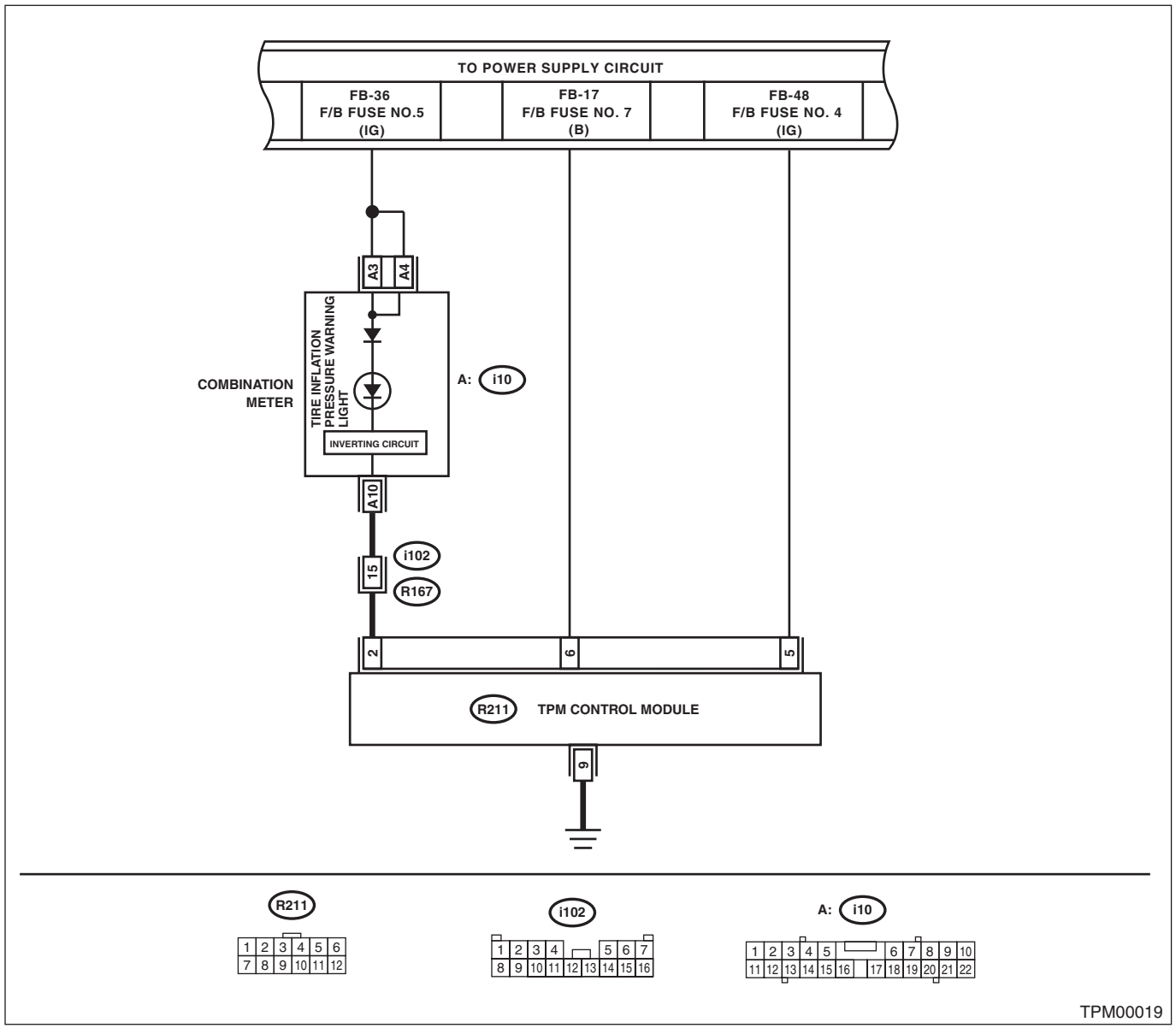
DETECTING CONDITION:

- Defective combination meter
- Defective harness

TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), the tire pressure warning light does not come on (for approximately 2 seconds).

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DIAGNOSTIC TROUBLE CODE (DTC)** Connect Subaru Select Monitor, read Diagnostic Trouble Code. <Ref. to TPM(diag)-8, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is diagnostics code (DTC) displayed?	Perform the diagnosis according to DTC. <Ref. to TPM(diag)-26, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK DATA OUTPUT.** 1) Select data display of the tire pressure monitoring. 2) Check that the warning light output is ON for approximately 2 seconds immediately after turning the ignition switch to ON.	Is the warning light output ON for approximately 2 seconds?	Go to step **3**.	Replace the tire pressure monitoring control module. <Ref. to WT-11, TIRE PRESSURE MONITORING CONTROL MODULE, REMOVAL, Tire Pressure Monitoring System.>
3	**CHECK HARNESS.** 1) Disconnect the tire pressure monitoring control module connector. 2) Use a lead wire to short the terminal No. 2 of the tire pressure monitoring control module harness connector (R211) with the chassis ground, and turn the ignition switch to ON.	Is the tire pressure warning light lit?	Go to step **4**.	Replace the tire pressure monitoring control module. <Ref. to WT-11, TIRE PRESSURE MONITORING CONTROL MODULE, REMOVAL, Tire Pressure Monitoring System.>
4	**CHECK HARNESS.** 1) Connect the tester to the terminal No. 2 of the tire pressure monitoring control module connector (R211) 2) Turn the ignition switch to ON and measure the voltage between the tire pressure monitoring control module connector and chassis ground. ***Connector & terminal*** ***(R211) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5**.	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>
5	**CHECK COMBINATION METER.** 1) Short between the combination meter connector (i10) No. 10 and the chassis ground. 2) Turn the ignition switch to ON.	Is the tire pressure warning light lit?	Go to step **6**.	Repair or replace the harness that is open between the combination meter connector and the tire pressure monitoring control module harness.
6	**CHECK HARNESS.** 1) Disconnect the combination meter connector (i10). 2) Measure the resistance between tire pressure monitoring control module connector (i10) and chassis ground. ***Connector & terminal*** ***(i10) No. 10 — Chassis ground:***	Is the resistance less than 1 Ω?	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>	Repair or replace the harness that is open between the combination meter and the chassis ground.

C: TIRE PRESSURE WARNING LIGHT DOES NOT COME OFF

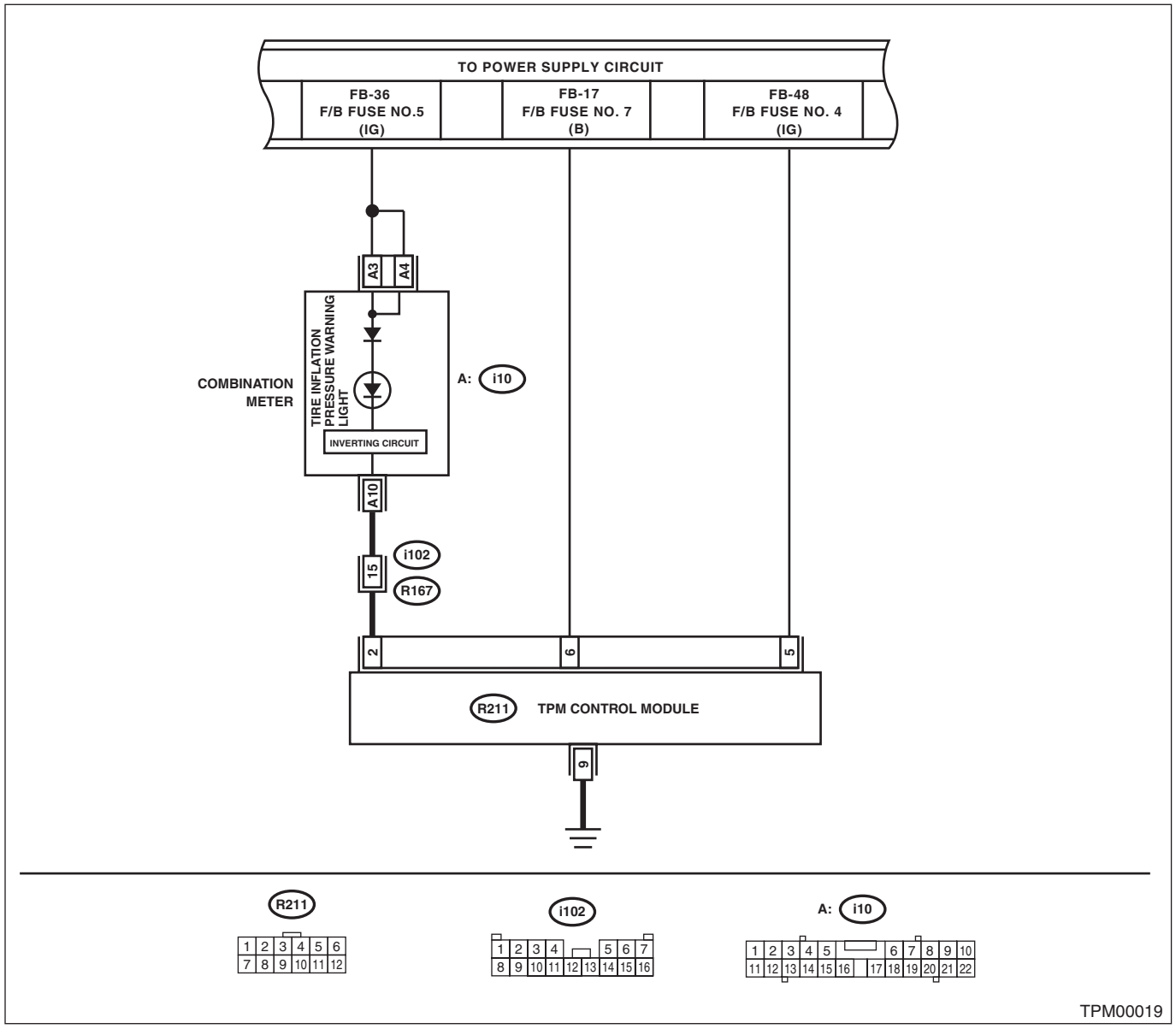
DETECTING CONDITION:

- Defective combination meter
- Defective harness
- Tires pressure drop
- Transmitter ID not registered

TROUBLE SYMPTOM:

Tire pressure warning light does not go off after engine starts.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DIAGNOSTIC TROUBLE CODE (DTC)** Connect Subaru Select Monitor, read Diagnostic Trouble Code. <Ref. to TPM(diag)-8, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC. <Ref. to TPM(diag)-26, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK TRANSMITTER (ID)** Display the transmitter ID of the tire pressure monitor system.	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	**CHECK TRANSMITTER DATA OUTPUT.** 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 tire pressure monitoring control module. <Ref. to WT-11, TIRE PRESSURE MONITORING CONTROL MODULE, REMOVAL, Tire Pressure Monitoring System.>	Go to step **4**.
4	**CHECK HARNESS.** 1) Disconnect the tire pressure monitoring control module connector. 2) Connect the tester to the terminal No. 2 of the tire pressure monitoring control module connector (R211) 3) Turn the ignition switch to ON, and measure the voltage. ***Connector & terminal*** ***(R211) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5**.	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>
5	**CHECK COMBINATION METER.** 1) Short between the combination meter connector (i10) No. 10 and the chassis ground. 2) Turn the ignition switch to ON.	Is the tire pressure warning light lit?	Go to step **6**.	Repair or replace the harness that is open between the combination meter connector and the tire pressure monitoring control module harness.
6	**CHECK HARNESS.** 1) Disconnect the combination meter connector (i10). 2) Measure the resistance between tire pressure monitoring control module connector (R211) and chassis ground. ***Connector & terminal*** ***(R211) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>	Repair or replace the harness connector short circuit between the combination meter connector and the tire pressure monitoring control module connector.

D: TIRE PRESSURE WARNING LIGHT IS BLINKING

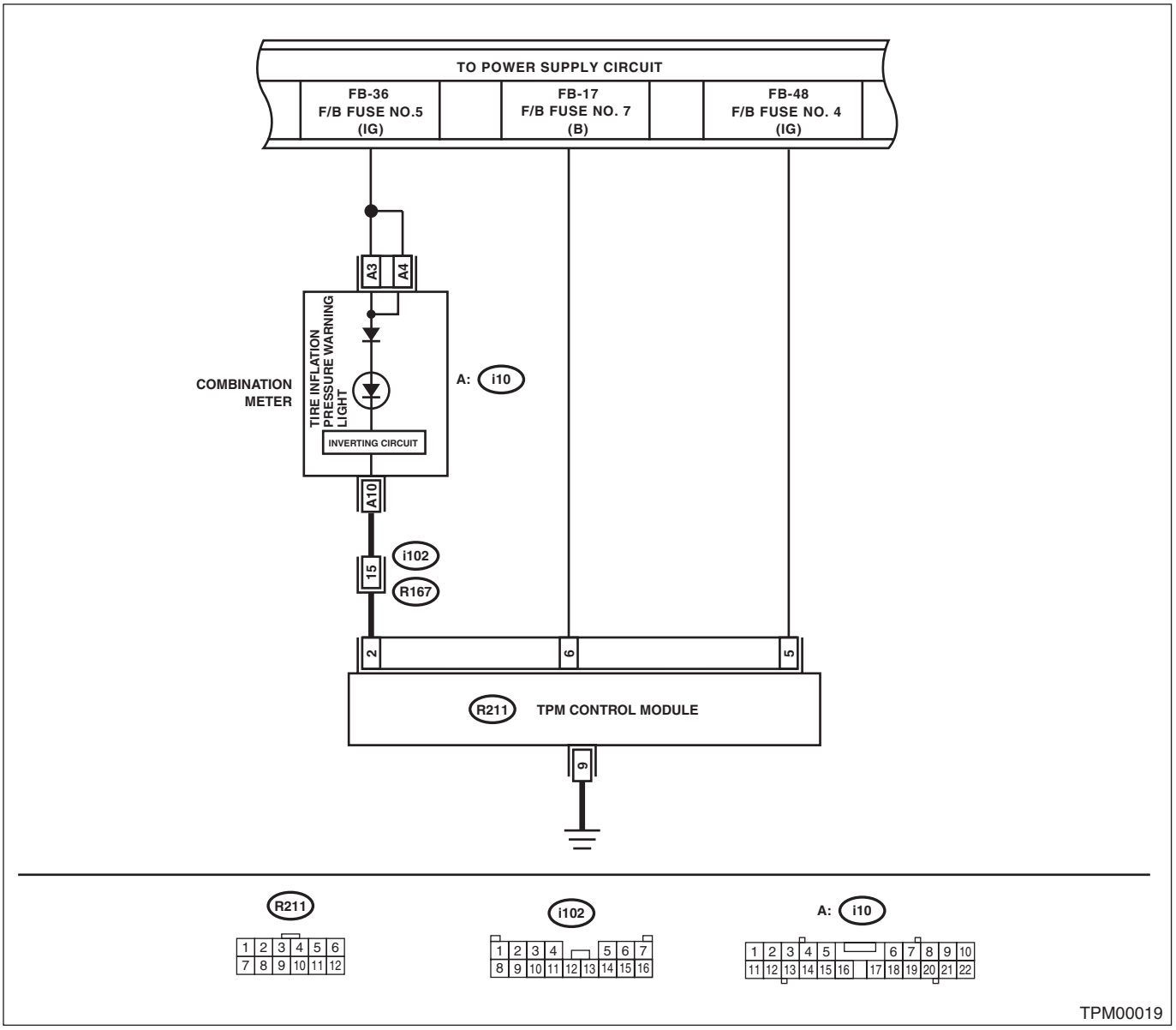
DETECTING CONDITION:

- Tire pressure monitoring control module is faulty.
- Defective harness
- Transmitter is faulty.

TROUBLE SYMPTOM:

Tire pressure warning light blinks continuously after engine starting.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK DIAGNOSTIC TROUBLE CODE (DTC)** Connect Subaru Select Monitor, read Diagnostic Trouble Code. <Ref. to TPM(diag)-8, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is diagnostics code (DTC) displayed?	Perform the diagnosis according to DTC. <Ref. to TPM(diag)-26, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK HARNESS.** 1) Disconnect the tire pressure monitoring control module connector. 2) Short the terminal No. 2 of the tire pressure monitoring control module harness connector (R211) with the chassis ground, and turn the ignition switch to ON.	Is the tire pressure warning light lit?	Go to step **3**.	Replace the tire pressure monitoring control module.
3	**CHECK HARNESS.** 1) Connect the tester to the terminal No. 2 of the tire pressure monitoring control module connector (R211). 2) Turn the ignition switch to ON, and measure the voltage. ***Connector & terminal*** ***(R211) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>
4	**CHECK COMBINATION METER.** 1) Short between the combination meter connector (i10) No. 10 and the chassis ground. 2) Turn the ignition switch to ON.	Is the tire pressure warning light lit?	Go to step **5**.	There is an open circuit between the combination meter connector and the tire pressure monitoring control module harness. Repair or replace the harness.
5	**CHECK HARNESS.** 1) Disconnect the combination meter connector (i10). 2) Measure the resistance between tire pressure monitoring control module connector (i10) and chassis ground. ***Connector & terminal*** ***(i10) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the combination meter. <Ref. to IDI-11, REMOVAL, Combination Meter.>	Repair or replace the harness connector short circuit between the combination meter connector and the tire pressure monitoring control module connector.

10.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Contents of diagnosis	Remarks
11	FL air pressure decrease	FL tire pressure is reduced.	<Ref. to TPM(diag)-28, DTC 11 FL AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
12	FR air pressure decrease	FR tire pressure is reduced.	<Ref. to TPM(diag)-28, DTC 12 FR AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
13	RR air pressure decrease	RR tire pressure is reduced.	<Ref. to TPM(diag)-28, DTC 13 RR AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
14	RL air pressure decrease	RL tire pressure is reduced.	<Ref. to TPM(diag)-28, DTC 14 RL AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
21	No FL transmitter data	Data cannot be received from FL sensor.	<Ref. to TPM(diag)-29, DTC 21 NO FL TRANSMITTER DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	No FR transmitter data	Data cannot be received from FR sensor.	<Ref. to TPM(diag)-29, DTC 22 NO FR TRANSMITTER DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	No RR transmitter data	Data cannot be received from RR sensor.	<Ref. to TPM(diag)-29, DTC 23 NO RR TRANSMITTER DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	No RL transmitter data	Data cannot be received from RL sensor.	<Ref. to TPM(diag)-29, DTC 24 NO RL TRANSMITTER DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	FL transmit pres data abnormal.	FL sensor data contents are abnormal.	<Ref. to TPM(diag)-30, DTC 31 FL TRANSMIT PRES DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
32	FR transmitter pres data abnormal.	FR sensor data contents are abnormal.	<Ref. to TPM(diag)-30, DTC 32 FR TRANSMIT PRES DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	RR transmit pres data abnormal.	RR sensor data contents are abnormal.	<Ref. to TPM(diag)-30, DTC 33 RR TRANSMIT PRES DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
34	RL transmit pres data abnormal.	RL sensor data contents are abnormal.	<Ref. to TPM(diag)-31, DTC 34 RL TRANSMIT PRES DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
41	FL trans function code abnormal.	Function code has error.	<Ref. to TPM(diag)-32, DTC 41 FL TRANS FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
42	FR trans function code abnormal.	Function code has error.	<Ref. to TPM(diag)-32, DTC 42 FR TRANS FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
43	RR trans function code abnormal.	Function code has error.	<Ref. to TPM(diag)-32, DTC 43 RR TRANS FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
44	RL trans function code abnormal.	Function code has error.	<Ref. to TPM(diag)-32, DTC 44 RL TRANS FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Contents of diagnosis	Remarks
51	FL transmitter battery low voltage	Transmitter battery voltage is low.	<Ref. to TPM(diag)-33, DTC 51 FL TRANSMIT BATTERY LOW VOLTAGE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
52	FR transmit battery low voltage.	Transmitter battery voltage is low.	<Ref. to TPM(diag)-33, DTC 52 FR TRANSMIT BATTERY LOW VOLTAGE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
53	RR transmit battery low voltage.	Transmitter battery voltage is low.	<Ref. to TPM(diag)-33, DTC 53 RR TRANSMIT BATTERY LOW VOLTAGE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
54	RL transmit battery low voltage.	Transmitter battery voltage is low.	<Ref. to TPM(diag)-33, DTC 54 RL TRANSMIT BATTERY LOW VOLTAGE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
61	Vehicle speed is abnormal.	Vehicle speed signal is not input to the control module with the vehicle speed more than 25 km/h.	<Ref. to TPM(diag)-34, DTC 61 VEHICLE SPEED IS ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

11.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 11 FL AIR PRESSURE DECREASE

NOTE:
Refer to DTC 14 for diagnostic procedure. <Ref. to TPM(diag)-28, DTC 14 RL AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

B: DTC 12 FR AIR PRESSURE DECREASE

NOTE:
Refer to DTC 14 for diagnostic procedure. <Ref. to TPM(diag)-28, DTC 14 RL AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: DTC 13 RR AIR PRESSURE DECREASE

NOTE:
Refer to DTC 14 for diagnostic procedure. <Ref. to TPM(diag)-28, DTC 14 RL AIR PRESSURE DECREASE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

D: DTC 14 RL AIR PRESSURE DECREASE

DTC DETECTING CONDITION:
Inflation pressure of each tire reduces under specifications (188 kPs (1.9 kgf/cm^2, 27.3 psi) or less).
TROUBLE SYMPTOM:
Tire pressure warning light illuminates.

	Step	Check	Yes	No
1	**CHECK THE TIRES.** Lift-up the vehicle and check for damage in the tires.	Are there cracks or damage?	Replace the tire. <Ref. to WT-6, Tire.>	Go to step **2**.
2	**CHECK THE TIRES.** Check the tire air pressure.	Is the tire pressure in the specifications?	Go to step **3**.	Adjust the air pressure.
3	**CHECK THE TRANSMITTER** Drive the vehicle at a speed more than 40 km/h (25 MPH) 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-11, Tire Pressure Monitoring System.>.	Go to step **4**.
4	**PERFORM DRIVING TEST.** 1) Perform the clear memory mode. <Ref. to TPM(diag)-9, CLEAR MEMORY, OPERATION, Subaru Select Monitor.> 2) Perform the driving test. <Ref. to TPM(diag)-17, PROCEDURE, Inspection Mode.> 3) Read the DTC. <Ref. to TPM(diag)-8, 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)-26, 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 NO FL TRANSMITTER DATA

NOTE:
Refer to DTC 24 for diagnostic procedure. <Ref. to TPM(diag)-29, DTC 24 NO RL TRANSMITTER DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

F: DTC 22 NO FR TRANSMITTER DATA

NOTE:
Refer to DTC 24 for diagnostic procedure. <Ref. to TPM(diag)-29, DTC 24 NO RL TRANSMITTER DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

G: DTC 23 NO RR TRANSMITTER DATA

NOTE:
Refer to DTC 24 for diagnostic procedure. <Ref. to TPM(diag)-29, DTC 24 NO RL TRANSMITTER DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

H: DTC 24 NO RL TRANSMITTER DATA

DTC DETECTING CONDITION:
Data from each transmitter is not received for 10 minutes.
TROUBLE SYMPTOM:
Tire pressure warning light blinks.

	Step	Check	Yes	No
1	**START FL TRANSMITTER.** 1) Connect the Subaru Select Monitor and then turn the ignition switch to ON. 2) Select “Transmitter ID”. <Ref. to TPM(diag)-10, DISPLAY TRANSMITTER (ID)., OPERATION, Subaru Select Monitor.> 3) Use the transmitter registration tool and transmit the ID from the FL transmitter to check “Latest Received ID”.	Is “Latest Received ID” updated?	Go to step **2**.	Replace the FL transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
2	**CHECK FL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the FL 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	**START FR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the FR transmitter to check “Latest Received ID”.	Is “Latest Received ID” updated?	Go to step **4**.	Replace the FR transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
4	**CHECK FR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the FR 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	**START RR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RR transmitter to check “Latest Received ID”.	Is “Latest Received ID” updated?	Go to step **6**.	Replace the RR transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
6	**CHECK RR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the RR registered ID.	Are the two IDs same?	Go to step **7**.	Record the received ID update as the RR transmitter. Go to step **7**.

	Step	Check	Yes	No
7	**START RL TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RL transmitter to check "Latest Received ID".	Is "Latest Received ID" updated?	Go to step **8**.	Replace the RL transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
8	**CHECK RL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the RL 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	**CHECK MALFUNCTION TRANSMITTER.**	Is ID recorded by this procedure?	Go to step **10**.	Replace the transmitter indicated by DTC. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
10	**CHECK MALFUNCTION TRANSMITTER.** 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-11, REMOVAL, Tire Pressure Monitoring System.>	Replace the transmitter indicated by DTC. <Ref. to WT-11, 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 FL TRANSMIT PRES DATA ABNORMAL

NOTE:
Refer to DTC 34 for diagnostic procedure. <Ref. to TPM(diag)-31, DTC 34 RL TRANSMIT PRES DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

J: DTC 32 FR TRANSMIT PRES DATA ABNORMAL

NOTE:
Refer to DTC 34 for diagnostic procedure. <Ref. to TPM(diag)-31, DTC 34 RL TRANSMIT PRES DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC 33 RR TRANSMIT PRES DATA ABNORMAL

NOTE:
Refer to DTC 34 for diagnostic procedure. <Ref. to TPM(diag)-31, DTC 34 RL TRANSMIT PRES DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC 34 RL TRANSMIT PRES 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.

	Step	Check	Yes	No
1	**START FL TRANSMITTER.** 1) Connect the Subaru Select Monitor and then turn the ignition switch to ON. 2) Select “Transmitter ID”. <Ref. to TPM(diag)-10, DISPLAY TRANSMITTER (ID)., OPERATION, Subaru Select Monitor.> 3) Use the transmitter registration tool and transmit the ID from the FL transmitter to check “Latest Received ID”.	Is “Latest Received ID” updated?	Go to step **2**.	Replace the FL transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
2	**CHECK FL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the FL 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	**START FR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the FR transmitter to check “Latest Received ID”.	Is “Latest Received ID” updated?	Go to step **4**.	Replace the FR transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
4	**CHECK FR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the FR 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	**START RR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RR transmitter to check “Latest Received ID”.	Is “Latest Received ID” updated?	Go to step **6**.	Replace the RR transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
6	**CHECK RR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the RR 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	**START RL TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RL transmitter to check “Latest Received ID”.	Is “Latest Received ID” updated?	Go to step **8**.	Replace the RL transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
8	**CHECK RL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the RL 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	**CHECK MALFUNCTION TRANSMITTER.**	Is ID recorded by this procedure?	Go to step **10**.	Replace the transmitter indicated by DTC.
10	**CHECK MALFUNCTION TRANSMITTER.** 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-11, REMOVAL, Tire Pressure Monitoring System.>	Replace the transmitter indicated by DTC. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>

M: DTC 41 FL TRANS FUNCTION CODE ABNORMAL

NOTE:
Refer to DTC 44 for diagnostic procedure. <Ref. to TPM(diag)-32, DTC 44 RL TRANS FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

N: DTC 42 FR TRANS FUNCTION CODE ABNORMAL

NOTE:
Refer to DTC 44 for diagnostic procedure. <Ref. to TPM(diag)-32, DTC 44 RL TRANS FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

O: DTC 43 RR TRANS FUNCTION CODE ABNORMAL

NOTE:
Refer to DTC 44 for diagnostic procedure. <Ref. to TPM(diag)-32, DTC 44 RL TRANS FUNCTION CODE ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

P: DTC 44 RL TRANS FUNCTION CODE ABNORMAL

DTC DETECTING CONDITION:
Unexpected function codes received from each transmitter.
TROUBLE SYMPTOM:
Tire pressure warning light blinks.

	Step	Check	Yes	No
1	**START FL TRANSMITTER.** 1) Connect the Subaru Select Monitor and then turn the ignition switch to ON. 2) Select “Transmitter ID”. <Ref. to TPM(diag)-10, DISPLAY TRANSMITTER (ID)., OPERATION, Subaru Select Monitor.> 3) Use the transmitter registration tool and transmit the ID from the FL transmitter to check “Latest Received ID”.	Is “Latest Received ID” updated?	Go to step **2**.	Replace the FL transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
2	**CHECK FL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the FL 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	**START FR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the FR transmitter to check “Latest Received ID”.	Is “Latest Received ID” updated?	Go to step **4**.	Replace the FR transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
4	**CHECK FR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the FR 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	**START RR TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RR transmitter to check “Latest Received ID”.	Is “Latest Received ID” updated?	Go to step **6**.	Replace the RR transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
6	**CHECK RR TRANSMITTER ID.** Check the ID displayed in the updated ID display and the RR registered ID.	Are the two IDs same?	Go to step **7**.	Record the received ID update as the RR transmitter. Go to step **7**.

	Step	Check	Yes	No
7	**START RL TRANSMITTER.** Use the transmitter registration tool and transmit the ID from the RL transmitter to check "Latest Received ID".	Is "Latest Received ID" updated?	Go to step **8**.	Replace the RL transmitter. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
8	**CHECK RL TRANSMITTER ID.** Check the ID displayed in the updated ID display and the RL 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	**CHECK MALFUNCTION TRANSMITTER.**	Is ID recorded by this procedure?	Go to step **10**.	Replace the transmitter indicated by DTC. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>
10	**CHECK MALFUNCTION TRANSMITTER.** 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-11, REMOVAL, Tire Pressure Monitoring System.>	Replace the transmitter indicated by DTC. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>

Q: DTC 51 FL TRANSMIT BATTERY LOW VOLTAGE

NOTE:
Refer to DTC 54 for diagnostic procedure. <Ref. to TPM(diag)-33, DTC 54 RL TRANSMIT BATTERY LOW VOLTAGE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

R: DTC 52 FR TRANSMIT BATTERY LOW VOLTAGE

NOTE:
Refer to DTC 54 for diagnostic procedure. <Ref. to TPM(diag)-33, DTC 54 RL TRANSMIT BATTERY LOW VOLTAGE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

S: DTC 53 RR TRANSMIT BATTERY LOW VOLTAGE

NOTE:
Refer to DTC 54 for diagnostic procedure. <Ref. to TPM(diag)-33, DTC 54 RL TRANSMIT BATTERY LOW VOLTAGE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

T: DTC 54 RL TRANSMIT BATTERY LOW VOLTAGE

DTC DETECTING CONDITION:
Low battery signals received 20 times from each transmitter.
TROUBLE SYMPTOM:
Tire pressure warning light blinks.

	Step	Check	Yes	No
1	**CHECK TRANSMITTER.** 1) Replace all transmitters with new ones and register their IDs. <Ref. to WT-11, 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?	Transmitter embedded battery has worn out. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>	Replace the tire pressure monitoring control module. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>

U: DTC 61 VEHICLE SPEED IS ABNORMAL

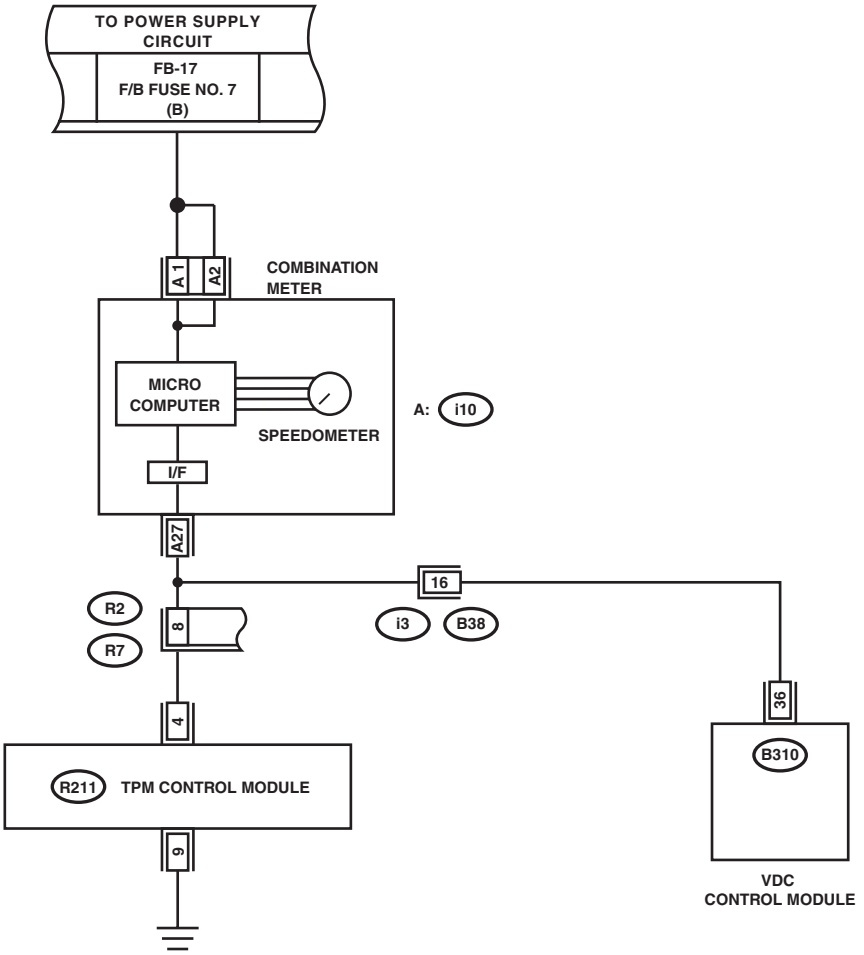
DTC DETECTING CONDITION:

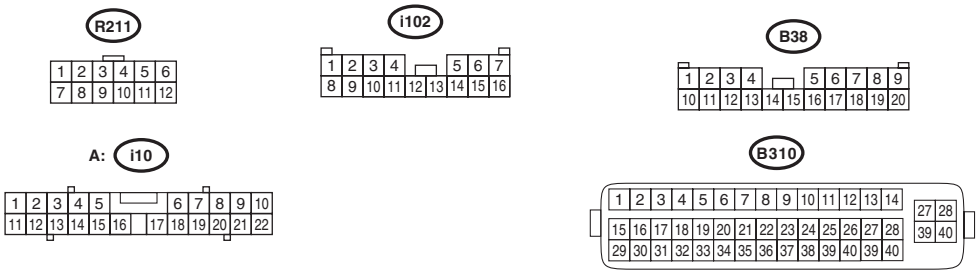
Vehicle speed function codes were received from the transmitter, but the vehicle speed signal was not input to the module.

TROUBLE SYMPTOM:

Tire pressure warning light blinks.

WIRING DIAGRAM:





TPM00020

	Step	Check	Yes	No
1	**CHECK TIRE PRESSURE MONITORING CONTROL MODULE.** 1) Connect an oscilloscope to the terminal No. 4 of the tire pressure monitoring control module connector (R211) 2) Drive the vehicle at 40 km/h (25 MPH) for 20 seconds and check the vehicle speed signal at that time.	Is the vehicle speed being input?	Replace the tire pressure monitoring control module. <Ref. to WT-11, REMOVAL, Tire Pressure Monitoring System.>	Go to step **2**.
2	**CHECK HARNESS.** 1) Disconnect the combination meter connector (i10). 2) Connect the tire pressure monitoring control module connector (R211) and combination meter connector (i10) and measure the resistance.	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.

12.General Diagnostic Table

A: INSPECTION

Symptom		Problem parts
Tire pressure warning light illuminates.	Tire pressure is reduced.	• Improper tire pressure adjustment. • Punctured tire
Tire pressure warning light blinks.	TIRE PRESSURE MONITORING SYSTEM HAS MALFUNCTION	• AIR PRESSURE SENSOR MALFUNCTION • AIR PRESSURE SENSOR IS OUT OF BATTERY • Tire pressure monitoring control module is faulty. • Defective vehicle harness
Tire pressure is dropping but the warning light does not illuminate.	TIRE PRESSURE WARNING LIGHT DOES NOT ILLUMINATE	• AIR PRESSURE SENSOR IS FAULTY. • Tire pressure monitoring control module is faulty. • Defective vehicle harness

1. General Description

A: NOTE

For inspection, refer to the 5AT section.
<Ref. to 5AT-65, Transfer Clutch.>

2. Transfer Clutch

A: NOTE

For removal, installation and inspection, refer to "5AT" section.
<Ref. to 5AT-65, Transfer Clutch.>

3. Extension Case

A: NOTE

For removal, installation and inspection, refer to “5AT” section. <Ref. to 5AT-63, Extension Case.>

4. Oil Seal

A: NOTE

For inspection, refer to the 5AT section.
<Ref. to 5AT-43, Extension Case Oil Seal.> <Ref. to 5AT-45, Differential Side Retainer Oil Seal.>

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.>

7. Transfer Clutch Pressure Test

A: NOTE

For inspection, refer to the 5AT section.
<Ref. to 5AT-33, Transfer Clutch Pressure Test.>

1. Basic Diagnostic Procedure

A: PROCEDURE

NOTE:
- To check the harness for broken wires 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
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using the interview checklist. <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)-9, INSPECTION, General Description.>	Is the component that might influence the VDC problem normal?	Go to step **2**.	Repair or replace each component.
2	**CHECK INDICATION OF DTC.** 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 the Subaru Select Monitor power switch to ON. 4) Read the DTC. <Ref. to VDC(diag)-22, 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 VDC(diag)-19, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.> 5) Record all DTCs and freeze frame data.	Is DTC displayed?	Go to step **4**.	Go to step **3**.
3	**PERFORM GENERAL DIAGNOSTICS.** 1) Inspect using “General Diagnostic Table”. <Ref. to VDC(diag)-87, INSPECTION, General Diagnostic Table.> 2) Perform the clear memory mode. <Ref. to VDC(diag)-24, OPERATION, Clear Memory Mode.> 3) Perform the inspection mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-22, 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)-29, ABS WARNING LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-26, VDC WARNING LIGHT, TCS OFF INDICATOR LIGHT AND VDC INDICATOR LIGHT DO NOT COME ON, Warning Light Illumination Pattern.>

	Step	Check	Yes	No
4	**PERFORM THE DIAGNOSIS.** 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)-34, LIST, List of Diagnostic Trouble Code (DTC).> 2) Correct the cause of trouble. 3) Perform the clear memory mode. <Ref. to VDC(diag)-24, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 5) Read the DTC. <Ref. to VDC(diag)-22, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Repeat step 4 until DTC is not shown.	Finish the diagnosis.

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.	❑ Always ❑ Sometimes ❑ Only once ❑ Does not come on • When/How long does it come on?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after starting engine, while engine is running) ❑ ON (after starting engine, engine is stop)		
Timing	❑ Immediately after turning the ignition switch to ON ❑ Immediately after turning the ignition switch to START		
	❑ Accelerating	—	km/h
		—	MPH
	❑ While traveling at a constant speed	km/h	MPH
	❑ Reducing speed	—	km/h
		—	MPH
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When operating other electrical parts		
	• Part name: • Operating condition:		

2. STATE OF VDC WARNING LIGHT AND TCS OFF INDICATOR LIGHT

<table>
<tr><td>VDC warning light and TCS OFF indicator light come on.</td><td colspan="3">❑ Always
❑ Sometimes
❑ Only once
❑ Does not come on
• When/How long does it come on?</td></tr>
<tr><td>Ignition key position</td><td colspan="3">❑ LOCK
❑ ACC
❑ ON (before starting engine)
❑ START
❑ ON (after starting engine, while engine is running)
❑ ON (after starting engine, engine is stop)</td></tr>
<tr><td rowspan="11">Timing</td><td colspan="3">❑ Immediately after turning the ignition switch to ON
❑ Immediately after turning the ignition switch to START</td></tr>
<tr><td rowspan="2">❑ Accelerating</td><td colspan="2">— km/h</td></tr>
<tr><td colspan="2">— MPH</td></tr>
<tr><td>❑ While traveling at a constant speed</td><td>km/h</td><td>MPH</td></tr>
<tr><td rowspan="2">❑ Reducing speed</td><td colspan="2">— km/h</td></tr>
<tr><td colspan="2">— MPH</td></tr>
<tr><td rowspan="2">❑ When turning to the right</td><td>Steering angle:</td><td>deg</td></tr>
<tr><td>Steering time:</td><td>Sec.</td></tr>
<tr><td rowspan="2">❑ When turning to the left</td><td>Steering angle:</td><td>deg</td></tr>
<tr><td>Steering time:</td><td>Sec.</td></tr>
<tr><td colspan="3">❑ When operating other electrical parts</td></tr>
<tr><td colspan="3">• Part name:
• Operating condition:</td></tr>
</table>

3. STATE OF VDC INDICATOR LIGHT

VDC indicator light comes on.	❑ Always ❑ Sometimes ❑ Only once ❑ Does not come on • When/How long does it come on?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after starting engine, while engine is running) ❑ ON (after starting engine, engine is stop)		
Timing	❑ Immediately after turning the ignition switch to ON ❑ Immediately after turning the ignition switch to START		
	❑ Accelerating	— km/h — MPH	
	❑ While traveling at a constant speed	km/h	MPH
	❑ Reducing speed	— km/h — MPH	
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When operating other electrical parts		
	• Part name: • Operating condition:		

4. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others:
	b) Ambient temperature	°C (°F)
	c) Road	❑ Inner city ❑ Suburbs ❑ Highway ❑ General road ❑ Uphill ❑ Downhill ❑ Paved road ❑ Gravel road ❑ Muddy road ❑ Sandy place ❑ Straight road ❑ Sharp curve ❑ Gentle curve ❑ S-curve ❑ Road with a slope on both sides ❑ Others:
	d) Road surface	❑ Dry ❑ Wet ❑ New-fallen snow ❑ Compressed snow ❑ Frozen slope ❑ Others:

Check List for Interview

Condition	a) Brakes	Deceleration: G
		❑ continuous / ❑ intermittent
	b) Accelerator	Acceleration: G
		❑ continuous / ❑ intermittent
	c) Vehicle speed	km/h | MPH
		❑ Advancing ❑ Accelerating ❑ Reducing speed ❑ Low speed ❑ Turning ❑ Others:
	d) Tire inflation pressure	Front RH tire: kPa
		Front LH tire: kPa
		Rear RH tire: kPa
		Rear LH tire: kPa
	e) Degree of wear	Front RH tire:
		Front LH tire:
		Rear RH tire:
		Rear LH tire:
	f) Steering wheel	❑ Sharp turning ❑ Gentle turning ❑ Straight forward motion ❑ Gentle return ❑ Sharp return
	g) Tire/Wheel size	❑ Specified size ❑ Except specification ( )
	h) Tire variation	❑ Summer tire ❑ Studless tire (Brand:)
	i) Tire chains are fitted: ❑ Yes / ❑ No	
	j) T-type tire is used: ❑ Yes / ❑ No	
	k) Condition of suspension alignment:	
	l) Loading state:	
	m) Repair parts are used: ❑ Yes / ❑ No	
	• Contents:	
	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:
• 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 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, CHECK HYDRAULIC UNIT VDC OPERATION WITH BRAKE TESTER, INSPECTION, VDC Control Module & 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 & Hydraulic Control Unit (VDCCM&H/U).>

5. BRAKE DRAG

Check for brake drag.

6. BRAKE PAD AND ROTOR

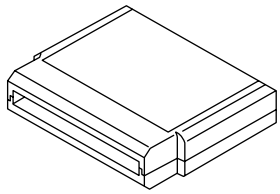
Check the brake pad and rotor.
• Front <Ref. to BR-13, INSPECTION, Front Brake Pad.> <Ref. to BR-14, INSPECTION, Front Disc Rotor.>
• Rear <Ref. to BR-19, INSPECTION, Rear Brake Pad.> <Ref. to BR-20, INSPECTION, Rear Disc Rotor.>

7. TIRE

Check the tire specifications, tire wear and air pressure. <Ref. to WT-2, SPECIFICATION, General Description.>

C: PREPARATION TOOL

1. SPECIAL TOOL

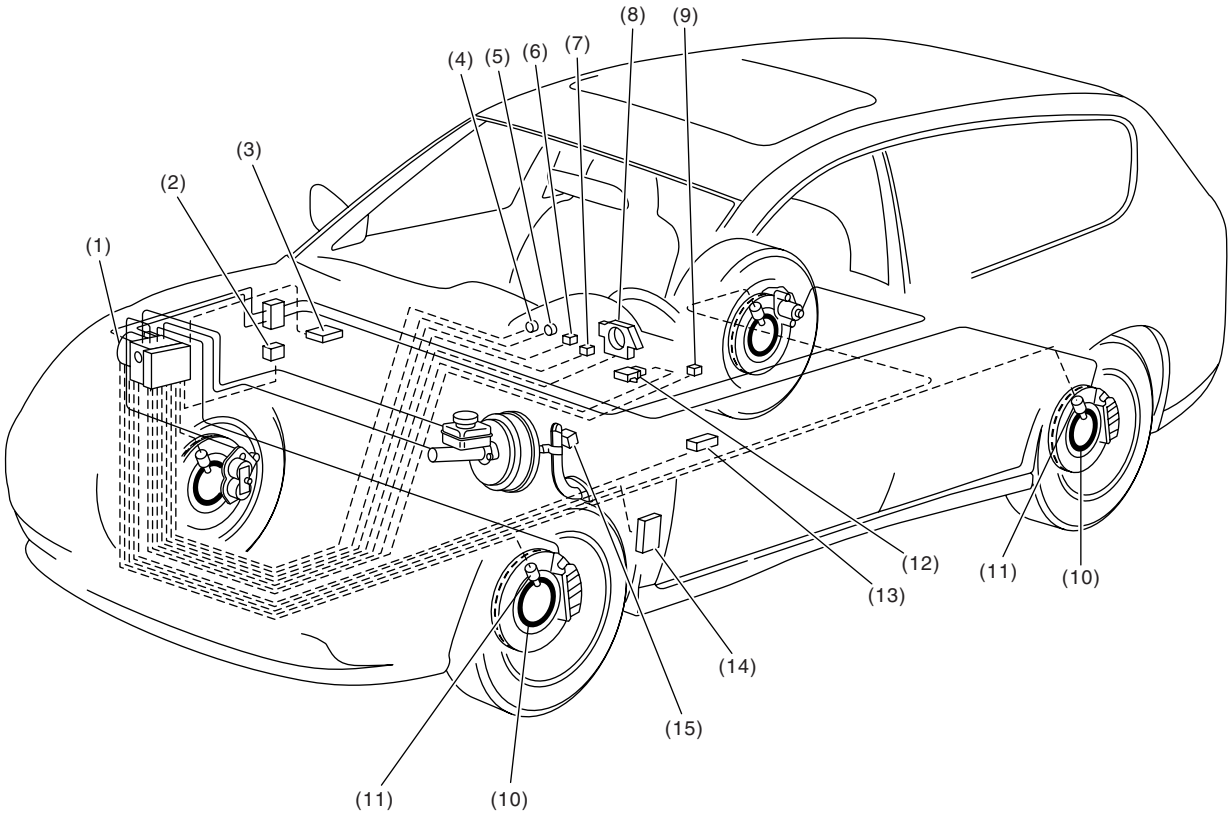
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.

2. GENERAL TOOL

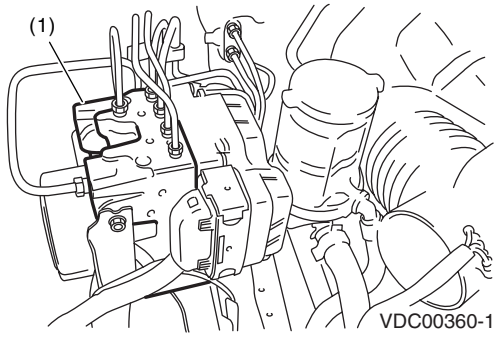
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring sensor.

4. Electrical Component Location

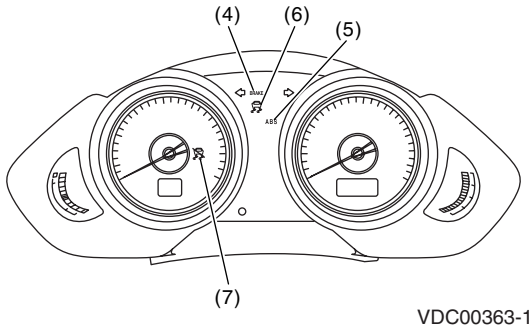
A: LOCATION



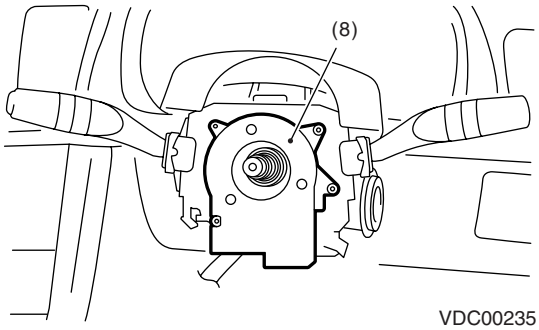
(1) VDC control module & hydraulic control unit (VDCCM&H/U)
(2) Relay box
(3) Engine control module (ECM)
(4) Brake warning light (EBD warning light)
(5) ABS warning light
(6) VDC indicator light
(7) VDC warning light and TCS OFF indicator light
(8) Steering angle sensor
(9) TCS OFF switch
(10) Magnetic encoder
(11) ABS wheel speed sensor
(12) Yaw rate & lateral G sensor
(13) Data link connector
(14) Transmission control module (TCM)
(15) Stop light switch



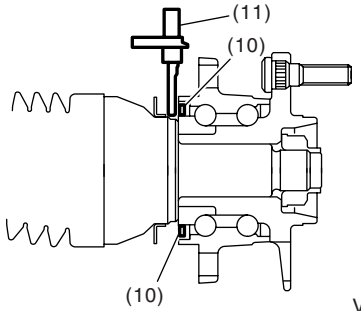
VDC00360-1



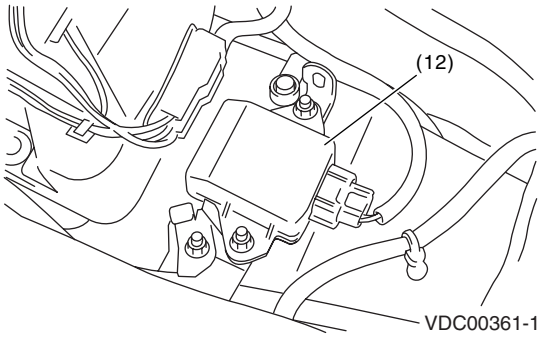
VDC00363-1



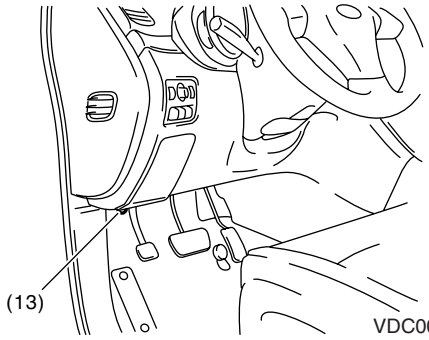
VDC00235



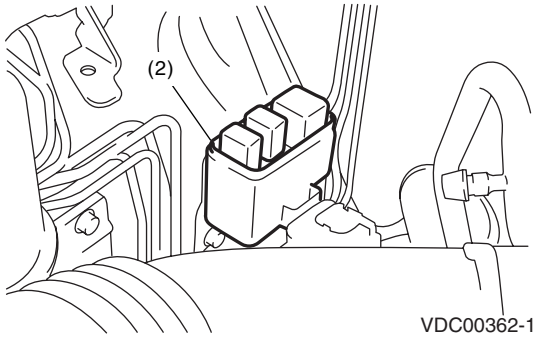
VDC00234



VDC00361-1



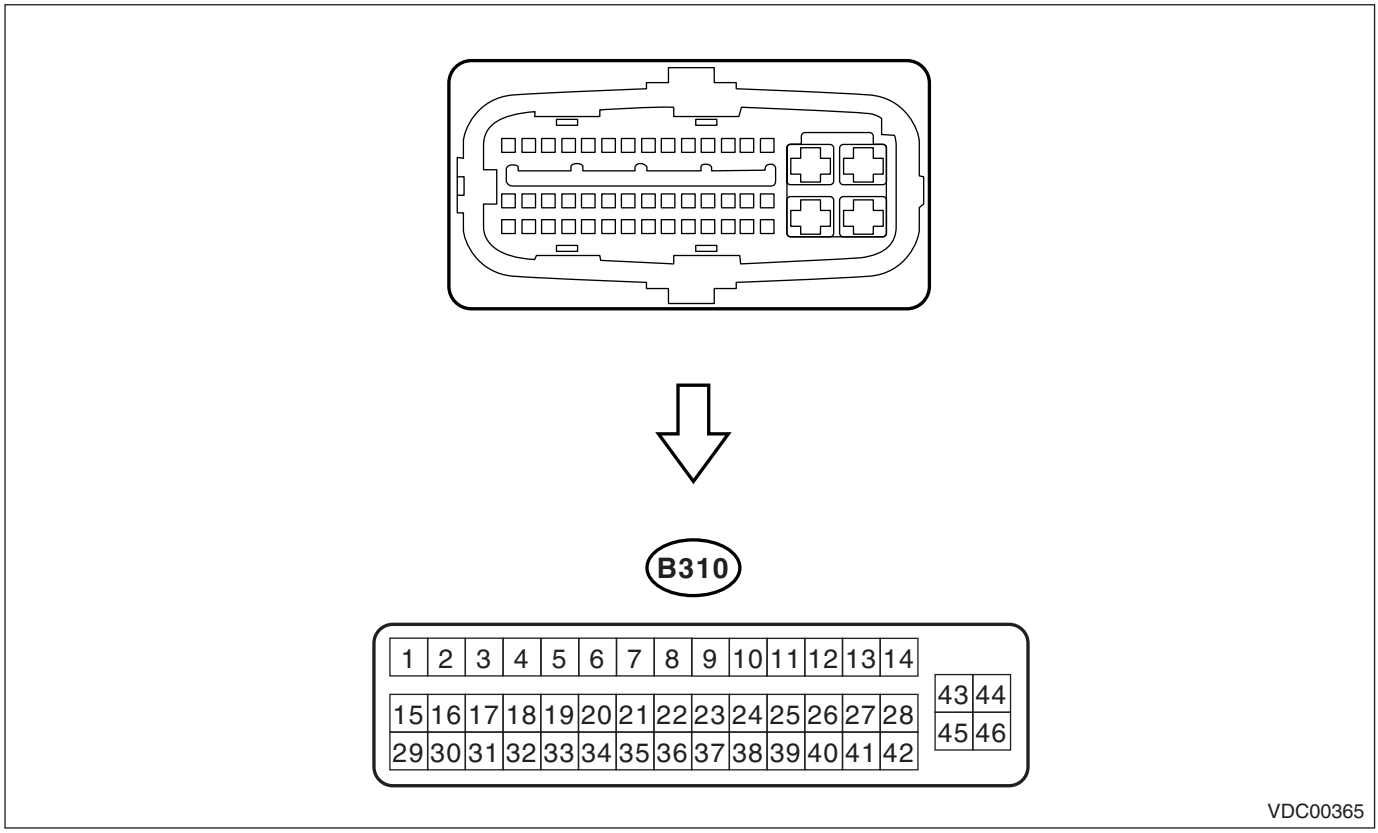
VDC00364-1



VDC00362-1

5. Control Module I/O Signal

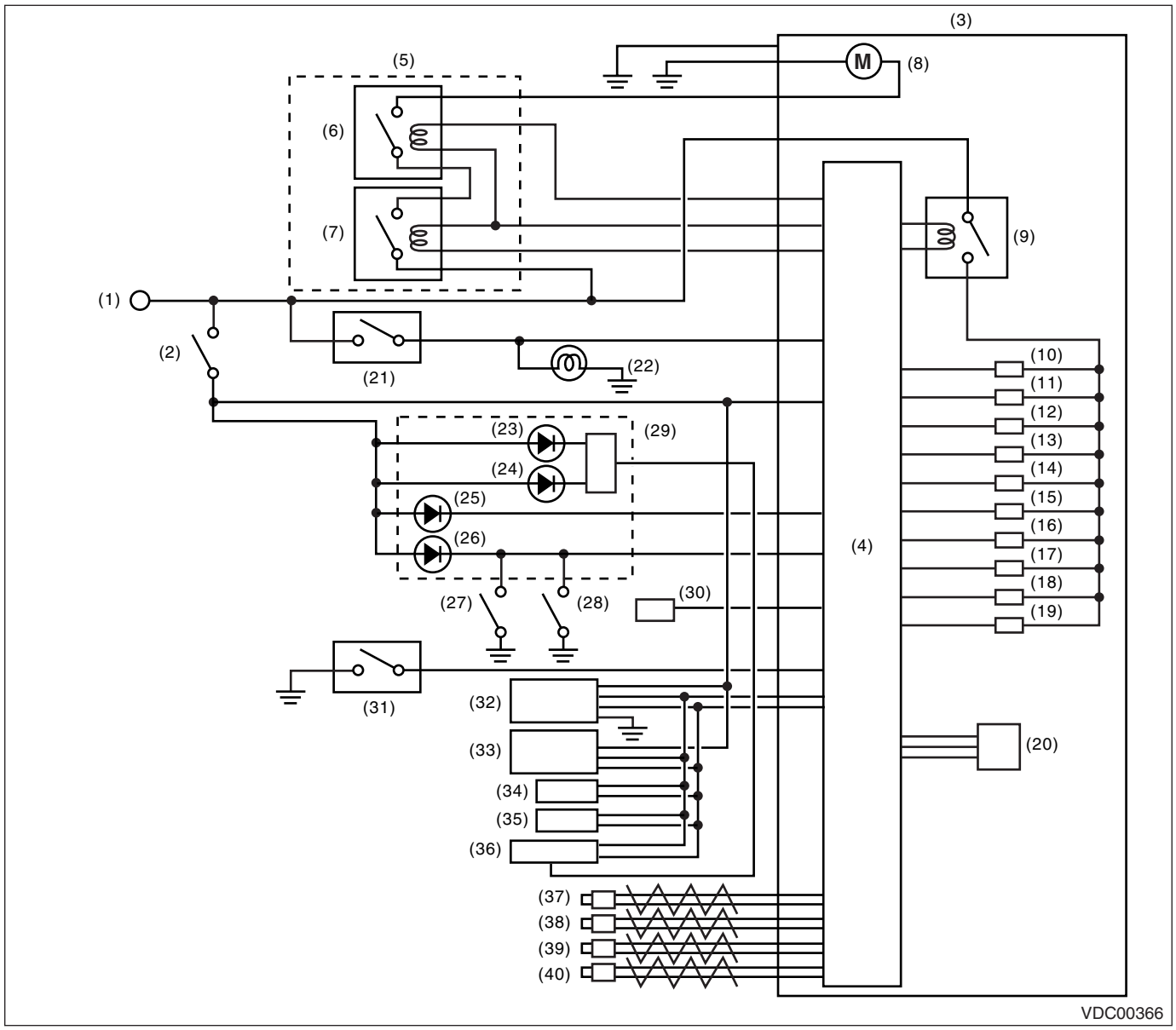
A: ELECTRICAL SPECIFICATION



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, VDC warning light and TCS OFF indicator light illuminate.

Description			Terminal No. (+) — (–)	Input/Output signal
				Measured value and measuring conditions
Power supply			1 — 43	10 — 15 V when the ignition switch is ON.
ABS wheel speed sensor	Front LH wheel	Power supply	27 — 43	8.5 — 13.5 V
		Signal	41	5 — 17 mA: Rectangle waveform
	Front RH wheel	Power supply	42 — 43	8.5 — 13.5 V
		Signal	28	5 — 17 mA: Rectangle waveform
	Rear LH wheel	Power supply	25 — 43	8.5 — 13.5 V
		Signal	39	5 — 17 mA: Rectangle waveform
	Rear RH wheel	Power supply	26 — 43	8.5 — 13.5 V
		Signal	40	5 — 17 mA: Rectangle waveform
Yaw rate & lateral G sensor			34 — 20	Serial communication
Steering angle sensor				
CAN communication line (+)			34	Serial communication
CAN communication line (–)			20	Serial communication
Valve relay power supply			44 — 43	10 — 15 V when the ignition switch is ON.
Motor power supply			45 — 46	10 — 15 V when the ignition switch is ON.
ABS warning light			16 — 43	After turning the ignition switch to ON, 10 — 15 V during 1.5 seconds and less than 1.5 V after 1.5 seconds passed.
Brake warning light (EBD warning light)			3 — 43	After turning the ignition switch to ON, 10 — 15 V during 1.5 seconds and less than 1.5 V after 1.5 seconds passed.
Stop light switch			18 — 43	Less than 1.5 V when the stop light is OFF; otherwise, 10 — 15 V when the stop light is ON.
Subaru Select Monitor			32 — 43	0 ←→ 12 V pulse (in communication)
Vehicle speed output signal			33	0 ←→ 5 V pulse
Ground			43	—
Relay box	Relay power supply		2 — 43	10 — 15 V when the ignition switch is ON.
	Motor relay drive		30 — 43	After turning the ignition switch to ON, 1.5 V after 10 — 15, motor startup.
	Fail safe relay drive		31 — 43	When the ignition switch is ON, less than 1.5 V.

B: WIRING DIAGRAM



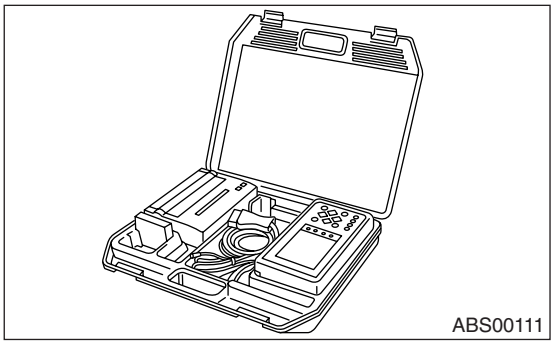
(1) Battery
(2) Ignition switch
(3) VDC control module & hydraulic control unit (VDCCM&H/U)
(4) VDC control module
(5) Relay box
(6) Motor relay
(7) Fail safe relay
(8) Motor
(9) Valve relay
(10) Front inlet solenoid valve LH
(11) Front outlet solenoid valve LH
(12) Front inlet solenoid valve RH
(13) Front outlet solenoid valve RH
(14) Rear inlet solenoid valve LH
(15) Rear outlet solenoid valve LH
(16) Rear inlet solenoid valve RH
(17) Rear outlet solenoid valve RH
(18) Linear valve 1
(19) Linear valve 2
(20) Pressure sensor
(21) Stop light switch
(22) Stop light
(23) VDC indicator light
(24) VDC warning light and TCS OFF indicator light
(25) ABS warning light
(26) Brake warning light
(27) Parking brake switch
(28) Brake fluid level switch
(29) Combination meter
(30) Data link connector
(31) TCS OFF switch
(32) Steering angle sensor
(33) Yaw rate & lateral G sensor
(34) Transmission control module (TCM)
(35) Engine control module (ECM)
(36) Body integrated unit
(37) Front ABS wheel speed sensor LH
(38) Front ABS wheel speed sensor RH
(39) Rear ABS wheel speed sensor LH
(40) Rear ABS wheel speed sensor RH

6. Subaru Select Monitor

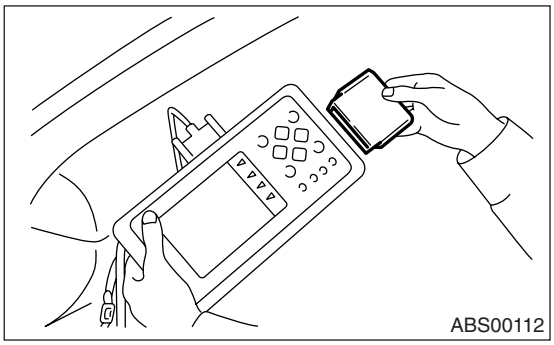
A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

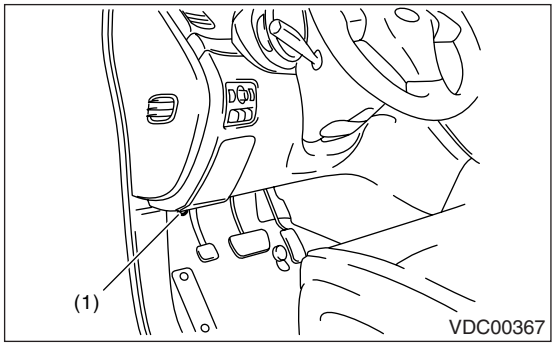
1) Prepare the Subaru Select Monitor kit. <Ref. to VDC(diag)-10, SPECIAL TOOL, PREPARATION TOOL, General Description.>



2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to the Subaru Select Monitor. <Ref. to VDC(diag)-10, SPECIAL TOOL, PREPARATION TOOL, General Description.>



4) 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).

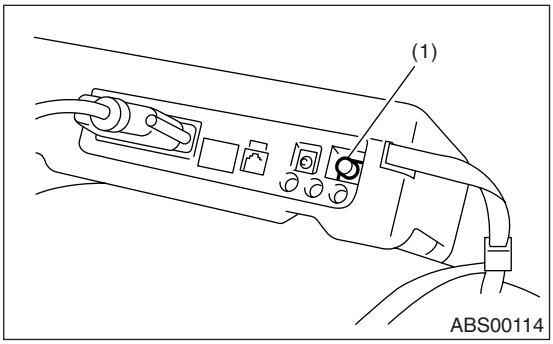


(1) Data link connector

(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON.



(1) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Brake Control} and press the [YES] key.
8) Press the [YES] key after the {VDC AWD AT} is displayed.
9) On the «VDC Diagnosis» screen, select the {Diagnostic Code(s) Display}, and then press the [YES] key.

NOTE:
• For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTCs, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to VDC(diag)-34, List of Diagnostic Trouble Code (DTC).>
• DTCs are displayed up to three in detected order.

10) If VDC and Subaru Select Monitor cannot communicate, check the communication circuit. <Ref. to VDC(diag)-19, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>

Display	Contents to be monitored
Current	Indicate the latest malfunction DTC on the Subaru Select Monitor display.
Old	The latest DTC in previous troubles is displayed on Subaru Select Monitor display screen.
Older	The second latest DTC in previous troubles is displayed on Subaru Select Monitor display screen.

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Brake Control} and press the [YES] key.
3) Press the [YES] key after {VDC AWD AT} is displayed.
4) On the «Brake Control Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Display Menu» screen, select the data display method and press the [YES] key.
6) Using a 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 monitored	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
Front/Rear G Sensor	Vehicle front/rear acceleration detected by G sensor is displayed.	m/s^2
Lateral G Sensor	Vehicle lateral acceleration detected by G sensor is displayed.	m/s^2
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 Light	ON/OFF condition of TCS OFF indicator light is displayed.	ON or OFF
E/G Control Prohibited Flag	Engine control command signal is displayed.	1 or 0
OFF Switch Signal	Operation condition of TCS OFF switch is displayed.	ON or OFF
Motor Fail Safe Relay Drive Signal	Motor fail safe relay drive signal is displayed.	ON or OFF

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

3. CLEAR MEMORY MODE

1) On the «Main Menu», select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Brake Control} and press the [YES] key.
3) Press the [YES] key after {VDC AWD AT} is displayed.
4) On the «Brake Control Diagnosis» display screen, select the {Memory Clear} and press the [YES] key.

Display	Contents to be monitored
Clear memory?	DTC deleting function

5) When “Done” and “Turn ignition switch OFF” are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

4. SEQUENCE CONTROL

Display	Contents to be monitored	Reference target
ABS sequence control	Operate the valve and pump motor continuously to perform the ABS sequence control.	<Ref. to VDC-12, ABS Sequence Control.>
VDC sequence control	Operate the valve and pump motor continuously to perform the VDC sequence control.	<Ref. to VDC-15, VDC Sequence Control.>

5. FREEZE FRAME DATA

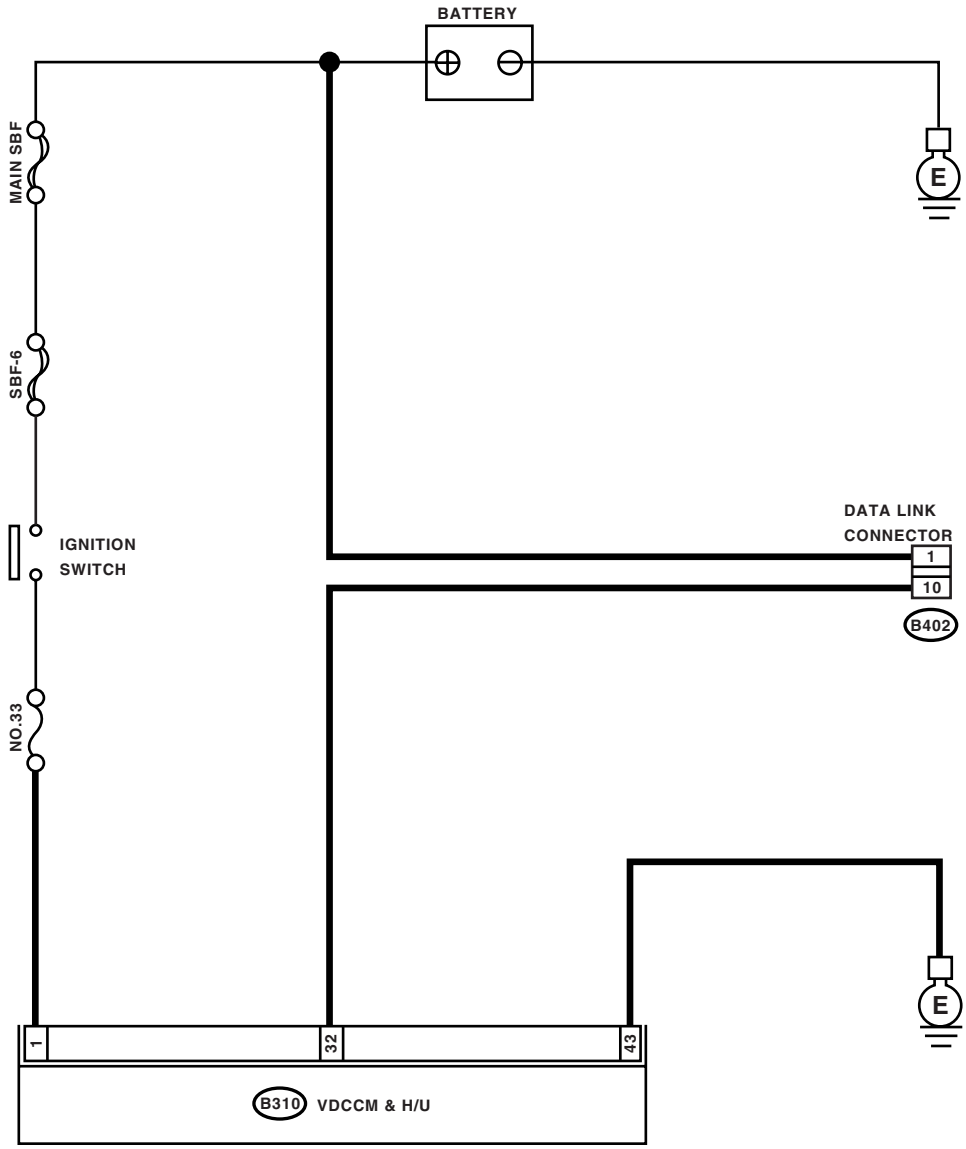
NOTE:
• Data stored at the time of trouble occurrence is shown on display.
• Each time trouble occurs, the latest information is stored in the freeze frame data in memory.

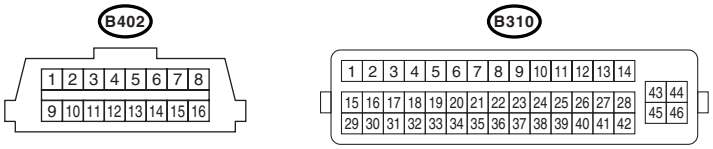
Display	Contents to be monitored
IG Counter	Number of times ignition switch turned to ON is displayed.
DTC	The recorded failure code is displayed.
FR Wheel Speed	Wheel speed detected by front ABS wheel speed sensor RH is displayed in km/h or MPH.
FL Wheel Speed	Wheel speed detected by front ABS wheel 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 Shaft	The sensor value for a 45° angle crossed 2 axis G sensor is displayed.
G Sensor Second Shaft	
Yaw Rate Sensor	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	Steering angle detected by steering angle sensor is displayed.
Pressure sensor output	Brake fluid pressure detected by pressure sensor is displayed.
Engine Speed	Engine speed on malfunction occurrence is displayed.
Acceleration Opening Angle	Acceleration opening is displayed.
Gear position	Gear position on malfunction occurrence is displayed.
Steering Angle Sensor Malfunction Code	The recorded steering angle sensor failure code 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 Flag	
Absolute angle recognition flag	Whether the absolute angle was determined is displayed.
OFF Switch Signal	Operation condition of TCS OFF switch is displayed.

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:





VDC00368

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is the ignition switch ON?	Go to step **2**.	Turn the ignition switch to ON, and select VDC mode using Subaru Select Monitor.
2	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage more than 11 V?	Go to step **3**.	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4**.
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other system can be executed normally.	Are the system name and model year displayed on Subaru Select Monitor?	Go to step **8**.	Go to step **5**.
5	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 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.	Are the system name and model year displayed on Subaru Select Monitor?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6**.
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the VDCCM&H/U, ECM and TCM. 3) Measure the resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B402) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair the harness and connector between each control module and data link connector.
7	**CHECK THE VDCCM&H/U OUTPUT SIGNALS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B402) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **8**.	Repair the harness and connector between each control module and data link connector.
8	**CHECK THE HARNESS CONNECTOR BETWEEN VDCCM&H/U AND DATA LINK CONNECTOR.** Measure the resistance between VDCCM&H/U connector and data link connector. ***Connector & terminal*** ***(B310) No. 32 — (B402) No. 10:***	Is the resistance less than 0.5 Ω?	Go to step **9**.	Repair harness and connector between VDCCM&H/U and data link connector.
9	**CHECK INSTALLATION OF VDCCM&H/U CONNECTOR.** 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.
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON.(Engine OFF) 2) Measure the ignition power supply voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **11**.	Repair open circuit in harness between VDCCM&H/U and battery.

	Step	Check	Yes	No
11	**CHECK THE HARNESS CONNECTOR BETWEEN VDCCM&H/U AND CHASSIS GROUND.** 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. ***Connector & terminal*** ***(B310) No. 43 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **12**.	Repair the open circuit in harness between VDCCM&H/U and inhibitor side connector, and poor contact of coupling connector.
12	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in 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 & Hydraulic Control Unit (VDCCM&H/U).>

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

For details concerning DTC reading procedure, refer to “Subaru Select Monitor”. <Ref. to VDC(diag)-16, Subaru Select Monitor.>

8. Inspection Mode

A: PROCEDURE

Reproduce the malfunction occurrence condition as possible.
Drive the vehicle at least ten minutes.

NOTE:
Make sure the vehicle is not dragged to one side under usual driving condition.

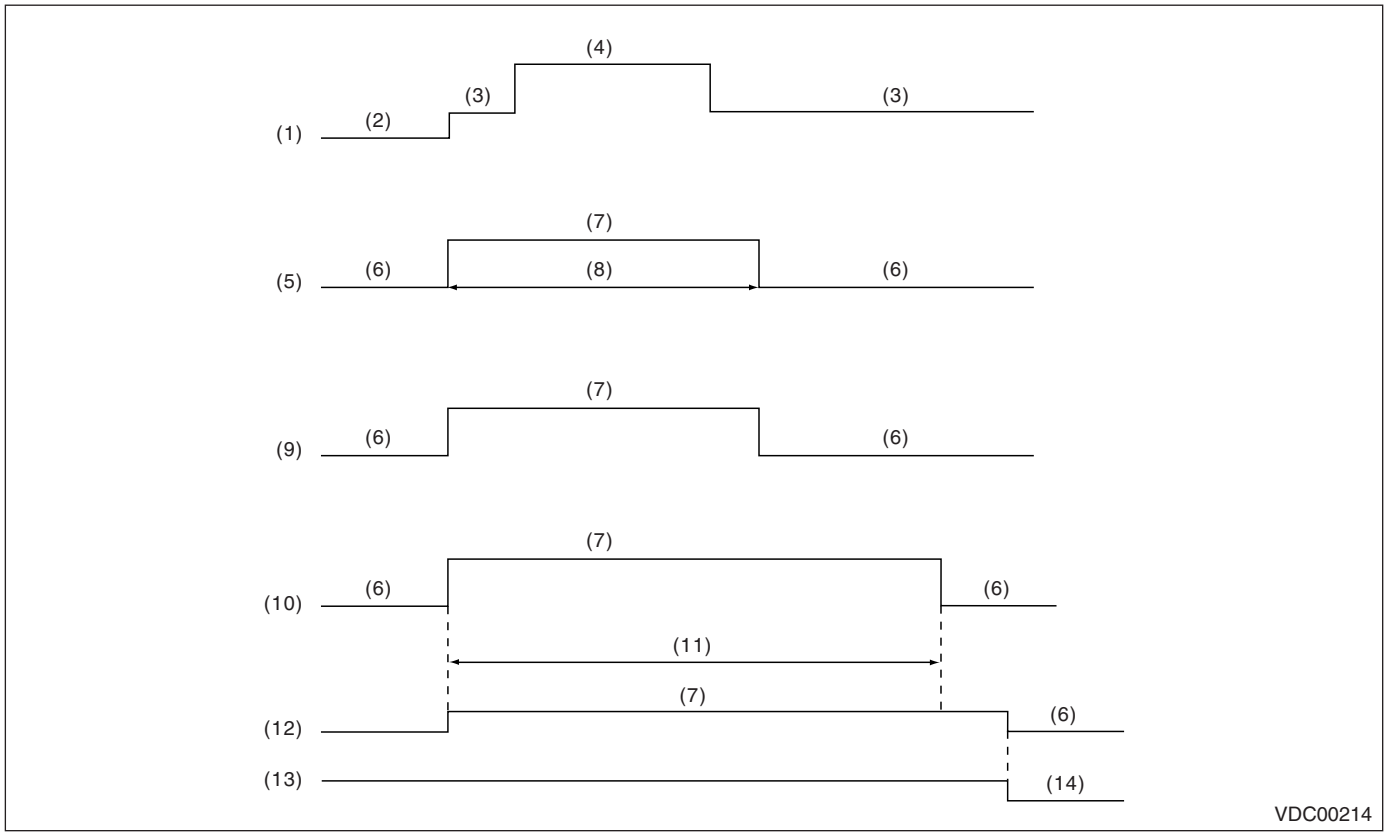
9. Clear Memory Mode

A: OPERATION

For details concerning DTC clear operation, refer to “Subaru Select Monitor”. <Ref. to VDC(diag)-16, Subaru Select Monitor.>

10.Warning Light Illumination Pattern

A: INSPECTION



(1) Ignition switch
(2) OFF
(3) ON
(4) Engine start
(5) ABS warning light
(6) Light OFF
(7) Light ON
(8) 1.5 seconds
(9) VDC indicator light
(10) VDC warning light and TCS OFF indicator light
(11) Several seconds (depending on engine coolant temperature)
(12) Brake warning light (EBD warning light)
(13) Parking brake
(14) Released

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)-26, VDC WARNING LIGHT, TCS OFF INDICATOR LIGHT AND VDC 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)-29, ABS WARNING LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.>

4) When the VDC indicator light, VDC warning light and TCS OFF indicator light do not go off, check the combination meter circuit or CAN communication circuit. <Ref. to VDC(diag)-30, VDC INDICATOR LIGHT DOES 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.
• It may take several minutes before VDC warning light and TCS OFF indicator light goes off if the vehicle is parked under low temperature for a specified time. This is not defective because it is resulted from low engine coolant temperature.
• With the vehicle jack-up/lift-up or set on free rollers, when the wheels lock or spin after starting the engine, ABS warning light, VDC warning light and TCS OFF indicator light may illuminate because VDCCM&H/U detects the abnormal conditions from ABS wheel speed sensors. In this case, this is not a malfunction. Perform the clear memory mode.

B: VDC WARNING LIGHT, TCS OFF INDICATOR LIGHT AND VDC INDICATOR LIGHT DO NOT COME ON

DETECTING CONDITION:
• Defective combination meter
• Defective CAN communication

TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), VDC indicator light, VDC warning light and TCS OFF indicator light do not come on.

NOTE:
When pressing the TCS OFF switch for more than 10 seconds, the TCS OFF indicator light goes off and cannot operate any more. When turning the ignition switch from OFF to ON, the OFF operation enabled status is restored.

	Step	Check	Yes	No
1	**CHECK OTHER INDICATOR LIGHT.** 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.
2	**CHECK VDCCM.** When the engine does not start, display the current data of VDCCM using Subaru Select Monitor.	Is “VDC warning light” output set to “ON”?	Go to step **3**.	Replace the VDCCM&H/U.
3	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **4**.
4	**CHECK COMBINATION METER.** Check the combination meter.	Is combination meter OK?	Replace the VDCCM&H/U.	Repair the combination meter assembly.

C: ABS WARNING LIGHT DOES NOT COME ON

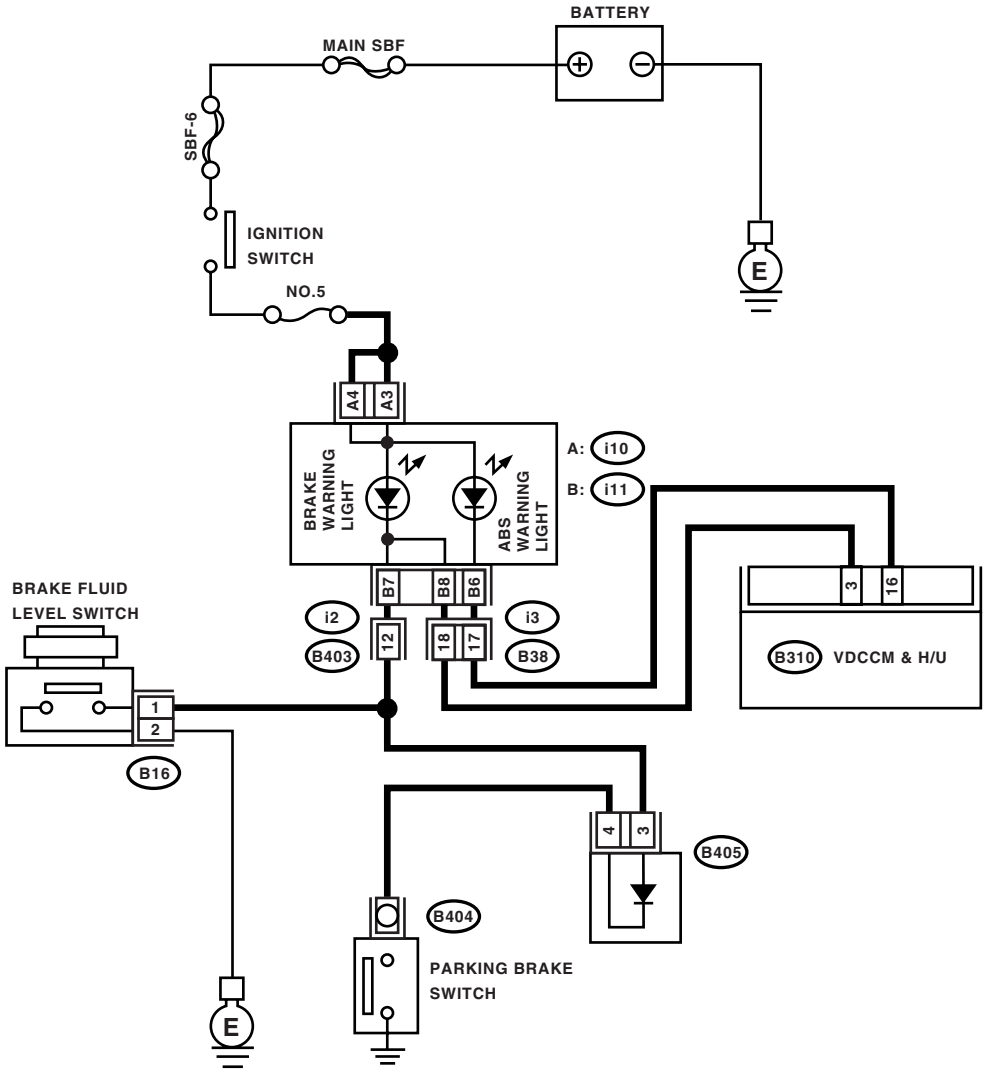
DETECTING CONDITION:

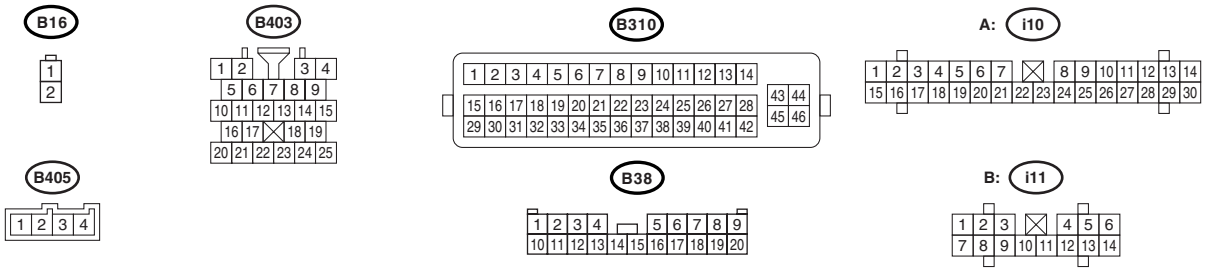
- Defective combination meter
- Defective harness

TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), ABS warning light does not come on.

WIRING DIAGRAM:





VDC00369

Warning Light Illumination Pattern

	Step	Check	Yes	No
1	**CHECK OTHER LIGHTS TURN ON.** Turn the ignition switch to ON.(Engine OFF)	Do other warning lights illuminate?	Go to step **2**.	Check the combination meter.
2	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK GROUND SHORT CIRCUIT OF HARNESS.** 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. ***Connector & terminal*** ***(B310) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair the harness connector between VDCCM&H/U and combination meter.
4	**CHECK VDCCM.** 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). ***Connector & terminal*** ***(i11) No. B6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Check the combination meter.	Replace the VDCCM&H/U.

D: ABS WARNING LIGHT DOES NOT GO OFF

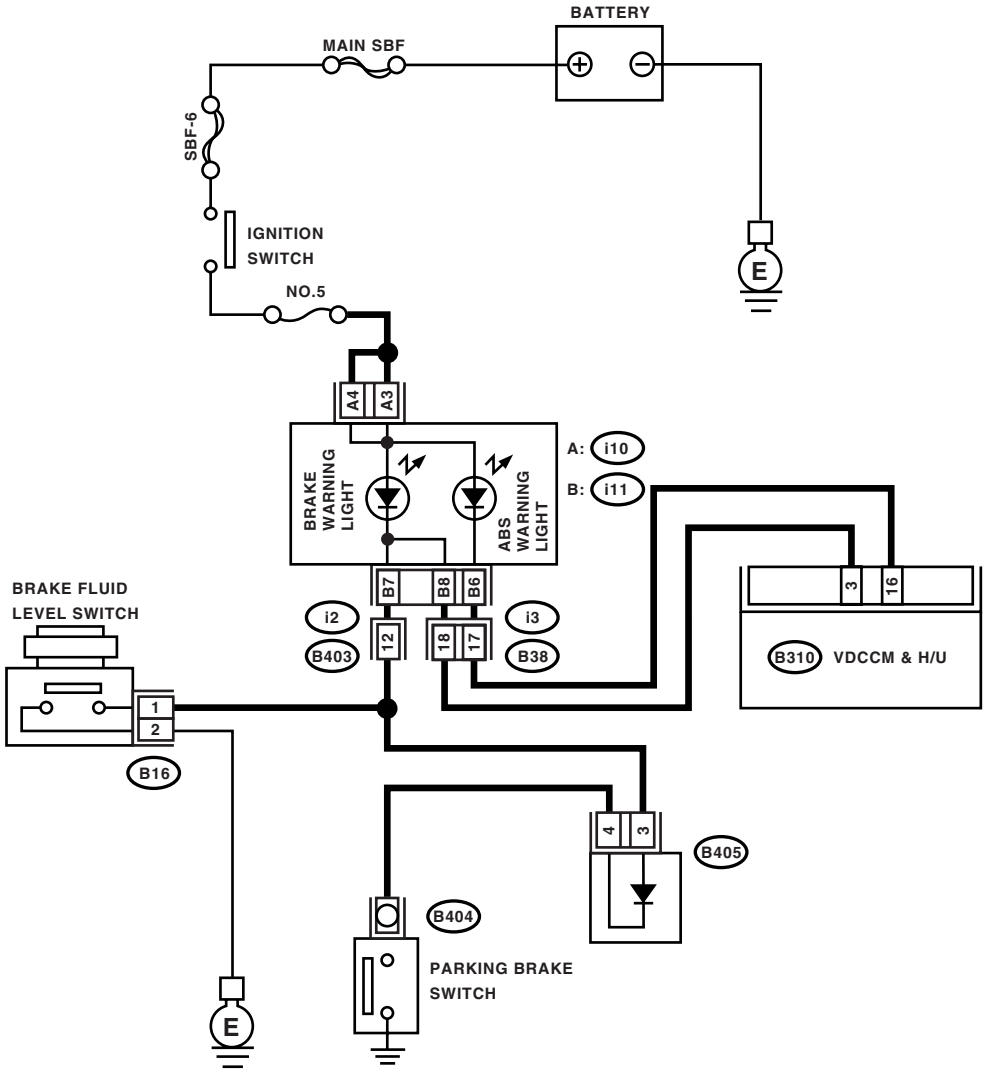
DETECTING CONDITION:

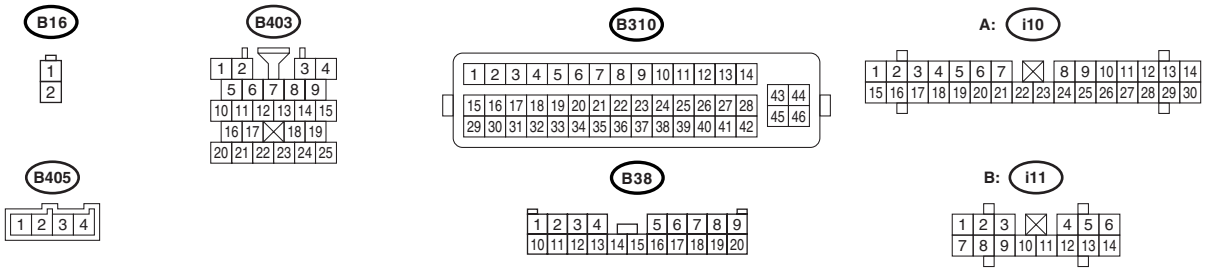
- Defective combination meter
- Open circuit in harness

TROUBLE SYMPTOM:

When starting the engine, the ABS warning light is kept ON.

WIRING DIAGRAM:





VDC00369

	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK WIRING HARNESS.** 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. ***Connector & terminal*** ***(B310) No. 16 — (i11) No. B6:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair the harness connector between VDCCM&H/U and combination meter.
3	**CHECK POOR CONTACT OF CONNECTOR.** Check poor contact in all connectors.	Is there poor contact?	Repair the connector.	Go to step **4**.
4	**CHECK VDCCM.** 1) Connect the connector (B310) to VDCCM&H/U. 2) Turn the ignition switch to ON. 3) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. B6 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Check the combination meter.	Replace the VDCCM&H/U.

E: VDC INDICATOR LIGHT DOES NOT GO OFF

DETECTING CONDITION:

- Defective combination meter
- Defective CAN communication

TROUBLE SYMPTOM:

When starting the engine, VDC indicator light is kept ON.

	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **3**.
3	**CHECK COMBINATION METER.** Check the combination meter.	Is combination meter OK?	Replace the VDCCM&H/U.	Repair the combination meter.

F: VDC WARNING LIGHT AND TCS OFF INDICATOR LIGHT DO NOT GO OFF

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 pressing the TCS OFF switch for more than 10 seconds, the TCS OFF indicator light goes off and cannot operate any more. When turning the ignition switch from OFF to ON, the OFF operation enabled status is restored.

	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK ENGINE.**	Does the malfunction indicator light illuminate?	Repair the engine.	Go to step **3**.
3	**CHECK ENGINE COOLANT TEMPERATURE.** Warm up the engine and check if VDC warning light and TCS OFF indicator light illumination condition changes.	When the engine coolant temperature is too low, VDC warning light and TCS OFF indicator light illuminate. Do the lights go off when the engine is warmed-up?	Normal	Go to step **4**.
4	**CHECK TCS OFF SWITCH.** Remove and check TCS OFF switch.	Is TCS OFF switch normal?	Go to step **5**.	Replace the TCS OFF switch.
5	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **6**.
6	**CHECK COMBINATION METER.** Check the combination meter.	Is combination meter OK?	Replace the VDCCM&H/U.	Repair the combination meter.

G: BRAKE WARNING LIGHT DOES NOT GO OFF

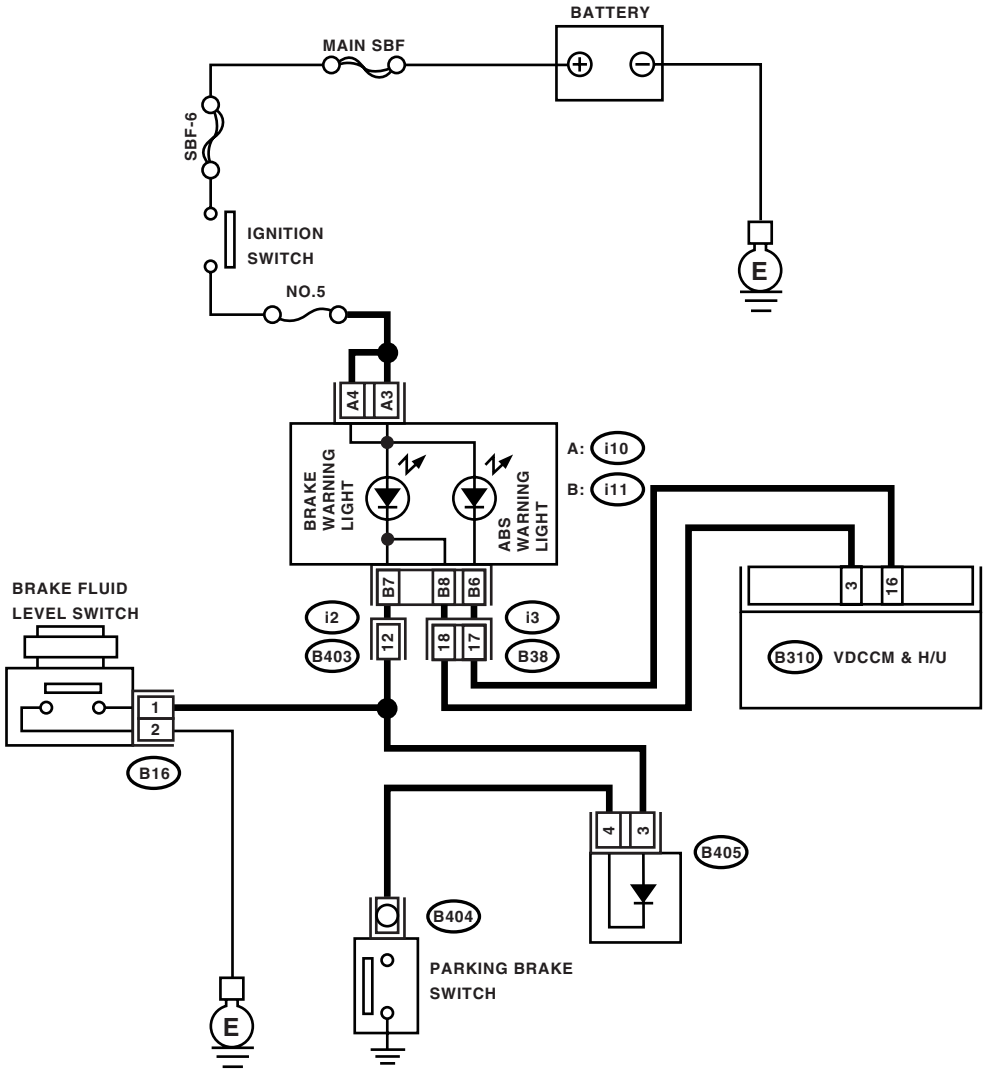
DETECTING CONDITION:

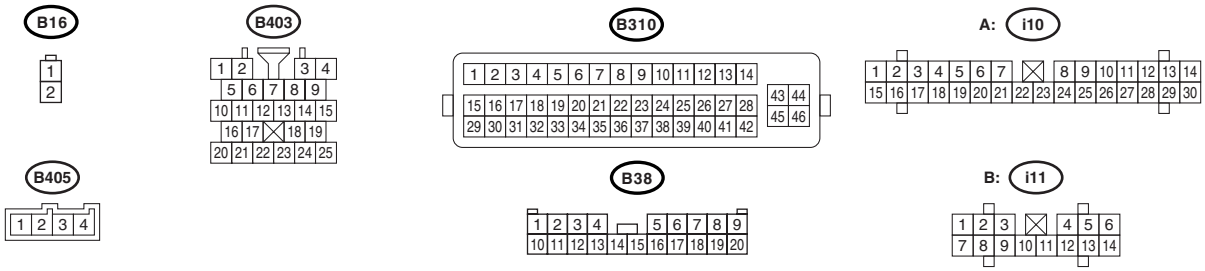
- Brake warning light circuit is shorted.
- Defective sensor/connector

TROUBLE SYMPTOM:

After starting the engine, the brake warning light is kept on though the parking lever is released.

WIRING DIAGRAM:





VDC00369

	Step	Check	Yes	No
1	**CHECK INSTALLATION OF VDCCM&H/U CONNECTOR.** 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.
2	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK BRAKE FLUID AMOUNT.** 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.
4	**CHECK BRAKE FLUID LEVEL SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the level switch connector (B16) from master cylinder. 3) Measure the resistance of master cylinder terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Replace the master cylinder.
5	**CHECK PARKING BRAKE SWITCH.** 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 more than 1 MΩ?	Go to step **6**.	Replace the parking brake switch.
6	**CHECK GROUND SHORT OF HARNESS.** 1) Disconnect the connector (i11) from combination meter. 2) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. B8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair the harness connector between combination meter brake fluid level switch and parking brake switch.
7	**CHECK HARNESS CONNECTOR.** 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. ***Connector & terminal*** ***(B310) No. 3 — (i11) No. B8:***	Is the resistance less than 0.5 Ω?	Go to step **8**.	Repair the harness connector between VDCCM&H/U and combination meter.
8	**CHECK POOR CONTACT IN CONNECTOR.** Check poor contact in all connectors.	Is there poor contact?	Repair the connector.	Go to step **9**.
9	**CHECK VDCCM.** 1) Connect the connector (B310) to VDCCM&H/U. 2) Turn the ignition to ON. 3) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. B8 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Check the combination meter.	Replace the VDCCM&H/U.

11.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Detailed code	Display	Content of diagnosis	Reference target
C0021	4211	FR wheel speed sensor open line	Open line of the front ABS wheel speed sensor RH	<Ref. to VDC(diag)-38, DTC C0021 FRONT ABS WHEEL SPEED SENSOR RH OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0022	4221	FR wheel speed sensor system	Front ABS wheel speed sensor RH signal malfunction	<Ref. to VDC(diag)-42, DTC C0022 FRONT ABS WHEEL SPEED SENSOR RH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4222	FR wheel sensor noise	Front ABS wheel speed sensor RH signal noise	<Ref. to VDC(diag)-42, DTC C0022 FRONT ABS WHEEL SPEED SENSOR RH SIGNAL NOISE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0023	4231	FL wheel speed sensor open line	Open line of the front ABS wheel speed sensor LH	<Ref. to VDC(diag)-38, DTC C0023 FRONT ABS WHEEL SPEED SENSOR LH OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0024	4241	FL wheel speed sensor signal system	Front ABS wheel speed sensor LH signal malfunction	<Ref. to VDC(diag)-42, DTC C0024 FRONT ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4242	FL wheel sensor noise	Front ABS wheel speed sensor LH signal noise	<Ref. to VDC(diag)-42, DTC C0024 FRONT ABS WHEEL SPEED SENSOR LH SIGNAL NOISE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0025	4251	RR wheel sensor open line	Rear ABS wheel speed sensor RH open line	<Ref. to VDC(diag)-38, DTC C0025 REAR ABS WHEEL SPEED SENSOR RH OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0026	4261	RR wheel speed sensor signal system	Rear ABS wheel speed sensor RH signal malfunction	<Ref. to VDC(diag)-42, DTC C0026 REAR ABS WHEEL SPEED SENSOR RH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4262	RR wheel sensor noise	Rear ABS wheel speed sensor RH signal noise	<Ref. to VDC(diag)-42, DTC C0026 REAR ABS WHEEL SPEED SENSOR RH SIGNAL NOISE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0027	4271	RL wheel speed sensor open line	Rear ABS wheel speed sensor LH open line	<Ref. to VDC(diag)-39, DTC C0027 REAR ABS WHEEL SPEED SENSOR LH OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0028	4281	RL wheel speed sensor signal system	Rear ABS wheel speed sensor LH signal malfunction	<Ref. to VDC(diag)-43, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4282	RL wheel sensor noise	Rear ABS wheel speed sensor LH signal noise	<Ref. to VDC(diag)-42, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL 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)-45, DTC C0031 FRONT INLET SOLENOID VALVE RH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Detailed code	Display	Content of diagnosis	Reference target
C0032	4321	FR pressure reducing valve malfunction	Front outlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-45, 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)-46, DTC C0033 FRONT INLET SOLENOID VALVE LH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0034	4341	FL pressure reducing valve malfunction	Front outlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-46, 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)-46, 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)-46, 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)-46, 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)-46, DTC C0038 REAR OUTLET SOLENOID VALVE LH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0061	4611	VDC switching valve (P) system	Primary linear valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-46, DTC C0061 PRIMARY LINEAR VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0062	4621	VDC switching valve (S) system	Secondary linear valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-46, DTC C0062 SECONDARY LINEAR VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0063	4631	VDC switching valve	Linear valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-47, DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0042	4421	Power supply voltage failure	Power voltage malfunction	<Ref. to VDC(diag)-49, DTC C0042 POWER VOLTAGE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0047	C471	CAN communication system	Improper CAN communication	<Ref. to VDC(diag)-52, DTC C0047 IMPROPER CAN COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0051	4511	Valve relay system open line	Valve relay open line	<Ref. to VDC(diag)-53, DTC C0051 VALVE RELAY SYSTEM OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4512	Valve relay system short	Valve relay system short	<Ref. to VDC(diag)-55, DTC C0051 VALVE RELAY SYSTEM SHORT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Detailed code	Display	Content of diagnosis	Reference target
C0052	4521	Motor relay system open line	Motor / motor relay system open line	<Ref. to VDC(diag)-56, DTC C0052 MOTOR / MOTOR RELAY SYSTEM OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4522	Motor relay system short	Motor / motor relay system short	<Ref. to VDC(diag)-60, DTC C0052 MOTOR/ MOTOR RELAY SYSTEM SHORT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4523	Motor system not running	Motor system not running	<Ref. to VDC(diag)-64, DTC C0052 MOTOR SYSTEM NO ROTATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4524	Motor system	Motor system malfunction	<Ref. to VDC(diag)-57, DTC C0052 MOTOR SYSTEM MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4525	Motor fail safe system short	Motor fail safe system short	<Ref. to VDC(diag)-60, DTC C0052 MOTOR FAIL SAFE RELAY SHORT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0054	4541	Brake light switch open line	Brake light switch open line	<Ref. to VDC(diag)-66, DTC C0054 BRAKE LIGHT SWITCH OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0056	4561	G Sensor Output Seizure	G sensor output seizure	<Ref. to VDC(diag)-68, DTC C0056 G SENSOR OUTPUT SEIZURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4562	G sensor signal	G sensor signal malfunction	<Ref. to VDC(diag)-68, DTC C0056 G SENSOR SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4563	Yaw G sensor power voltage	Faulty yaw rate & lateral G sensor power supply voltage	<Ref. to VDC(diag)-69, DTC C0056 YAW RATE & G SENSOR POWER SUPPLY VOLTAGE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4564	G sensor output	Defective G sensor output	<Ref. to VDC(diag)-70, DTC C0056 G SENSOR OUTPUT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	C565	G sensor communication	Defective G sensor communication	<Ref. to VDC(diag)-79, DTC C0056 DEFECTIVE G SENSOR COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4566	G sensor inside	Defect inside G sensor	<Ref. to VDC(diag)-79, DTC C0056 DEFECT INSIDE G SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0057	C571	ECM communication circuit	ECM communication circuit	<Ref. to VDC(diag)-71, DTC C0057 ECM COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	C573	TCM communication circuit	TCM communication circuit	<Ref. to VDC(diag)-71, DTC C0057 AT COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4574	Transmission system	Transmission system malfunction	<Ref. to VDC(diag)-72, DTC C0057 TRANSMISSION SYSTEM MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Detailed code	Display	Content of diagnosis	Reference target
C0071	4711	Steering angle sensor counter	Defective steering angle sensor	<Ref. to VDC(diag)-73, DTC C0071 STEERING ANGLE SENSOR COMMUNICATION MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	C712	No signal from steering angle sensor	Defective steering angle sensor communication	<Ref. to VDC(diag)-75, DTC C0071 DEFECTIVE STEERING ANGLE SENSOR COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4713	Steering angle sensor signal seizure	Steering angle sensor signal seizure	<Ref. to VDC(diag)-77, DTC C0071 STEERING ANGLE SENSOR SIGNAL SEIZURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4714	Steering angle sensor calibration incomplete	Steering angle sensor calibration incomplete	<Ref. to VDC(diag)-77, DTC C0071 STEERING ANGLE SENSOR CALIBRATION INCOMPLETE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0072	4721	Yaw rate sensor signal	Defective yaw rate sensor signal	<Ref. to VDC(diag)-78, DTC C0072 YAW RATE SENSOR SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4722	Inside yaw rate sensor	Defect inside yaw rate sensor	<Ref. to VDC(diag)-79, DTC C0072 DEFECT INSIDE YAW RATE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	C723	Yaw rate sensor communication	Defective yaw rate sensor communication	<Ref. to VDC(diag)-80, 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)-77, DTC C0072 YAW RATE SENSOR OSCILLATION MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0074	4741	Pressure sensor open line	Pressure sensor open line	<Ref. to VDC(diag)-82, DTC C0074 PRESSURE SENSOR OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4742	Pressure sensor signal seizure	Pressure sensor signal seizure	<Ref. to VDC(diag)-81, DTC C0074 PRESSURE SENSOR SIGNAL SEIZURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4743	Pressure sensor 0 point	Pressure sensor 0 point	<Ref. to VDC(diag)-84, DTC C0074 PRESSURE SENSOR 0 POINT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	4744	Pressure sensor noise	Pressure Sensor Noise	<Ref. to VDC(diag)-85, 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)-81, DTC C0074 PRESSURE SENSOR OUTPUT RISE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

12.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC C0021 FRONT ABS WHEEL SPEED SENSOR RH OPEN LINE

NOTE:
For the diagnostic procedure, refer to DTC C0027 REAR ABS WHEEL SPEED SENSOR LH OPEN LINE. <Ref. to VDC(diag)-39, DTC C0027 REAR ABS WHEEL SPEED SENSOR LH OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

B: DTC C0023 FRONT ABS WHEEL SPEED SENSOR LH OPEN LINE

NOTE:
For the diagnostic procedure, refer to DTC C0027 REAR ABS WHEEL SPEED SENSOR LH OPEN LINE. <Ref. to VDC(diag)-39, DTC C0027 REAR ABS WHEEL SPEED SENSOR LH OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: DTC C0025 REAR ABS WHEEL SPEED SENSOR RH OPEN LINE

NOTE:
For the diagnostic procedure, refer to DTC C0027 REAR ABS WHEEL SPEED SENSOR LH OPEN LINE. <Ref. to VDC(diag)-39, DTC C0027 REAR ABS WHEEL SPEED SENSOR LH OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

D: DTC C0027 REAR ABS WHEEL SPEED SENSOR LH OPEN LINE

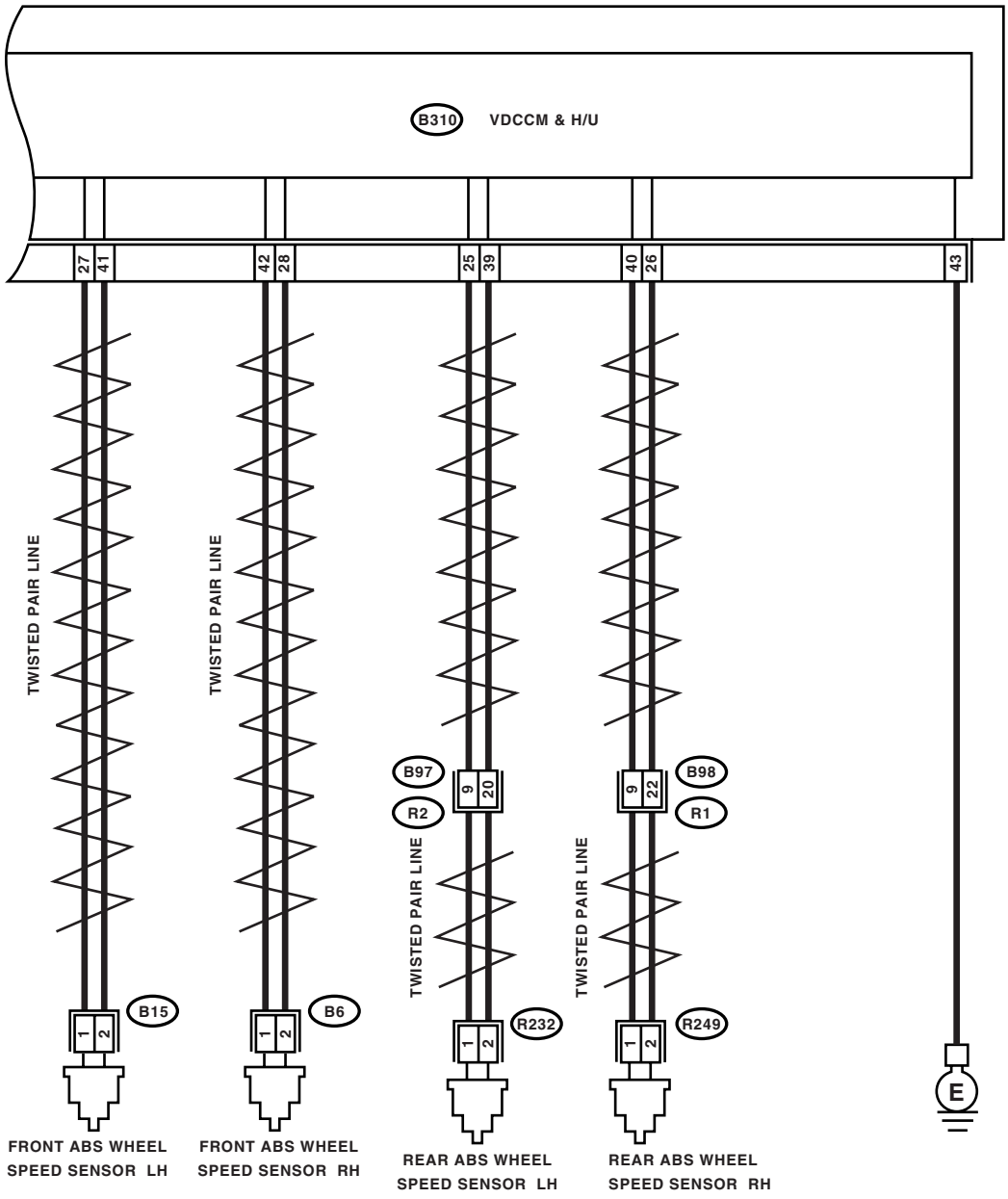
DTC DETECTING CONDITION:

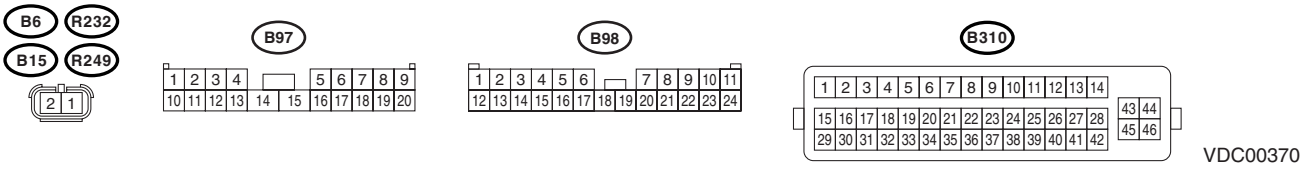
- Faulty ABS wheel speed sensor (harness open line)
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00370

	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF CONNECTOR.** 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**.
2	**CHECK HARNESS CONNECTOR BETWEEN VDCCM&H/U AND ABS WHEEL SPEED SENSOR.** 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. ***Connector & terminal*** ***DTC C0021*** ***(B310) No. 42 — (B6) No. 1:*** ***(B310) No. 28 — (B6) No. 2:*** ***DTC C0023*** ***(B310) No. 27 — (B15) No. 1:*** ***(B310) No. 41 — (B15) No. 2:*** ***DTC C0025*** ***(B310) No. 40 — (R249) No. 1:*** ***(B310) No. 26 — (R249) No. 2:*** ***DTC C0027*** ***(B310) No. 25 — (R232) No. 1:*** ***(B310) No. 39 — (R232) No. 2:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair the harness connector between VDCCM&H/U and ABS wheel speed sensor.
3	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC C0021*** ***(B310) No. 28 — Chassis ground:*** ***DTC C0023*** ***(B310) No. 41 — Chassis ground:*** ***DTC C0025*** ***(B310) No. 26 — Chassis ground:*** ***DTC C0027*** ***(B310) No. 39 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair the harness connector between VDCCM&H/U and ABS wheel speed sensor.
4	**CHECK ABS WHEEL SPEED SENSOR POWER SUPPLY CIRCUIT.** 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. ***Connector & terminal*** ***DTC C0021*** ***(B6) No. 1 (+) — Chassis ground (–):*** ***DTC C0023*** ***(B15) No. 1 (+) — Chassis ground (–):*** ***DTC C0025*** ***(R249) No. 1 (+) — Chassis ground (–):*** ***DTC C0027*** ***(R232) No. 1 (+) — Chassis ground (–):***	Is the voltage 8.5 — 13.5 V?	Go to step **6**.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK THE VDCCM&H/U POWER SUPPLY CIRCUIT.** 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. ***Connector & terminal*** ***(B310) No. 1 (+) — (B310) No. 43 (–):***	Is the voltage 10 — 15 V?	Go to step **7**.	Check the generator, battery and VDCCM&H/U power supply circuit.
6	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 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.
7	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **8**.
8	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.

E: DTC C0022 FRONT ABS WHEEL SPEED SENSOR RH SIGNAL NOISE

NOTE:
For the diagnostic procedure, refer to DTC C0028 “REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-43, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

F: DTC C0024 FRONT ABS WHEEL SPEED SENSOR LH SIGNAL NOISE

NOTE:
For the diagnostic procedure, refer to DTC C0028 “REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-43, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

G: DTC C0026 REAR ABS WHEEL SPEED SENSOR RH SIGNAL NOISE

NOTE:
For the diagnostic procedure, refer to DTC C0028 “REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-43, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

H: DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL NOISE

NOTE:
For the diagnostic procedure, refer to DTC C0028 “REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-43, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

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)-43, 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)-43, 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)-43, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION

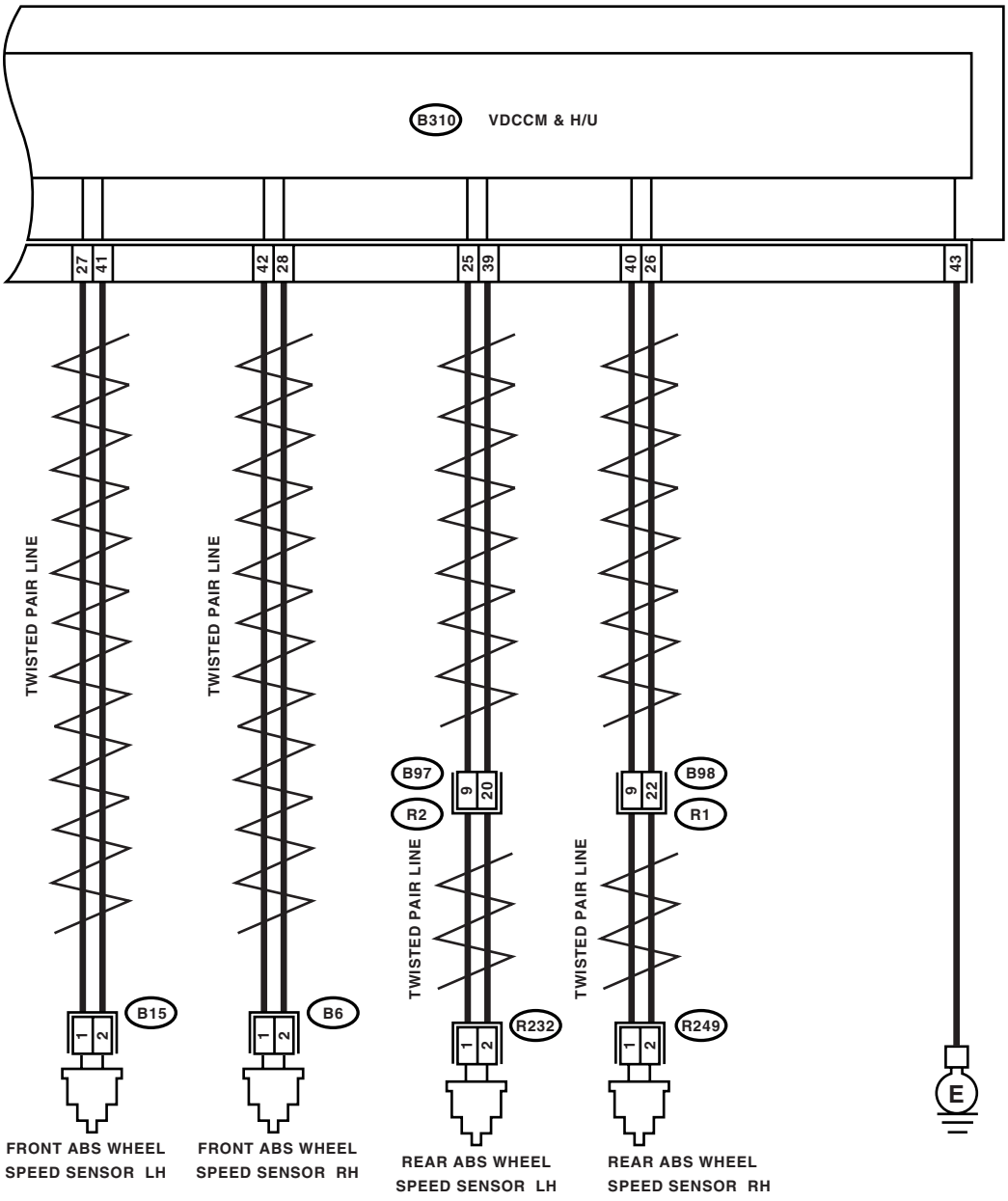
DTC DETECTING CONDITION:

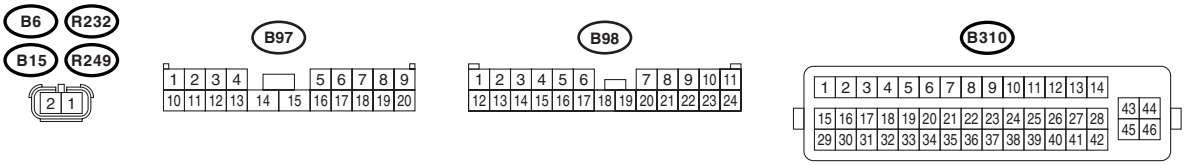
- Defective ABS wheel speed sensor signal (noise, irregular signal, etc.)
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00370

	Step	Check	Yes	No
1	**CHECK THE VDCCM&H/U POWER SUPPLY CIRCUIT.** 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. ***Connector & terminal*** ***(B310) No. 1 (+) — (B310) No. 43 (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Check the generator, battery and VDCCM&H/U power supply circuit.
2	**CHECK OUTPUT OF ABS WHEEL SPEED SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the ABS wheel speed sensor output corresponding to the faulty wheel in Subaru Select Monitor data display mode.	Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?	Go to step **3**.	Go to step **8**.
3	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connectors between VDCCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **4**.
4	**CHECK CAUSE OF SIGNAL NOISE.** Make sure the radio wave devices and electric components are installed correctly.	Are the radio wave devices and electric components installed correctly?	Go to step **5**.	Install the radio wave devices and electric components properly.
5	**CHECK CAUSE OF SIGNAL NOISE.** 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**.
6	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **7**.
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.
8	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Is the ABS wheel speed sensor installation bolt tightened 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)?	Go to step **9**.	Tighten the ABS wheel speed sensor installation bolts.
9	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 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 more one rotation?	Go to step **11**.	Go to step **10**.

	Step	Check	Yes	No
10	**CHECK ABS WHEEL SPEED SENSOR OR MAGNETIC ENCODER.**	Are there foreign matter, breakage or damage at the tip of ABS wheel speed sensor or magnetic encoder?	Remove dirt throughly. 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**.
11	**CHECK CAUSE OF SIGNAL NOISE.** Make sure the radio wave devices and electric components are installed correctly.	Are the radio wave devices and electric components installed correctly?	Go to step **12**.	Install the radio wave devices and electric components properly.
12	**CHECK CAUSE OF SIGNAL NOISE.** Check if the noise sources (such as an antenna) are installed near the sensor harness.	Is the noise sources installed?	Go to step **13**.	Install the noise sources apart from sensor harness.
13	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **14**.
14	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference. NOTE: Though the ABS warning light remains on at this time, it is normal. Drive the vehicle at more than 12 km/h (7 MPH) in order to turn ABS warning light off. Be sure to drive the vehicle and check the warning light goes off.

M: DTC C0031 FRONT INLET SOLENOID VALVE RH MALFUNCTION IN VDCCM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0063 “LINEAR VALVE MALFUNCTION IN VDCCM&H/U”. <Ref. to VDC(diag)-47, DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

N: DTC C0032 FRONT OUTLET SOLENOID VALVE RH MALFUNCTION IN VDCCM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0063 “LINEAR VALVE MALFUNCTION IN VDCCM&H/U”. <Ref. to VDC(diag)-47, DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

O: DTC C0033 FRONT INLET SOLENOID VALVE LH MALFUNCTION IN VDC-CM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0063 ”LINEAR VALVE MALFUNCTION IN VDCCM&H/U”. <Ref. to VDC(diag)-47, DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U, 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 ”LINEAR VALVE MALFUNCTION IN VDCCM&H/U”. <Ref. to VDC(diag)-47, DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U, 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 ”LINEAR VALVE MALFUNCTION IN VDCCM&H/U”. <Ref. to VDC(diag)-47, DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U, 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 ”LINEAR VALVE MALFUNCTION IN VDCCM&H/U”. <Ref. to VDC(diag)-47, DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U, 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 ”LINEAR VALVE MALFUNCTION IN VDCCM&H/U”. <Ref. to VDC(diag)-47, DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U, 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 ”LINEAR VALVE MALFUNCTION IN VDCCM&H/U”. <Ref. to VDC(diag)-47, DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

U: DTC C0061 PRIMARY LINEAR VALVE MALFUNCTION IN VDCCM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0063 ”LINEAR VALVE MALFUNCTION IN VDCCM&H/U”. <Ref. to VDC(diag)-47, DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

V: DTC C0062 SECONDARY LINEAR VALVE MALFUNCTION IN VDCCM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0063 ”LINEAR VALVE MALFUNCTION IN VDCCM&H/U”. <Ref. to VDC(diag)-47, DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

W: DTC C0063 LINEAR VALVE MALFUNCTION IN VDCCM&H/U

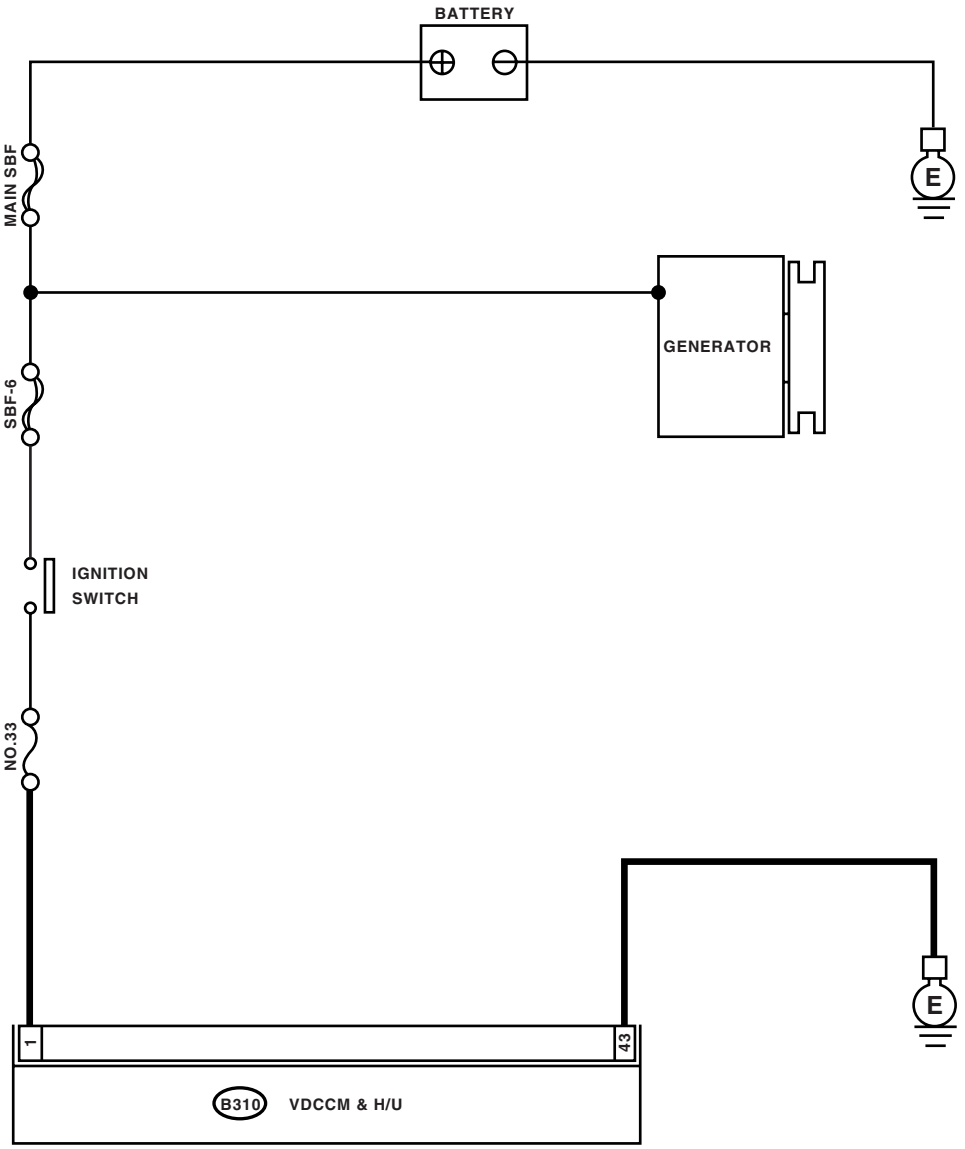
DTC DETECTING CONDITION:

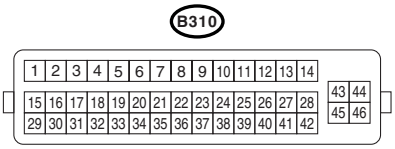
- Defective harness connector
- Defective VDCH/U solenoid valve

TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00371

	Step	Check	Yes	No
1	**CHECK THE VDCCM&H/U INPUT VOLTAGE.** 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. ***Connector & terminal*** ***(B310) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair the power supply circuit.
2	**CHECK THE VDCCM&H/U GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 43 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair the VDCCM&H/U ground harness.
3	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **4**.
4	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5**.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

X: DTC C0042 POWER VOLTAGE MALFUNCTION

DTC DETECTING CONDITION:

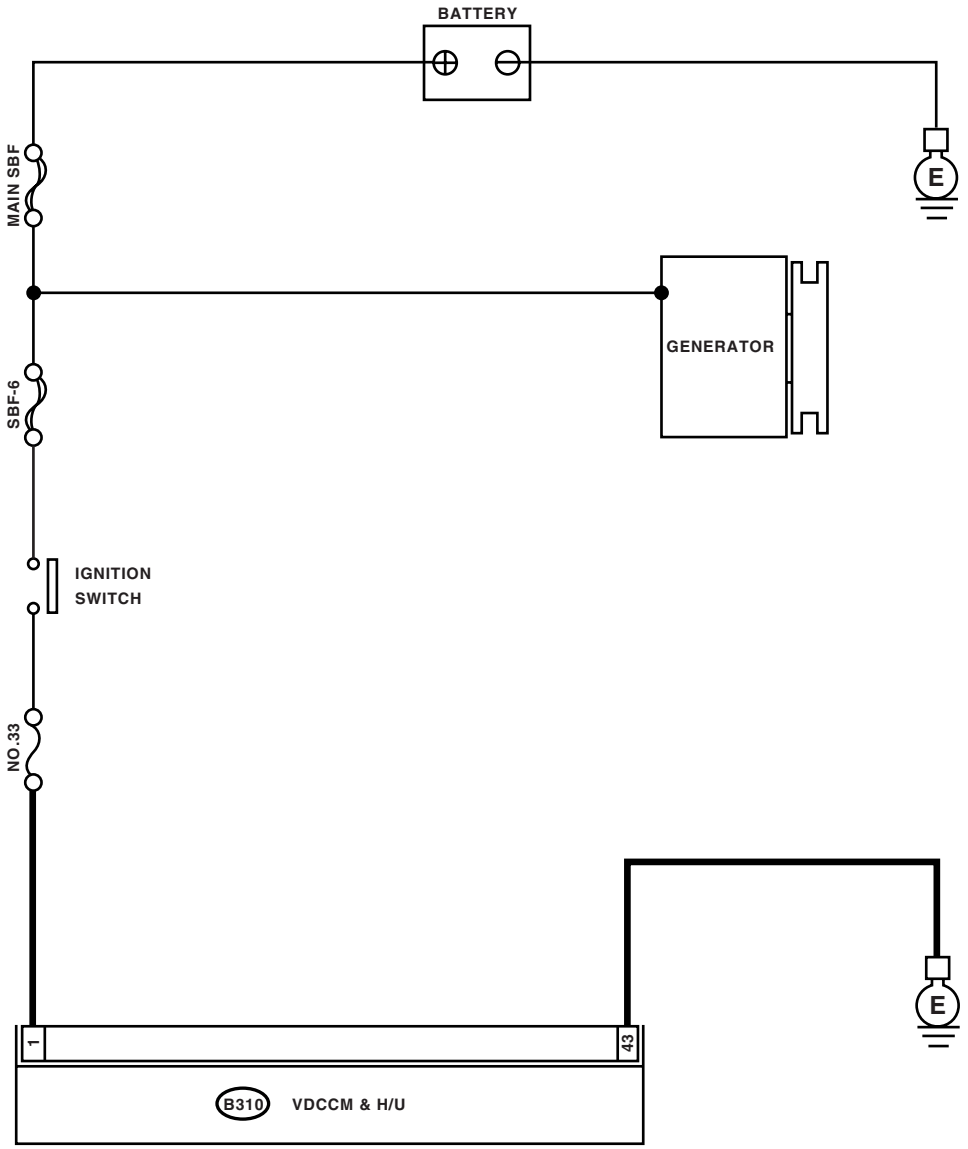
CHECK THE VDCCM&H/U power supply voltage.

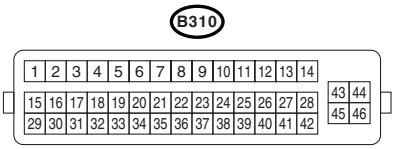
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD may not operate.
- VDC does not operate.

NOTE:
Warning lights go off if voltage returns.

WIRING DIAGRAM:





VDC00371

	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start the engine. 2) Run the engine at idle after warming up. 3) Measure the voltage between generator terminal B and chassis ground. ***Terminals*** ***Generator B terminal (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair the generator. <Ref. to SC(H6DO)-19, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Are the positive and negative battery terminals clamped tightly?	Go to step **3**.	Tighten the terminal.
3	**CHECK THE VDCCM&H/U INPUT VOLTAGE.** 1) Disconnect the connector from the VDCCM&H/U. 2) Run the engine at idle. 3) Operate the devices such as headlights, air conditioner, defogger, etc. which produce much electrical loading. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **4**.	Repair the power supply circuit.
4	**CHECK THE VDCCM&H/U GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 43 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5**.	Repair the VDCCM&H/U ground harness.
5	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **6**.
6	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **7**.
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-34, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

Y: 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
1	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **2**.
2	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in VDCCM&H/U connector?	Repair the connector.	Go to step **3**.
3	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Temporary poor contact occurs.

Z: DTC C0051 VALVE RELAY SYSTEM OPEN LINE

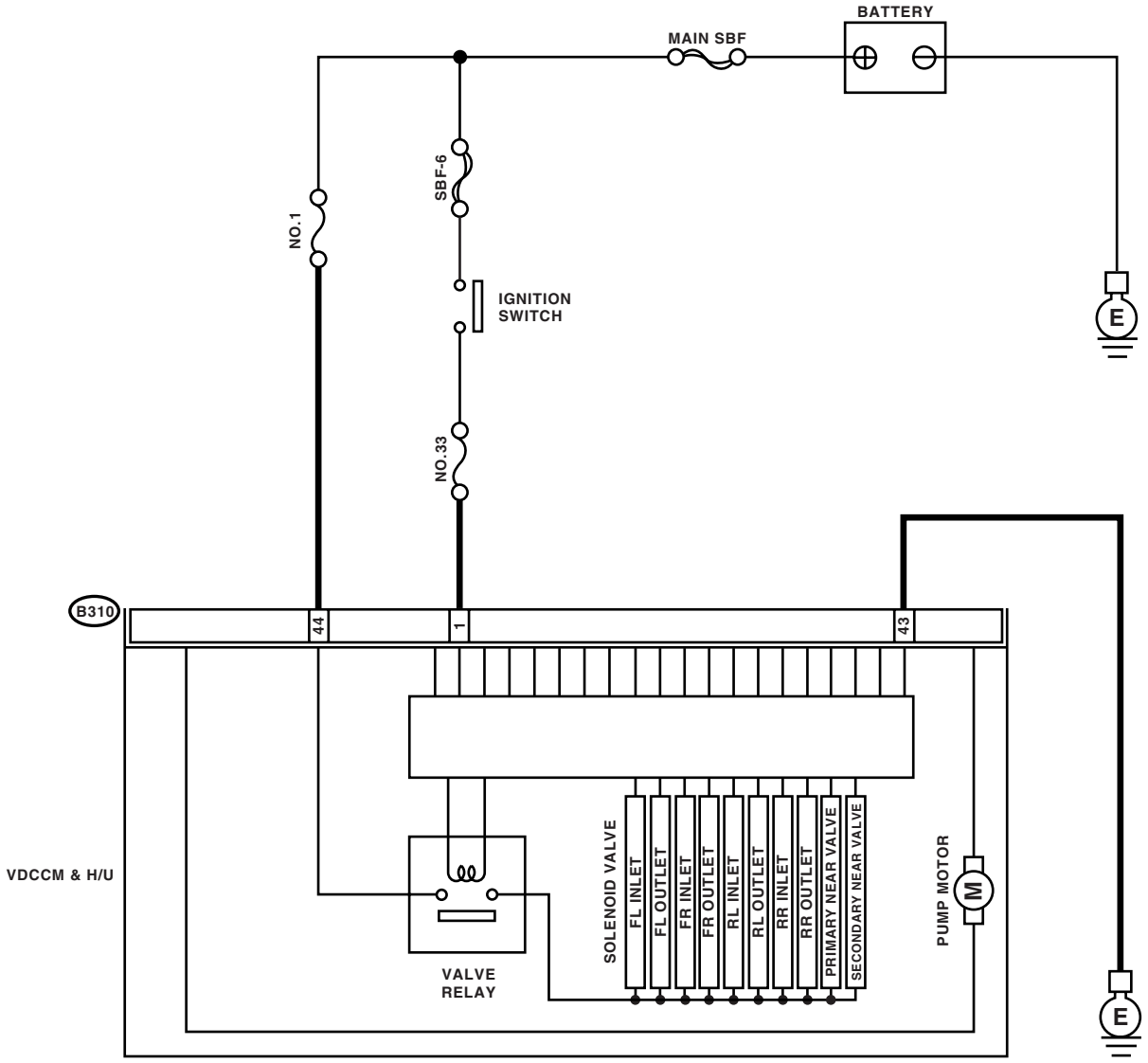
DTC DETECTING CONDITION:

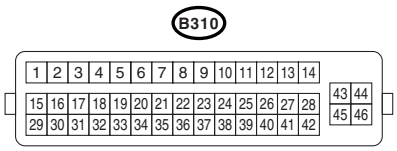
Defective valve relay

TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00372

	Step	Check	Yes	No
1	**CHECK THE VDCCM&H/U INPUT VOLTAGE.** 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. ***Connector & terminal*** ***(B310) No. 44 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair the harness connector between battery and VDCCM&H/U.
2	**CHECK THE VDCCM&H/U GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 43 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair the VDCCM&H/U ground harness.
3	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **4**.
4	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5**.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AA:DTC C0051 VALVE RELAY SYSTEM SHORT

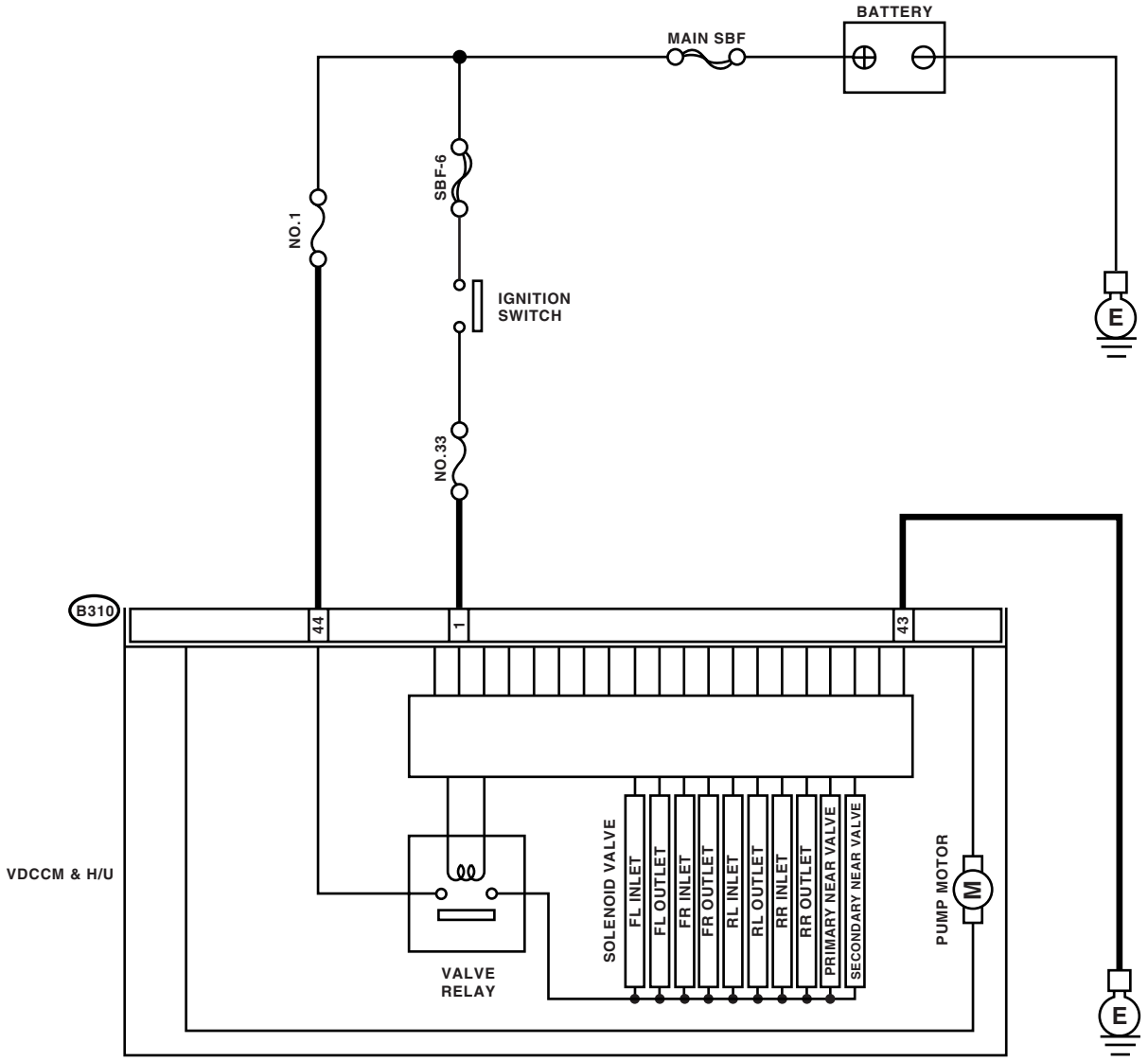
DTC DETECTING CONDITION:

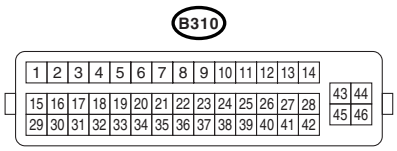
Defective valve relay

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD may not operate.

WIRING DIAGRAM:





VDC00372

	Step	Check	Yes	No
1	**CHECK THE VDCCM&H/U VALVE RELAY.** 1) Disconnect the connector from the VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U connector terminals. ***Terminals*** ***No. 44 — No. 43:***	Is the resistance more than 1 MΩ?	Go to step **2**.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
2	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **3**.
3	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **4**.
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-34, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AB:DTC C0052 MOTOR / MOTOR RELAY SYSTEM OPEN LINE

NOTE:
For the diagnostic procedure, refer to DTC C0052 “MOTOR SYSTEM MALFUNCTION.” <Ref. to VDC(diag)-57, DTC C0052 MOTOR SYSTEM MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AC:DTC C0052 MOTOR SYSTEM MALFUNCTION

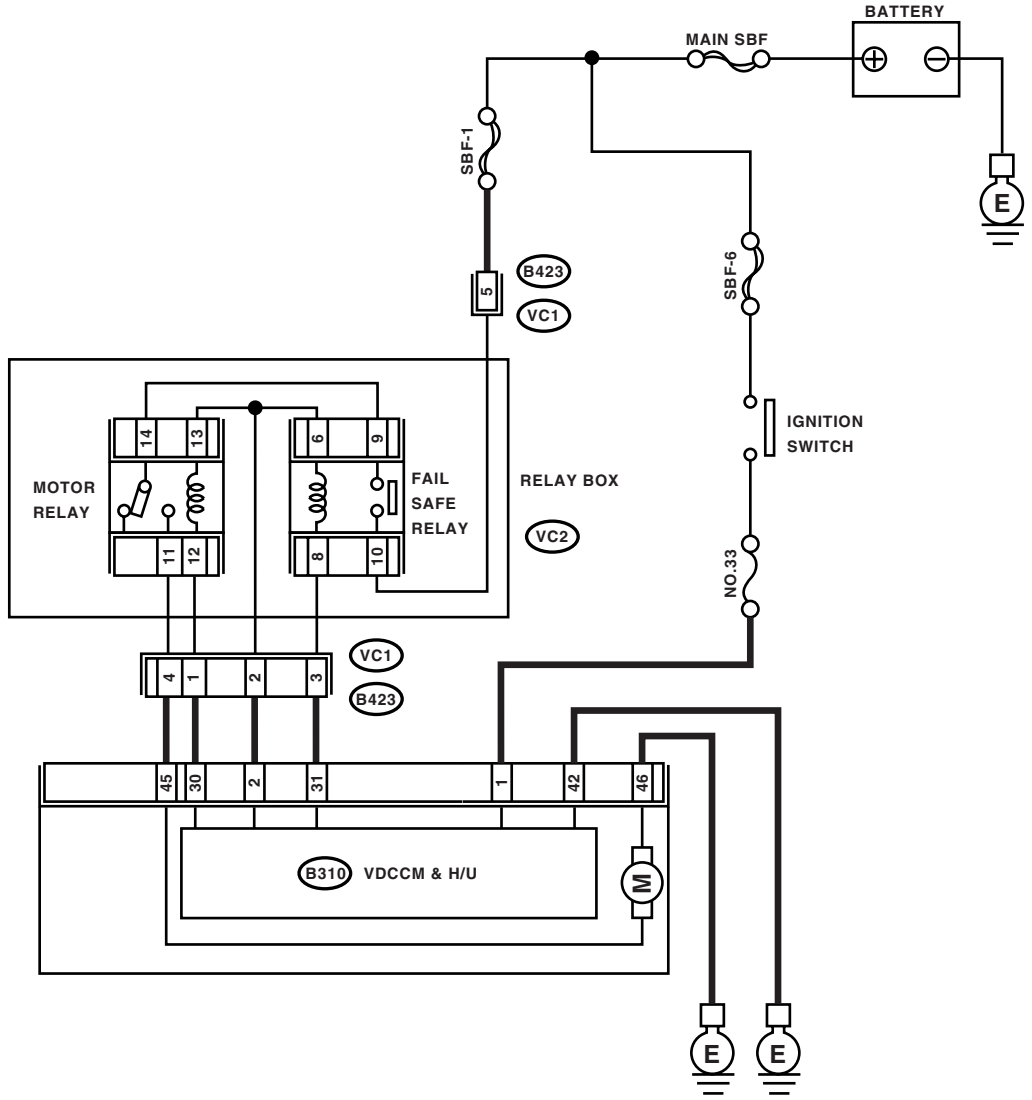
DTC DETECTING CONDITION:

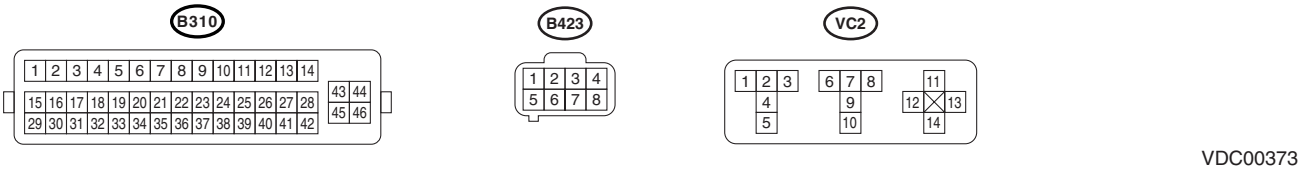
- Defective motor and motor relay
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD may not operate.

WIRING DIAGRAM:





VDC00373

	Step	Check	Yes	No
1	**CHECK MOTOR RELAY RESISTANCE.** 1) Turn the ignition switch to OFF. 2) Remove the motor relay from the relay box. 3) Measure the resistance between motor relay terminals. ***Terminals*** ***No. 12 — No. 13:***	Is the resistance between 70 — 90 Ω?	Go to step **2**.	Replace the motor relay.
2	**CHECK MOTOR RELAY CONTACT POINT.** 1) Connect the battery to motor relay terminals No. 12 and No. 13. 2) Measure the resistance between motor relay terminals. ***Terminals*** ***No. 11 — No. 14:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Replace the motor relay.
3	**CHECK MOTOR RELAY SHORT.** Measure the resistance between motor relay terminals. ***Terminals*** ***No. 12 — No. 11:*** ***No. 12 — No. 14:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace the motor relay.
4	**CHECK FAIL SAFE RELAY RESISTANCE.** 1) Turn the ignition switch to OFF. 2) Remove the fail safe relay from the relay box. 3) Measure the resistance between fail safe relay terminals. ***Terminals*** ***No. 6 — No. 8:***	Is the resistance between 90 — 110 Ω?	Go to step **5**.	Replace the fail safe relay.
5	**CHECK THE FAIL SAFE RELAY CONTACT POINT.** 1) Connect the battery to motor relay terminals No. 6 and No. 8. 2) Measure the resistance between motor relay terminals. ***Terminals*** ***No. 9 — No. 10:***	Is the resistance less than 0.5 Ω?	Go to step **6**.	Replace the fail safe relay.
6	**CHECK FAIL SAFE RELAY SHORT.** Measure the resistance between motor relay terminals. ***Terminals*** ***No. 6 — No. 9:*** ***No. 6 — No. 8:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Replace the fail safe relay.
7	**CHECK MOTOR RELAY POWER SUPPLY VOLTAGE.** 1) Disconnect the connectors (B423) and (VC1). 2) Turn the ignition switch to ON. 3) Measure the voltage between connector (B423) and chassis ground. ***Connector & terminal*** ***(B423) No. 5 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **8**.	Repair the power supply circuit.

	Step	Check	Yes	No
8	**CHECK RELAY BOX.** Measure the resistance between each terminal. ***Terminals*** ***(VC1) No. 5 — (VC2) No. 10:*** ***(VC1) No. 2 — (VC2) No. 6:*** ***(VC1) No. 2 — (VC2) No. 13:*** ***(VC1) No. 3 — (VC2) No. 8:*** ***(VC1) No. 1 — (VC2) No. 12:*** ***(VC1) No. 4 — (VC2) No. 11:*** ***(VC2) No. 9 — (VC2) No. 14:***	Is the resistance less than 0.5 Ω?	Go to step **9**.	Replace the relay box.
9	**CHECK HARNESS.** 1) Disconnect the connector from the VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U and relay box. ***Connector & terminal*** ***(B423) No. 3 — (B310) No. 31:*** ***(B423) No. 2 — (B310) No. 2:*** ***(B423) No. 1 — (B310) No. 30:*** ***(B423) No. 4 — (B310) No. 45:***	Is the resistance less than 0.5 Ω?	Go to step **10**.	Repair the harness.
10	**CHECK GROUND SHORT CIRCUIT OF HARNESS.** Measure the resistance between harness and chassis ground. ***Connector & terminal*** ***(B423) No. 3 — Chassis ground:*** ***(B423) No. 2 — Chassis ground:*** ***(B423) No. 1 — Chassis ground:*** ***(B423) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11**.	Repair the harness.
11	**CHECK GROUND CIRCUIT FOR MOTOR.** Measure the resistance between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 46 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **12**.	Repair the harness.
12	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in connector?	Repair the connector.	Go to step **13**.
13	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors and relays. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **14**.
14	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AD:DTC C0052 MOTOR/MOTOR RELAY SYSTEM SHORT

NOTE:
For the diagnostic procedure, refer to DTC C0052 “FAIL SAFE RELAY SYSTEM SHORT”. <Ref. to VDC(diag)-60, DTC C0052 MOTOR FAIL SAFE RELAY SHORT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AE:DTC C0052 MOTOR FAIL SAFE RELAY SHORT CIRCUIT

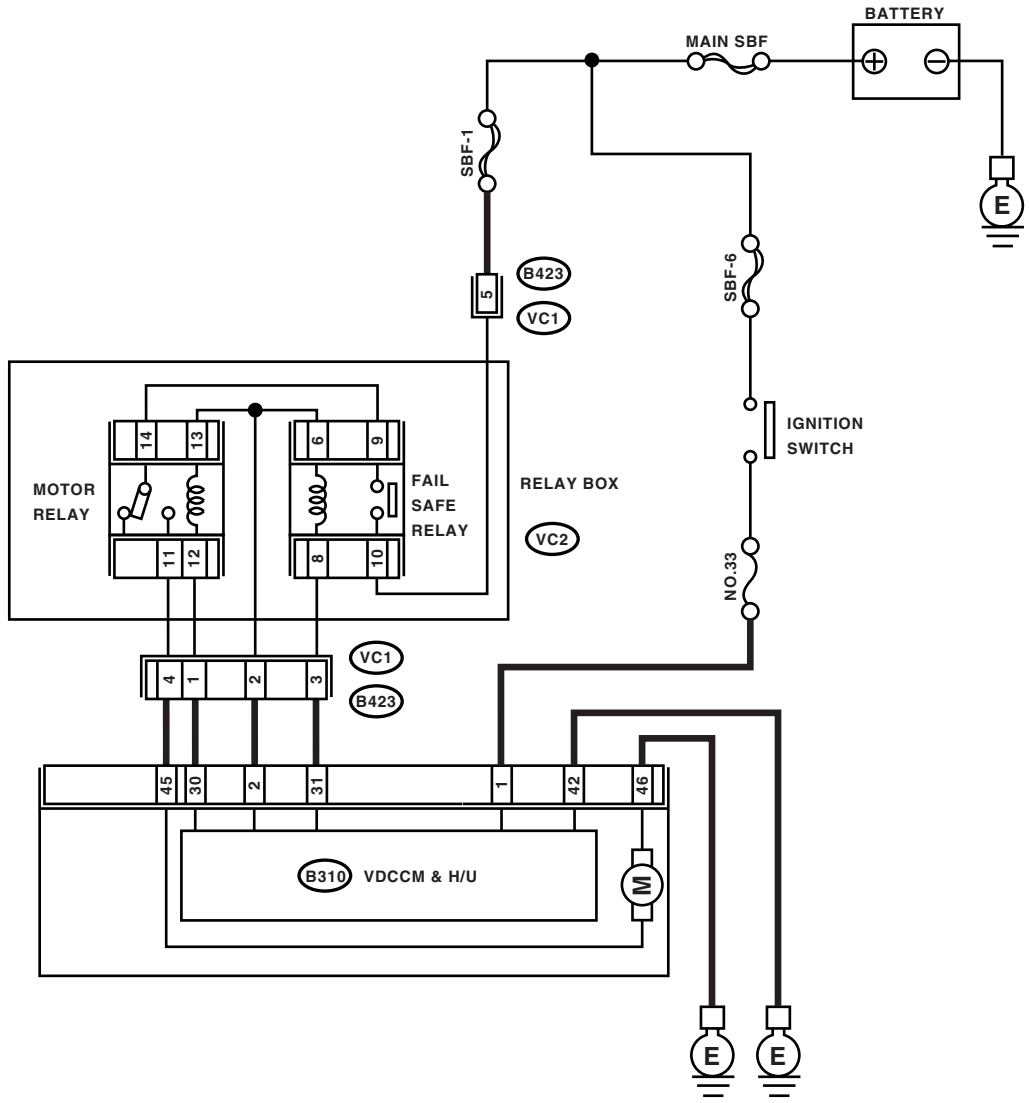
DTC DETECTING CONDITION:

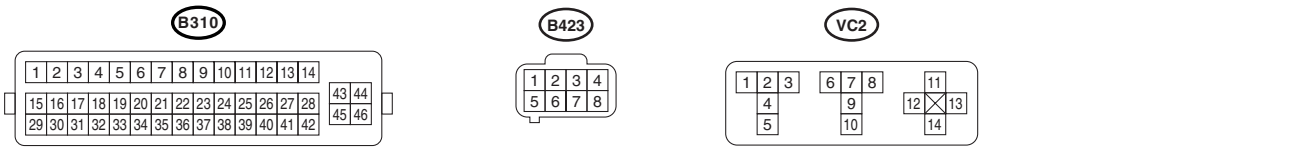
- Defective motor relay
- Fail safe relay malfunction
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD may not operate.

WIRING DIAGRAM:





VDC00373

	Step	Check	Yes	No
1	**CHECK MOTOR RELAY RESISTANCE.** 1) Turn the ignition switch to OFF. 2) Remove the motor relay from the relay box. 3) Measure the resistance between motor relay terminals. ***Terminals*** ***No. 12 — No. 13:***	Is the resistance between 70 — 90 Ω?	Go to step **2**.	Replace the motor relay.

	Step	Check	Yes	No
2	**CHECK MOTOR RELAY CONTACT POINT.** 1) Connect the battery to motor relay terminals No. 12 and No. 13. 2) Measure the resistance between motor relay terminals. ***Terminals*** ***No. 11 — No. 14:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Replace the motor relay.
3	**CHECK MOTOR RELAY SHORT.** Measure the resistance between motor relay terminals. ***Terminals*** ***No. 12 — No. 11:*** ***No. 12 — No. 14:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Replace the motor relay.
4	**CHECK FAIL SAFE RELAY RESISTANCE.** 1) Turn the ignition switch to OFF. 2) Remove the fail safe relay from the relay box. 3) Measure the resistance between fail safe relay terminals. ***Terminals*** ***No. 6 — No. 8:***	Is the resistance between 90 — 110 Ω?	Go to step **5**.	Replace the fail safe relay.
5	**CHECK THE FAIL SAFE RELAY CONTACT POINT.** 1) Connect the battery to motor relay terminals No. 6 and No. 8. 2) Measure the resistance between motor relay terminals. ***Terminals*** ***No. 9 — No. 10:***	Is the resistance less than 0.5 Ω?	Go to step **6**.	Replace the fail safe relay.
6	**CHECK FAIL SAFE RELAY SHORT.** Measure the resistance between motor relay terminals. ***Terminals*** ***No. 6 — No. 9:*** ***No. 6 — No. 8:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Replace the fail safe relay.
7	**CHECK RELAY BOX.** 1) Disconnect the connectors (B423) and (VC1). 2) Turn the ignition switch to ON. 3) Measure the voltage between connector (VC2) and chassis ground. ***Connector & terminal*** ***(VC2) No. 11 (+) — Chassis ground (–):*** ***(VC2) No. 12 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Replace the relay box.	Go to step **8**.
8	**CHECK HARNESS.** 1) Disconnect the connector from the VDCCM&H/U. 2) Measure the voltage between connector (B423) and chassis ground. ***Connector & terminal*** ***(B423) No. 4 (+) — Chassis ground (–):*** ***(B423) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Repair the harness.	Go to step **9**.
9	**CHECK THE MOTOR.** 1) Connect all the connectors and relays. 2) Turn the ignition switch to ON.	Is the motor continuing to rotate?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **10**.

	Step	Check	Yes	No
10	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors and relays. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **11**.
11	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AF:DTC C0052 MOTOR SYSTEM NO ROTATION

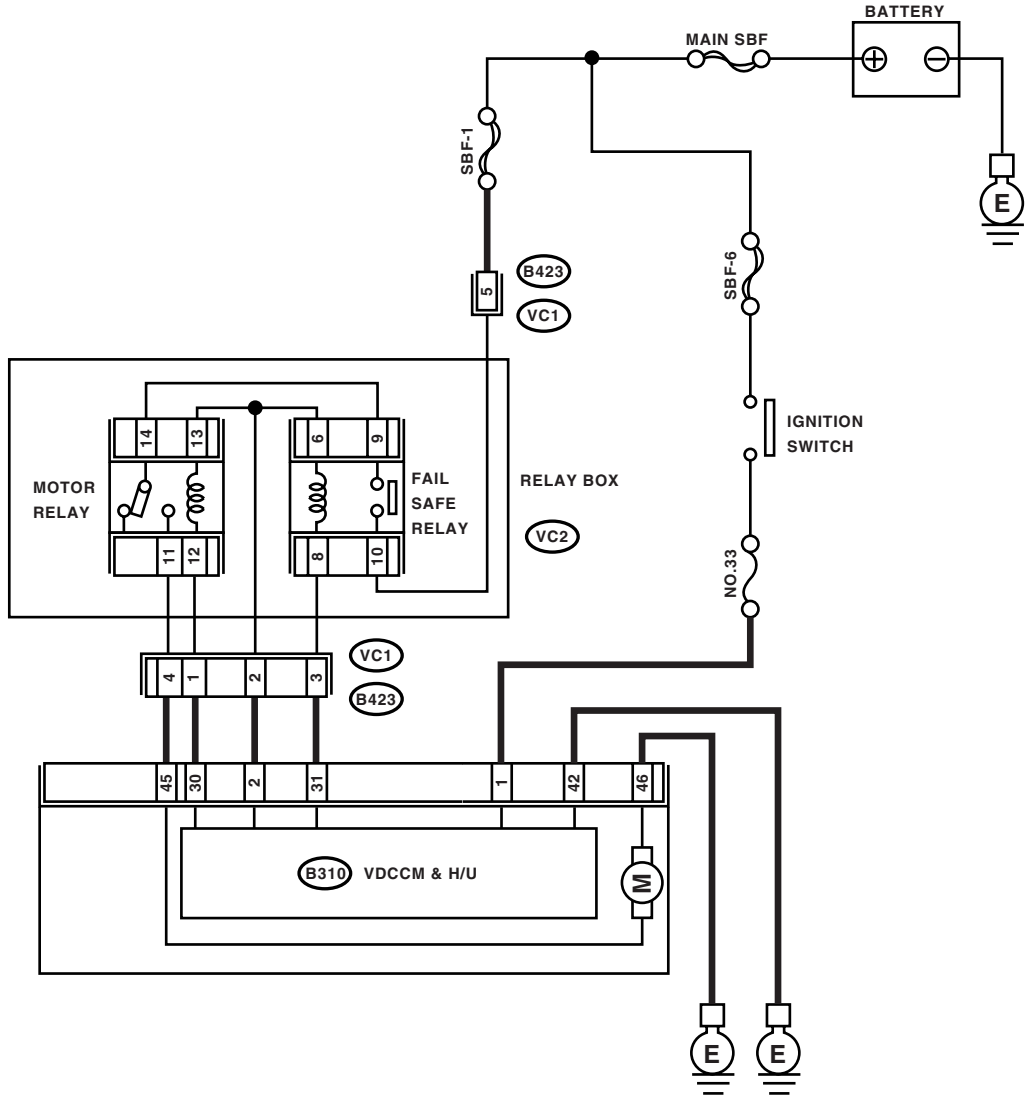
DTC DETECTING CONDITION:

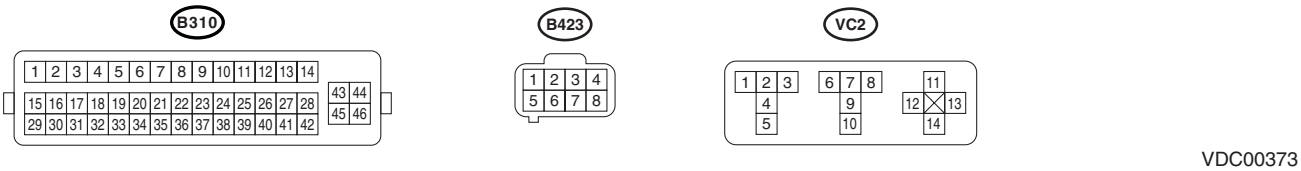
- Defective motor
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD may not operate.

WIRING DIAGRAM:





VDC00373

	Step	Check	Yes	No
1	**CHECK THE VDCCM&H/U INPUT VOLTAGE.** 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. ***Connector & terminal*** ***(B310) No. 1 (+) — Chassis ground (–):*** ***(B310) No. 45 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair the VDCCM&H/U power supply circuit.
2	**CHECK INSTALLATION OF MOTOR GROUND.**	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	**CHECK THE VDCCM&H/U GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 46 (+) — Chassis ground (–):***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair the VDCCM&H/U ground harness.
4	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors and relays. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5**.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AG:DTC C0054 BRAKE LIGHT SWITCH OPEN LINE

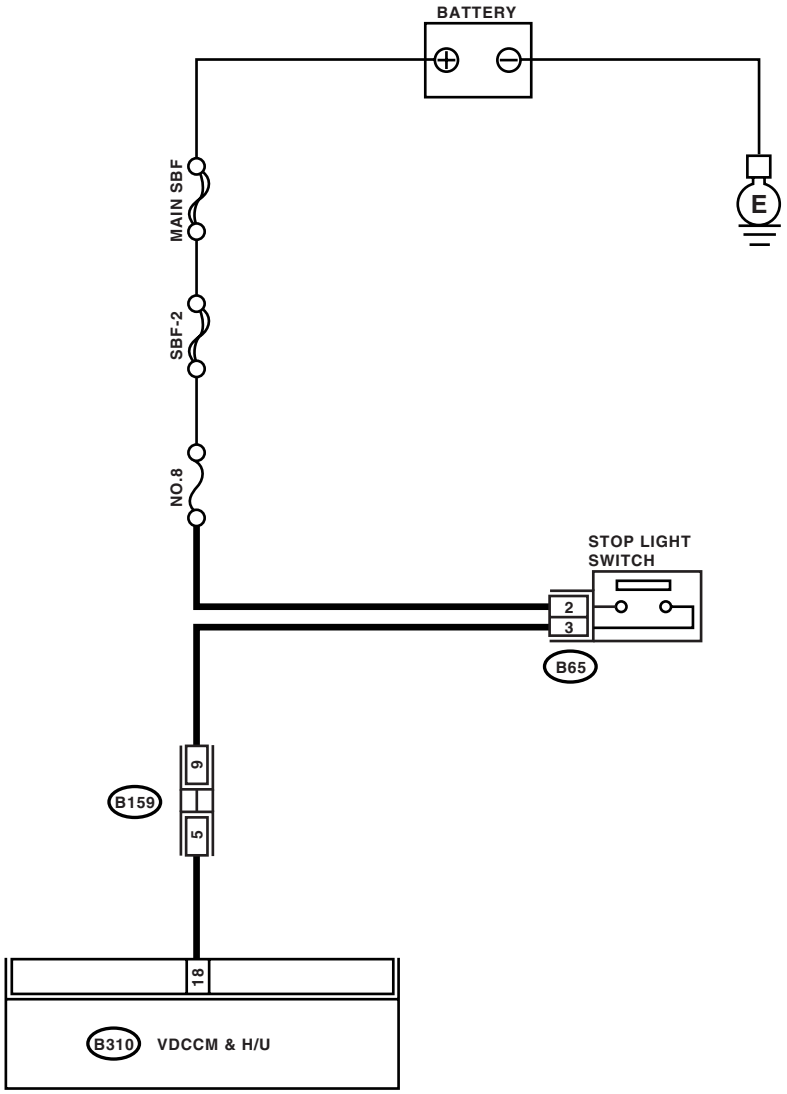
DTC DETECTING CONDITION:

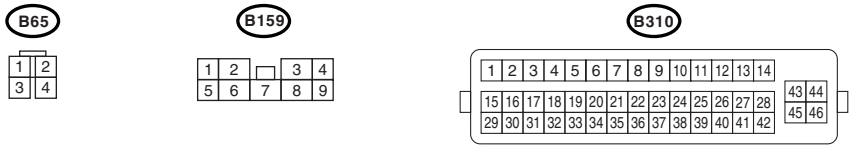
Defective stop light switch

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00374

	Step	Check	Yes	No
1	**CHECK OUTPUT OF STOP LIGHT SWITCH WITH SUBARU SELECT MONITOR.** 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	**CHECK OUTPUT OF STOP LIGHT SWITCH WITH SUBARU SELECT MONITOR.** 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	**CHECK IF STOP LIGHTS COME ON.** Depress the brake pedal.	Does the stop light illuminate?	Go to step **4**.	Repair the stop light circuit.
4	**CHECK OPEN CIRCUIT OF HARNESS.** 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. ***Connector & terminal*** ***(B310) No. 18 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **5**.	Repair the harness between stop light switch and VDCCM&H/U connector.
5	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in connector between stop light switch and VDCCU&H/U?	Go to step **6**.	Repair the connector.
6	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **7**.
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AH:DTC C0056 G SENSOR OUTPUT SEIZURE

DTC DETECTING CONDITION:
Defective G sensor
TROUBLE SYMPTOM:
VDC does not operate.

	Step	Check	Yes	No
1	**CHECK G SENSOR OUTPUT.** 1) Connect the Subaru Select Monitor to the vehicle. 2) Select {Current Data Display & Save} in 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.
2	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U.	Go to step **3**.
3	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

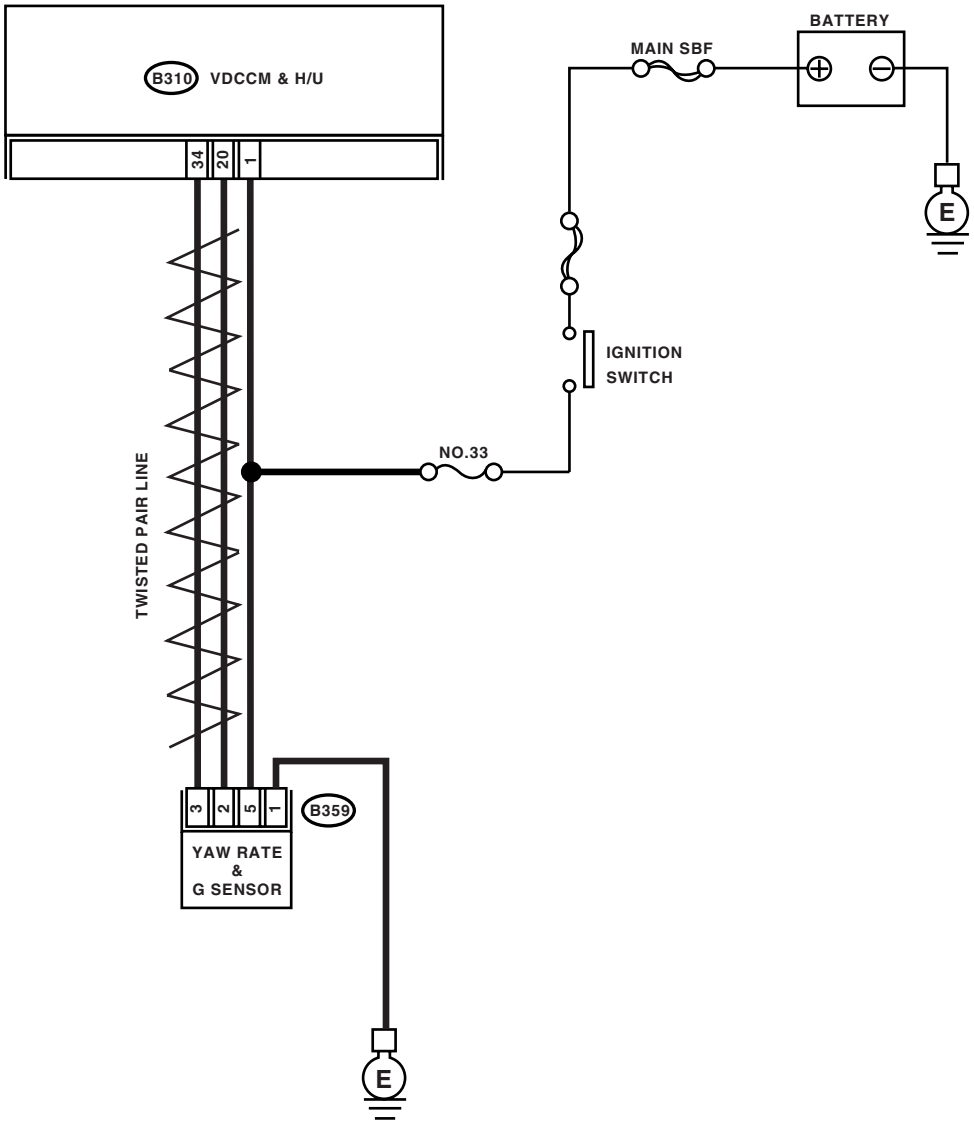
AI: DTC C0056 G SENSOR SIGNAL MALFUNCTION

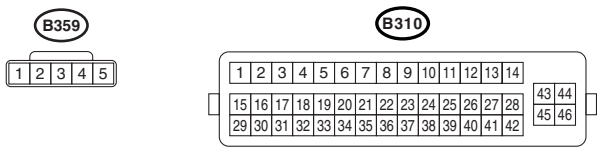
DTC DETECTING CONDITION:
Defective G sensor
TROUBLE SYMPTOM:
VDC does not operate.

	Step	Check	Yes	No
1	**CHECK YAW RATE & G SENSOR INSTALLATION.** Check the yaw rate & G sensor installation.	Are the yaw rate & G sensor and bracket tightened to a torque of 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)?	Go to step **2**.	Tighten the yaw rate & G sensor.
2	**CHECK G SENSOR OUTPUT.** 1) Connect the Subaru Select Monitor to the vehicle. 2) Select {Current Data Display & Save} in Subaru Select Monitor. 3) Read the G sensor output displayed on screen.	Is the value on the monitor display –1.5 — 1.5 m/s^2?	Go to step **3**.	Replace the yaw rate & G sensor.
3	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U.	Go to step **4**.
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AJ:DTC C0056 YAW RATE & G SENSOR POWER SUPPLY VOLTAGE MALFUNCTION

DTC DETECTING CONDITION:
Defective G sensor
TROUBLE SYMPTOM:
VDC does not operate.
WIRING DIAGRAM:





VDC00375

	Step	Check	Yes	No
1	**CHECK THE YAW RATE & G SENSOR POWER SUPPLY.** 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. ***Connector & terminal*** ***(B359) No. 5 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Replace the yaw rate & G sensor power supply circuit.
2	**CHECK GROUND CIRCUIT OF YAW RATE & G SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between the yaw rate & G sensor and chassis ground. ***Connector & terminal*** ***(B359) No. 1 (+) — Chassis ground (–):***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Replace the yaw rate & G sensor power supply circuit.
3	**CHECK YAW RATE & G SENSOR.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U.	Go to step **4**.
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AK:DTC C0056 G SENSOR OUTPUT MALFUNCTION

DTC DETECTING CONDITION:

Defective G sensor

TROUBLE SYMPTOM:

VDC does not operate.

	Step	Check	Yes	No
1	**CHECK YAW RATE & G SENSOR INSTALLATION.** Check the yaw rate & G sensor installation.	Are the yaw rate & G sensor and bracket tightened to a torque of 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)?	Go to step **2**.	Tighten the yaw rate & G sensor.
2	**CHECK G SENSOR OUTPUT.** 1) Connect the Subaru Select Monitor to the vehicle. 2) Select {Current Data Display & Save} in 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 m/s^2?	Go to step **3**.	Replace the yaw rate & G sensor.
3	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U.	Go to step **4**.
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AL:DTC C0057 ECM COMMUNICATION

DTC DETECTING CONDITION:

No CAN signal from ECM.

TROUBLE SYMPTOM:

VDC does not operate.

	Step	Check	Yes	No
1	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **2**.
2	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in ECM connector?	Repair the connector.	Go to step **3**.
3	**CHECK ECM.**	Is ECM normal?	Go to step **4**.	Replace the ECM.
4	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5**.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AM: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	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **2**.
2	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in TCM connector?	Repair the connector.	Go to step **3**.
3	**CHECK TCM.**	Is the TCM normal?	Go to step **4**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
4	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U.	Go to step **5**.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AN:DTC C0057 TRANSMISSION SYSTEM MALFUNCTION

DTC DETECTING CONDITION:

Transmission System Defect

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	**CHECK AT SYSTEM.** 1) Start the engine. 2) Check the DTC in AT system.	Is DTC of AT system displayed?	Repair the AT system.	Go to step **2**.
2	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U.	Go to step **3**.
3	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AO:DTC C0071 STEERING ANGLE SENSOR COMMUNICATION MALFUNCTION

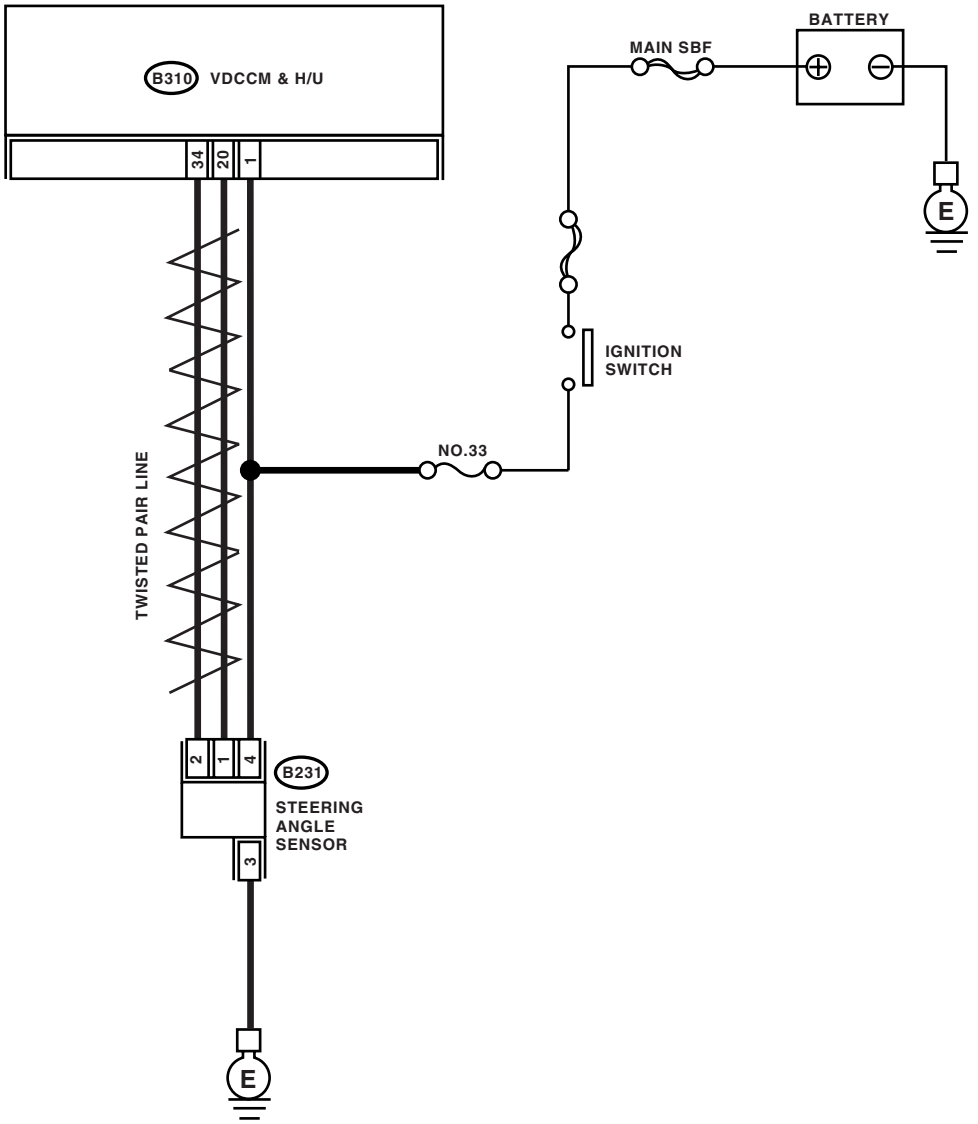
DTC DETECTING CONDITION:

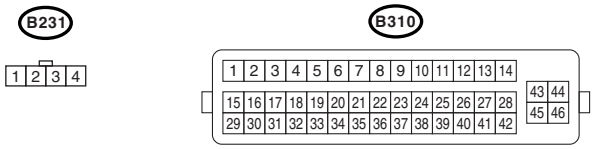
Defective steering angle sensor

TROUBLE SYMPTOM:

VDC does not operate.

WIRING DIAGRAM:





VDC00376

	Step	Check	Yes	No
1	**CHECK THE POWER SUPPLY OF THE STEERING ANGLE SENSOR.** 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. ***Connector & terminal*** ***(B231) No. 4 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair power supply circuit in the steering angle sensor.
2	**CHECK GROUND CIRCUIT OF STEERING ANGLE SENSOR.** Measure the voltage between steering angle sensor and chassis ground. ***Connector & terminal*** ***(B231) No. 3 (+) — Chassis ground (–):***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair ground circuit in the steering angle sensor.
3	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **4**.
4	**CHECK STEERING ANGLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the steering angle sensor.	Go to step **5**.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AP:DTC C0071 DEFECTIVE STEERING ANGLE SENSOR COMMUNICATION

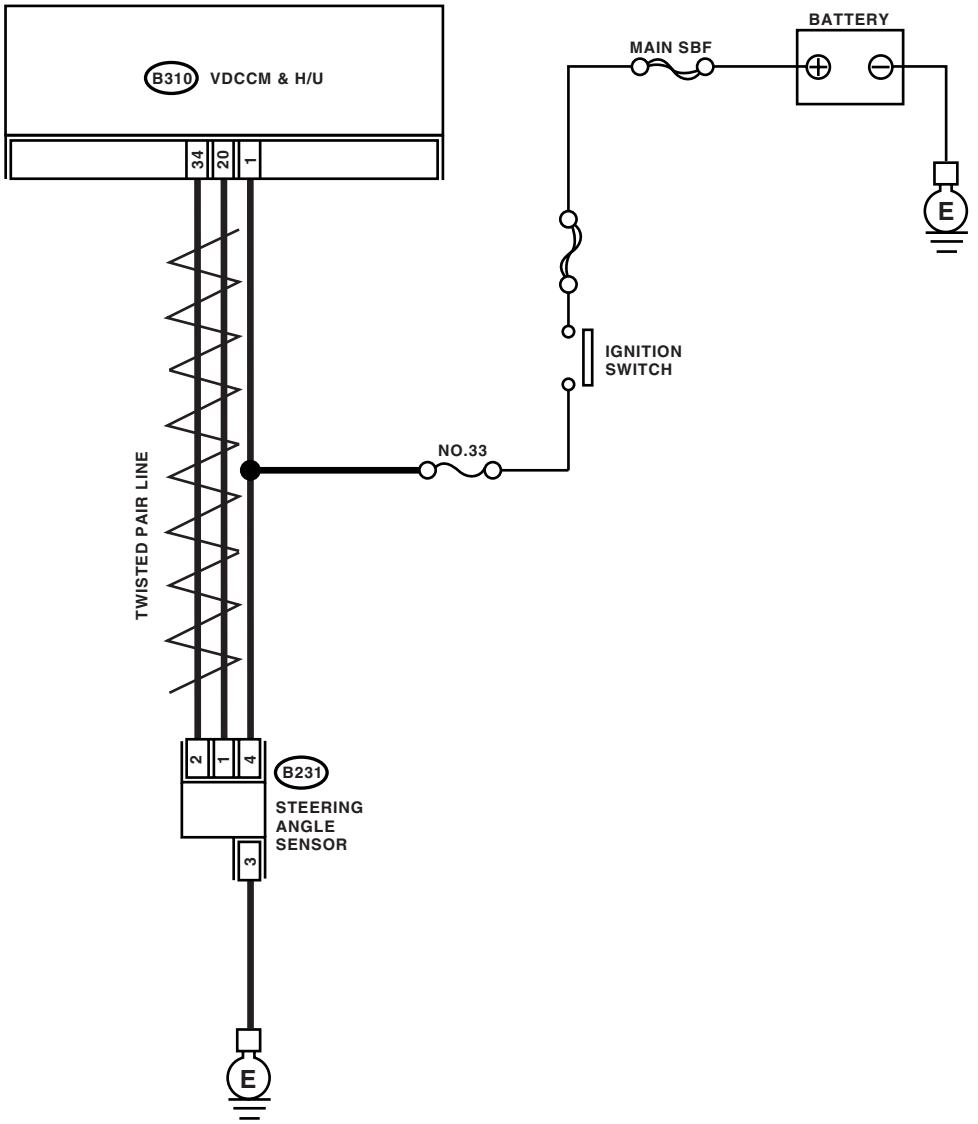
DTC DETECTING CONDITION:

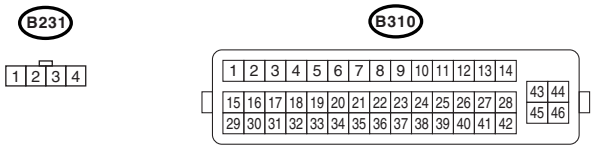
Signal does not come from steering angle sensor.

TROUBLE SYMPTOM:

VDC does not operate.

WIRING DIAGRAM:





VDC00376

	Step	Check	Yes	No
1	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **2**.
2	**CHECK POWER SUPPLY FOR STEERING ANGLE SENSOR.** 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. ***Connector & terminal*** ***(B231) No. 4 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **3**.	Repair the power supply circuit.
3	**CHECK GROUND CIRCUIT OF STEERING ANGLE SENSOR.** Measure the resistance between steering angle sensor and chassis ground. ***Connector & terminal*** ***(B231) No. 3 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair ground circuit in the steering angle sensor.
4	**CHECK STEERING ANGLE SENSOR HARNESS.** 1) Disconnect the connector from the VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U and steering angel sensor. ***Connector & terminal*** ***(B231) No. 1 — (B310) No. 20:*** ***(B231) No. 2 — (B310) No. 34:***	Is the resistance less than 0.5 Ω?	Go to step **5**.	Repair the harness between the steering angle sensor and VDCCM&H/U.
5	**CHECK GROUND SHORT CIRCUIT OF STEERING ANGLE SENSOR HARNESS.** Measure the resistance between steering angle sensor and chassis ground. ***Connector & terminal*** ***(B231) No. 1 — Chassis ground:*** ***(B231) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair the harness between the steering angle sensor and VDCCM&H/U.
6	**CHECK STEERING ANGLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Go to step **7**.	Go to step **8**.
7	**CHECK THE VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Replace the steering angle sensor. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **9**.
8	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
9	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Original steering angle sensor malfunction

AQ:DTC C0071 STEERING ANGLE SENSOR SIGNAL SEIZURE

DTC DETECTING CONDITION:

Defective steering angle sensor

TROUBLE SYMPTOM:

VDC does not operate.

	Step	Check	Yes	No
1	**CHECK STEERING WHEEL.** 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.
2	**CHECK DRIVING PLACE.** 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**.
3	**CHECK OUTPUT OF STEERING ANGLE SENSOR WITH SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in 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.
4	**CHECK THE VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5**.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AR:DTC C0071 STEERING ANGLE SENSOR CALIBRATION INCOMPLETE

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 & Hydraulic Control Unit (VDCCM&H/U).>

AS: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)-78, DTC C0072 YAW RATE SENSOR SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AT:DTC C0072 YAW RATE SENSOR SIGNAL MALFUNCTION

DTC DETECTING CONDITION:

Defective yaw rate sensor

TROUBLE SYMPTOM:

VDC does not operate.

	Step	Check	Yes	No
1	**CHECK DRIVING PLACE.** 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**.
2	**CHECK YAW RATE & G SENSOR INSTALLATION.**	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 installation bolt.
3	**CHECK OUTPUT OF YAW RATE & G SENSOR WITH SUBARU SELECT MONITOR.** 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Select {Current Data Display & Save} in 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.
4	**CHECK OUTPUT OF STEERING ANGLE SENSOR WITH SUBARU SELECT MONITOR.** 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Select {Current Data Display & Save} in 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.
5	**CHECK YAW RATE & G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Go to step **6**.	Go to step **7**.
6	**CHECK THE VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Replace the yaw rate & G sensor. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **8**.
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
8	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Malfunction is found in original yaw rate & G sensor.

AU:DTC C0056 DEFECT INSIDE G SENSOR

NOTE:
For the diagnostic procedure, refer to DTC C0072 “DEFECT INSIDE YAW RATE SENSOR”. <Ref. to VDC(diag)-79, DTC C0072 DEFECT INSIDE YAW RATE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AV:DTC C0072 DEFECT INSIDE YAW RATE SENSOR

DTC DETECTING CONDITION:
Yaw rate & G sensor malfunction
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.

Step		Check	Yes	No
1	**CHECK THE YAW RATE & G SENSOR.** 1) Erase the memory. 2) Perform the inspection mode. 3) Read the DTC.	Is the same DTC displayed?	Replace the yaw rate & G sensor.	Go to step **2**.
2	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AW:DTC C0056 DEFECTIVE G SENSOR COMMUNICATION

NOTE:
For the diagnostic procedure, refer to DTC C0072 “DEFECTIVE YAW RATE SENSOR COMMUNICATION”. <Ref. to VDC(diag)-80, DTC C0072 YAW RATE SENSOR COMMUNICATION MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AX:DTC C0072 YAW RATE SENSOR COMMUNICATION MALFUNCTION

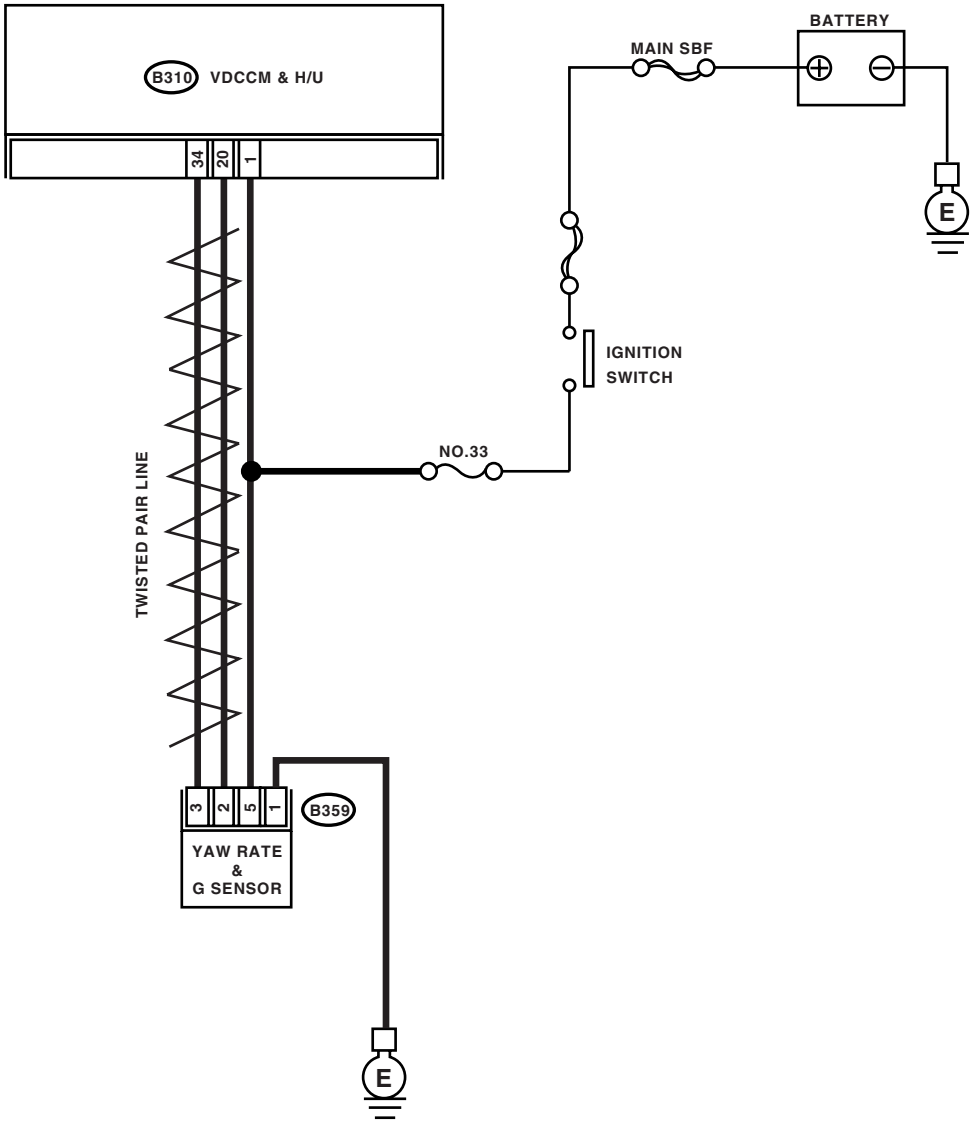
DTC DETECTING CONDITION:

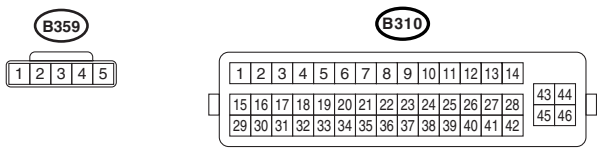
Yaw rate & G sensor malfunction

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00375

	Step	Check	Yes	No
1	**CHECK LAN SYSTEM.** 1) Perform the diagnosis for LAN system. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **2**.
2	**CHECK THE YAW RATE & G SENSOR POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the yaw rate & G sensors. 3) Turn the ignition switch to ON. 4) Measure the voltage between yaw rate & G sensor and chassis ground. ***Connector & terminal*** ***(B359) No. 5 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **3**.	Repair the yaw rate & G sensor power supply circuit.
3	**CHECK GROUND CIRCUIT OF YAW RATE & G SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between the yaw rate & G sensor and chassis ground. ***Connector & terminal*** ***(B359) No. 1— Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **4**.	Repair the yaw rate & G sensor ground circuit.
4	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **5**.
5	**CHECK THE YAW RATE & G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the yaw rate & G sensor.	Go to step **6**.
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AY:DTC C0074 PRESSURE SENSOR SIGNAL SEIZURE

NOTE:
For the diagnostic procedure, refer to DTC C0074 “PRESSURE SENSOR OPEN LINE”. <Ref. to VDC(diag)-82, DTC C0074 PRESSURE SENSOR OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AZ:DTC C0074 PRESSURE SENSOR OUTPUT RISE

NOTE:
For the diagnostic procedure, refer to DTC C0074 “PRESSURE SENSOR OPEN LINE”. <Ref. to VDC(diag)-82, DTC C0074 PRESSURE SENSOR OPEN LINE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BA:DTC C0074 PRESSURE SENSOR OPEN LINE

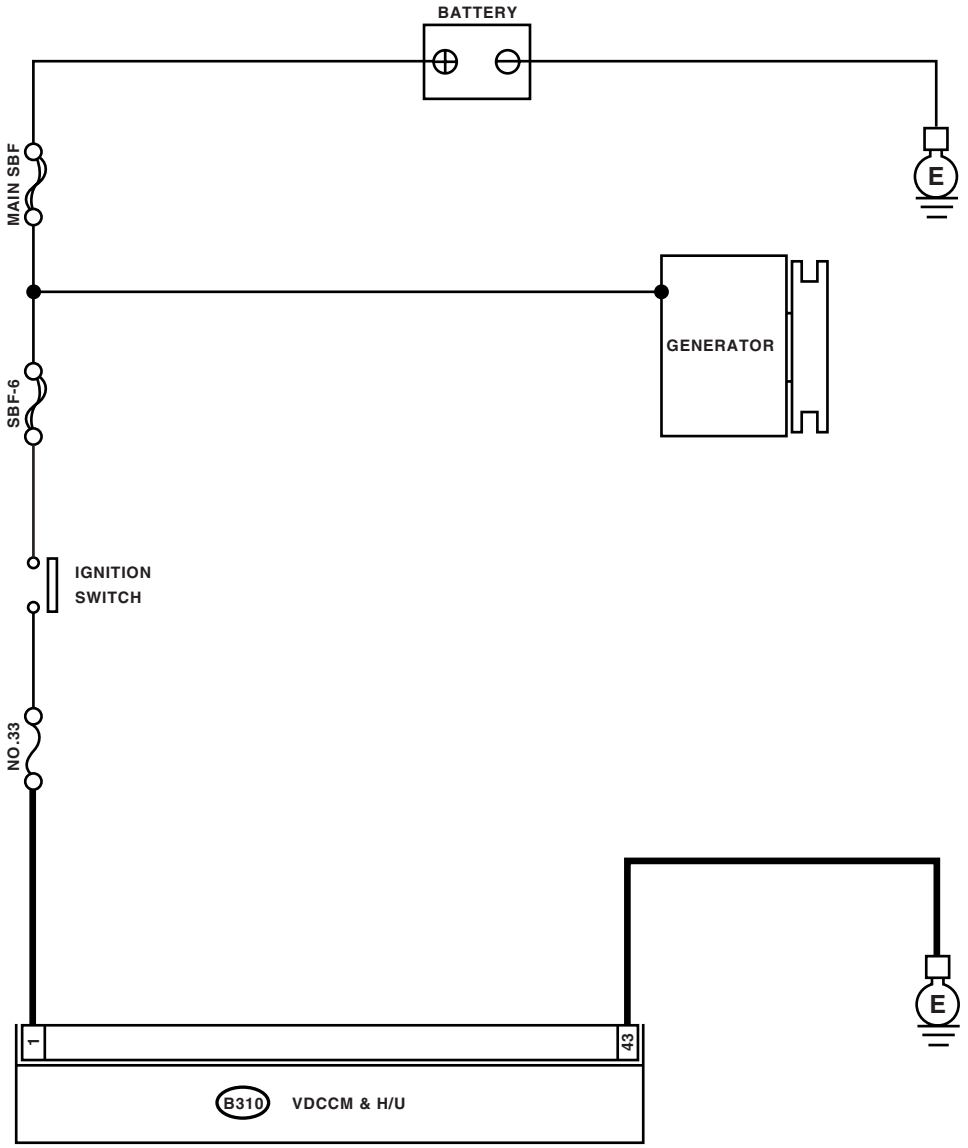
DTC DETECTING CONDITION:

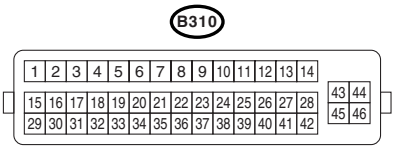
Defective pressure sensor

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00371

	Step	Check	Yes	No
1	**CHECK THE VDCCM&H/U POWER VOLTAGE.** 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. ***Connector & terminal*** ***(B310) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair the power supply circuit.
2	**CHECK THE VDCCM&H/U GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 43— Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair the VDCCM&H/U ground harness.
3	**CHECK PRESSURE SENSOR.** 1) Connect the Subaru Select Monitor to the vehicle. 2) Select {Current Data Display & Save} in Subaru Select Monitor. 3) Depress the brake pedal. 4) Read the pressure switch output in 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 & Hydraulic Control Unit (VDCCM&H/U).>
4	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5**.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

BB: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
1	**CHECK OUTPUT OF STOP LIGHT SWITCH WITH SUBARU SELECT MONITOR.** 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	**CHECK OUTPUT OF STOP LIGHT SWITCH WITH SUBARU SELECT MONITOR.** 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**.
3	**CHECK IF STOP LIGHTS COME ON.** 1) Depress the brake pedal.	Does the stop light illuminate?	Go to step **4**.	Repair the stop light circuit.
4	**CHECK PRESSURE SENSOR.** 1) Depress the brake pedal. 2) Read the pressure sensor output using the Subaru Select Monitor.	Do the output values on the monitor display change when the pedal is depressed?	Go to step **5**.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
5	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6**.
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

BC:DTC C0074 PRESSURE SENSOR NOISE

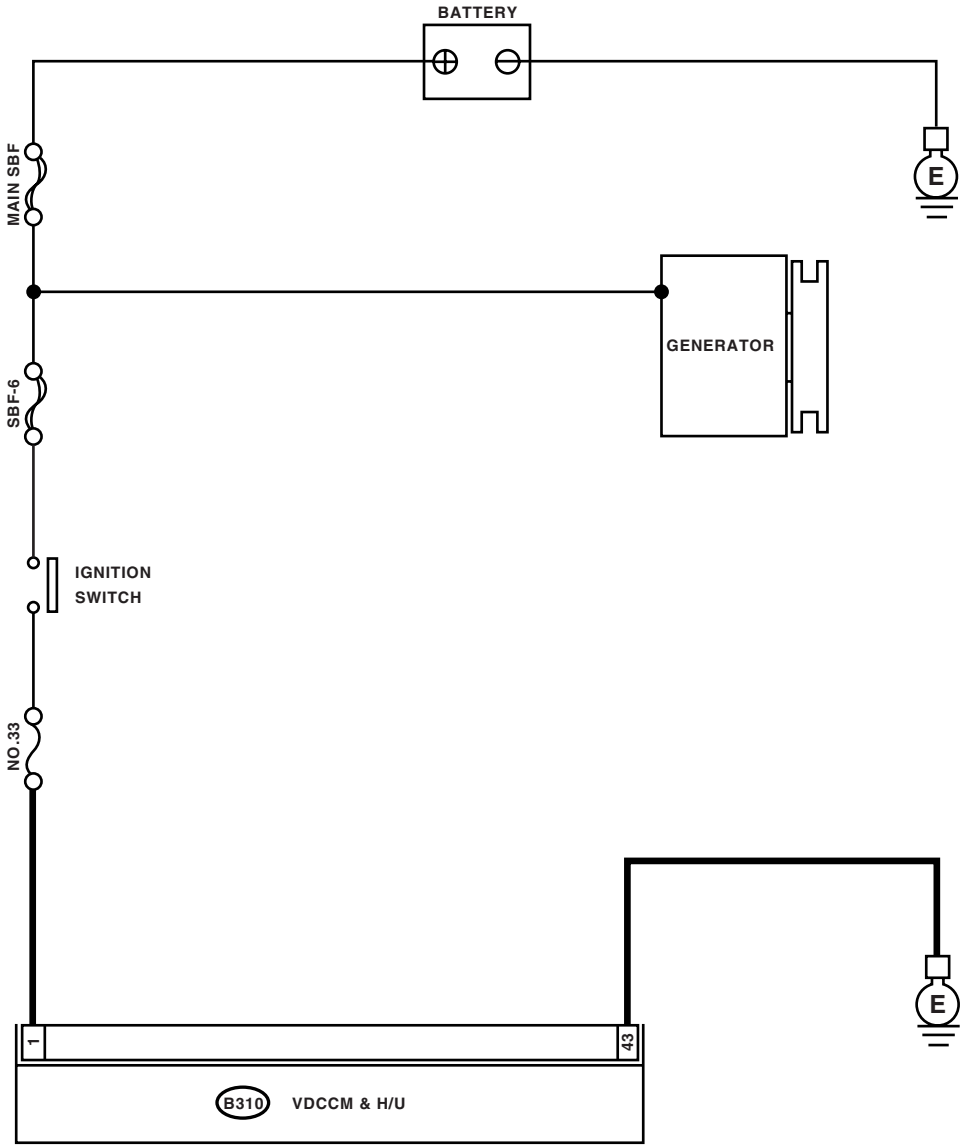
DTC DETECTING CONDITION:

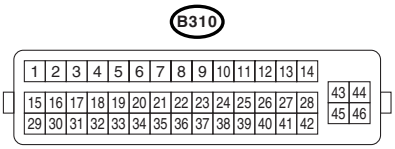
Defective pressure sensor

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00371

	Step	Check	Yes	No
1	**CHECK THE VDCCM&H/U POWER VOLTAGE.** 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. ***Connector & terminal*** ***(B310) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2**.	Repair the power supply circuit.
2	**CHECK THE VDCCM&H/U GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 43 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3**.	Repair the VDCCM&H/U ground harness.
3	**CHECK CAUSE OF SIGNAL NOISE.** Check if the noise sources (such as an antenna) are installed near the VDCCU&H/U.	Are noise sources installed?	Install the noise sources apart from the VDCCU&H/U.	Go to step **4**.
4	**CHECK PRESSURE SENSOR.** 1) Depress the brake pedal. 2) Read the pressure switch output in Subaru Select Monitor.	Do the output values on the monitor display change when the pedal is depressed?	Go to step **5**.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
5	**CHECK THE VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6**.
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

13.General Diagnostic Table

A: INSPECTION

Symptom		Main probable cause	Other probable cause
Poor brake performance	Long braking/ stopping distance	• VDCCM&H/U • Brake pad • Aeration to brake line • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation • Master cylinder • Brake caliper • Disc rotor • Brake pipe • Brake booster
	Wheel lock	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Incorrect wiring or piping connections	• Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation • Brake caliper • Brake pipe
	Brake drag	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Master cylinder • Brake caliper • Parking brake • Axle and wheels • Brake pedal play	• Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation • Brake pad • Brake pipe
	Long brake pedal stroke	• Aeration to brake line • Brake pedal play	• VDCCM&H/U • Master cylinder • Brake caliper • Brake pad • Brake pipe • Brake booster
	Vehicle vertical pitching	• VDCCM&H/U • Road surface (uneven) • Suspension play or fatigue (reduced damping) • Incorrect wiring or piping connections	• Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation
Poor brake performance	Unstable or uneven braking	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Brake caliper • Brake pad • Road surface (uneven) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation • Master cylinder • Disc rotor • Brake pipe • Axle and wheels • Road with crowns or banks • Suspension play or fatigue (poor damping)

General Diagnostic Table

Symptom		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	• Road surface (uneven) • Incorrect wiring or piping connections	• VDCCM&H/U • Brake booster • Suspension play or fatigue (poor damping)
	Noise from VDCH/U	• VDCCM&H/U (mount bushing) • Defective ABS wheel speed sensor or sensor gap • Brake pipe	• VDCCM&H/U • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation
	Noise from the front side of vehicle	• VDCCM&H/U (mount bushing) • Defective ABS wheel speed sensor or sensor gap • Master cylinder • Brake caliper • Brake pad • Disc rotor • Brake pipe • Brake booster • Suspension play or fatigue (poor damping)	• Axle and wheels • Tire specifications, tire wear and air pressures
	Noise inside passenger seat		• VDCCM&H/U • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation
	Noise from the rear side of vehicle	• Defective ABS wheel speed sensor or sensor gap • Brake caliper • Brake pad • Disc rotor • Parking brake • Brake pipe • Suspension play or fatigue (poor damping)	• Axle and wheels • Tire specifications, tire wear and air pressures
Engine does not accelerate or goes into a stall when accelerating suddenly or driving on a slippery surface.		• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Master cylinder • Brake caliper • Parking brake • Incorrect wiring or piping	• Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation • Brake pad • Brake pipe

Symptom		Main probable cause	Other probable cause
Poor change-direction-operation stability of TCS	Deviation to right or left direction	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation • Brake caliper • Brake pad • Wheel alignment • Road surface (uneven) • Road with crowns or banks • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Disc rotor • Brake pipe • Axle and wheels • Suspension play or fatigue (poor damping)
	Vehicle spin	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation • Brake pad • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Brake caliper • Brake pipe
Steering wheel drag while driving		• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation • Incorrect wiring or piping connections • Power steering system	• Brake caliper • Brake pad • Disc rotor • Wheel alignment • Road surface (uneven) • Road with crowns or banks • Suspension play or fatigue (poor damping) • Tire specifications, tire wear and air pressures
VDC operates while driving normally.		• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & G sensor or improper installation • Wheel alignment • Road surface (uneven) • Road with crowns or banks • Suspension play or fatigue (poor damping) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections • Power steering system	
TCS OFF indicator light does not come on when the TCS OFF switch is depressed. NOTE: When pressing TCS OFF switch for more than 10 seconds, TCS OFF indicator light goes off and cannot operate any more. When turning the ignition switch from OFF to ON, the previous status is restored.		• Harness • Indicator light bulb • TCS OFF switch	

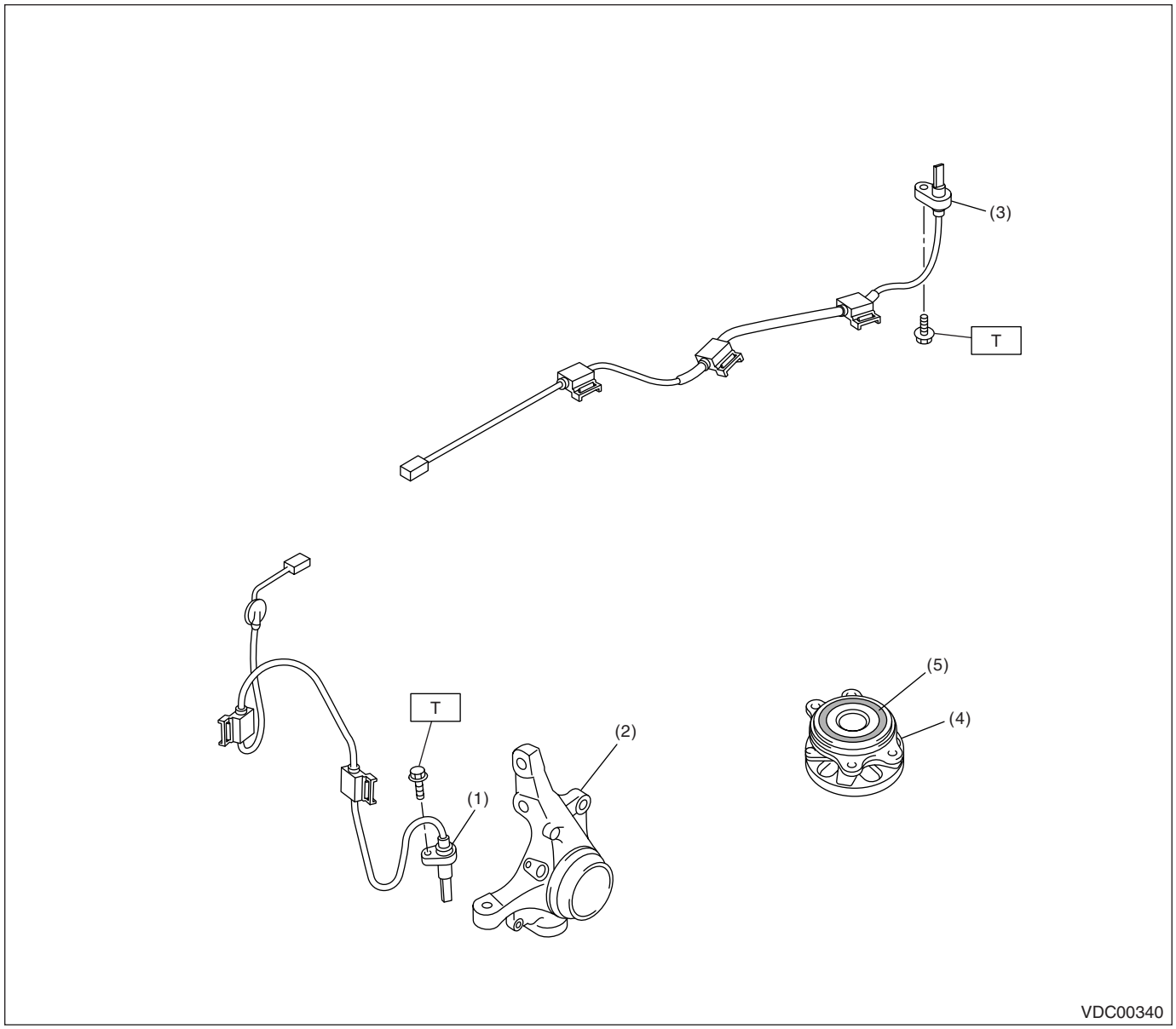
1. General Description

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			W1

B: COMPONENT

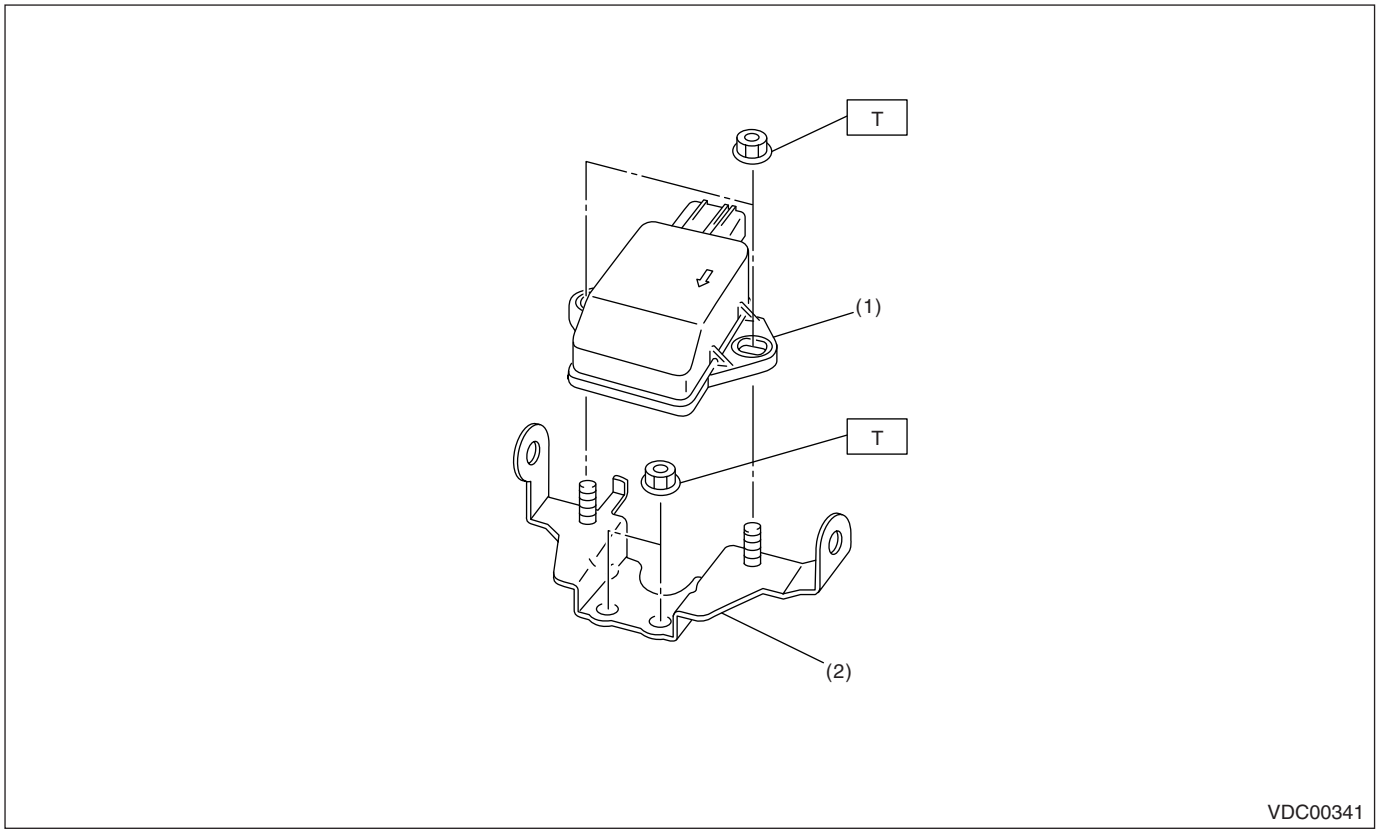
1. ABS WHEEL SPEED SENSOR



(1) Front ABS wheel speed sensor
(2) Front housing
(3) Rear ABS wheel speed sensor
(4) Hub unit bearing
(5) Magnetic encoder

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

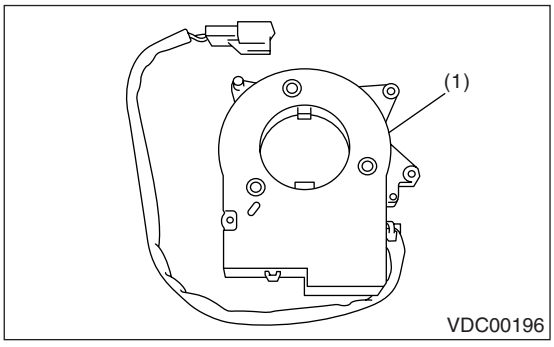
2. YAW RATE & LATERAL G SENSOR



(1) Yaw rate & lateral G sensor
(2) Bracket

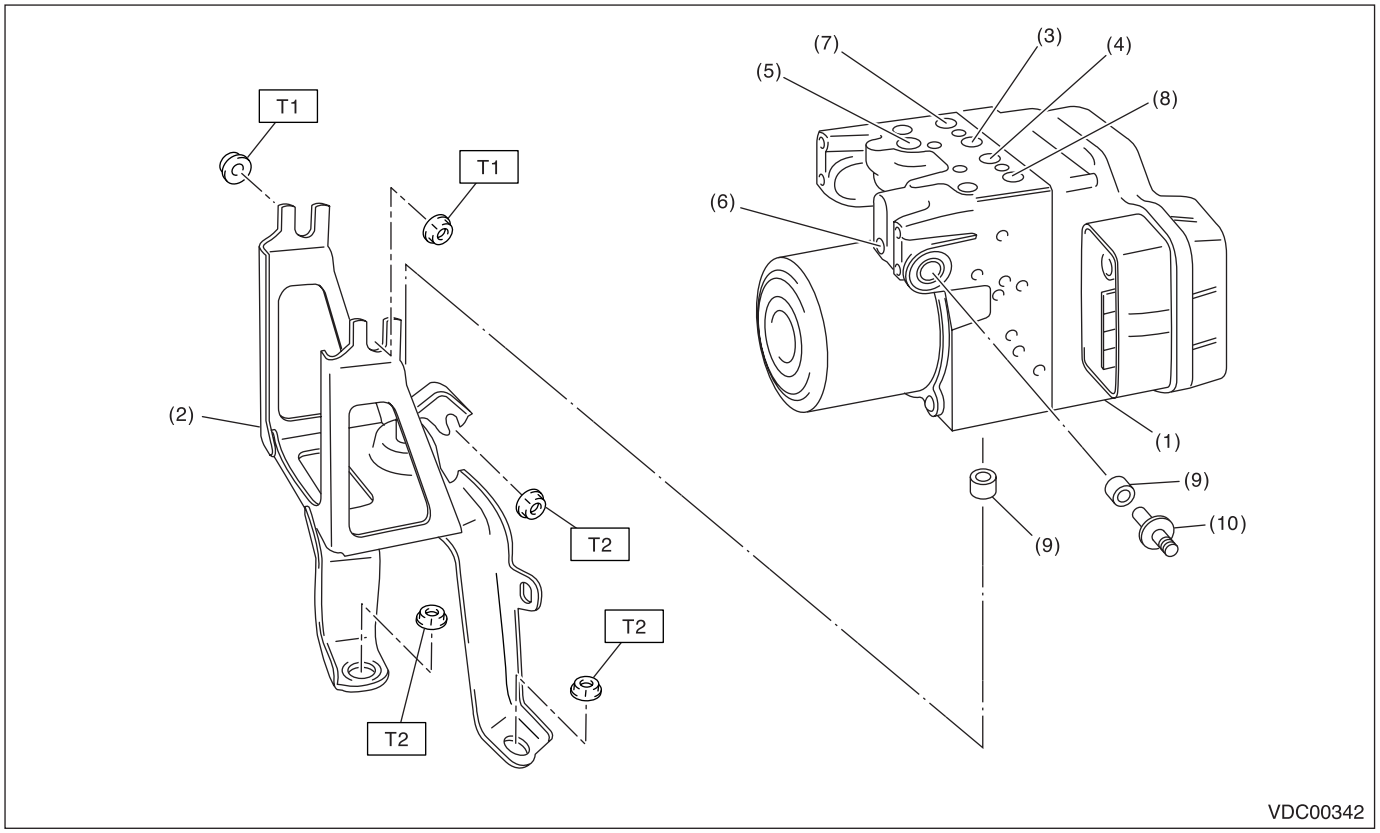
Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

3. STEERING ANGLE SENSOR



(1) Steering angle sensor

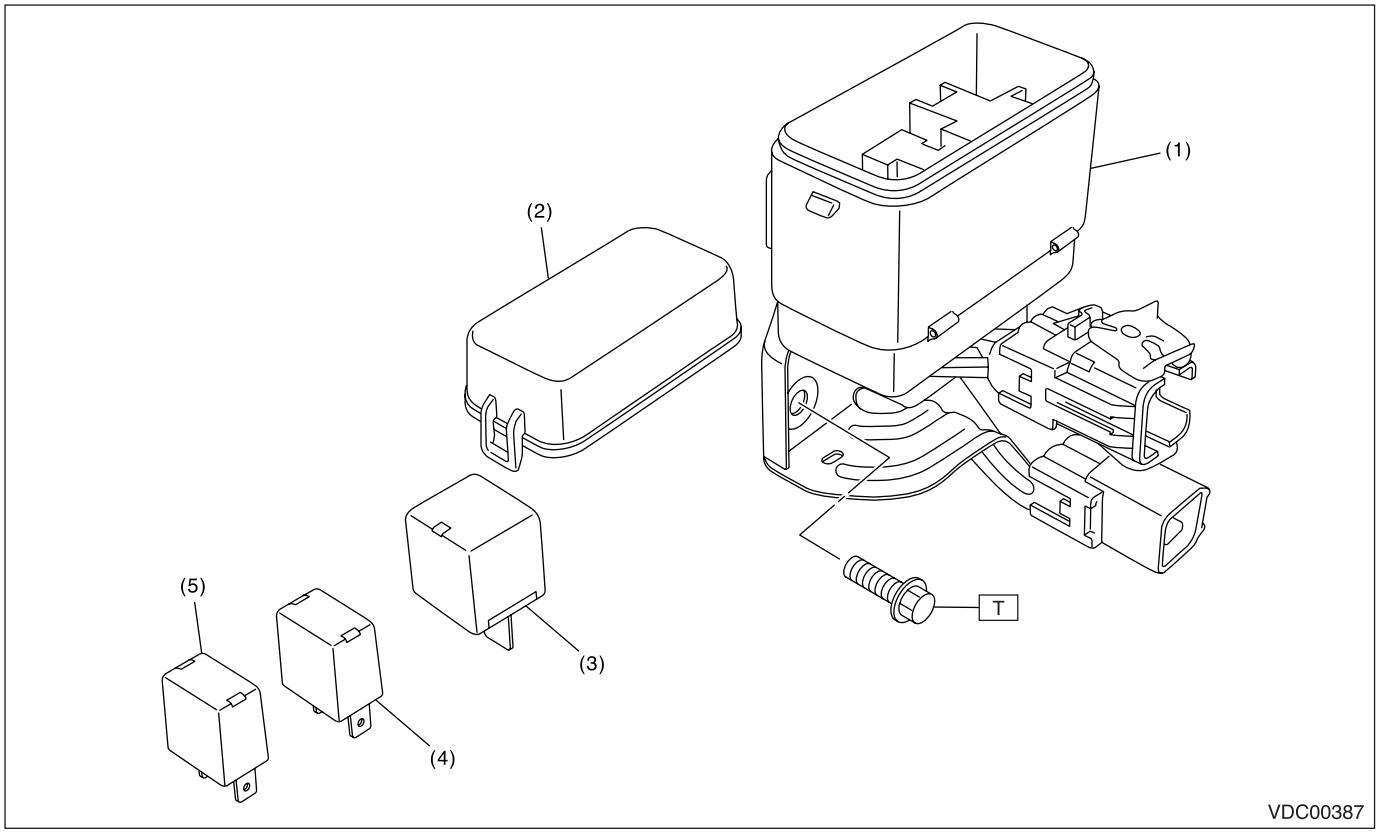
4. VDC CONTROL MODULE AND HYDRAULIC CONTROL UNIT (VDCCM&H/U)



(1) VDC control module and hydraulic control unit (VDCCM&H/U)
(2) Bracket
(3) Rear RH outlet
(4) Rear LH outlet
(5) Secondary inlet
(6) Primary inlet
(7) Front LH outlet
(8) Front RH outlet
(9) Damper
(10) Stud bolt

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 33 (3.4, 24)

5. RELAY BOX



(1) Relay box
(2) Cover
(3) Motor relay (blue)
(4) Fuel safe relay (green)
(5) Vacuum pump relay (black)

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

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 work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before 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.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.

2. OIL

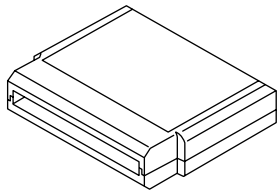
When handling oil, follow the rules below to prevent unexpected accidents.
• Prepare container and waste cloths when performing work which oil could possibly spill. If oil spills, wipe it off immediately to prevent from penetrating into floor or flowing outside, for environmental protection.
• Follow 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 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
 ST18482AA010	ST18482AA010	CARTRIDGE	Troubleshooting for the electrical system.
 ST22771AA030	22771AA030	Subaru Select Monitor KIT	Troubleshooting for 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 & Hydraulic Control Unit (VDCCM&H/U)

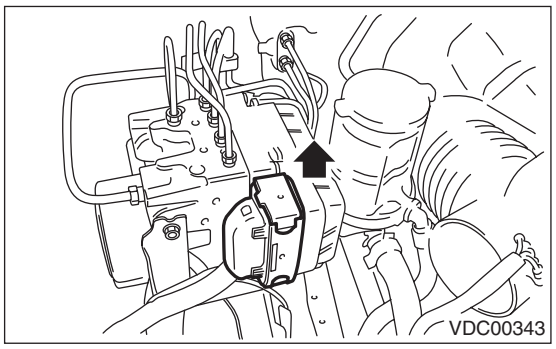
A: REMOVAL

1) Disconnect the ground cable from the battery.
2) Use compressed air to remove moisture and dust around the VDCCM&H/U.

NOTE:
If the terminals become dirty, it may cause improper contact.

3) Lift the lock lever and Disconnect the VDCCM&H/U connector.

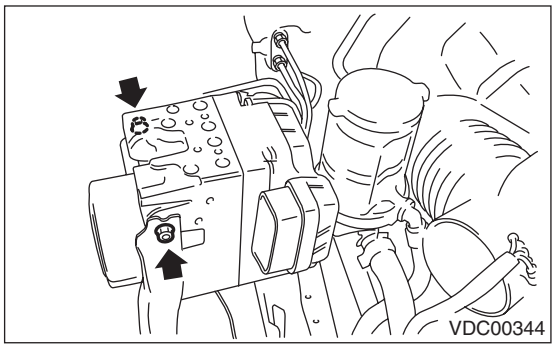
CAUTION:
Do not pull on the harness when disconnecting the connector.



4) Disconnect the brake pipes from the VDCCM&H/U.
5) 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.

6) Remove the nuts 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 during storage.
• Be careful not to let foreign matter enter the VDCCM&H/U.
• Be careful that no water enters the connectors.

7) Remove the VDCCM&H/U bracket.

B: INSTALLATION

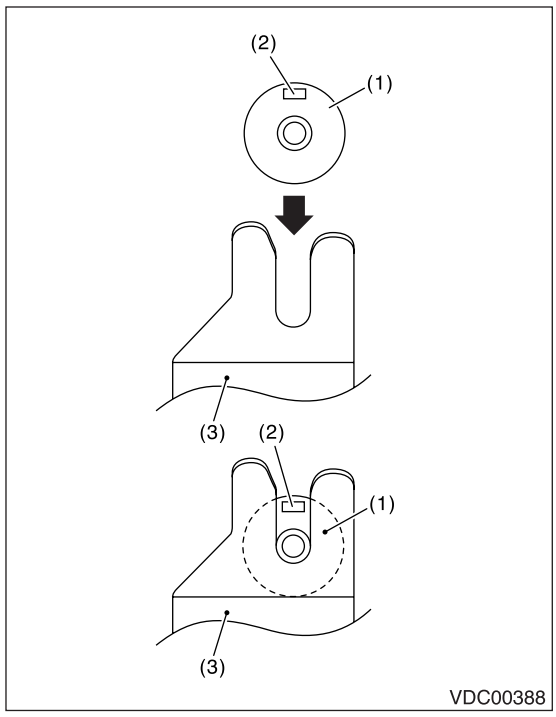
1) Install the VDCCM&H/U bracket.

Tightening torque:
33 N·m (3.3 kgf-m, 24 ft-lb)

2) Install the VDCCM&H/U to the bracket.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

CAUTION:
Attach so that the protrusion of the stud bolt is at the position shown in the figure.



(1) Stud bolt
(2) Protrusion portion
(3) Bracket

3) Connect the brake pipes to their correct VDCCM&H/U positions.

Tightening torque:
<Ref. to BR-7, FRONT BRAKE PIPES AND HOSE, COMPONENT, General Description.>

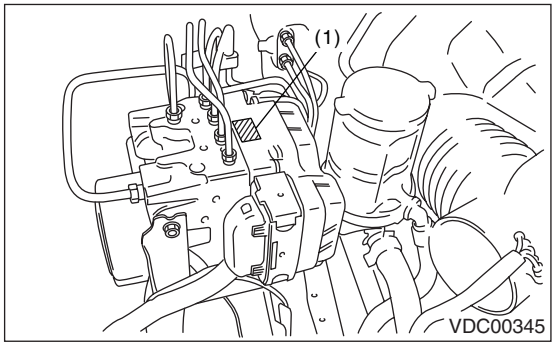
4) Connect the VDCCM&H/U connectors.

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.

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.>



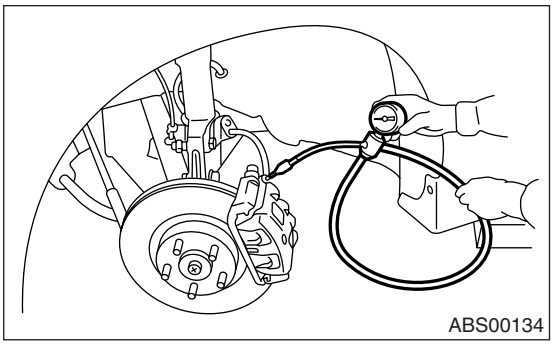
(1) Identification mark

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.

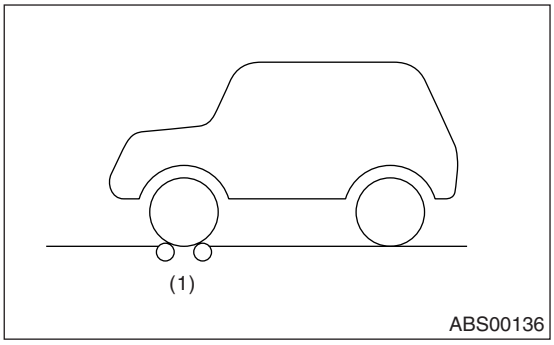
	Front wheel	Rear wheel
Initial value	3,500 kPa (36 kgf/cm^2, 511 psi)	3,500 kPa (36 kgf/cm^2, 511 psi)
When depressurized	500 kPa (5 kgf/cm^2, 73 psi) or less	500 kPa (5 kgf/cm^2, 73 psi) or less
When pressurized	3,500 kPa (36 kgf/cm^2, 511 psi) or more	3,500 kPa (36 kgf/cm^2, 511 psi) or more

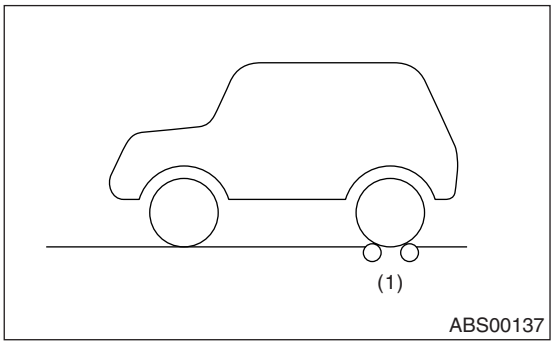
8) Disconnect the pressure gauges from FL and FR caliper bodies.
9) Install the air bleeder screws of FL and FR caliper bodies.
10) Remove the air bleeder screws from RL and RR caliper bodies.
11) Connect two pressure gauges to RL and RR caliper bodies.

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 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

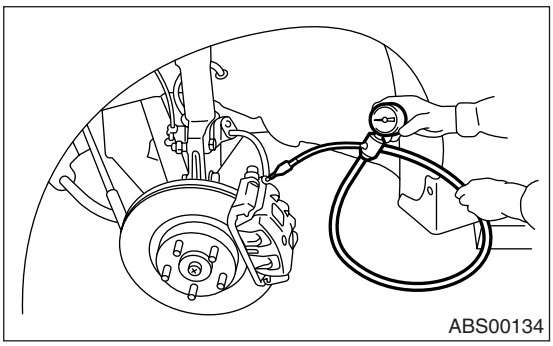
8) After the inspection, depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

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.>

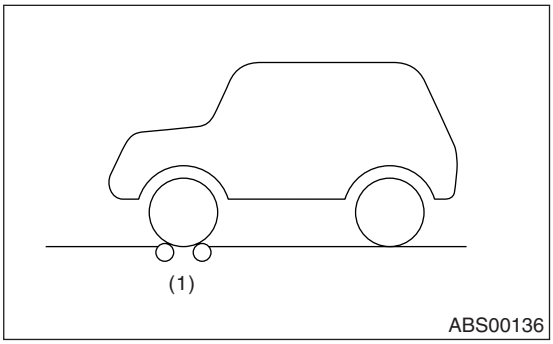
6) When the hydraulic unit begins to work, first the FL side performs compression, hold, and decompression, and then the FR side performs compression, hold, and decompression.
7) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets specification. Depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

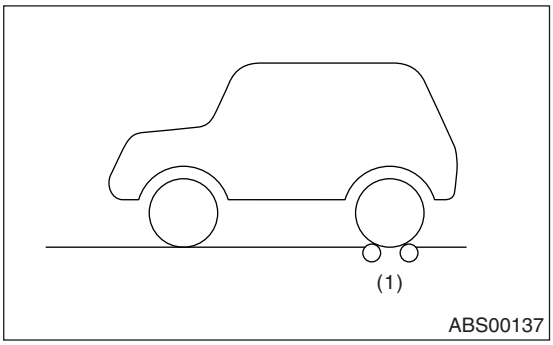
	Front wheel	Rear wheel
When pressurized	3,000 kPa (31 kgf/cm^2, 441 psi) or more	3,000 kPa (31 kgf/cm^2, 441 psi) or more
When depressurized	500 kPa (5 kgf/cm^2, 73 psi) or less	500 kPa (5 kgf/cm^2, 73 psi) or less

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. CHECK HYDRAULIC UNIT VDC OPERATION WITH BRAKE TESTER

1) Set wheels other than the one to measure 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 centering of the steering angle sensor and zero point setting of the yaw rate & 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 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 procedures shown in 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

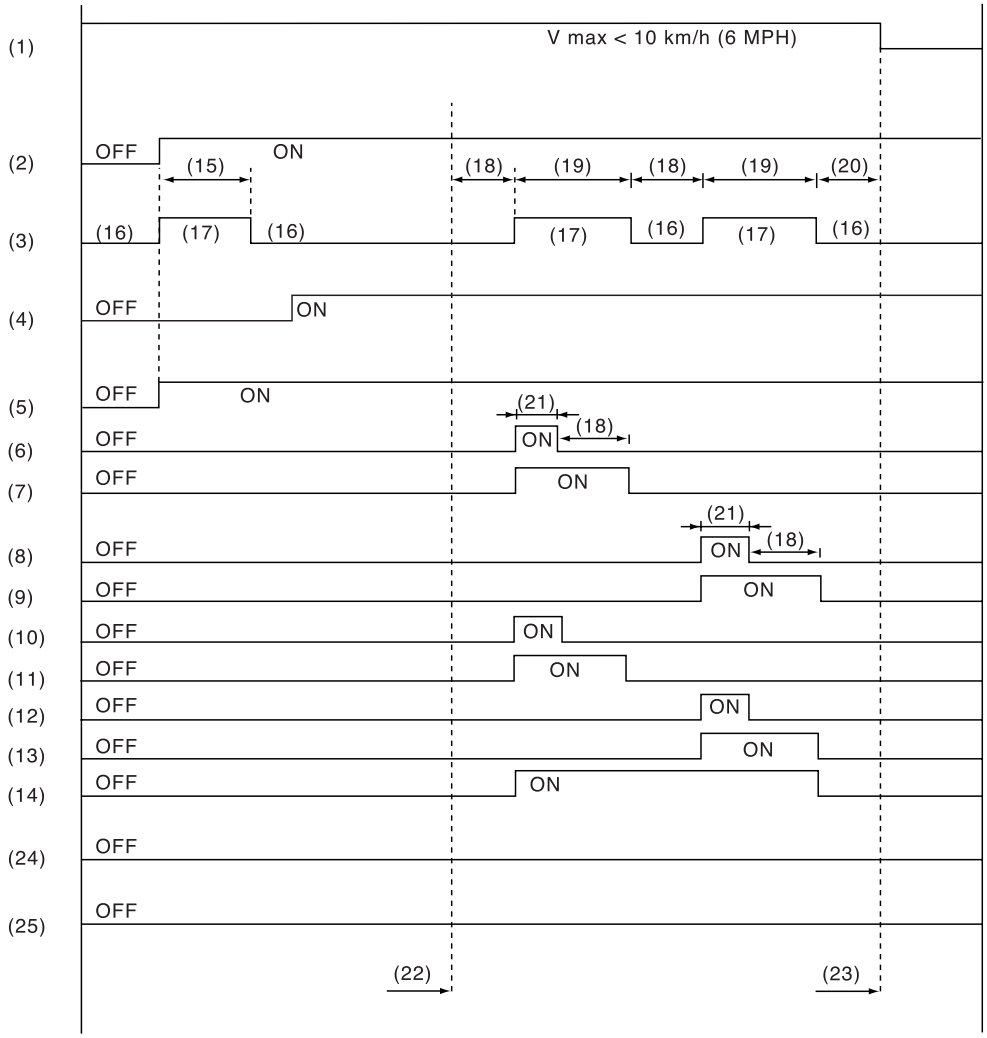
1) While the ABS sequence control is being performed, the operation of the hydraulic unit can be checked using the brake tester or pressure gauge after the hydraulic unit solenoid valve operation.
2) ABS sequence control can be started by the Subaru Select Monitor.

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 ON.
3) Set the Subaru Select Monitor switch to ON.
4) Set the Subaru Select Monitor to “Brake Control” mode.
5) When the “Function check sequence” is selected, the “ABS sequence control” will start.
6) Execute the following operations when the message “Press the brake pedal so that the brake pedal force is between 100 and 150 kgf” 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^2, 511 psi).
7) “Press the “YES” key” will be displayed. Press the [YES] key.
8) The brake system being operated is displayed on the Subaru Select Monitor.

2. CONDITIONS FOR ABS SEQUENCE CONTROL



VDC00357

(1) All wheel speed
(2) Ignition key
(3) ABS warning light
(4) Stop light switch
(5) Valve relay
(6) FL decompression valve
(7) FL hold valve
(8) FR decompression valve
(9) FR hold valve
(10) RR decompression valve
(11) RR hold valve
(12) RL decompression valve
(13) RL hold valve
(14) Pump motor
(15) 1.5 seconds
(16) Light OFF
(17) Light ON
(18) 1.0 seconds
(19) 1.4 seconds
(20) 0.6 seconds
(21) 0.4 seconds
(22) Point A
(23) Reset
(24) Linear valve 1
(25) Linear valve 2

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 lamp switch is becomes OFF.
3) After completion of ABS sequence control.
4) When a malfunction is detected.

4. VDC Sequence Control

A: OPERATION

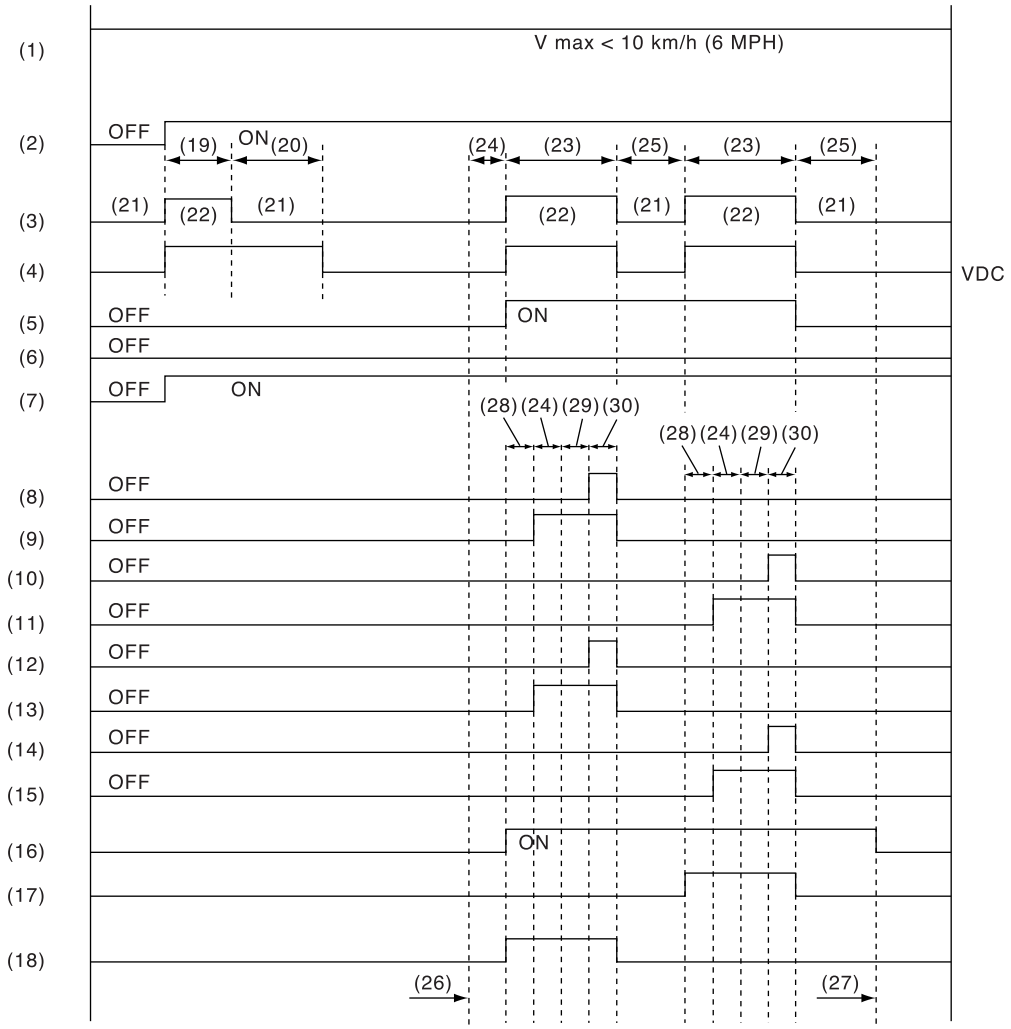
1) While the VDC sequence control is performed, the operation of the hydraulic unit can be checked using the brake tester or pressure gauge after the hydraulic unit solenoid valve is operated.
2) VDC sequence control can be started by Subaru Select Monitor.

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 ON.
3) Set the Subaru Select Monitor switch to ON.
4) Set the Subaru Select Monitor to “Brake Control” mode.
5) When the “VDC Inspection Mode” is selected from the “Function check sequence” menu, the “VDC sequence control” will start.
6) ”Press the “YES” key” will be displayed. Press the [YES] key.
7) Operation points will be displayed on Subaru Select Monitor.

2. CONDITIONS FOR VDC SEQUENCE CONTROL



VDC00358

(1) All wheel speed
(2) Ignition key
(3) ABS warning light
(4) VDC warning light
(5) VDC operation lamp (CAN output)
(6) Stop light switch
(7) Valve relay
(8) FL decompression valve
(9) FL compression valve
(10) FR decompression valve
(11) FR compression valve
(12) RR decompression valve
(13) RR compression valve
(14) RL decompression valve
(15) RL compression valve
(16) Pump motor
(17) Linear valve 1
(18) Linear valve 2
(19) 1.5 seconds
(20) Approx. 3 sec.
(21) Light OFF
(22) Light ON
(23) 3.4 seconds
(24) 1 second
(25) 1.6 seconds
(26) Point A
(27) Reset
(28) 0.8 seconds
(29) 1.2 seconds
(30) 0.4 seconds

NOTE:
The control operation starts from point A.

B: SPECIFICATION

1. CONDITIONS FOR COMPLETION OF VDC SEQUENCE CONTROL

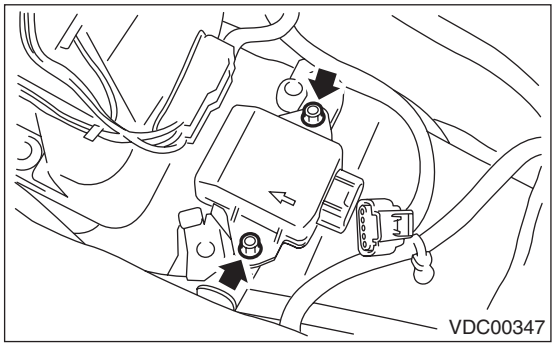
When the following conditions develop, the VDC sequence control stops and VDC operation is returned to the normal control mode.
1) When the speed of at least one wheel reaches 10 km/h (6 MPH).
2) When the brake pedal is pressed during sequence control and the stop light switch is set to ON.
3) After completion of VDC sequence control.
4) When a malfunction is detected.

5. Yaw Rate & Lateral G Sensor

A: REMOVAL

1) Disconnect the ground cable from the battery.
2) Remove the console box.
<Ref. to EI-38, Console Box.>
3) Disconnect the connector from the yaw rate & G sensor.
4) Remove the yaw rate & G sensor.

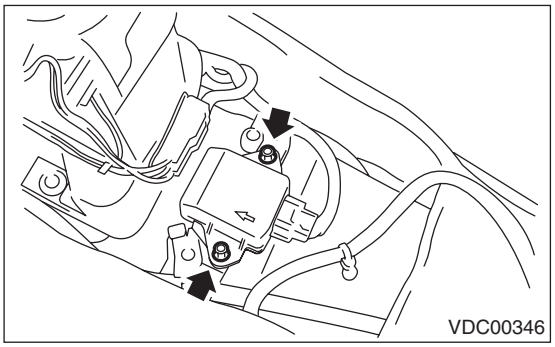
CAUTION:
Do not drop or bump the yaw rate & G sensor.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Install the yaw rate & 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, 5.5 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 & Hydraulic Control Unit (VDCCM&H/U)". <Ref. to VDC-11, ADJUSTMENT, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>

6. Steering Angle Sensor

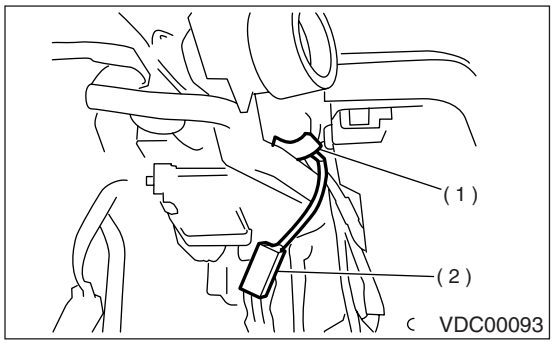
A: REPLACEMENT

CAUTION:
• Do not perform the removal except when the replacement.
• When replacing more than three times, 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-15, REMOVAL, Driver's Airbag Module.>

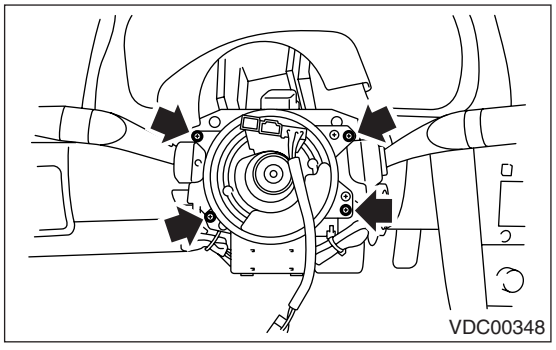
WARNING:
Always refer to "Airbag System" when performing the airbag module repair service.
<Ref. to AB-4, CAUTION, General Description.>

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.

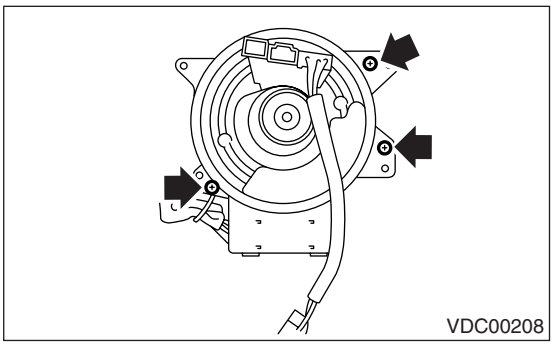


(1) Harness band
(2) Connector

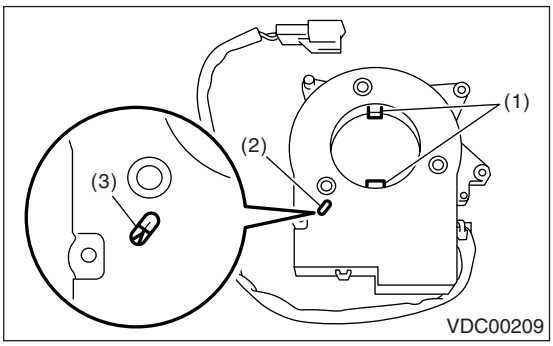
8) Remove the screws which secure the roll connector to steering column.



9) Remove the steering angle sensor from roll connector.



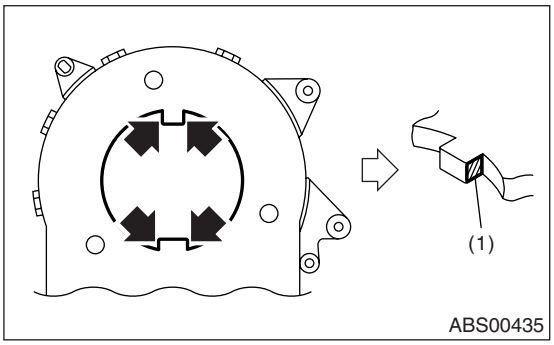
10) Turn the protrusion portion of new steering angle sensor to match the alignment mark of inspection hole.



(1) Protrusion portion
(2) Inspection hole
(3) Alignment mark

CAUTION:
Be careful not to allow foreign matter to enter into inspection hole.

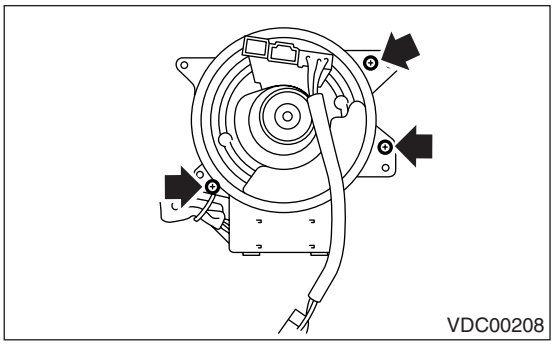
11) Align the center of roll connector.
<Ref. to AB-24, ADJUSTMENT, Roll Connector.>
12) Apply a thin coat of grease that is supplied with the new part, to the 4 protruding sections of the steering angle sensor.



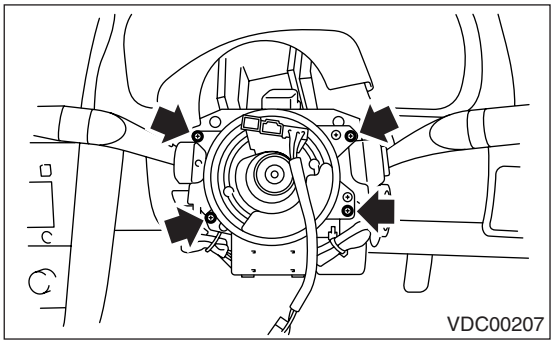
(1) Apply grease.

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-15, INSTALLATION, Driver's Airbag Module.>

WARNING:
Always refer to "Air Bag System" before performing the service operation.
<Ref. to AB-4, CAUTION, General Description.>

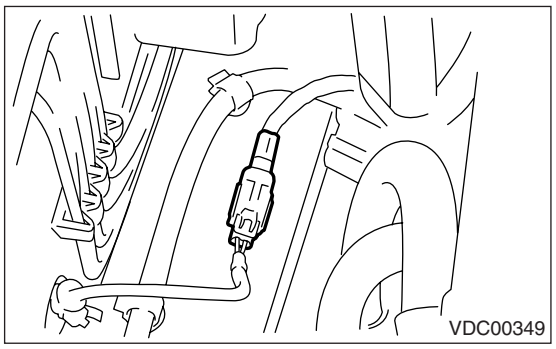
17) Connect ground cable to battery.

CAUTION:
After completion of installation, adjust 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 for the VDCCM to identify vehicle position afterward. For the setting procedures of the 2 steps above, refer to "VDC Control Module & Hydraulic Control Unit (VDCCM&H/U)". <Ref. to VDC-11, ADJUSTMENT, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>

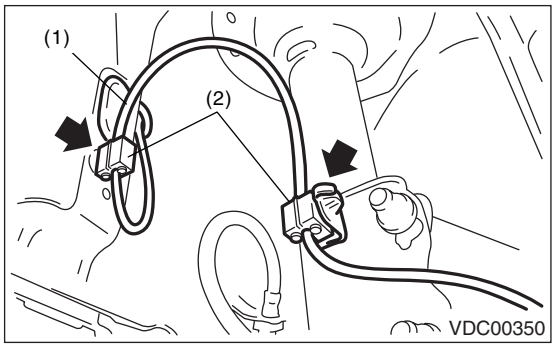
7. Front ABS Wheel Speed Sensor

A: REMOVAL

1) Disconnect the ground cable from the battery.
2) Disconnect the ABS wheel speed sensor connector in the engine compartment.



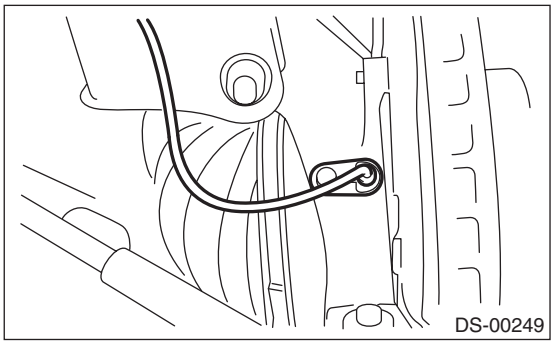
3) Remove the sensor harness from the clip.



(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, 5.5 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

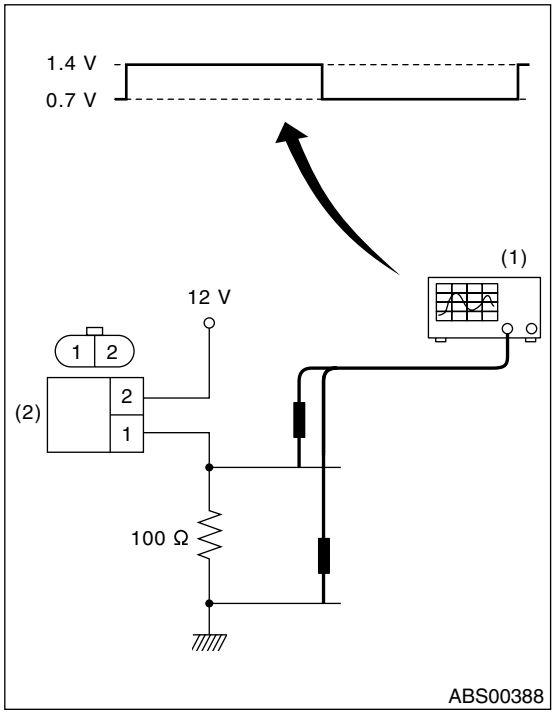
1. CHECK WITH SUBARU SELECT MONITOR

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.>

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

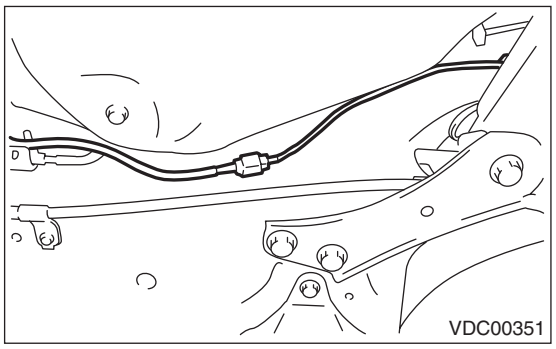


(1) Oscilloscope
(2) ABS wheel speed sensor

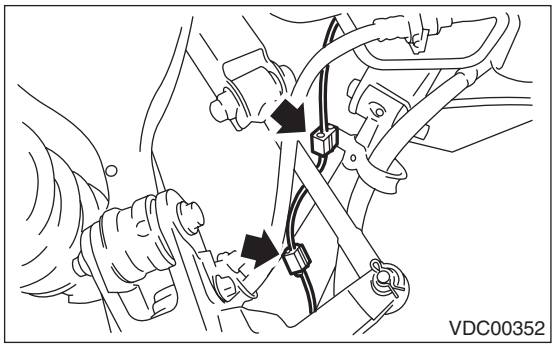
8. Rear ABS Wheel Speed Sensor

A: REMOVAL

1) Disconnect the ground cable from the battery.
2) Disconnect the connector from the rear ABS wheel speed sensor.

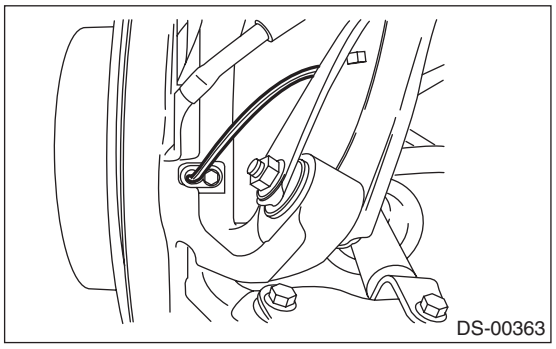


3) Remove the sensor harness from the rear arm clip.



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, 5.5 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.>

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-19, 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 one 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-21, 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-22, INSTALLATION, Rear Hub Unit Bearing.>

C: INSPECTION

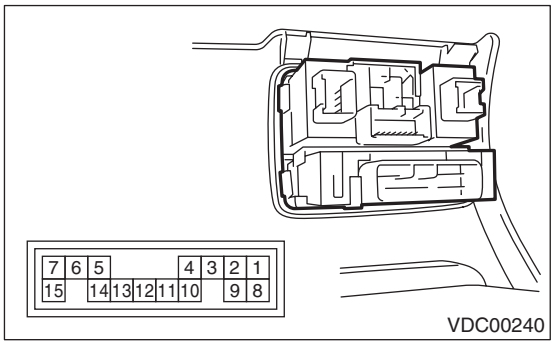
Visually check the magnetic encoder parts for any damage. If necessary, replace with a new hub unit bearing.

NOTE:
Because the magnetic encoder is integrated with hub unit bearing assembly, replace the hub unit bearing with a new one if there is any defect found on the magnetic encoder.

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 VDC OFF switch terminals.

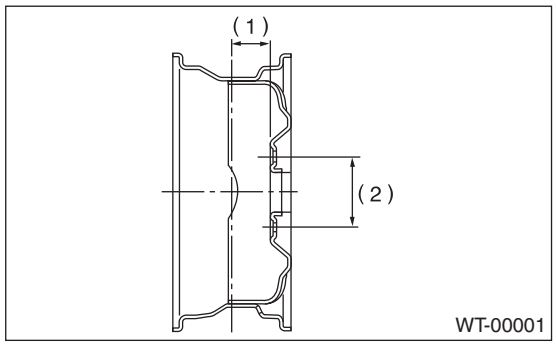
Switch position	Terminal No.	Standard
OFF	2 — 15	1 M Ω or more
ON	2 — 15	Less than 1 Ω

If NG, replace the TCS OFF switch.

1. General Description

A: SPECIFICATION

1. WHEEL AND TIRE SIZE



(1) Offset
(2) P.C.D.

Specification	Tire size	Wheel size	Offset mm (in)	P.C.D. mm (in)	Tire inflation pressure kPa (kgf/cm^2, psi)	
					Front wheel	Rear wheel
Standard type	P225/55R18 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)	

3. ADJUSTING PARTS

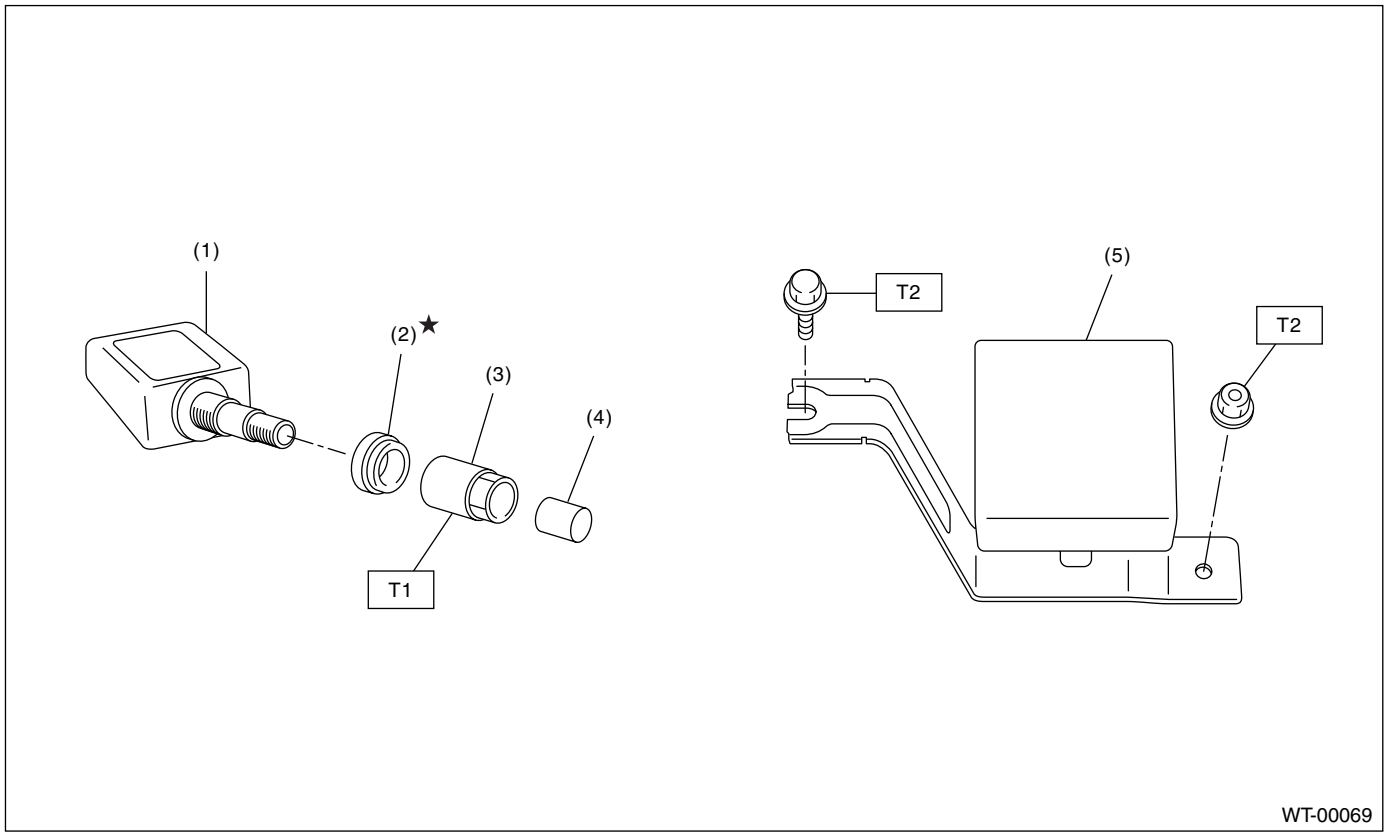
Wheel balancing	Standard:	Service limit
Dynamic unbalance	Less than 10 g (0.35 oz)	

Balance weight part number (Knock–on type weight for aluminum wheel)	Weight
23141GA462	5 g (0.18 oz)
23141GA472	10 g (0.35 oz)
23141GA482	15 g (0.53 oz)
23141GA492	20 g (0.71 oz)
23141GA502	25 g (0.88 oz)
23141GA512	30 g (1.06 oz)
23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50 g (1.76 oz)
23141GA562	55 g (1.94 oz)
23141GA572	60 g (2.12 oz)

Balance weight part number (Adhesive type weight for aluminum wheel)	Weight
28101AE00B	5 g (0.18 oz)
28101AE01B	7.5 g (0.26 oz)
28101AE02B	10 g (0.35 oz)
28101AE03B	12.5 g (0.44 oz)
28101AE04B	15 g (0.53 oz)
28101AE05B	17.5 g (0.62 oz)
28101AE06B	20 g (0.71 oz)
28101AE07B	22.5 g (0.79 oz)
28101AE08B	25 g (0.88 oz)
28101AE09B	27.5 g (0.97 oz)
28101AE10B	30 g (1.06 oz)
28101AE11B	32.5 g (1.15 oz)
28101AE12B	35 g (1.23 oz)
28101AE13B	37.5 g (1.32 oz)
28101AE14B	40 g (1.41 oz)
28101AE15B	42.5 g (1.50 oz)
28101AE16B	45 g (1.59 oz)
28101AE17B	47.5 g (1.68 oz)
28101AE18B	50 g (1.76 oz)
28101AE19B	52.5 g (1.85 oz)
28101AE20B	55 g (1.94 oz)
28101AE21B	57.5 g (2.03 oz)
28101AE22B	60 g (2.12 oz)
28101AE23B	62.5 g (2.20 oz)
28101AE24B	65 g (2.29 oz)
28101AE25B	67.5 g (2.38 oz)
28101AE26B	70 g (2.47 oz)
28101AE27B	72.5 g (2.56 oz)
28101AE28B	75 g (2.65 oz)
28101AE29B	77.5 g (2.73 oz)
28101AE30B	80 g (2.82 oz)
28101AE31B	82.5 g (2.91 oz)
28101AE32B	85 g (3.00 oz)
28101AE33B	87.5 g (3.09 oz)
28101AE34B	90 g (3.17 oz)
28101AE35B	92.5 g (3.26 oz)
28101AE36B	95 g (3.35 oz)
28101AE37B	97.5 g (3.44 oz)
28101AE38B	100 g (3.53 oz)
28101AG50B	102.5 g (3.62 oz)
28101AG51B	105 g (3.70 oz)
28101AG52B	107.5 g (3.79 oz)
28101AG53B	110 g (3.88 oz)
28101AG54B	112.5 g (3.97 oz)
28101AG55B	115 g (4.06 oz)
28101AG56B	117.5 g (4.14 oz)
28101AG57B	120 g (4.23 oz)

B: COMPONENT

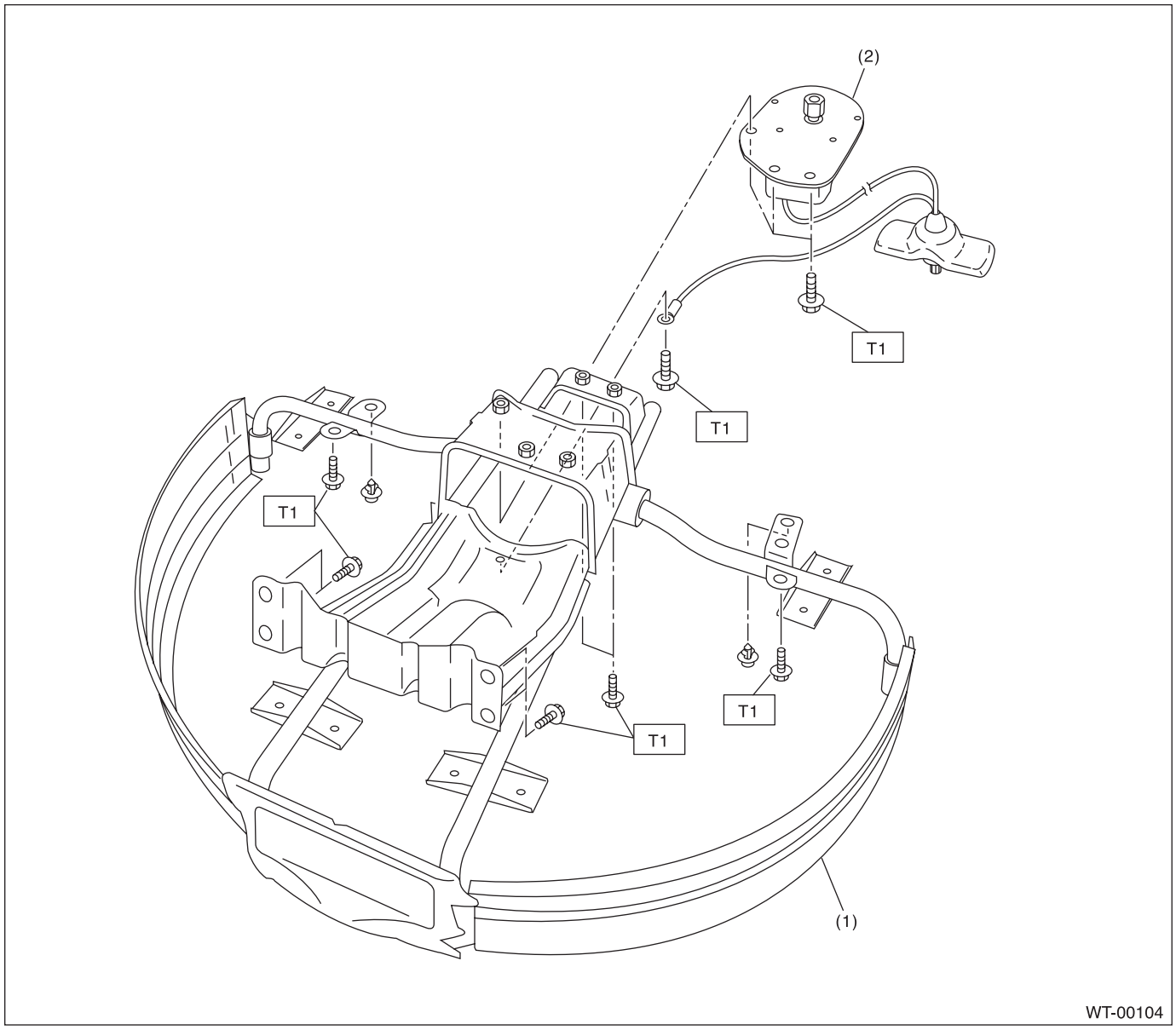
1. TIRE PRESSURE MONITORING SYSTEM



(1) Transmitter
(2) Grommet
(3) Nut
(4) Cap
(5) Tire pressure monitoring control module

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.53)
T2: 8 (0.8, 5.8)

2. SPARE TIRE HOIST



(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

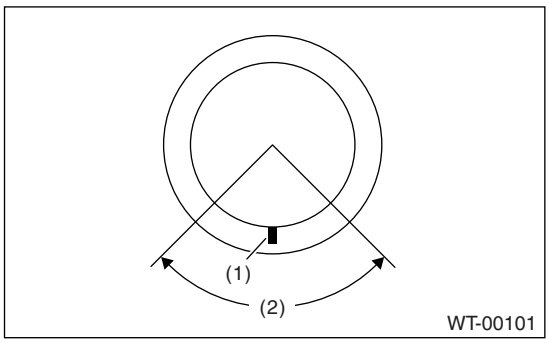
TOOL NAME	REMARKS
Air pressure gauge	Used for measuring tire air pressure.
Dial gauge with magnet stand	Used for measuring wheel runout.
Wheel balancer	Used for adjusting wheel balance.

2. Tire

A: INSPECTION

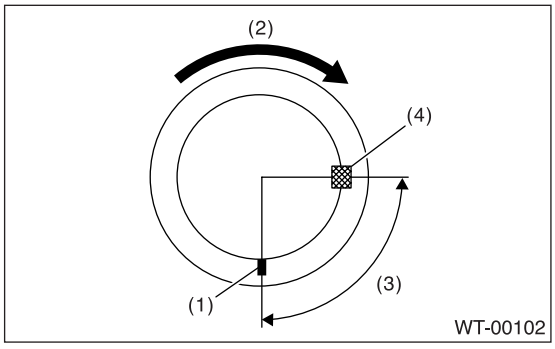
1) Take stones, glass, nails etc. out of the tread groove.
2) Replace tires in the following cases.

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.)

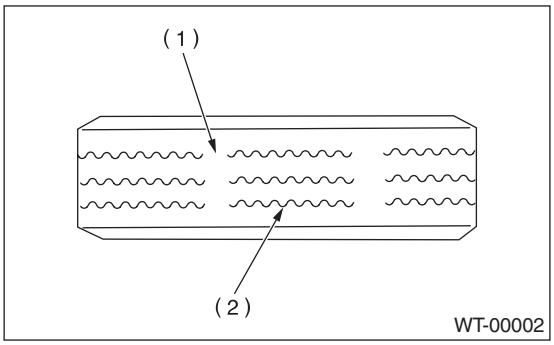
• To prevent damaging the transmitter, set the tire changer boom in the position as shown in the figure.



(1) Transmitter
(2) Turn table rotation direction
(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.

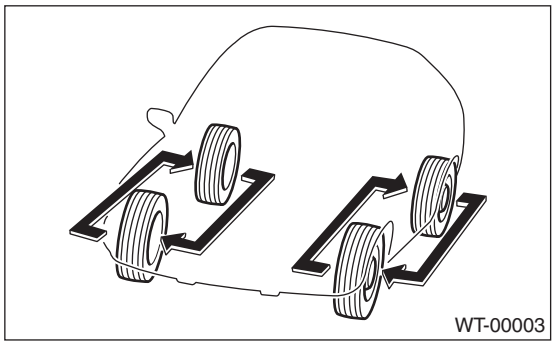


(1) Tread wear indicator
(2) Tire tread

3) When a crack on tire valve is found, replace the tire valve.

1. TIRE ROTATION

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



NOTE:
Vehicles equipped with tire pressure monitoring systems will require re-registration of transmitter ID. <Ref. to TPM(diag)-9, REGISTER TRANSMITTER ID, OPERATION, Subaru Select Monitor.>

3. Aluminum Wheel

A: REMOVAL

1) Apply the parking brake, and position select lever to “P” or “LOW”.
2) Set the shop jacks or a lift to the specified points, and support the vehicle with its wheels slightly contacting the floor.
3) Loosen the wheel nuts.
4) Raise the vehicle until its wheels are off the ground using the jack or a lift.
5) Remove the wheel nuts and wheels.

NOTE:
• When removing the wheels, be careful not to damage the hub bolts.
• Place the wheels with their outer sides facing upward to prevent wheels from being damaged.

B: INSTALLATION

1) Remove dirt from the mating surface of the wheel and brake rotor.
2) Attach the wheel to the hub by aligning the wheel bolt holes with the hub bolts.
3) Temporarily attach the wheel nuts to the hub bolts. (In the case of aluminum wheels, use SUBARU genuine wheel nuts for aluminum wheels.)
4) Tighten the nuts by hand, making sure the wheel hub hole is aligned correctly to the guide portion of hub.
5) Tighten the wheel nuts in a diagonal selection to the specified torque. Use a wheel nut wrench.

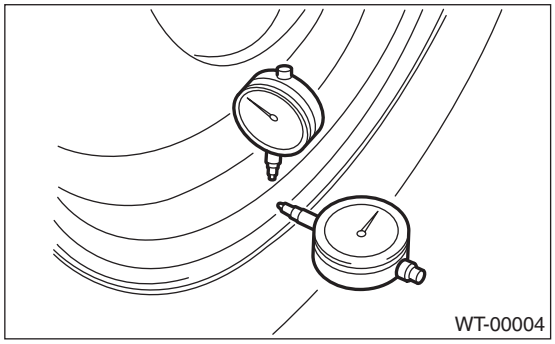
Wheel nut tightening torque:
110 N·m (11.2 kgf-m, 81.1 ft-lb)

CAUTION:
• Tighten the wheel nuts in two or three steps by gradually increasing the torque on opposing nuts, until they reach the specified torque.
• Do not push the wrench by foot. Always use both hands when tightening the nuts.
• Make sure the bolt, nut and the nut seating surface of the wheel are free from oil.

6) If a wheel is removed for replacement or for repair of a puncture, retighten the wheel nuts to the specified torque after driving 1,000 km (600 miles).

C: INSPECTION

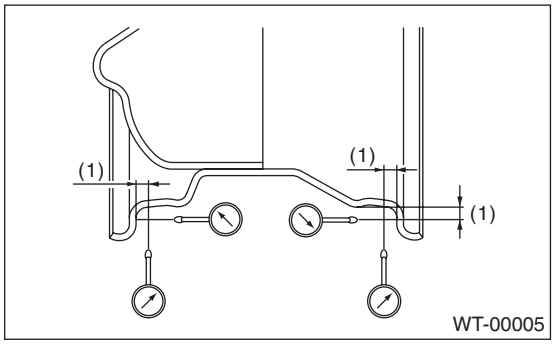
1) Deformation or damage to the rim may cause air leakage. Check the rim flange for deformation, cracks or damage, and repair or replace as necessary.
2) Jack-up the vehicle until wheels clear the floor.
3) Slowly rotate the wheel to check rim “runout” using a dial gauge.



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.

D: CAUTION

Aluminum wheels are easily scratched. To maintain their appearance and safety, be careful of the following:
1) Do not damage the aluminum wheels during removal, installation, wheel balancing, etc. After removing aluminum wheels, place them on a rubber mat etc.
2) When washing the aluminum wheel, use neutral synthetic detergent and water. Avoid using the cleanser including abrasive, hard brushes or an automatic car washer.

4. Wheel Balancing

A: ADJUSTMENT

NOTE:
The balance weight for the outside of the wheel uses an adhesive type weight. Change the setting of the wheel balancer to an adhesive type weight.

1) Remove the balance weights.

CAUTION:
• Be careful not to damage the wheel.
• Completely remove the double–sided tape of the adhesive type weight from the wheel.

2) Using the wheel balancer, measure wheel balance.
3) Select a weight close to the value measured by wheel balancer.

CAUTION:
Use SUBARU genuine balance weights.

Balance weight part number (Knock–on type weight for aluminum wheel)	Weight
23141GA462	5 g (0.18 oz)
23141GA472	10 g (0.35 oz)
23141GA482	15 g (0.53 oz)
23141GA492	20 g (0.71 oz)
23141GA502	25 g (0.88 oz)
23141GA512	30 g (1.06 oz)
23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50 g (1.76 oz)
23141GA562	55 g (1.94 oz)
23141GA572	60 g (2.12 oz)

Balance weight part number (Adhesive type weight for aluminum wheel)	Weight
28101AE00B	5 g (0.18 oz)
28101AE01B	7.5 g (0.26 oz)
28101AE02B	10 g (0.35 oz)
28101AE03B	12.5 g (0.44 oz)
28101AE04B	15 g (0.53 oz)
28101AE05B	17.5 g (0.62 oz)
28101AE06B	20 g (0.71 oz)
28101AE07B	22.5 g (0.79 oz)
28101AE08B	25 g (0.88 oz)
28101AE09B	27.5 g (0.97 oz)
28101AE10B	30 g (1.06 oz)
28101AE11B	32.5 g (1.15 oz)
28101AE12B	35 g (1.23 oz)
28101AE13B	37.5 g (1.32 oz)
28101AE14B	40 g (1.41 oz)

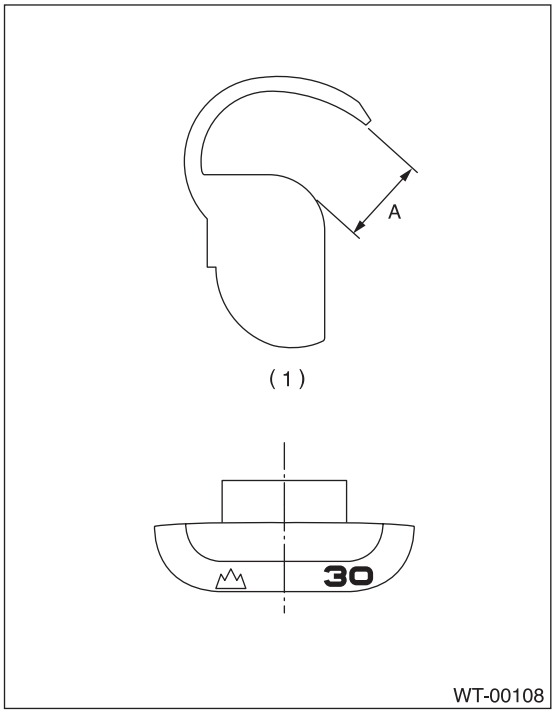
Balance weight part number (Adhesive type weight for aluminum wheel)	Weight
28101AE15B	42.5 g (1.50 oz)
28101AE16B	45 g (1.59 oz)
28101AE17B	47.5 g (1.68 oz)
28101AE18B	50 g (1.76 oz)
28101AE19B	52.5 g (1.85 oz)
28101AE20B	55 g (1.94 oz)
28101AE21B	57.5 g (2.03 oz)
28101AE22B	60 g (2.12 oz)
28101AE23B	62.5 g (2.20 oz)
28101AE24B	65 g (2.29 oz)
28101AE25B	67.5 g (2.38 oz)
28101AE26B	70 g (2.47 oz)
28101AE27B	72.5 g (2.56 oz)
28101AE28B	75 g (2.65 oz)
28101AE29B	77.5 g (2.73 oz)
28101AE30B	80 g (2.82 oz)
28101AE31B	82.5 g (2.91 oz)
28101AE32B	85 g (3.00 oz)
28101AE33B	87.5 g (3.09 oz)
28101AE34B	90 g (3.17 oz)
28101AE35B	92.5 g (3.26 oz)
28101AE36B	95 g (3.35 oz)
28101AE37B	97.5 g (3.44 oz)
28101AE38B	100 g (3.53 oz)
28101AG50B	102.5 g (3.62 oz)
28101AG51B	105 g (3.70 oz)
28101AG52B	107.5 g (3.79 oz)
28101AG53B	110 g (3.88 oz)
28101AG54B	112.5 g (3.97 oz)
28101AG55B	115 g (4.06 oz)
28101AG56B	117.5 g (4.14 oz)
28101AG57B	120 g (4.23 oz)

4) Install the selected weight to the point designated by the wheel balancer.

CAUTION:
• Remove grease from adhesive type weight applying surface of wheel.
• Press the adhesive type weight by 25 N (2.5 kgf, 5.6 lb) or more per 5 g (0.18 oz) for more then 2 seconds and attain full adhesion.
• The total weight of all adhesive weight on models with transmitters (tire pressure sensor) is to be 120 g (4.23 oz) or less.

5) Using the wheel balancer, measure the wheel balance again. Check that wheel balance is correctly adjusted.

NOTE:
Knock-on type balance weights for aluminum wheels are available for use with any 15 to 18 inch wheels.



(1) Knock-on type weight for aluminum wheels

Service limit:
Knock-on type weight for aluminum wheels:
5—25 g (0.18—0.88 oz) 5.0 mm (0.20 in)
30 g (1.06 oz) or more 4.5 mm (0.177 in)

5. "T–type" Tire

A: NOTE

"T–type" tire for temporary use is equipped as a spare tire.

CAUTION:
• Do not drive at a speed greater than 100 km/h (62 MPH).
• For the model with tire pressure monitoring system, the indicator light may blink when running with the "T-type" tire.

B: REPLACEMENT

Refer to Aluminum Wheels for removal and installation procedures of the "T–type". <Ref. to WT-7, REMOVAL, Aluminum Wheel.>

CAUTION:
The "T–type" tire is only for temporary use. Replace with a conventional tire as soon as possible.

C: INSPECTION

1) Check the tire air pressure.

Specifications:
420 kPa (4.2 kg/cm^2, 60 psi)

2) Take stones, glass, nails, etc. out of the tread groove.
3) Check the tires for deformation, cracks, partial wear, or wear.

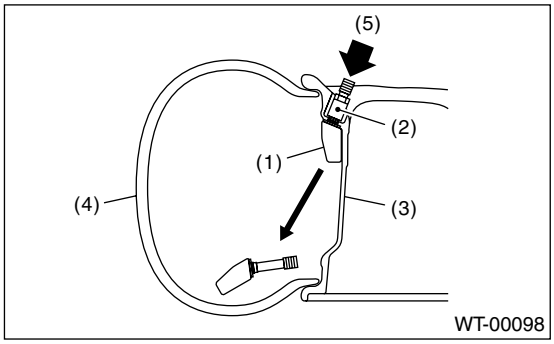
CAUTION:
Replace the tire with a new one if defective.

6. Tire Pressure Monitoring System

A: REMOVAL

1. TRANSMITTER (TIRE PRESSURE SENSOR)

1) Remove the wheels from the vehicle. <Ref. to WT-7, REMOVAL, Aluminum Wheel.>
2) Bleed air from tire valve.
3) Remove the nut, and drop the transmitter in the tire.



(1) Transmitter
(2) Nut
(3) Wheel
(4) TIRE
(5) Push

4) Remove the tires from wheels.

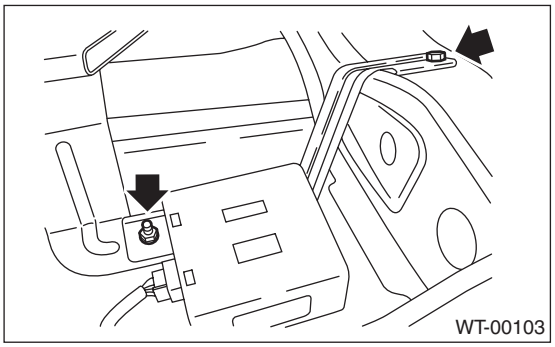
CAUTION:
Use a tire changer when removing the tire from the wheel.

5) Remove the nut to take out transmitter.

NOTE:
Replace the grommet with a new one when reusing transmitter.

2. TIRE PRESSURE MONITORING CONTROL MODULE

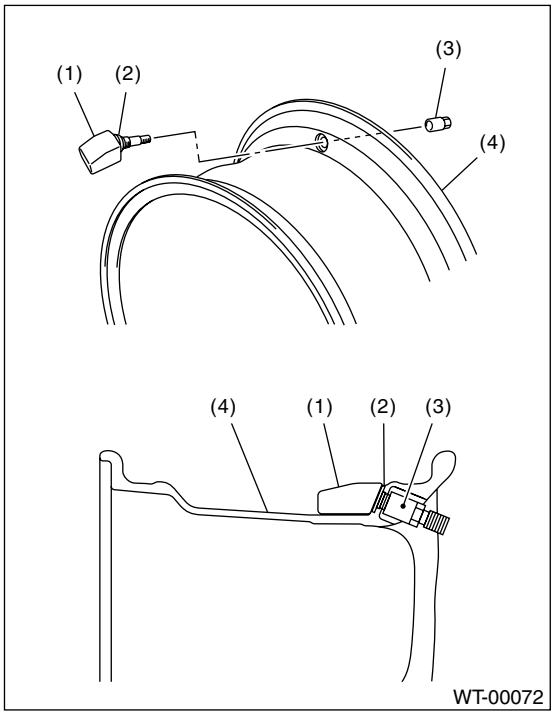
1) Remove the driver's seat. <Ref. to SE-7, REMOVAL, Front Seat.>
2) Turn up the floor mat in the driver's seat area.
3) Remove the connector to remove tire pressure monitoring control module.



B: INSTALLATION

1. TRANSMITTER (TIRE PRESSURE SENSOR)

1) Install the transmitter to the wheel by aligning it with valve hole, and then tighten with nuts.

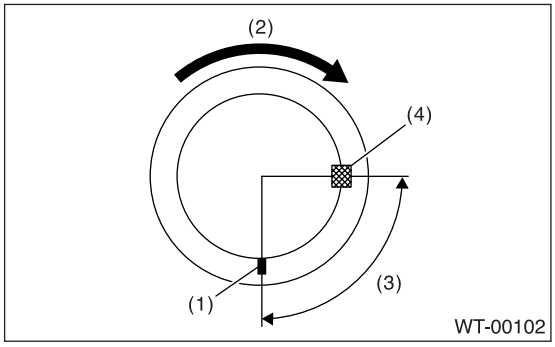


(1) Transmitter
(2) Grommet
(3) Nut
(4) Wheel

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

2) 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) Turn table rotation direction
(3) 90°
(4) Tire changer boom

3) Install the wheels to vehicle. <Ref. to WT-7, INSTALLATION, Aluminum Wheel.>
4) Register the transmitter ID to the tire pressure monitoring control module. <Ref. to TPM(diag)-9, REGISTER TRANSMITTER ID, OPERATION, Subaru Select Monitor.>

2. TIRE PRESSURE MONITORING CONTROL MODULE

Install in the reverse order of removal.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

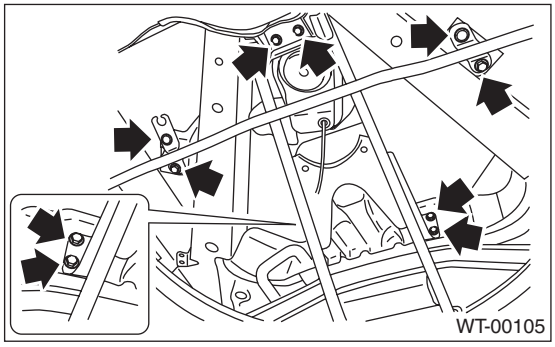
C: ADJUSTMENT

Re-register the transmitter ID when transmitter has been replaced or tires have been rotated. <Ref. to TPM(diag)-9, REGISTER TRANSMITTER ID, OPERATION, Subaru Select Monitor.>

7. Spare Tire Hoist

A: REMOVAL

1) Remove the spare tire from the vehicle.
2) Lift-up the vehicle.
3) Remove the spare tire guide.



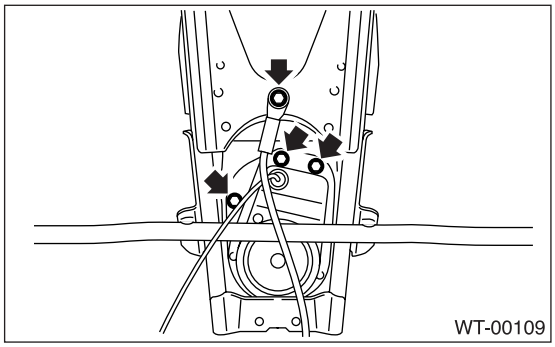
B: INSTALLATION

Install 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 in the reverse order of disassembly.

Tightening torque:
33 N·m (3.7 kgf-m, 24.3 ft-lb)

8. General Diagnostic Table

A: INSPECTION

Symptom	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-21, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-12, 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-20, INSPECTION, Front Hub Unit Bearing.>
	Rear hub unit bearing	Check the rear hub unit bearing. <Ref. to DS-23, 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-14, 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-8, ADJUSTMENT, Wheel Balancing.>
	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-20, INSPECTION, Front Hub Unit Bearing.>
	Rear hub unit bearing	Check the rear hub unit bearing. <Ref. to DS-23, 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-8, ADJUSTMENT, Wheel Balancing.>
	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.>

1. General Description

A: SPECIFICATION

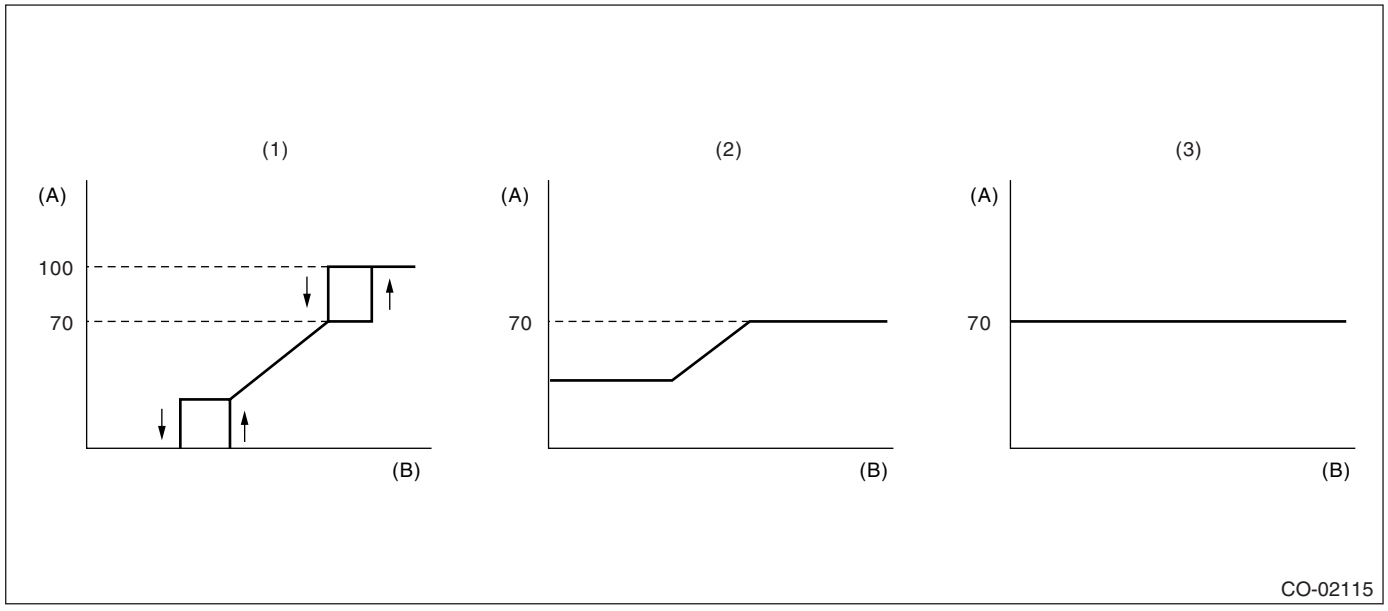
Cooling system			Electric fan + Forced engine coolant circulation system
Total engine coolant capacity		ℓ (US qt, Imp qt)	Approx. 7.2 (7.6, 6.3)
Water pump	Type		Centrifugal impeller type
	Discharge performance I	Discharge rate ℓ (US gal, Imp gal)/min	320 (84.5, 70.4)
		Pump speed — Discharge pressure	5,500 rpm — 176.5 kPa (5.0 mAq)
		Engine coolant temperature	80°C (176°F)
	Impeller diameter	mm (in)	73.2 (2.88)
	Number of impeller vanes		6
	Number of pump sprocket teeth		22
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	160
		Sub fan W	160
	Fan diameter / Blade	Main fan	320 mm (12.60 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^2, psi)	Above: 108±15 (1.1±0.15, 16±2) Below: The atmospheric pressure or less
	Fins		Corrugated fin type
Reservoir tank	Capacity	ℓ (US qt, Imp qt)	0.45 (0.48, 0.40)

• 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: 95 — 101°C (203 — 214°F) Decrease: 92 — 99°C (198 — 210°F)	Increase: more than 102°C (216°F) Decrease: more than 100°C (212°F)
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%

- **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: more than 102°C (216°F) Decrease: more than 100°C (212°F)
Driving speed 19 km/h (12 MPH) or less Driving speed 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%



(A) Fan speed (%)

(B) Water temperature

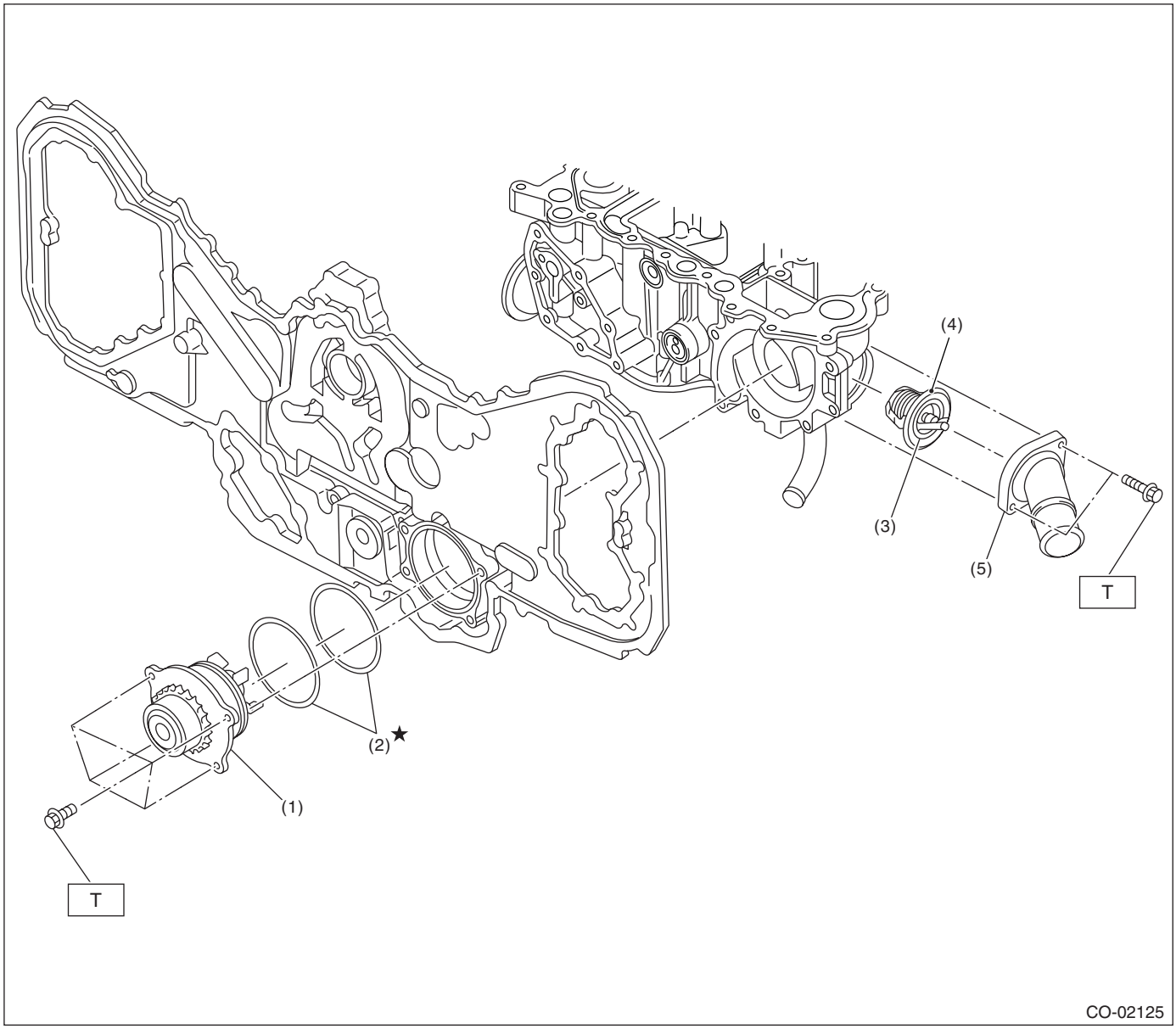
(1) A/C OFF control

(2) A/C ON control (A/C middle pressure switch OFF)

(3) A/C ON control (A/C middle pressure switch ON)

B: COMPONENT

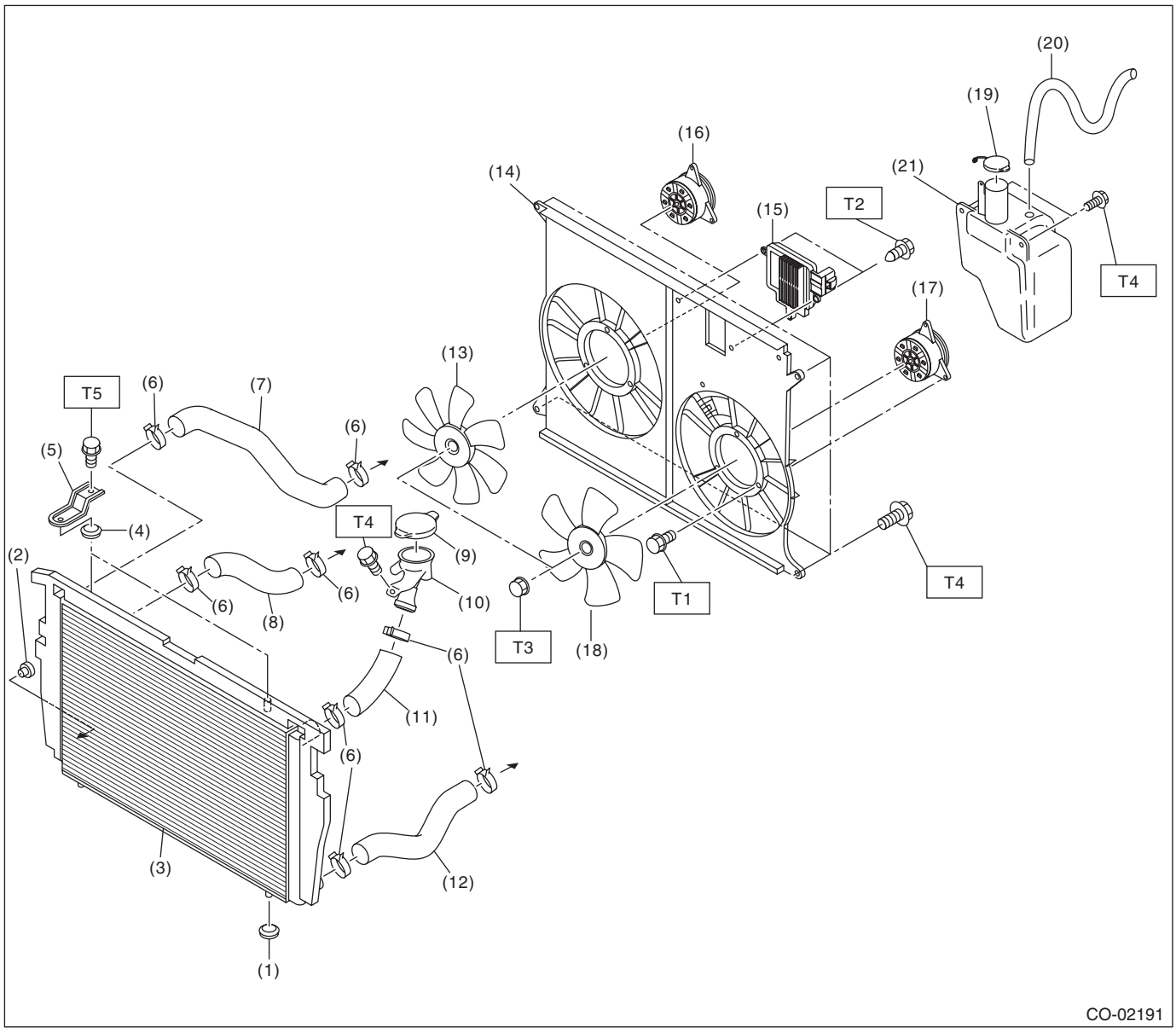
1. WATER PUMP



(1) Water pump ASSY
(2) O-ring
(3) Thermostat
(4) Gasket
(5) Thermostat cover

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

2. RADIATOR AND RADIATOR FAN



(1) Radiator lower cushion
(2) Engine coolant drain cock
(3) Radiator
(4) Radiator upper cushion
(5) Radiator upper bracket
(6) Clamp
(7) Radiator hose A
(8) Radiator hose B
(9) Radiator cap
(10) Radiator hose bracket
(11) Radiator hose B
(12) Radiator hose D
(13) Radiator sub fan
(14) Radiator fan shroud
(15) Radiator fan control unit
(16) Radiator sub fan motor
(17) Radiator main fan motor
(18) Radiator main fan
(19) Engine coolant reservoir tank cap
(20) Over flow hose
(21) Engine coolant reservoir tank

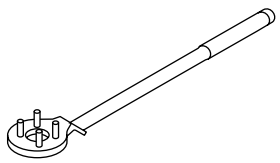
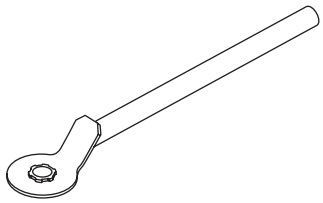
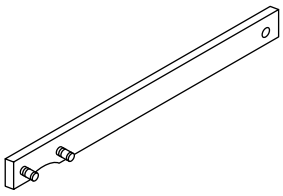
Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*3.8 (0.39, 2.8)*
T2:	*2.6 (0.27, 1.9)*
T3:	*6.3 (0.64, 4.6)*
T4:	*7.5 (0.76, 5.5)*
T5:	*12 (1.2, 8.9)*

C: CAUTION

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

D: PREPARATION TOOL

1. SPECIAL TOOL

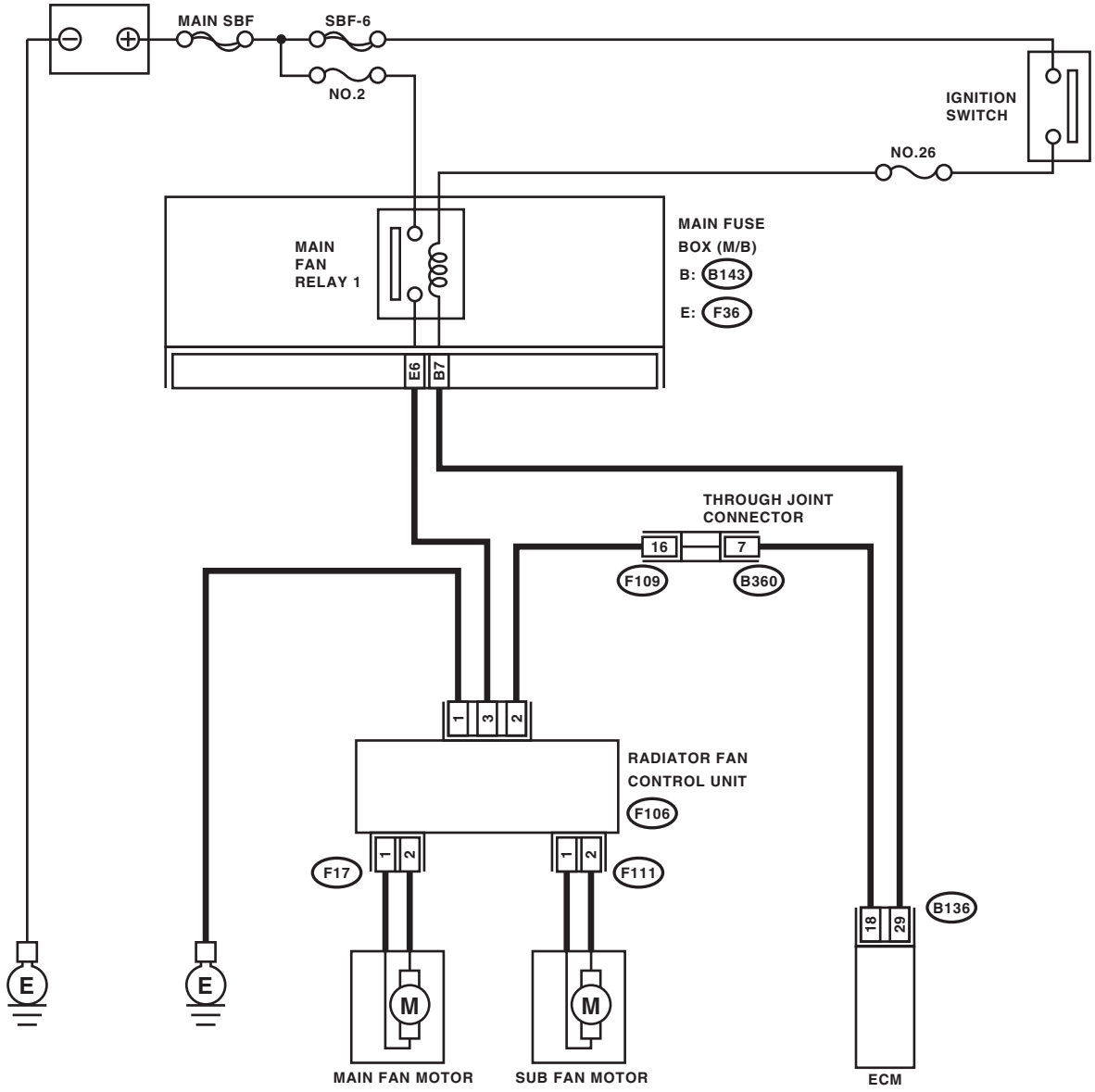
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolts.
 ST-499977500	499977500	CAM SPROCKET WRENCH	Used for removing and installing intake cam sprocket.
 ST18231AA020	18231AA020	CAM SPROCKET WRENCH	Used for removing and installing the exhaust cam sprocket.

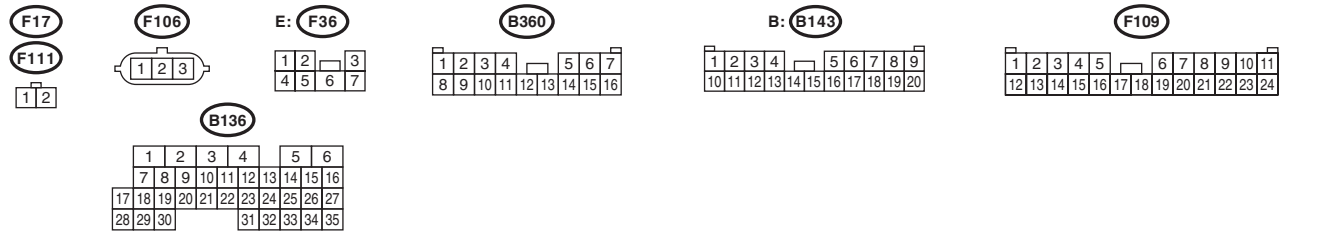
2. GENERAL TOOL

TOOL NAME	REMARKS
Radiator cap tester	Used for measuring pressure.

2. Radiator Fan System

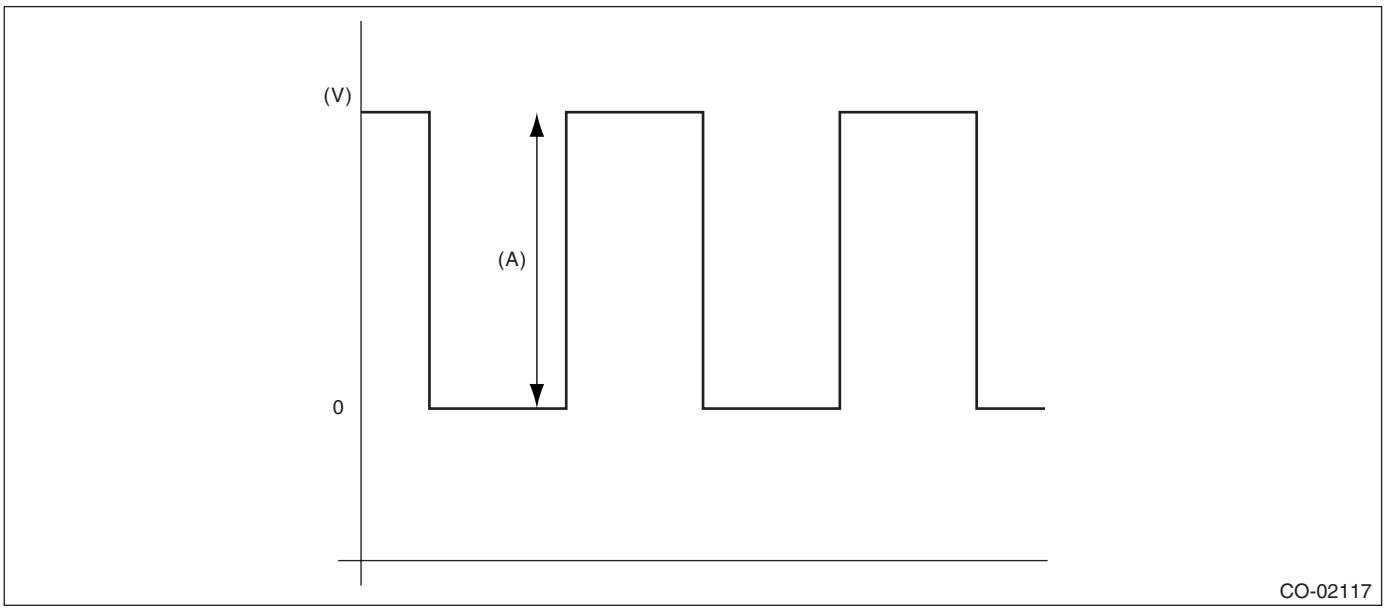
A: WIRING DIAGRAM





CO-02209

B: RADIATOR FAN CONTROL OUTPUT WAVEFORM



(A) 5 V

C: INSPECTION

DETECTING CONDITION:

- Engine coolant temperature is more than 95°C (203°F).
- A/C switch is turned OFF.
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOMS:

Radiator main fan and sub fan do not rotate under the above conditions.

	Step	Check	Yes	No
1	**CHECK MAIN FAN RELAY 1.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 1 from A/C relay holder. 3) Measure the resistance of terminal in main fan relay 1 switch.	Is the resistance more than 1 MΩ?	Go to step **2**.	Replace the main fan relay 1.
2	**CHECK MAIN FAN RELAY 1.** 1) Connect the battery to terminal of main fan relay 1 coil. 2) Measure the resistance between terminals of main fan relay 1 switch.	Is the resistance less than 1 Ω?	Go to step **3**.	Replace the main fan relay 1.
3	**CHECK POWER SUPPLY FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM. 3) Turn the ignition switch ON. 4) Measure the voltage between ECM terminal and chassis ground. ***Connector & terminal*** ***(B136) No. 29 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Repair the power supply line.

	Step	Check	Yes	No
4	**CHECK POWER SUPPLY FOR RADIATOR FAN CONTROL UNIT.** 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 ON. 5) Measure the voltage between radiator fan control unit terminal and chassis ground. ***Connector & terminal*** ***(F106) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5**.	Repair the power supply line.
5	**CHECK HARNESS BETWEEN ECM AND RADIATOR FAN CONTROL UNIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the ECM. 3) Measure the resistance between radiator fan control unit and ECM connector. ***Connector & terminal*** ***(B136) No. 18 — (F106) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between ECM and radiator fan control unit.
6	**CHECK RADIATOR FAN CONTROL UNIT AND GROUND CIRCUIT.** 1) Connect the connector to ECM and radiator fan control unit. 2) Measure the resistance between radiator fan control unit connector and chassis ground. ***Connector & terminal*** ***(F106) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **7**.	Repair the open circuit of harness between radiator fan control unit connector and chassis ground.
7	**CHECK MAIN FAN MOTOR.** 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.
8	**CHECK SUB FAN MOTOR.** 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.
9	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector. 3) Turn the ignition switch ON. 4) Check the output waveform using oscilloscope. <Ref. to CO(H6DO)-8, RADIATOR FAN CONTROL OUTPUT WAVEFORM, Radiator Fan System.> ***Connector & terminal*** ***(B134) No. 18 (+) — Chassis ground (–):***	Is waveform being output?	Replace the radiator fan control unit. <Ref. to CO(H6DO)-29, Radiator Fan Control Unit.>	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

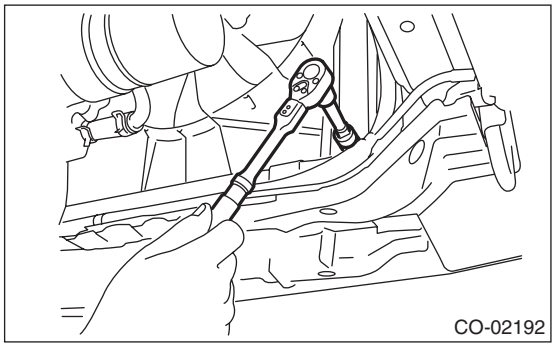
3. Engine Coolant

A: REPLACEMENT

1. DRAINING OF ENGINE COOLANT

1) Lift-up the vehicle.
2) Remove the 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.

2. FILLING OF ENGINE COOLANT

1) Pour cooling system conditioner through the filler neck.

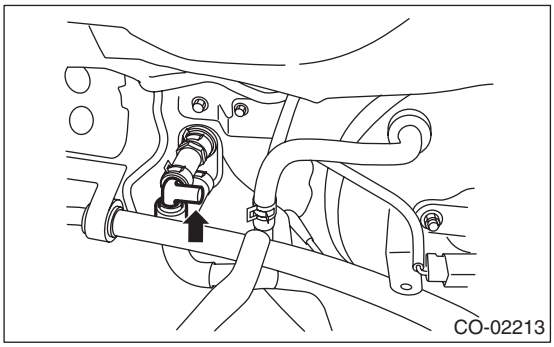
Cooling system protective agent:
COOLING SYSTEM CONDITIONER (Part No. SOA345001)

2) Pour engine coolant into the radiator up to the filler neck position.

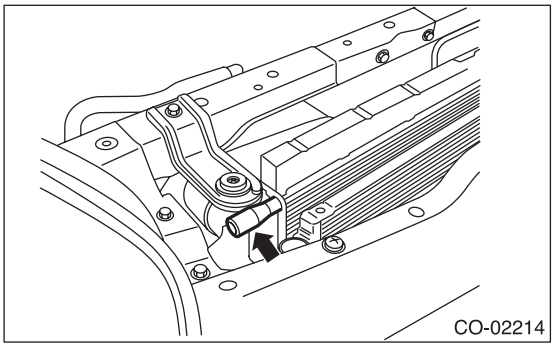
Coolant level:
Refer to "SPECIFICATION" for the engine coolant capacity. <Ref. to CO(H6DO)-2, SPECIFICATION, General Description.>

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

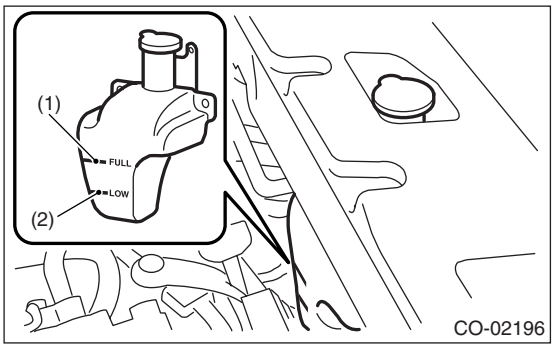
3) Open the air bleeding valve on the heater hose side.



4) If the engine coolant level drops, add engine coolant into radiator up to the filler neck position.
5) When engine coolant has come out from the air bleeding valve on the heater hose side, close the valve.
6) Open the air bleeding valve on the radiator side.



7) If the engine coolant level drops, add engine coolant into radiator up to the filler neck position.
8) When engine coolant has come out from the air bleeding valve on the radiator side, close the valve.
9) Fill engine coolant into the reservoir tank up to "FULL" level.



(1) FULL
(2) LOW

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

11) Wait for one minute after the engine stops, 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) Attach 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.

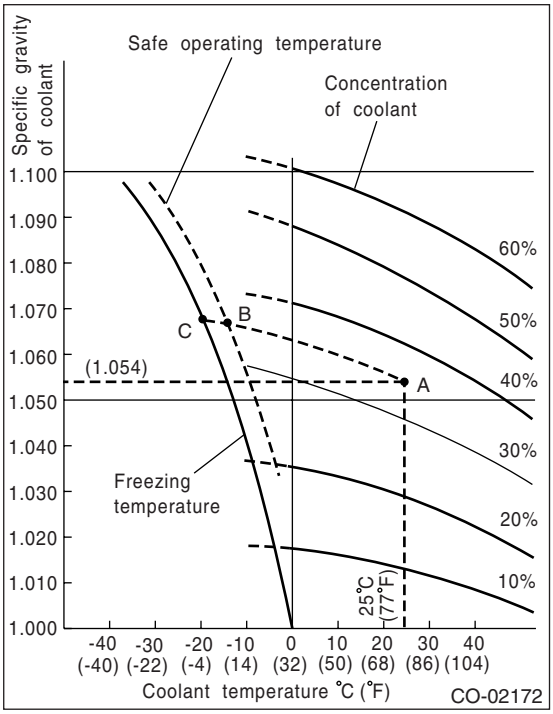
NOTE:
• Be careful with the engine coolant temperature gauge to prevent overheating.
• If the radiator hose becomes harden with the pressure of engine coolant, air bleeding operation seems to be almost completed.

16) Stop the engine and wait until the engine coolant temperature lowers to 30°C (86°F).
17) Open the radiator cap. If the engine coolant level drops, add engine coolant into radiator up to the filler neck position and reservoir tank to the "FULL" level.
18) Attach 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 less than 3,000 rpm. If the flowing sound is heard at this time, perform the procedures from 15) again.

B: INSPECTION

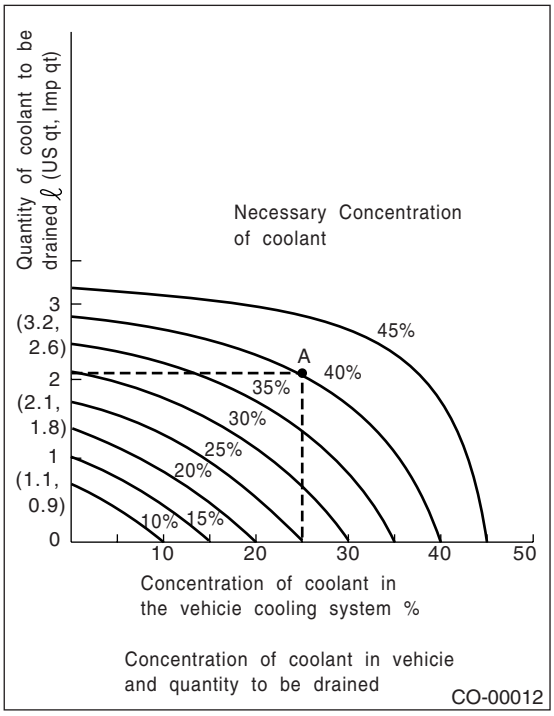
1. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERATURE

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



2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

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

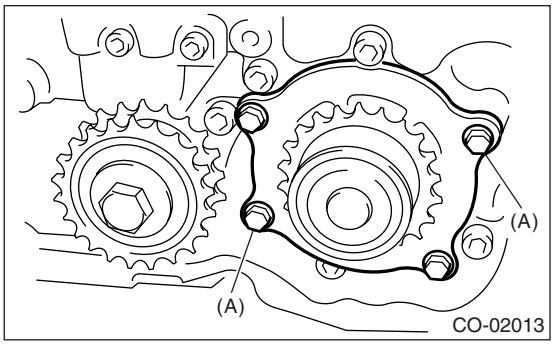


4. Water Pump

A: REMOVAL

1) Remove the radiator. <Ref. to CO(H6DO)-15, REMOVAL, Radiator.>
2) Remove the V-belts.
<Ref. to ME(H6DO)-31, REMOVAL, V-belt.>
3) Remove the front chain cover.
<Ref. to ME(H6DO)-42, REMOVAL, Front Chain Cover.>
4) Remove the timing chain assembly.
<Ref. to ME(H6DO)-44, REMOVAL, Timing Chain Assembly.>
5) Remove the water pump.

NOTE:
When the water pump cannot be removed easily, screw-in the bolt (A) to the threaded end to remove water pump.



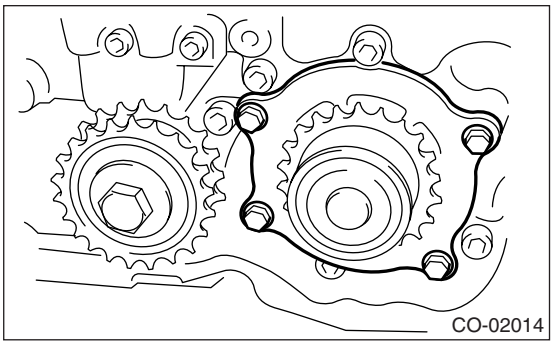
B: INSTALLATION

1) Install the water pump to rear chain cover.

NOTE:
Apply engine coolant to O-ring.

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

NOTE:
- Use new O-rings.
- Apply engine coolant to O-ring to install water pump easier.



2) Install the timing chain assembly.
<Ref. to ME(H6DO)-45, INSTALLATION, Timing Chain Assembly.>
3) Install the front chain cover.
<Ref. to ME(H6DO)-42, INSTALLATION, Front Chain Cover.>
4) Install the V-belts.
<Ref. to ME(H6DO)-31, INSTALLATION, V-belt.>
5) Install the radiator. <Ref. to CO(H6DO)-17, INSTALLATION, Radiator.>
6) Fill engine coolant. <Ref. to CO(H6DO)-10, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

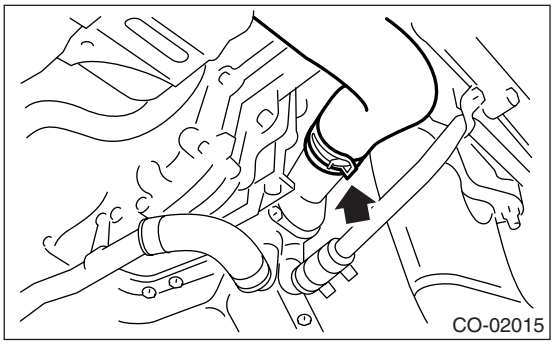
C: INSPECTION

1) Check the water pump bearing for smooth rotation.
2) Check the water pump sprocket for abnormalities.

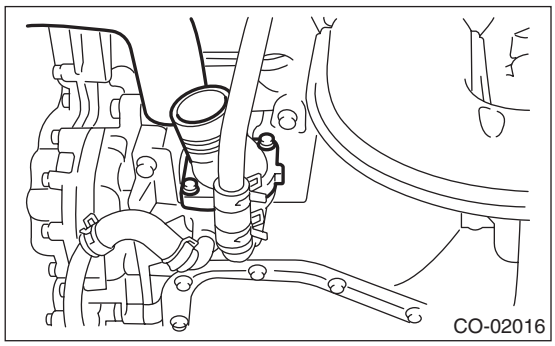
5. Thermostat

A: REMOVAL

1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Drain engine coolant completely.
<Ref. to CO(H6DO)-10, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
5) Disconnect the radiator hose from thermostat cover.



6) Remove the thermostat cover, and then remove the thermostat.



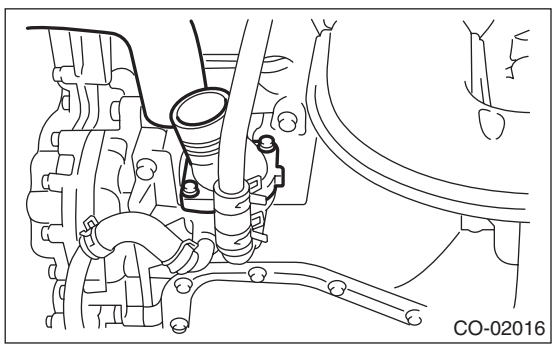
B: INSTALLATION

1) Install a gasket to thermostat.

NOTE:
Use a new gasket.

2) Install the thermostat and thermostat cover.

NOTE:
The thermostat must be installed with the jiggle pin facing to the up side.



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

3) Connect the radiator hose to thermostat cover.
4) Install the under cover.
5) Lower the vehicle.
6) Fill engine coolant. <Ref. to CO(H6DO)-10, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.

- Inspection method

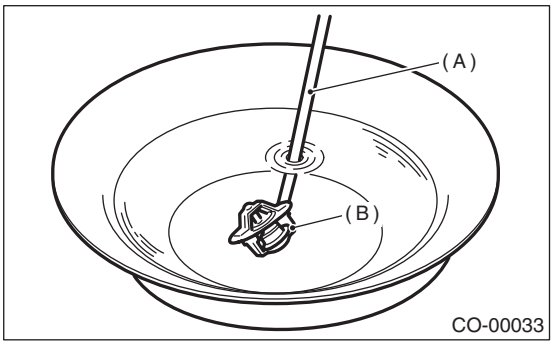
Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measured value should meet the specification.

Starting temperature to open:
80 — 84°C (176 — 183°F)

Fully opens:
95°C (203°F)

NOTE:
- Leave the thermostat in the boiling water for more than five minutes before measuring the valve lift.
- Hold the thermostat with a wire or the like to avoid contacting with container bottom.

Valve lift:
9.0 mm (0.354 in) or more



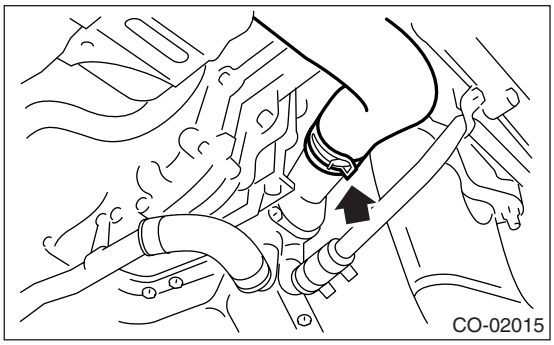
(A) Thermometer
(B) Thermostat

6. Radiator

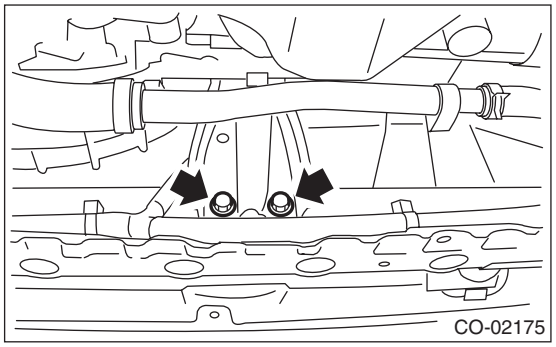
A: REMOVAL

WARNING:
The radiator is pressurized. Wait until engine cools down before working on the radiator.

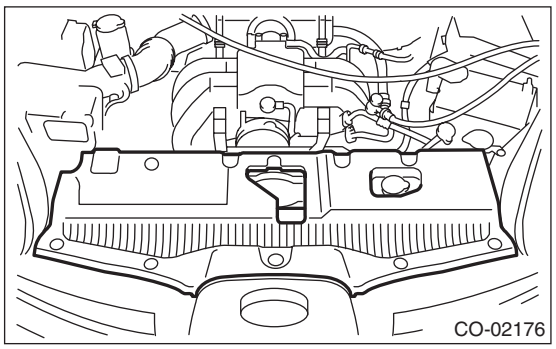
1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.
4) Lift-up the vehicle.
5) Remove the under cover.
6) Drain engine coolant completely.
<Ref. to CO(H6DO)-10, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
7) Disconnect the radiator hose from radiator.



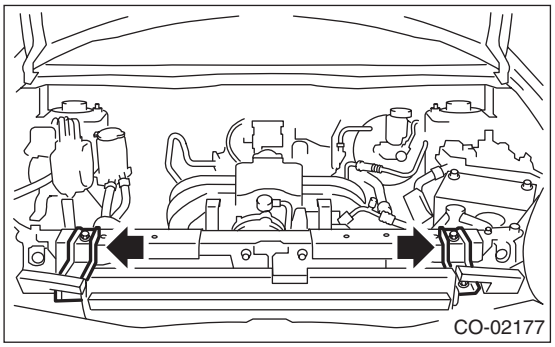
8) Remove the bolts on the underside of the radiator stay.



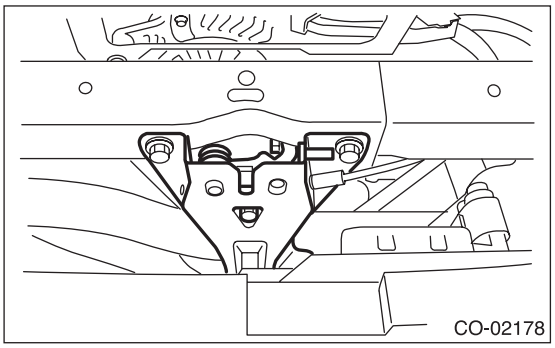
9) Lower the vehicle.
10) Remove the air intake duct. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
11) Remove the front upper cover.



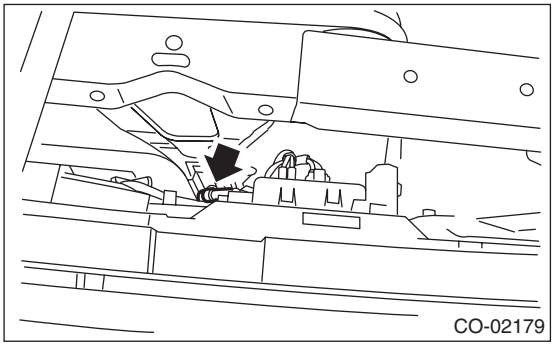
12) Remove the radiator upper brackets.



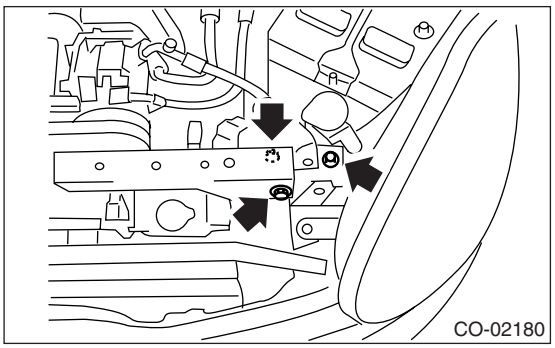
13) Remove the radiator stay.
(1) Remove the latch.



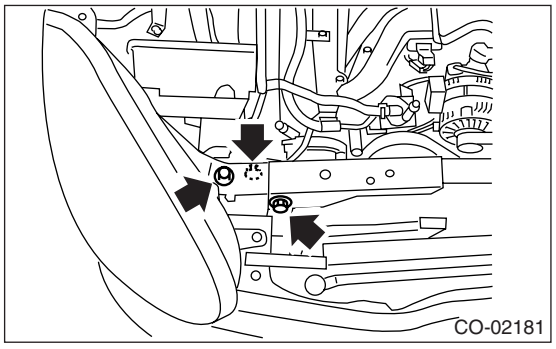
(2) Remove the radiator hose bracket.
(3) Remove the clip holding the harness.



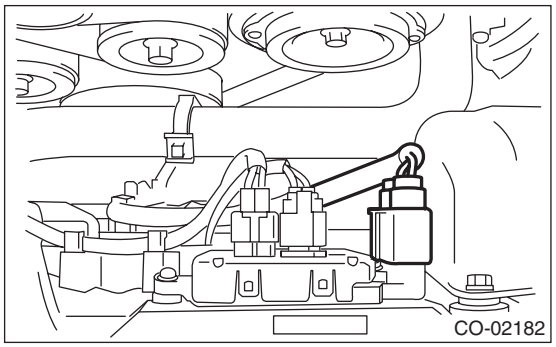
(4) Remove the bolts on the left side of the radiator stay.



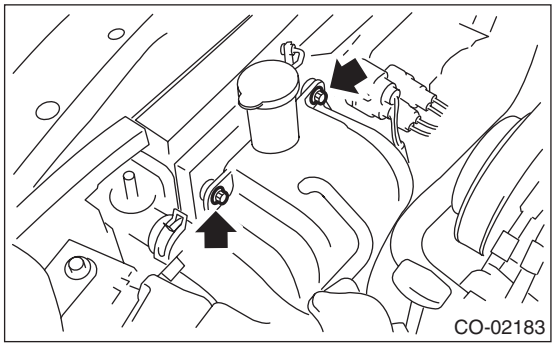
(5) Remove the bolts on the right side of the radiator stay.


CO-02181

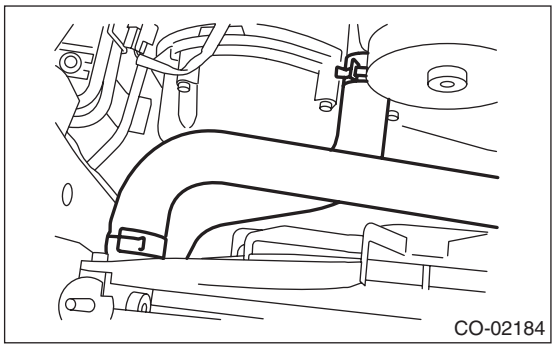
14) Disconnect the connector from radiator fan control unit.


CO-02182

15) Remove the reservoir tank.

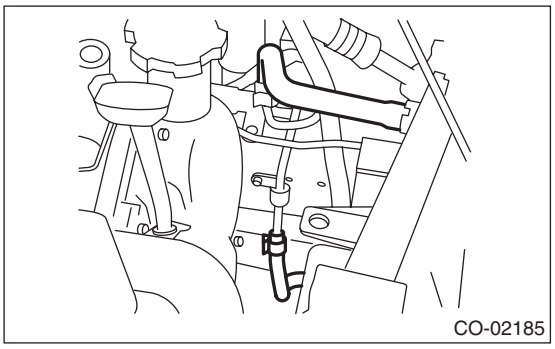

CO-02183

16) Disconnect the radiator hose from radiator.

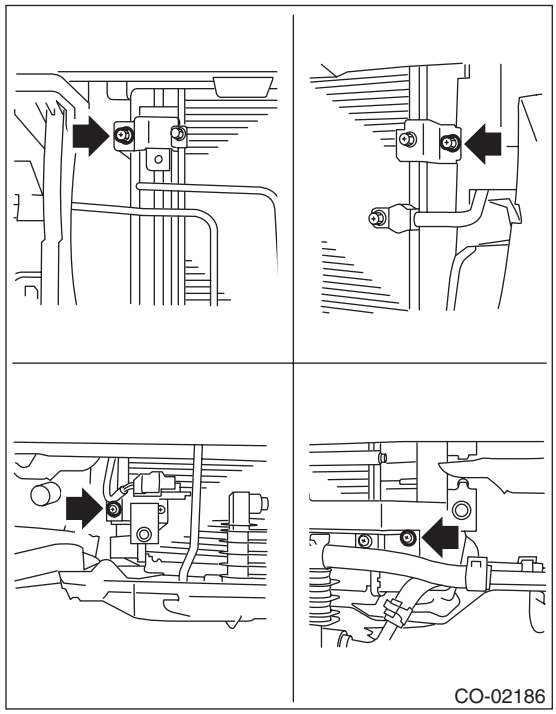

CO-02184

17) Disconnect the ATF cooler hose from the radiator.

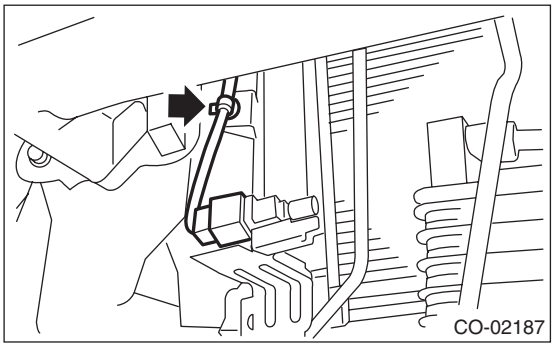
NOTE:
Plug the ATF pipe to prevent ATF leaks.


CO-02185

18) Remove the front bumper. <Ref. to EI-21, REMOVAL, Front Bumper.>
19) Remove the bolts which hold the radiator and condenser.


CO-02186

20) Remove the clip holding the ambient temperature sensor harness.


CO-02187

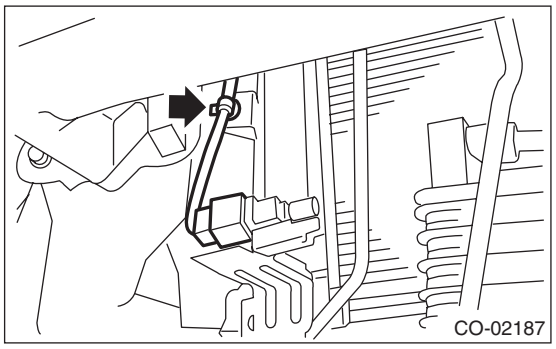
21) Lift the radiator up and away from vehicle.

B: INSTALLATION

1) Install the radiator lower cushion to the vehicle.
2) Install the radiator to vehicle.

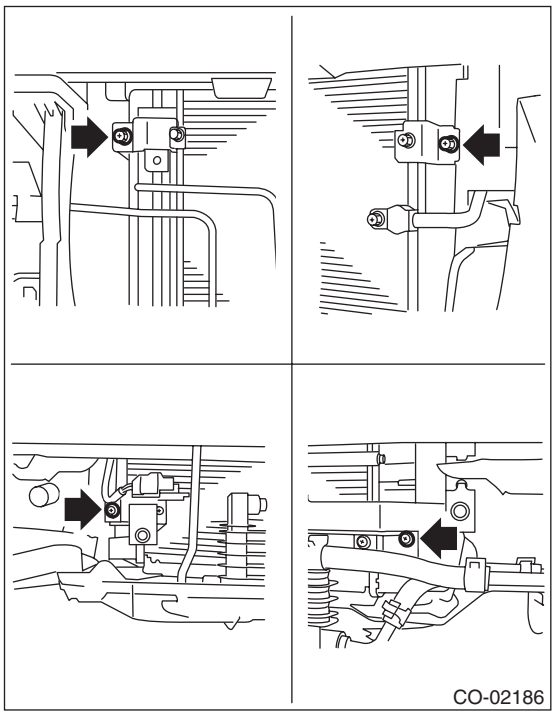
NOTE:
Insert the pins on the lower side of radiator into the radiator lower cushions on the vehicle side.

3) Hold the harness of the ambient temperature sensor with a clip.



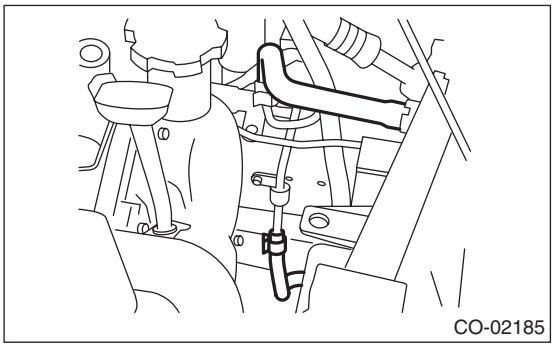
4) Hold the radiator and condenser with bolts.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

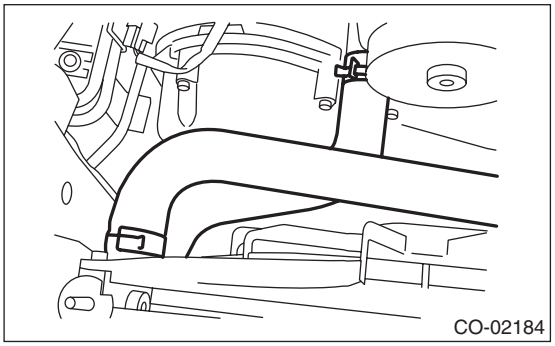


5) Install the front bumper. <Ref. to EI-22, INSTALLATION, Front Bumper.>

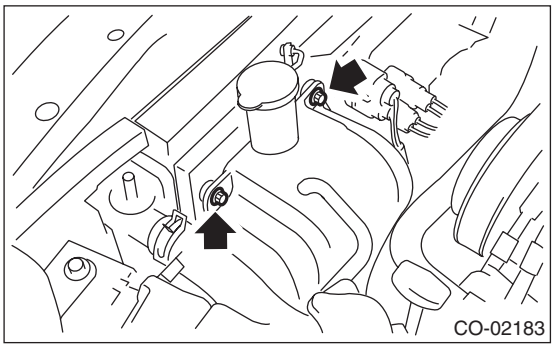
6) Connect the ATF cooler hoses.



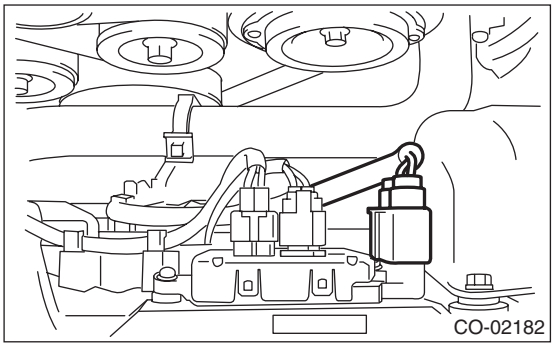
7) Connect the radiator hose.



8) Install the reservoir tank.

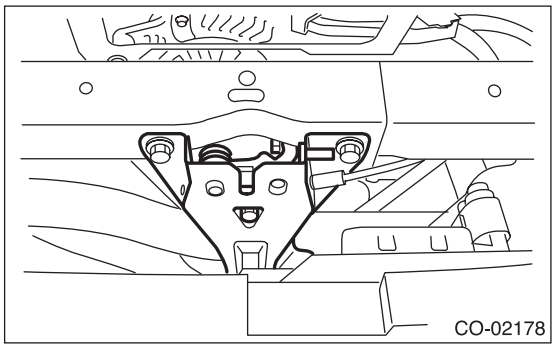


9) Connect the connector of the radiator fan control unit.

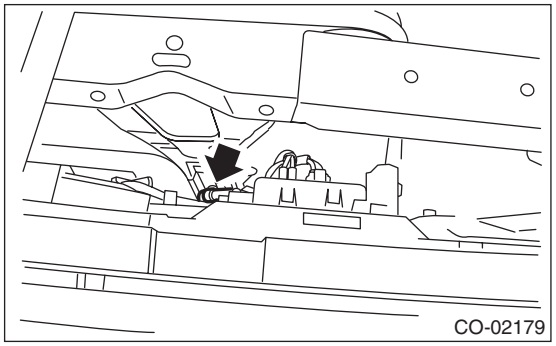


10) Install the radiator stay.
(1) Install the latch.

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

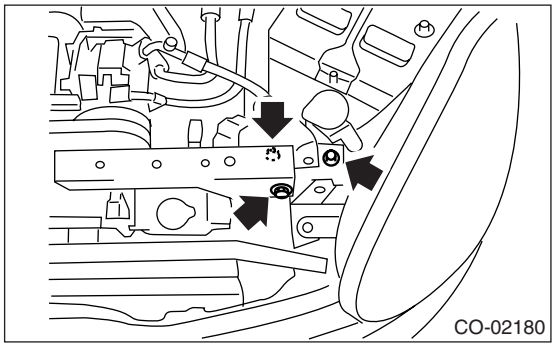


(2) Install the radiator hose bracket.
(3) Hold the harness to the radiator stay with a clip.



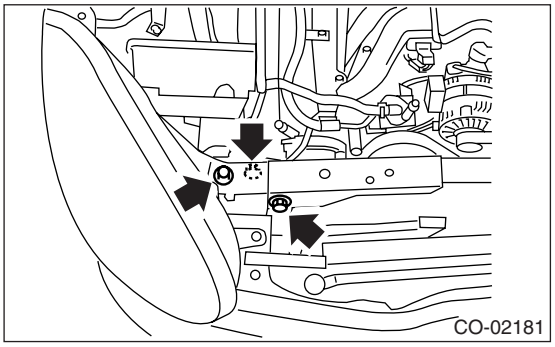
(4) Tighten the bolts on the left side of the radiator stay.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



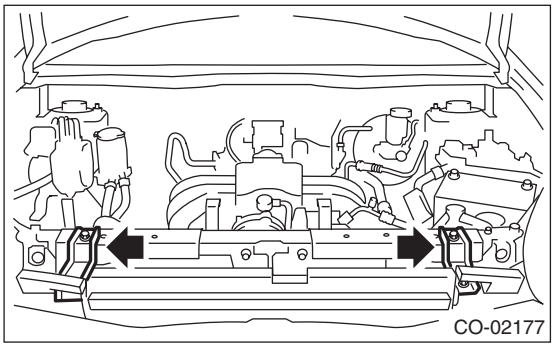
(5) Tighten the bolts on the right side of the radiator stay.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

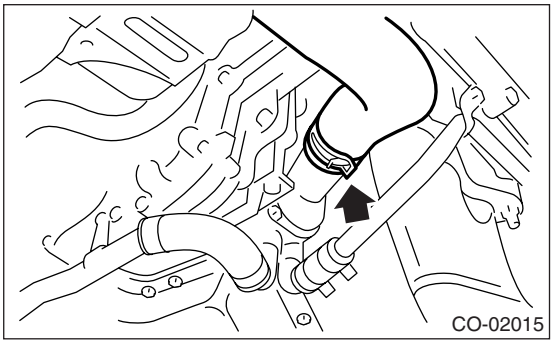


11) Install the radiator upper brackets.

Tightening torque:
12 N·m (1.2 kgf-m, 8.9 ft-lb)

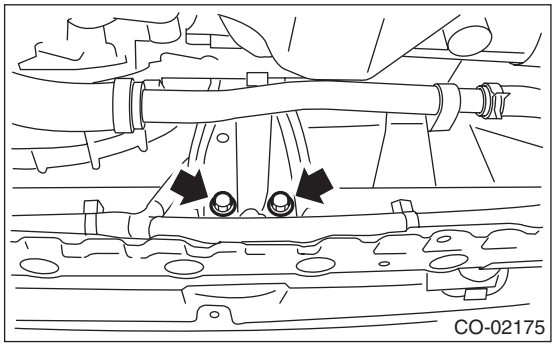


12) Lift-up the vehicle.
13) Connect the radiator hose.



14) Tighten the bolts on the lower side of the radiator stay.

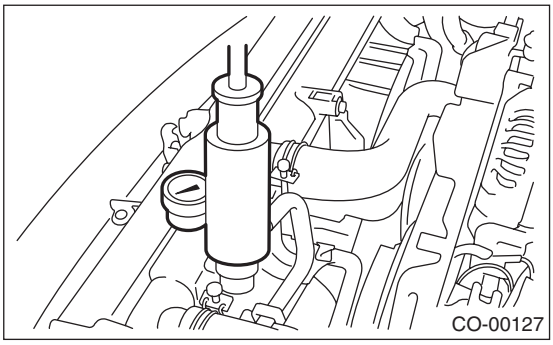
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



15) Lower the vehicle.
16) Connect the ground cable to battery.
17) Fill engine coolant.
<Ref. to CO(H6DO)-10, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
18) Check the ATF level and replenish it if necessary.
<Ref. to 5AT-26, INSPECTION, Automatic Transmission Fluid.>
19) Lift-up the vehicle.
20) Install the under cover.
21) Lower the vehicle.
22) Install the front upper cover.
23) Install the air intake duct. <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Duct.>
24) Install the collector cover.

C: INSPECTION

1) Remove the radiator cap, fill the radiator with engine coolant, and then install the tester to the installation position of cap.



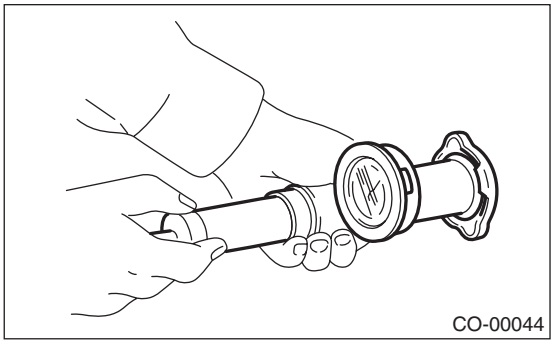
2) Apply a pressure of 157 kPa (1.6 kg/cm^2, 23 psi) to the radiator and check the following points:
- Leakage from the radiator or its vicinity
- Leakage from the hose or its connections

CAUTION:
- **Engine should be turned off.**
- **Wipe engine coolant from check points in advance.**
- **Be careful of the spurt of engine coolant when removing the tester.**
- **Be careful not to deform the filler neck of radiator when installing and removing the tester.**

7. Radiator Cap

A: INSPECTION

1) Attach the radiator cap to tester.



2) Increase pressure until the tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for five - six seconds.

Specified pressure:
93 — 123 kPa (0.95 — 1.25 kg/cm^2, 14 — 18 psi)

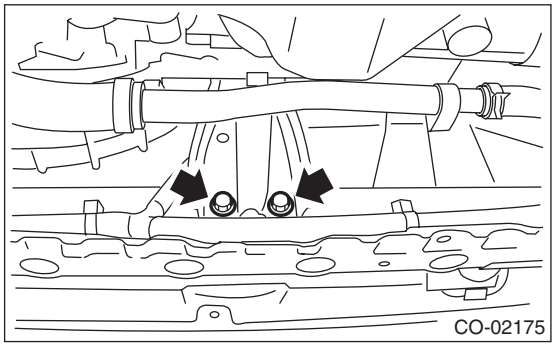
Service limit pressure:
83 kPa (0.85 kg/cm^2, 12 psi)

CAUTION:
Be sure to remove foreign matter and rust from the cap in advance. Otherwise, results of pressure test will be incorrect.

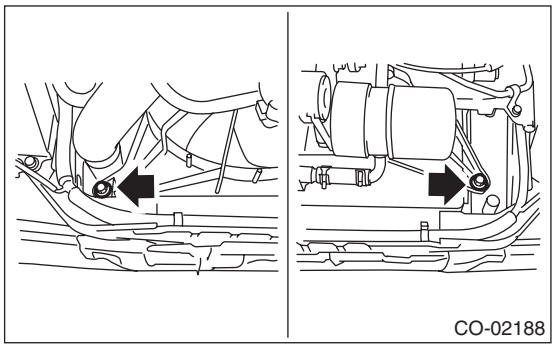
8. Radiator Main Fan and Fan Motor

A: REMOVAL

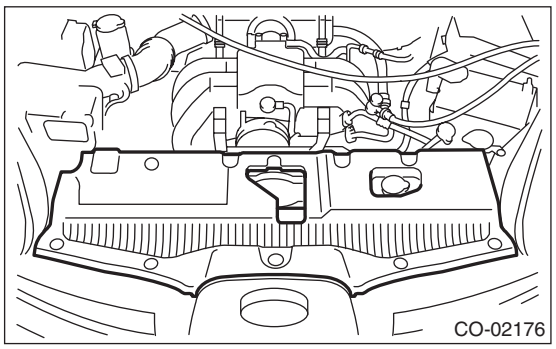
1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.
4) Lift-up the vehicle.
5) Remove the under cover.
6) Remove the bolts on the underside of the radiator stay.



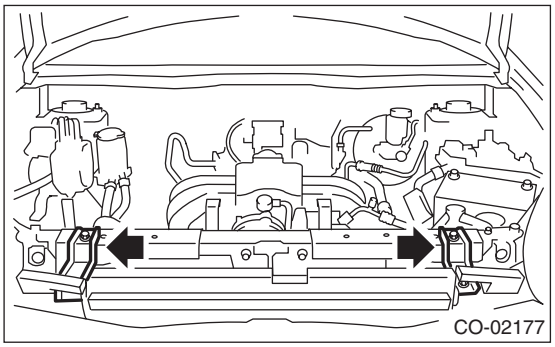
7) Remove the bolts on the underside of the radiator fan shroud.



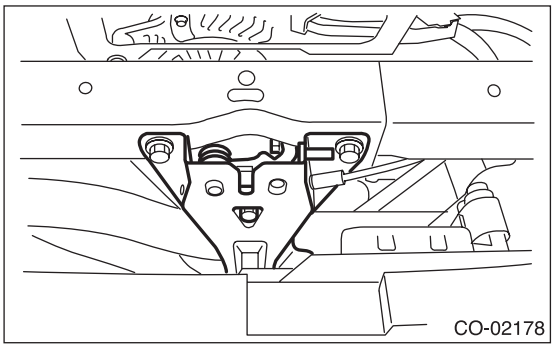
8) Lower the vehicle.
9) Remove the air intake duct. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
10) Remove the front upper cover.



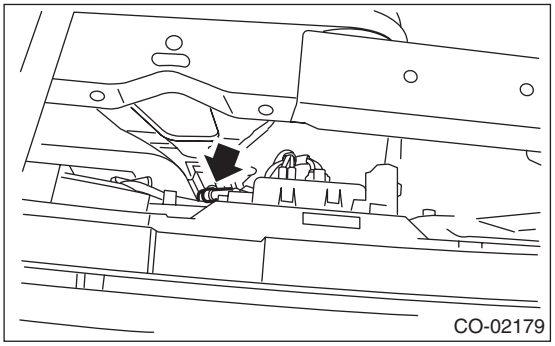
11) Remove the radiator upper brackets.



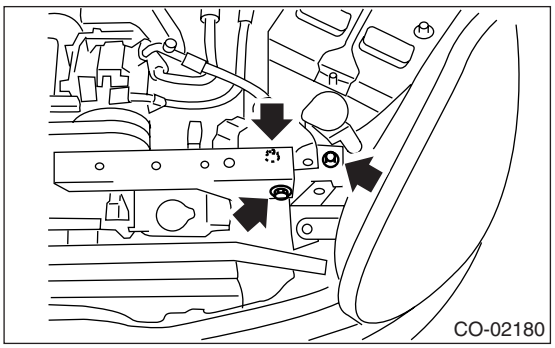
12) Remove the radiator stay.
(1) Remove the latch.



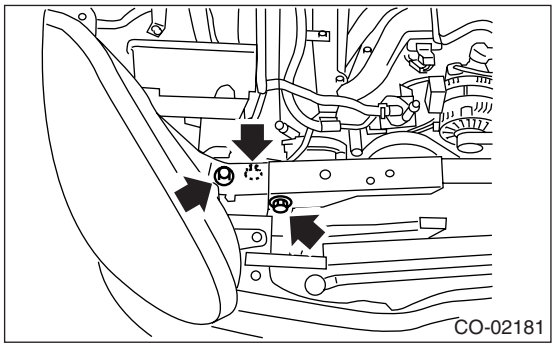
(2) Remove the radiator hose bracket.
(3) Remove the clip holding the harness.



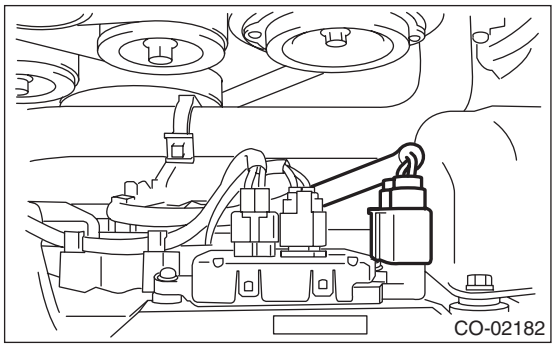
(4) Remove the bolts on the left side of the radiator stay.



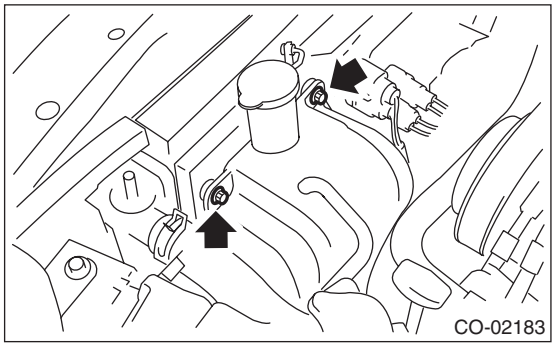
(5) Remove the bolts on the right side of the radiator stay.



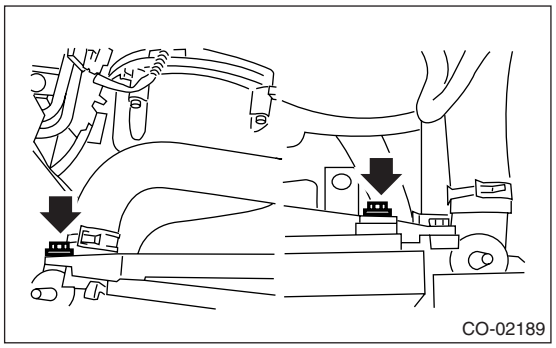
13) Disconnect the connector from radiator fan control unit.



14) Remove the reservoir tank.



15) Remove the bolts on the upper side of the radiator fan shroud.



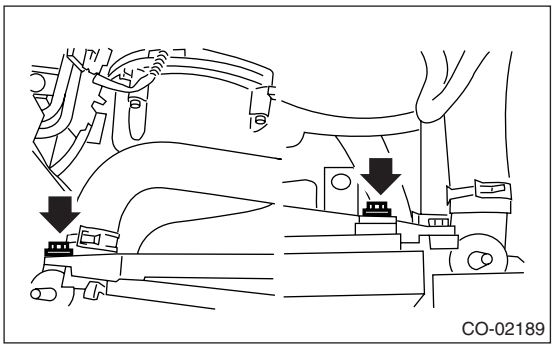
16) Remove the radiator fan shroud.

NOTE:
When pulling the radiator fan shroud up, be careful not to hit and damage the radiator and ATF hoses.

B: INSTALLATION

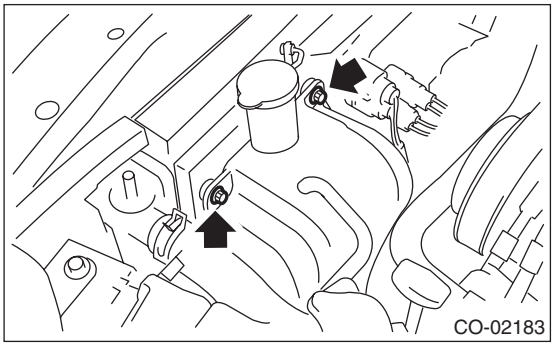
1) Tighten the bolts on the top side of the radiator fan shroud.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

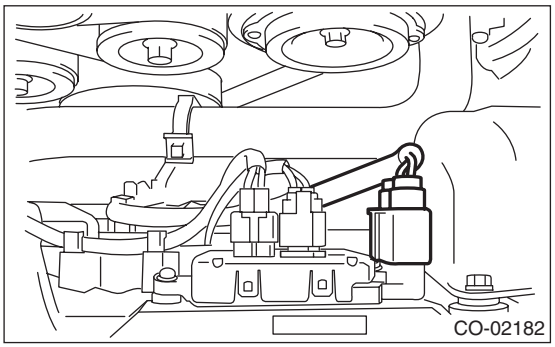


2) Install the reservoir tank.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

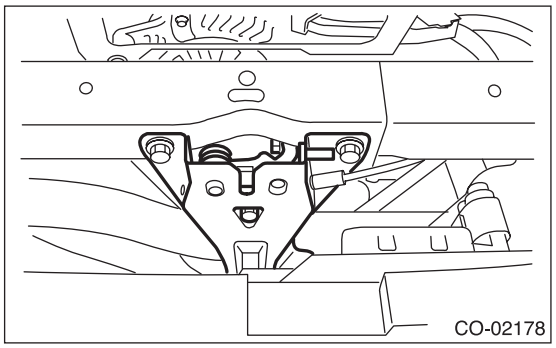


3) Connect the connector of the radiator fan control unit.

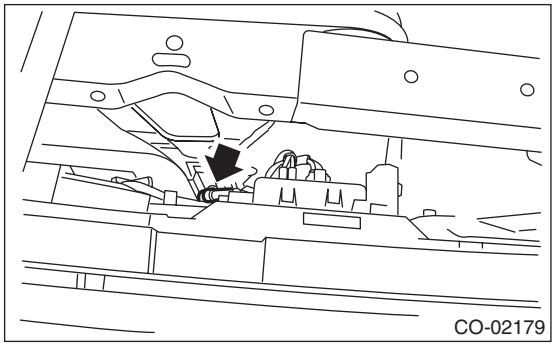


4) Install the radiator stay.
(1) Install the latch.

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

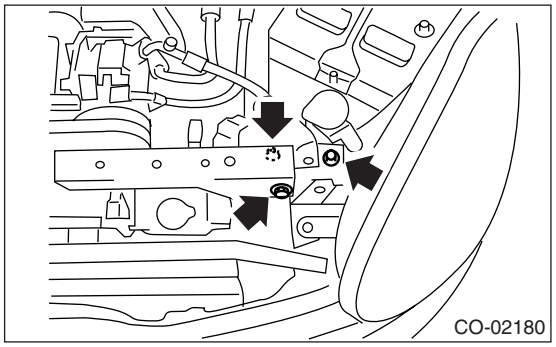


(2) Connect the radiator hose brackets.
(3) Hold the harness to the radiator stay with a clip.



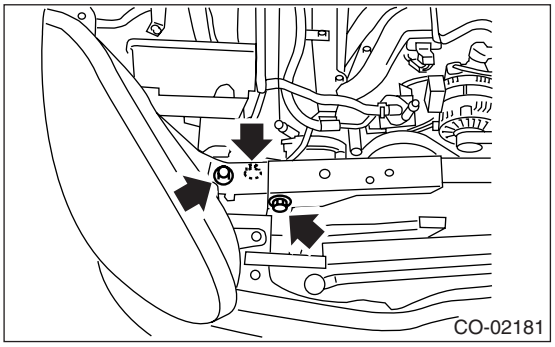
(4) Tighten the bolts on the left side of the radiator stay.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



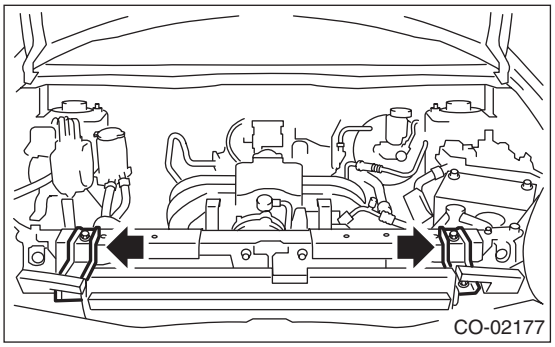
(5) Tighten the bolts on the right side of the radiator stay.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

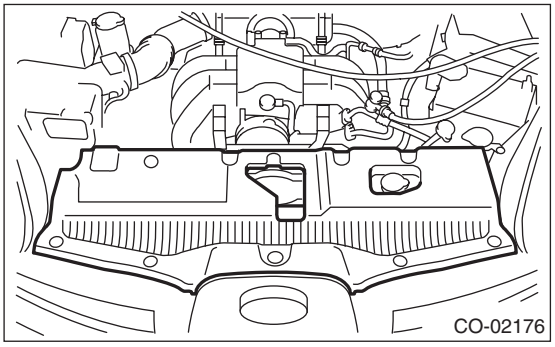


5) Install the radiator upper brackets.

Tightening torque:
12 N·m (1.2 kgf-m, 8.9 ft-lb)



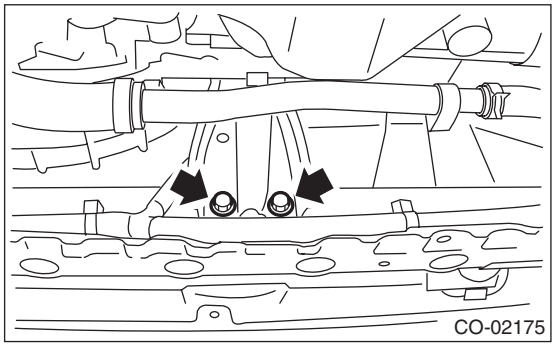
6) Install the front upper cover.



7) Install the air intake duct. <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Duct.>
8) Lift-up the vehicle.

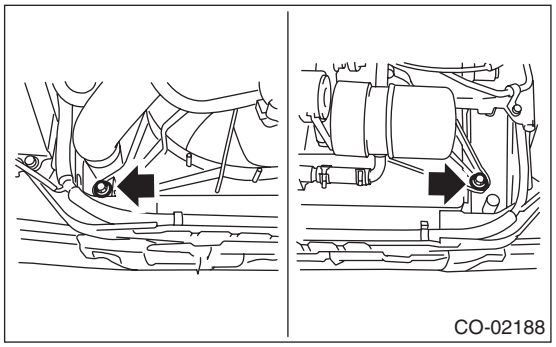
9) Tighten the bolts on the lower side of the radiator stay.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



10) Tighten the bolts on the lower side of the radiator fan shroud.

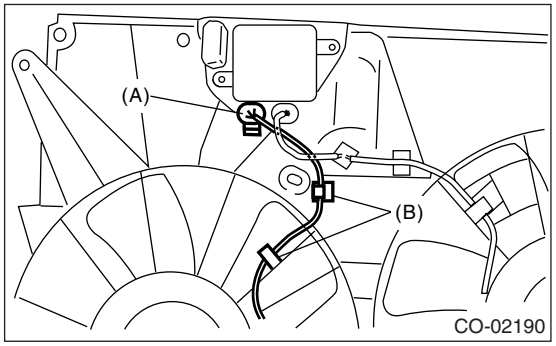
Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



11) Install the under cover.
12) Lower the vehicle.
13) Connect the ground cable to battery.
14) Install the collector cover.

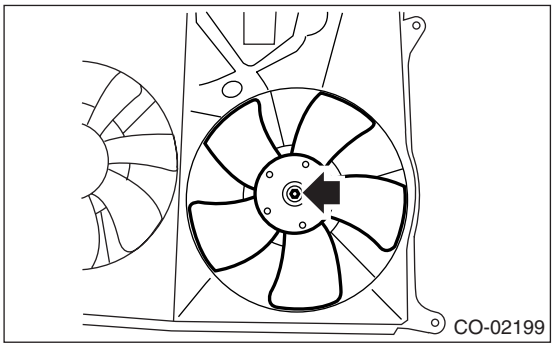
C: DISASSEMBLY

1) Disconnect the connector from radiator fan control unit.

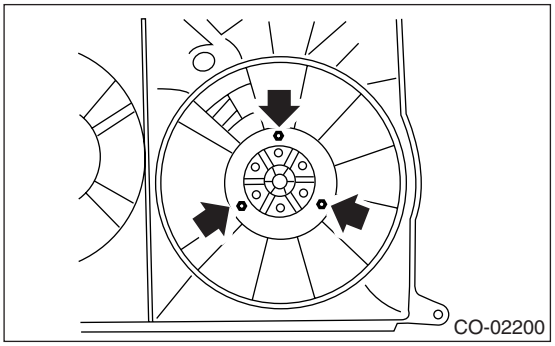


(A) Connector
(B) Clip

2) Remove the radiator main fan.



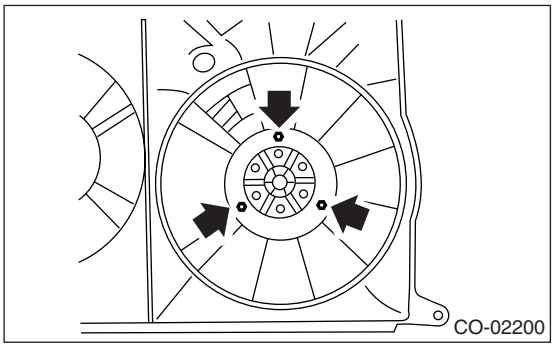
3) Remove the radiator main fan motor.



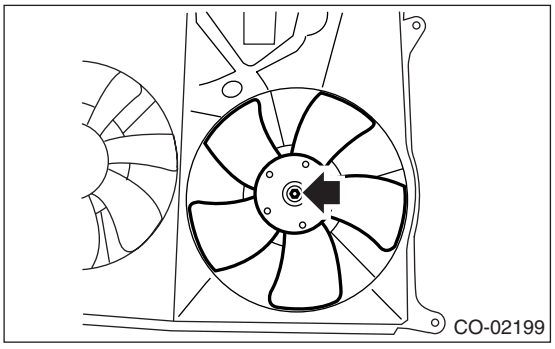
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
3.8 N·m (0.39 kgf-m, 2.8 ft-lb)



Tightening torque:
6.3 N·m (0.64 kgf-m, 4.6 ft-lb)



9. Radiator Sub Fan and Fan Motor

A: REMOVAL

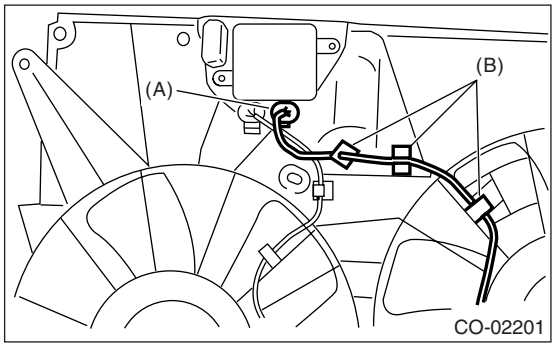
Refer to the radiator main fan & fan motor. <Ref. to CO(H6DO)-21, REMOVAL, Radiator Main Fan and Fan Motor.>

B: INSTALLATION

Refer to the radiator main fan & fan motor. <Ref. to CO(H6DO)-22, INSTALLATION, Radiator Main Fan and Fan Motor.>

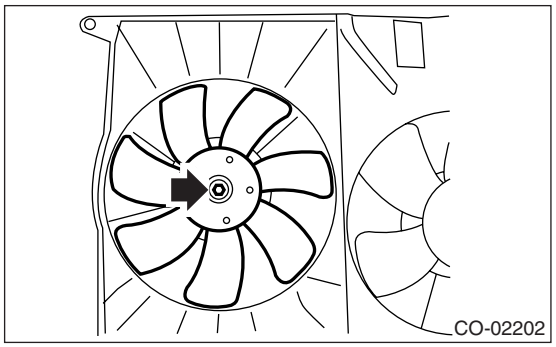
C: DISASSEMBLY

1) Disconnect the connector from radiator fan control unit.

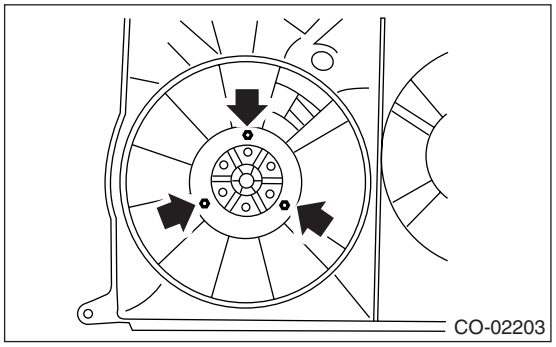


(A) Connector
(B) Clip

2) Remove the radiator sub fan.



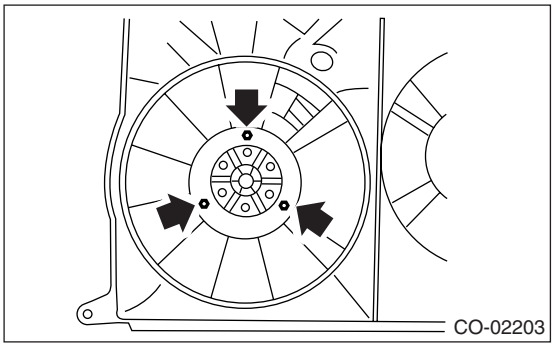
3) Remove the radiator sub fan motor.



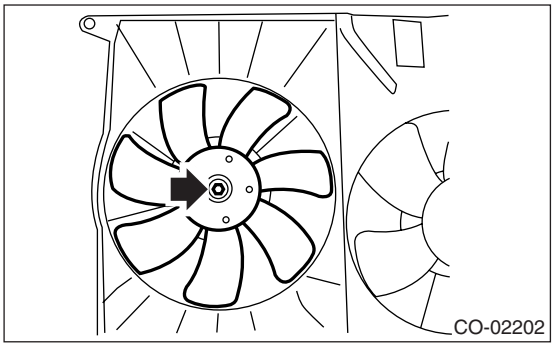
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
3.8 N·m (0.39 kgf-m, 2.8 ft-lb)



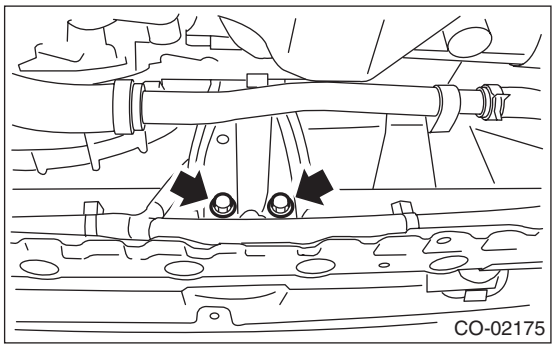
Tightening torque:
6.3 N·m (0.64 kgf-m, 4.6 ft-lb)



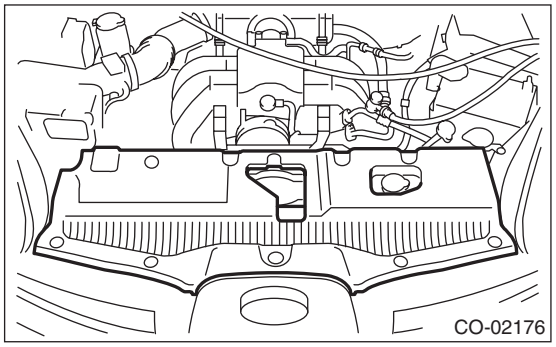
10.Reservoir Tank

A: REMOVAL

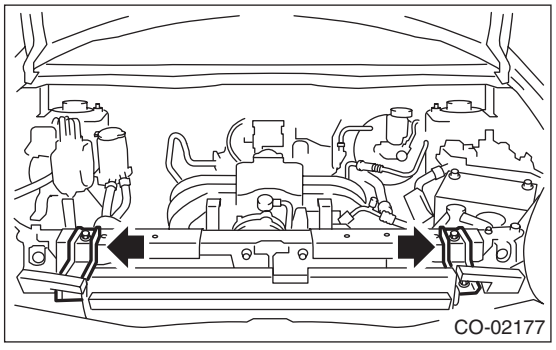
1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Lift-up the vehicle.
4) Remove the under cover.
5) Remove the bolts on the underside of the radiator stay.


CO-02175

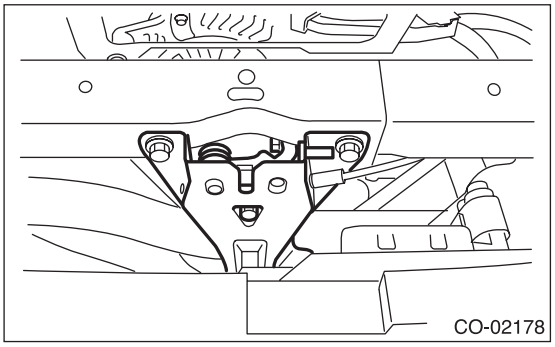
6) Lower the vehicle.
7) Remove the air intake duct. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
8) Remove the front upper cover.


CO-02176

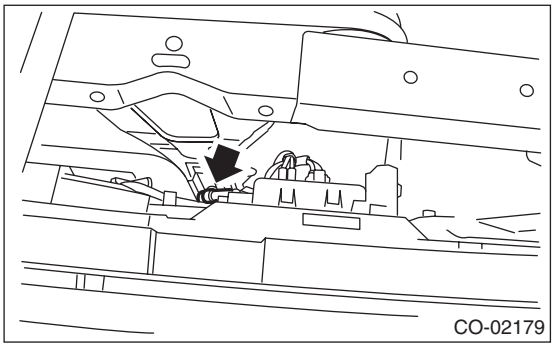
9) Remove the radiator upper brackets.


CO-02177

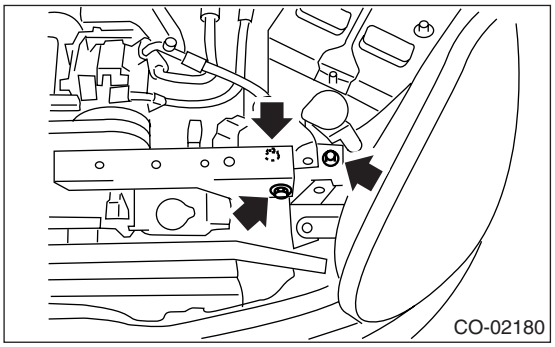
10) Remove the radiator stay.
(1) Remove the latch.


CO-02178

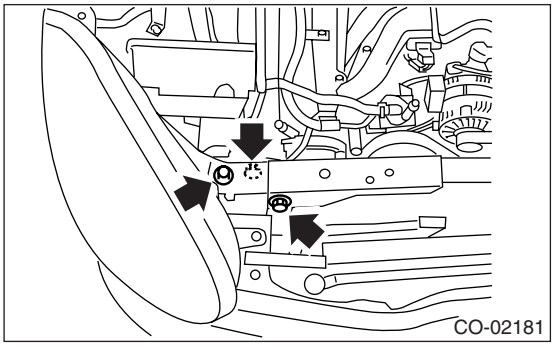
(2) Remove the radiator hose bracket.
(3) Remove the clip holding the harness.


CO-02179

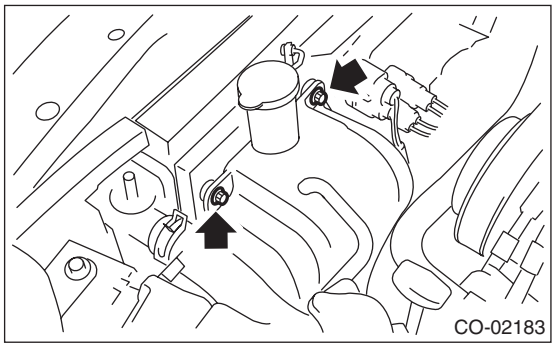
(4) Remove the bolts on the left side of the radiator stay.


CO-02180

(5) Remove the bolts on the right side of the radiator stay.


CO-02181

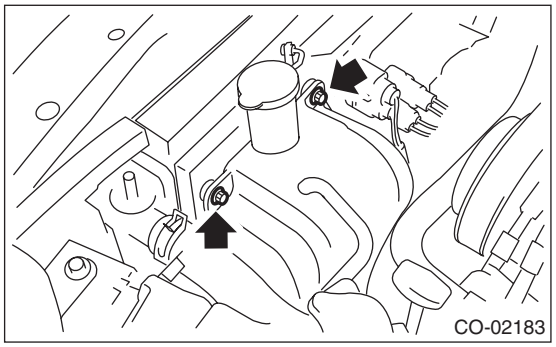
11) Remove the reservoir tank.



B: INSTALLATION

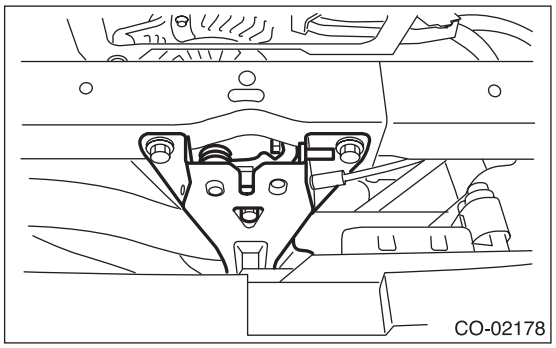
1) Install the reservoir tank.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



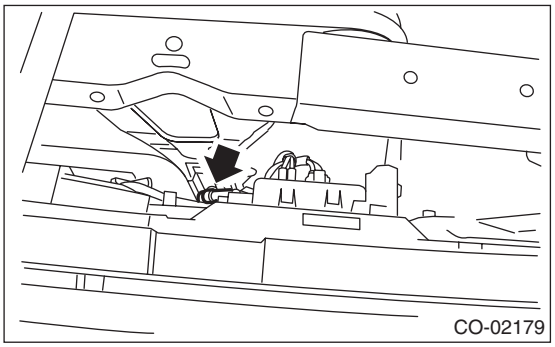
2) Install the radiator stay.
(1) Install the latch.

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



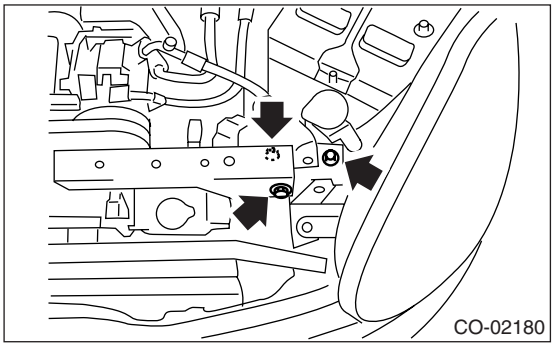
(2) Install the radiator hose bracket.

(3) Hold the harness to the radiator stay with a clip.



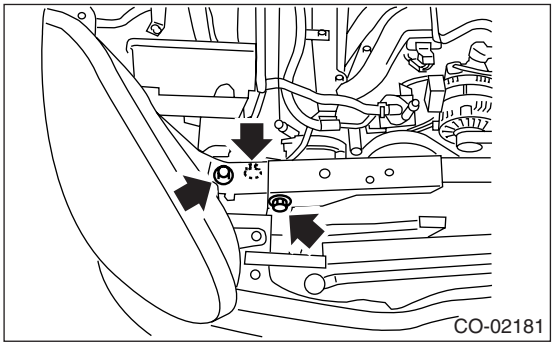
(4) Tighten the bolts on the left side of the radiator stay.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



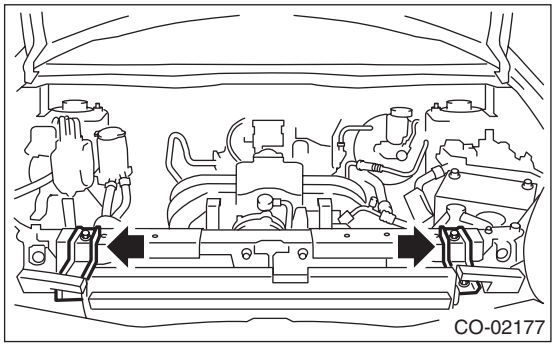
(5) Tighten the bolts on the right side of the radiator stay.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

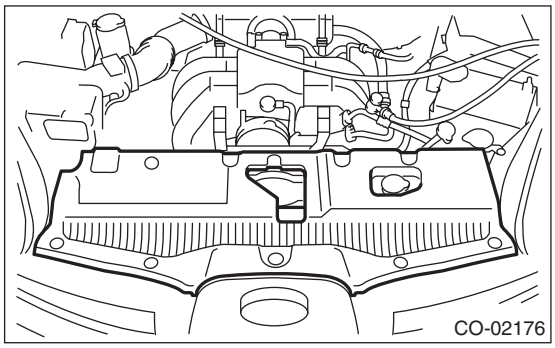


3) Install the radiator upper brackets.

Tightening torque:
12 N·m (1.2 kgf-m, 8.9 ft-lb)

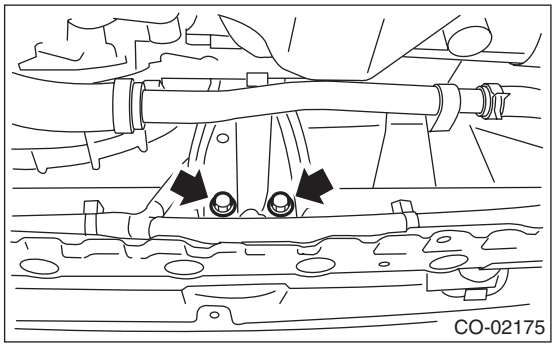


4) Install the front upper cover.



5) Install the air intake duct. <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Duct.>
6) Lift-up the vehicle.
7) Tighten the bolts on the lower side of the radiator stay.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



8) Install the under cover.
9) Lower the vehicle.
10) Install the collector cover.

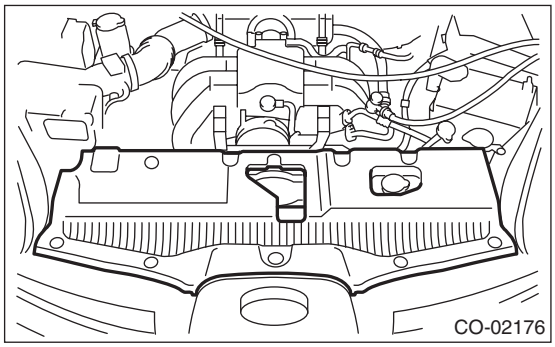
C: INSPECTION

Make sure the engine coolant level is between “FULL” and “LOW”.

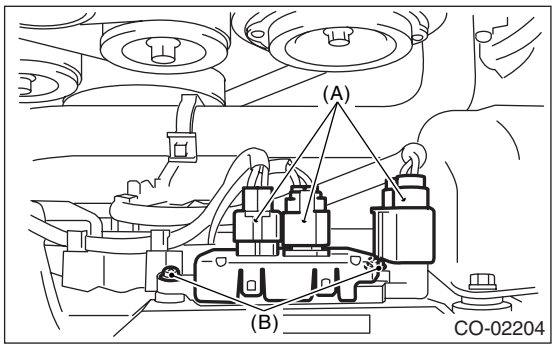
11.Radiator Fan Control Unit

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the air intake duct. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
3) Remove the front upper cover.



4) Remove the radiator fan control unit.
   (1) Disconnect the connector from radiator fan control unit.
   (2) Remove the screws which hold the radiator fan control unit.



(A) Connector
(B) Screw

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
2.6 N·m (0.27 kgf-m, 1.9 ft-lb)

12.Engine Cooling System Trouble in General

A: INSPECTION

Trouble	Possible cause	Corrective action
Overheating	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 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. Slipping clutch	Correct or replace.
	l. Dragging brake	Adjust.
	m. Faulty transmission gear oil	Replace.
	n. Malfunction of 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	Correct or replace.
	b. Leakage from water pump	Replace.
	c. Leakage from water pipe	Correct or replace.
	d. Leakage around cylinder head gasket	Retighten cylinder head bolts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase	Correct or replace.
	f. Damaged or cracked thermostat case	Correct or replace.
	g. Leakage from radiator	Correct or replace.
Strange noise	a. Defective drive belt	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace water pump.
	d. Defective water pump mechanical seal	Replace water pump.

1. General Description

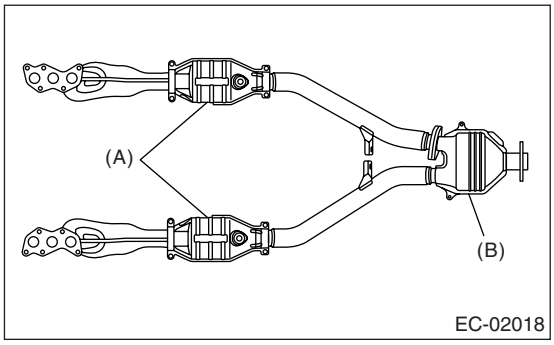
A: CAUTION

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

2. Front Catalytic Converter

A: REMOVAL

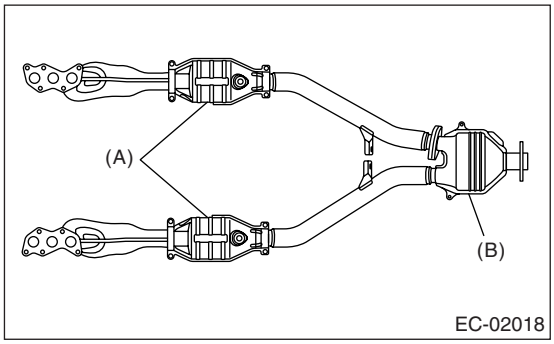
The front and rear catalytic converters are integrated into the front exhaust pipe therefore, refer to “Front Exhaust Pipe” for the removal procedure. <Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.>



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

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.>



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

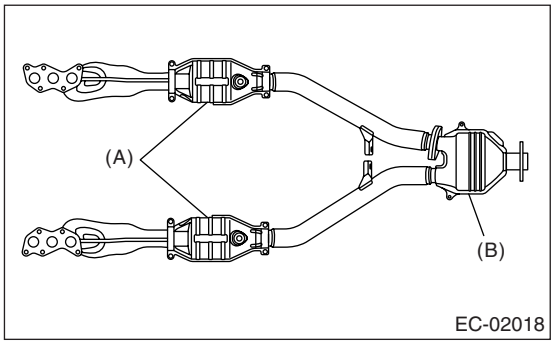
C: INSPECTION

1) Check the connections and welds for exhaust leaks.
2) Check for hole or rust.

3. Rear Catalytic Converter

A: REMOVAL

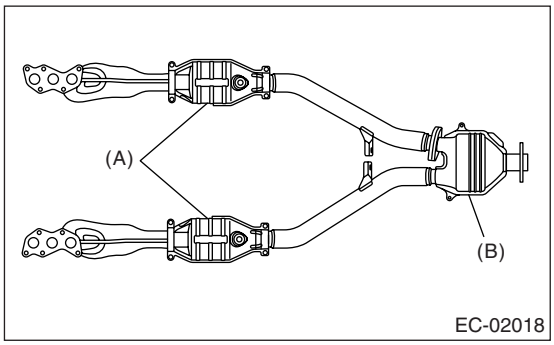
The front and rear catalytic converters are integrated into the front exhaust pipe therefore, refer to “Front Exhaust Pipe” for the removal procedure. <Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.>



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

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.>



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

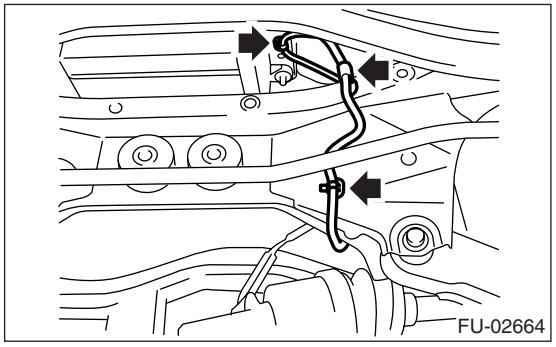
C: INSPECTION

1) Check the connections and welds for exhaust leaks.
2) Check for hole or rust.

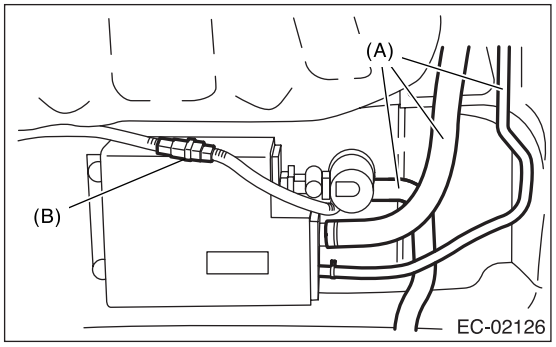
4. Canister

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle.
3) Remove the clip holding the harness.

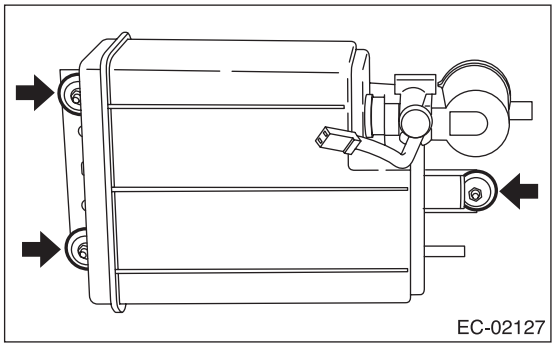


4) Remove the rear suspension assembly. <Ref. to RS-16, REMOVAL, Rear Sub Frame.>
5) Disconnect the following hoses and connectors.
   (1) Evaporation hose
   (2) Connector



(A) Evaporation hose
(B) Connector

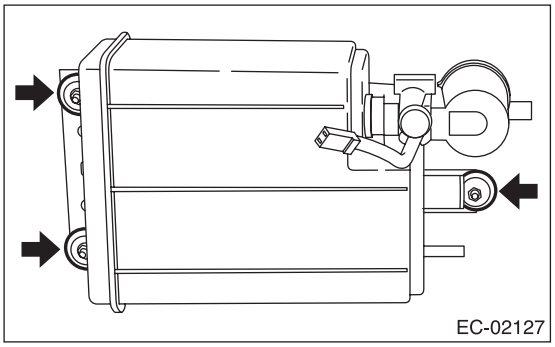
6) Remove the canister from body.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
8.0 N·m (0.82 kgf-m, 5.9 ft-lb)



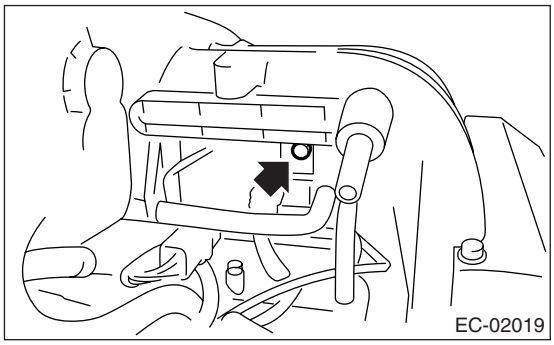
C: INSPECTION

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

5. Purge Control Solenoid Valve

A: REMOVAL

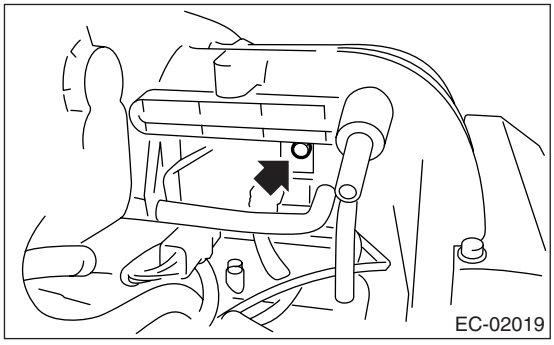
1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Remove the air intake chamber.
<Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
4) Disconnect the connector and hoses of purge control solenoid valve, and then remove the purge control solenoid valve.



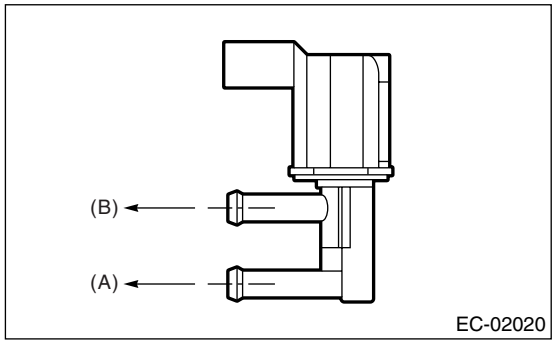
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



NOTE:
Connect the evaporation hose as shown in the figure.



(A) To fuel pipe (evaporation line)
(B) To intake manifold

C: INSPECTION

Make sure the hoses are not cracked or loose.

6. Fuel Level Sensor

A: REMOVAL

For removal procedure, refer to “FU(H6DO)” section. <Ref. to FU(H6DO)-45, REMOVAL, Fuel Level Sensor.>

B: INSTALLATION

For installation procedure, refer to “FU(H6DO)” section. <Ref. to FU(H6DO)-45, INSTALLATION, Fuel Level Sensor.>

7. 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)-45, REMOVAL, Fuel Level 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)-45, INSTALLATION, Fuel Level Sensor.>

8. Fuel Sub Level Sensor

A: REMOVAL

For removal procedure, refer to “FU(H6DO)” section. <Ref. to FU(H6DO)-46, REMOVAL, Fuel Sub Level Sensor.>

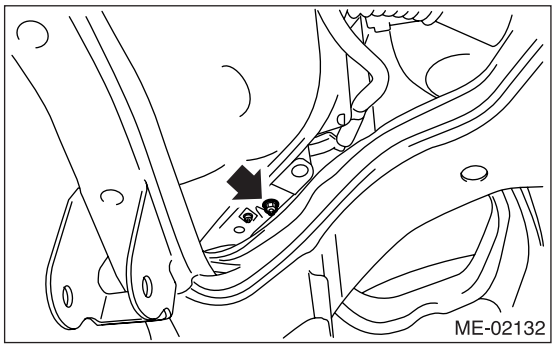
B: INSTALLATION

For installation procedure, refer to “FU(H6DO)” section. <Ref. to FU(H6DO)-46, INSTALLATION, Fuel Sub Level Sensor.>

9. Fuel Tank Pressure Sensor

A: REMOVAL

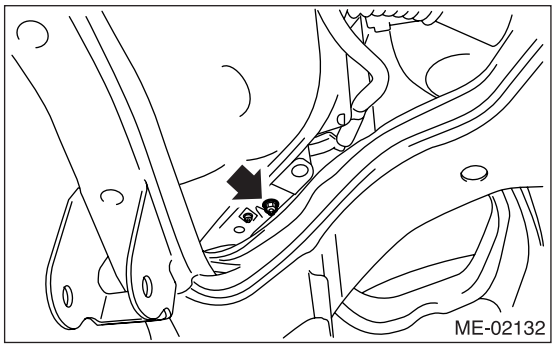
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Lift-up the vehicle.
5) Disconnect the connector from fuel tank pressure sensor.
6) Disconnect the hose from the fuel tank pressure sensor.
7) Remove the fuel tank pressure sensor along with the bracket.



B: INSTALLATION

Install in the reverse order of removal.

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



C: INSPECTION

Make sure the hoses are not cracked or loose.

10.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)-5, REMOVAL, Canister.> <Ref. to EC(H6DO)-5, INSTALLATION, Canister.>

11.Drain Valve

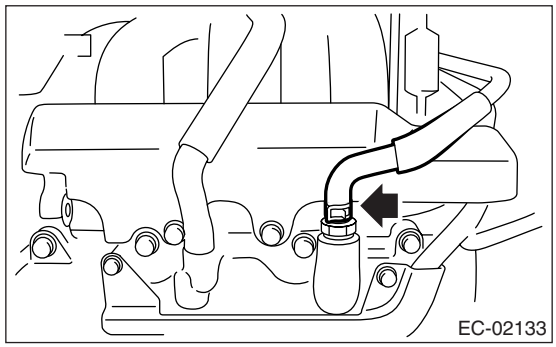
A: SPECIFICATION

Canister is a non-disassembled part, so do not remove the drain valve from canister.
Refer to “Canister” for removal and installation procedure. <Ref. to EC(H6DO)-5, REMOVAL, Canister.> <Ref. to EC(H6DO)-5, INSTALLATION, Canister.>

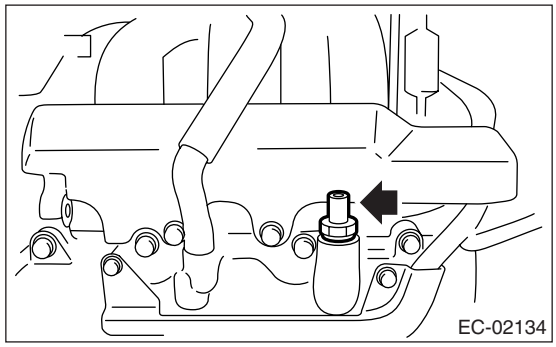
12.PCV Valve

A: REMOVAL

1) Disconnect the PCV hose.



2) 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 1105 (Part No.004403010)

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

1. Basic Diagnostic Procedure

A: PROCEDURE

1. ENGINE

	Step	Check	Yes	No
1	**CHECK ENGINE START FAILURE.** 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to EN(H6DO)(diag)-3, CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step **2**.	Inspection using "Diagnostics for Engine Start Failure". <Ref. to EN(H6DO)(diag)-57, Diagnostics for Engine Starting Failure.>
2	**CHECK ILLUMINATION OF MALFUNCTION INDICATOR LIGHT.**	Does the malfunction indicator light illuminate?	Go to step **3**.	Inspection using "General Diagnostic Table" <Ref. to EN(H6DO)(diag)-392, INSPECTION, General Diagnostic Table.>
3	**CHECK INDICATION OF DTC ON DISPLAY.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or general scan tool to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor power switch to ON. 4) Read DTC on Subaru Select Monitor or general scan tool.	Is DTC displayed on the Subaru Select Monitor or general scan tool?	Record the DTC. Repair the trouble cause. <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> Go to step **4**.	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)-48, Malfunction Indicator Light.>
4	**PERFORM DIAGNOSIS** 1) Perform the clear memory mode. <Ref. to EN(H6DO)(diag)-45, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(H6DO)(diag)-35, Inspection Mode.>	Is DTC displayed on the Subaru Select Monitor or general scan tool?	Inspect using "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-77, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

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 sale		Fuel brand	
Date of repair		Odometer reading	km
V.I.N.			miles
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:		
Ambient air temperature	°C (°F)		
	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Place	❑ Highway ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Engine temperature	❑ Cold ❑ Warming-up ❑ After warming-up ❑ Any temperature ❑ Others:		
Engine speed	rpm		
Vehicle speed	km/h (MPH)		
Driving conditions	❑ Not affected ❑ At starting ❑ While idling ❑ At racing ❑ While accelerating ❑ While cruising ❑ While decelerating ❑ While turning (RH/LH)		
Headlight	❑ ON/❑ OFF	Rear defogger	❑ ON/❑ OFF
Blower	❑ ON/❑ OFF	Audio	❑ ON/❑ OFF
A/C compressor	❑ ON/❑ OFF	Car phone	❑ ON/❑ OFF
Radiator fan	❑ ON/❑ OFF		
Front wiper	❑ ON/❑ OFF		
Rear wiper	❑ ON/❑ OFF		

2. CHECK LIST No. 2

Check the following item about the vehicle's state when malfunction indicator light turns on.

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. ❑ Yes/❑ No
❑ Low fuel warning light ❑ Charge indicator light ❑ AT diagnostic indicator light ❑ ABS warning light ❑ Oil pressure indicator light
b) Fuel level
• Lack of gasoline: ❑ Yes/❑ No • Indicator position of fuel gauge: • Experienced running out of fuel: ❑ Yes/❑ No
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ❑ Yes/❑ No
• What:
d) Intentional connecting or disconnecting of hoses: ❑ Yes/❑ No
• What:
e) Installing of parts other than genuine parts: ❑ Yes/❑ No
• What: • Where:
f) Occurrence of noise: ❑ Yes/❑ No
• From where: • What kind:
g) Occurrence of smell: ❑ Yes/❑ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes/❑ No
i) Troubles occurred
❑ Engine does not start. ❑ Engine stalls during idling. ❑ Engine stalls while driving. ❑ Engine speed decreases. ❑ Engine speed does not decrease. ❑ Rough idling ❑ Poor acceleration ❑ Back fire ❑ After fire ❑ No shift ❑ Excessive shift shock

3. General Description

A: CAUTION

1) Airbag system wiring harness is routed near the ECM, main relay and fuel pump relay.

CAUTION:
• All airbag system wiring harnesses and connectors are colored yellow. Do not use electrical test equipment on these 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.
• The ECM will be destroyed instantly.
• The fuel injector and other parts will 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.
5) Poor contact has been identified as a primary cause of this problem. Measure the voltage or resistance of individual sensor or all electrical control modules using a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.
6) Remove the ECM from the located position after disconnecting two cables on battery.
Otherwise, the ECM may be damaged.

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

7) Connectors of each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. Even if the connectors are waterproof, take care not to allow water to get into them when washing the vehicle, or when servicing the vehicle in rainy weather.
8) Use ECM mounting stud bolts as the grounding point to chassis when measuring voltage and resistance in the passenger compartment.
9) Use the engine ground terminal or engine assembly as the grounding point to chassis when measuring the voltage and resistance in engine compartment.
10) Every MFI-related part is a precision part. Do not drop them.
11) Observe the following cautions when installing a radio in MFI equipped models.

CAUTION:
• The antenna must be kept as far apart as possible from control unit. (The ECM is located under the steering column, inside of the instrument panel lower trim panel.)
• The antenna feeder must be placed as far apart as possible from the ECM and MFI harness.
• Carefully adjust the antenna for correct matching.
• When mounting a large power type radio, pay special attention to the three items mentioned above.
• Incorrect installation of the radio may affect the operation of ECM.

12) Release the pressure in the fuel system before disconnecting the fuel hose. If engine starts during this operation, run it until it stops.
13) For the model with ABS, the ABS warning light 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. After diagnosis of engine control system, perform the ABS memory clear procedure of self-diagnosis function.

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 electrolyte.

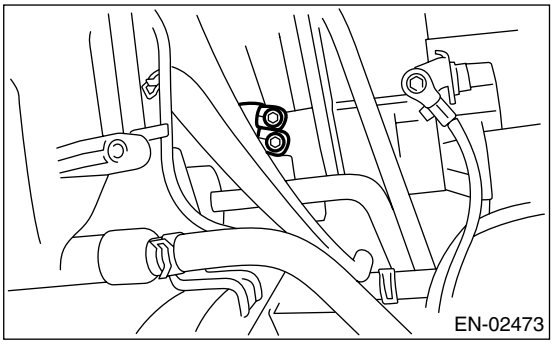
Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUND

Make sure the engine ground terminal is properly connected to engine.



C: NOTE

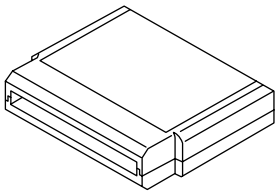
1. GENERAL DESCRIPTION

• The on-board diagnostics (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 or 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 engine family 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 first.
• If the OBD system detects the various malfunctions including the fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about fuel trim or 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.
• When troubleshooting the vehicle which complies with OBD-II Regulations, connect the Subaru Select Monitor or general scan tool to the vehicle.

2. ENGINE AND EMISSION CONTROL SYSTEM

• The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.
With this system fuel, which is pressurized at a constant pressure, is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.
• Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element etc.
The MFI system also has the following features:
- Reduced emission of harmful exhaust gases.
- Reduced in fuel consumption.
- Increased engine output.
- Superior acceleration and deceleration.
- Superior startability and warm-up performance in cold weather since compensation is made for coolant and intake air temperature.

D: PREPARATION TOOL

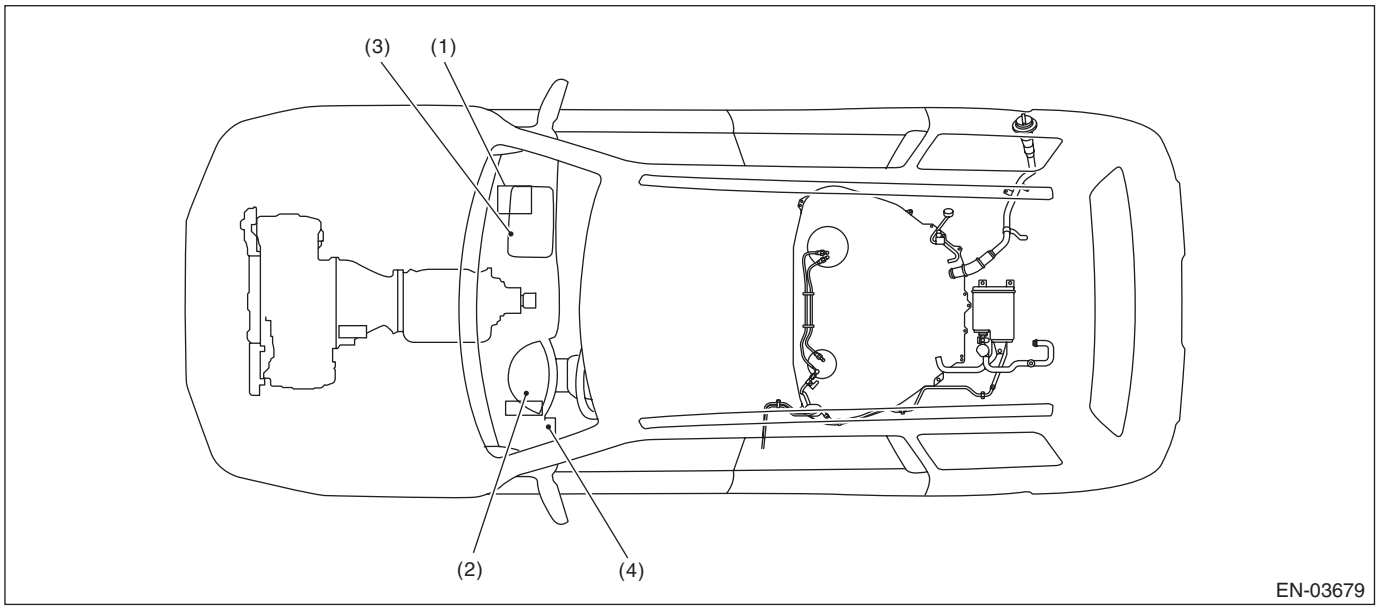
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.

4. Electrical Component Location

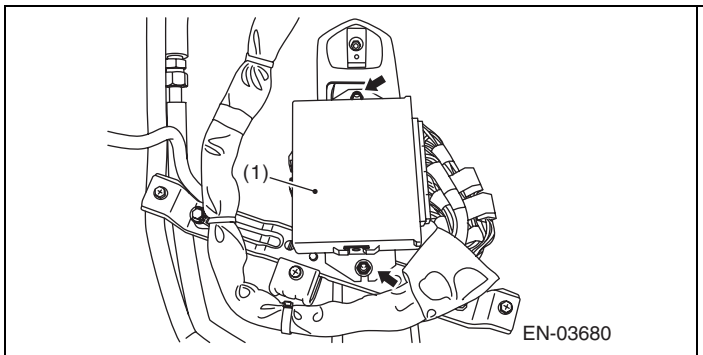
A: LOCATION

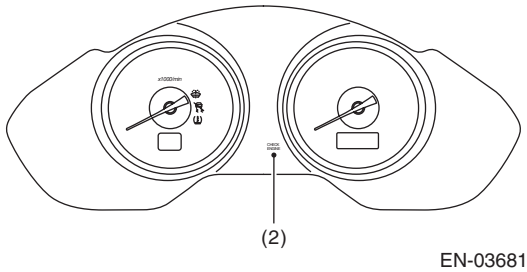
1. ENGINE

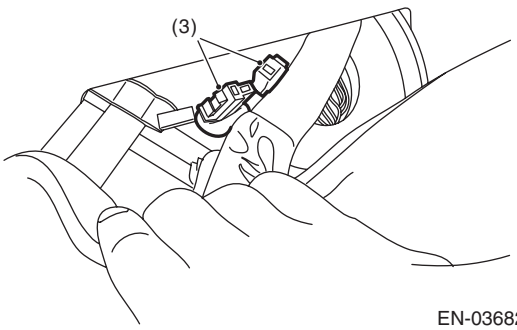
- Control module

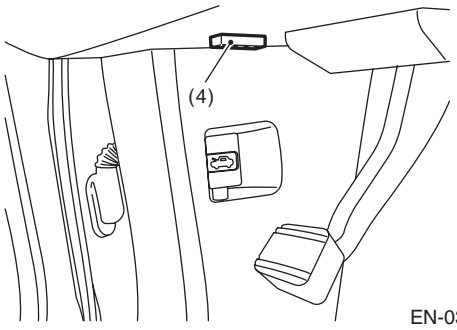


(1) Engine control module (ECM)
(2) Malfunction indicator light
(3) Test mode connector
(4) Data link connector

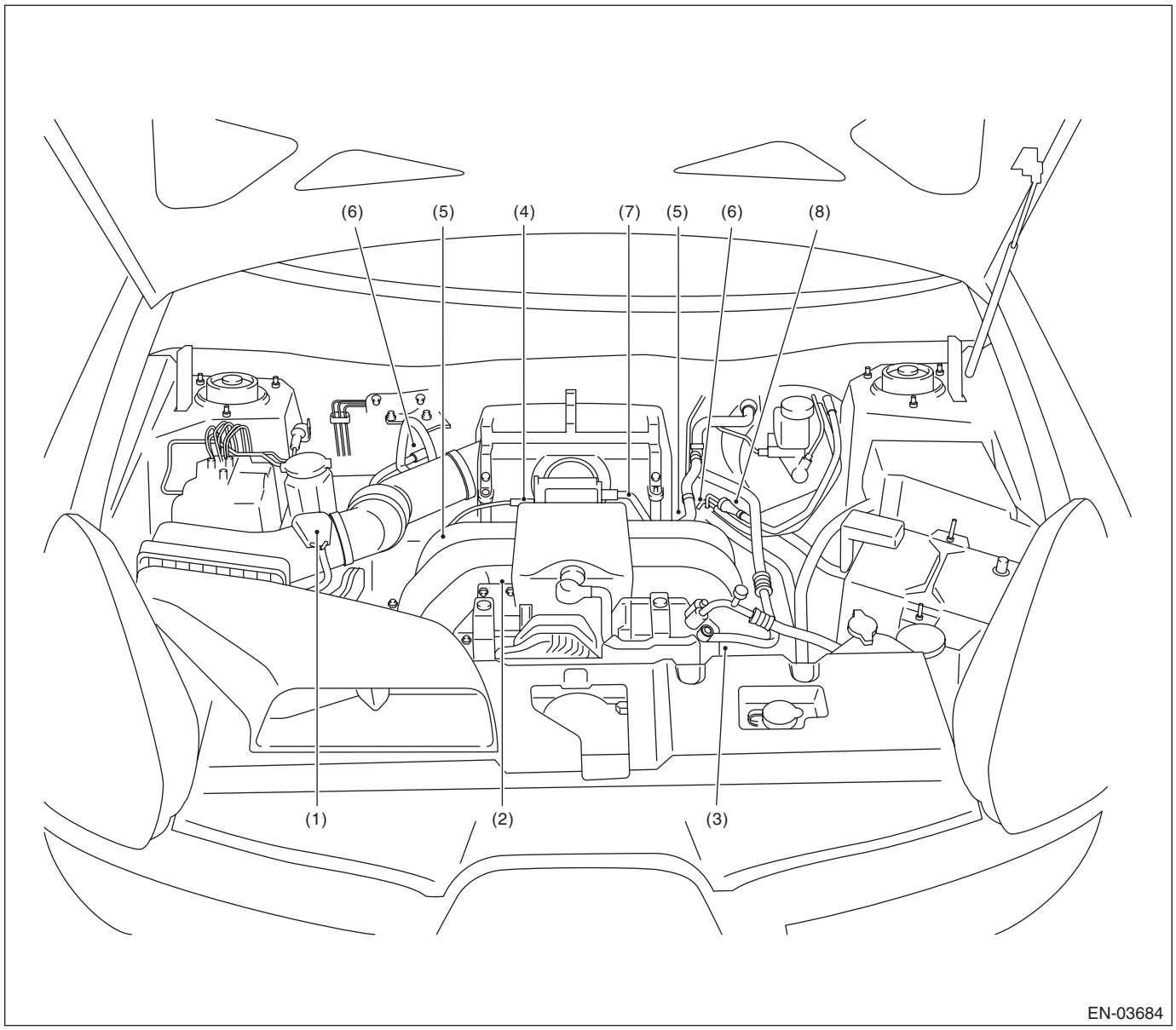




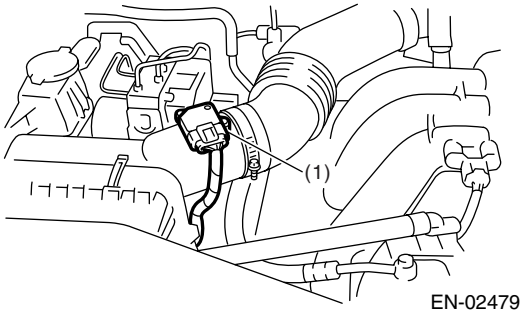




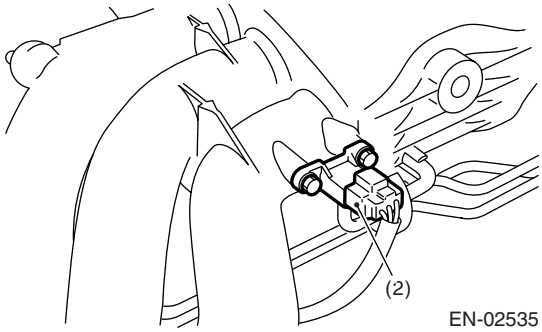
- Sensor



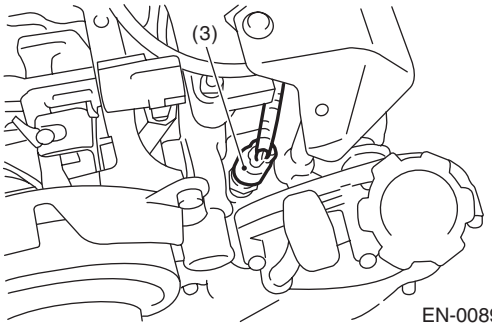
(1) Mass air flow and intake air temperature sensor
(2) Manifold absolute pressure sensor
(3) Engine coolant temperature sensor
(4) Electronic throttle control
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor
(8) Oil temperature sensor



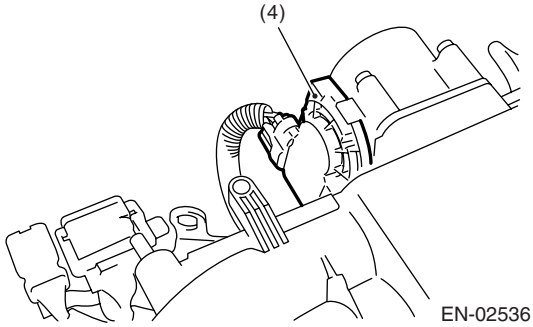
EN-02479



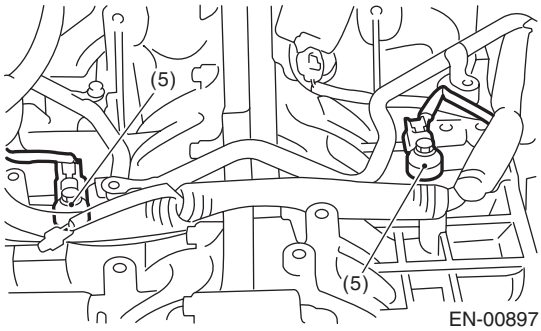
EN-02535



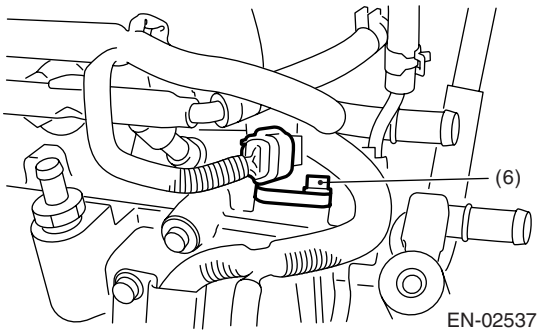
EN-00895



EN-02536



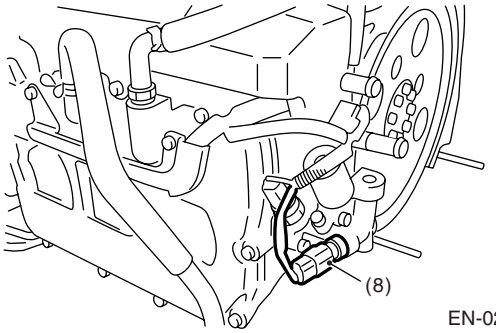
EN-00897



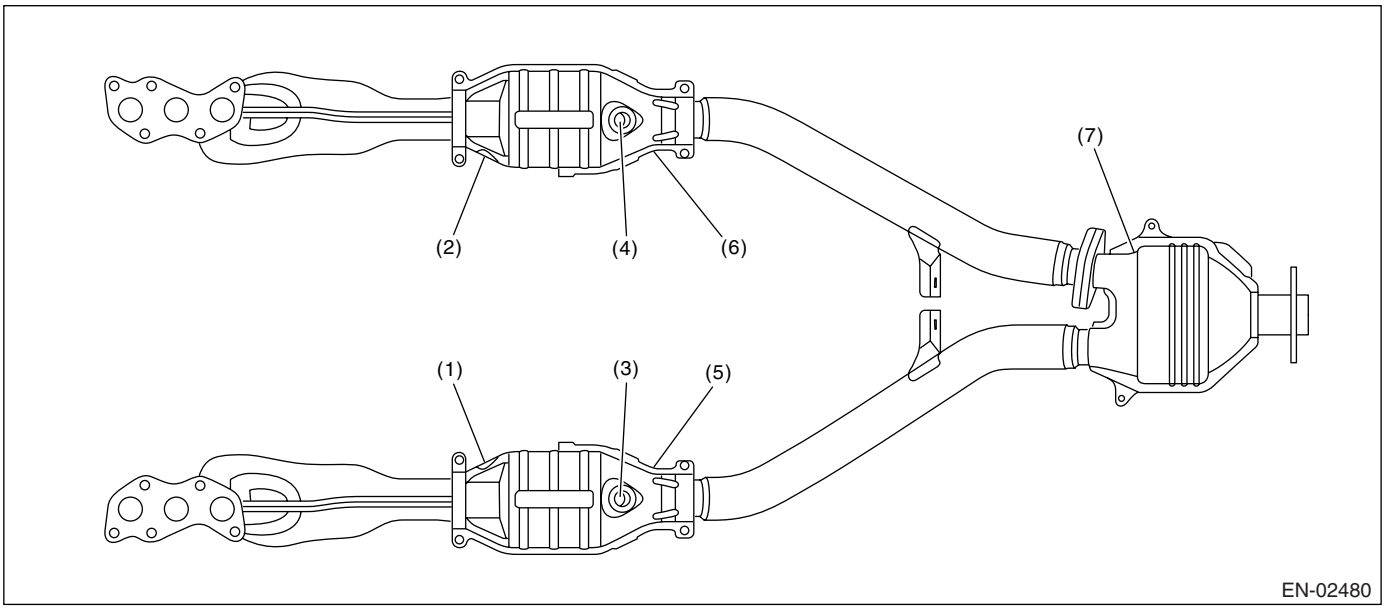
EN-02537



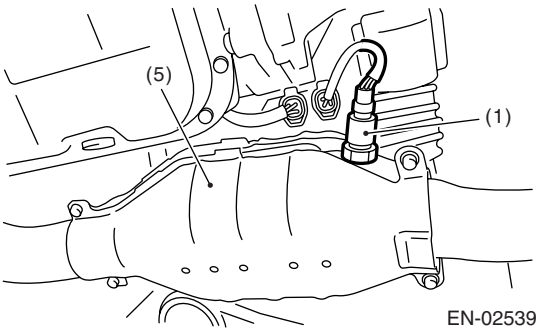
EN-00899

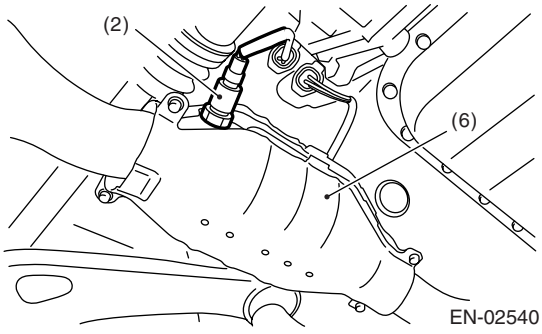


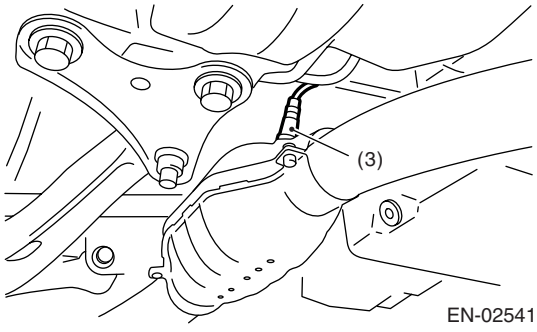
EN-02538

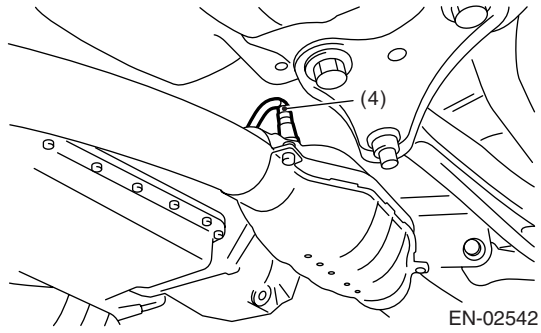


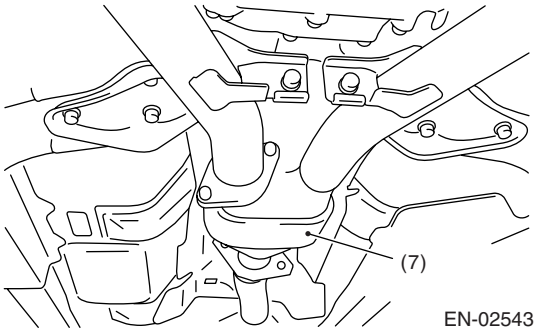
(1) Front oxygen (A/F) sensor LH
(2) Front oxygen (A/F) sensor RH
(3) Rear oxygen sensor LH
(4) Rear oxygen sensor RH
(5) Front catalytic converter LH
(6) Front catalytic converter RH
(7) Rear catalytic converter



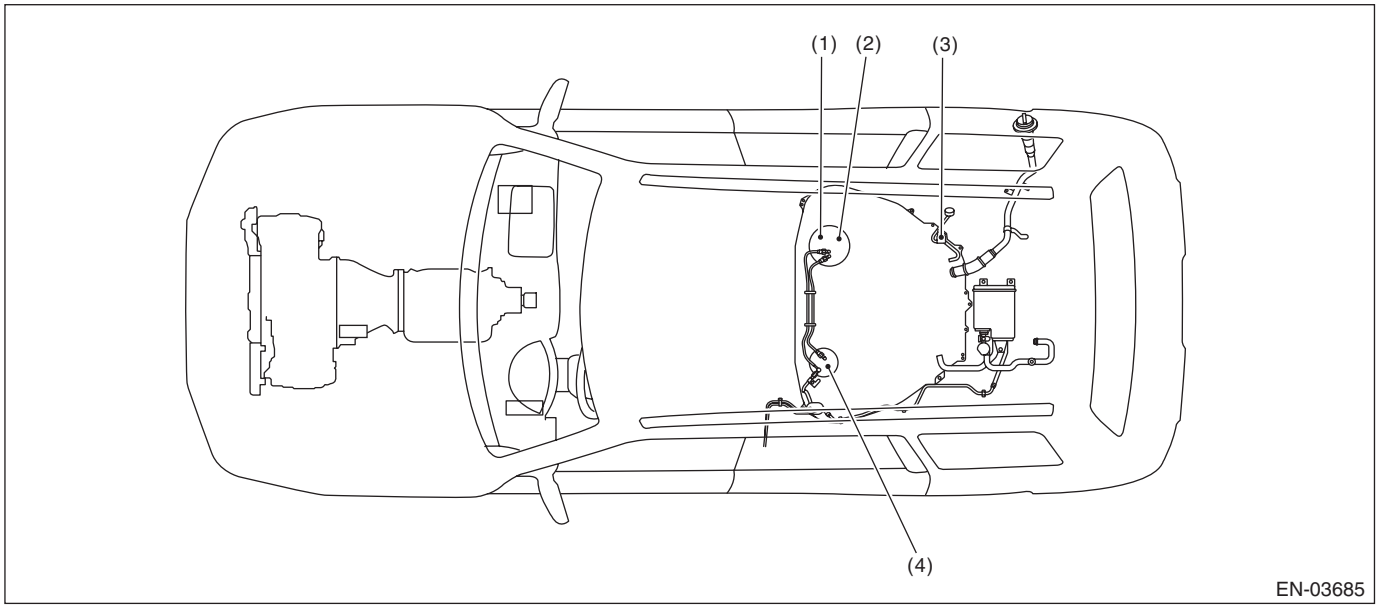




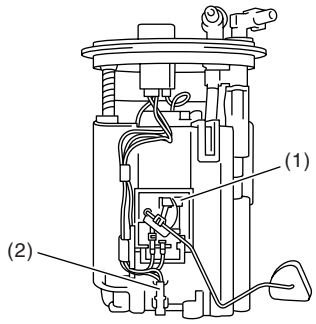


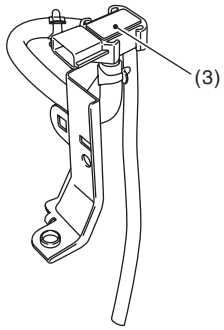


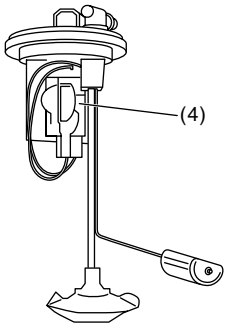
Electrical Component Location



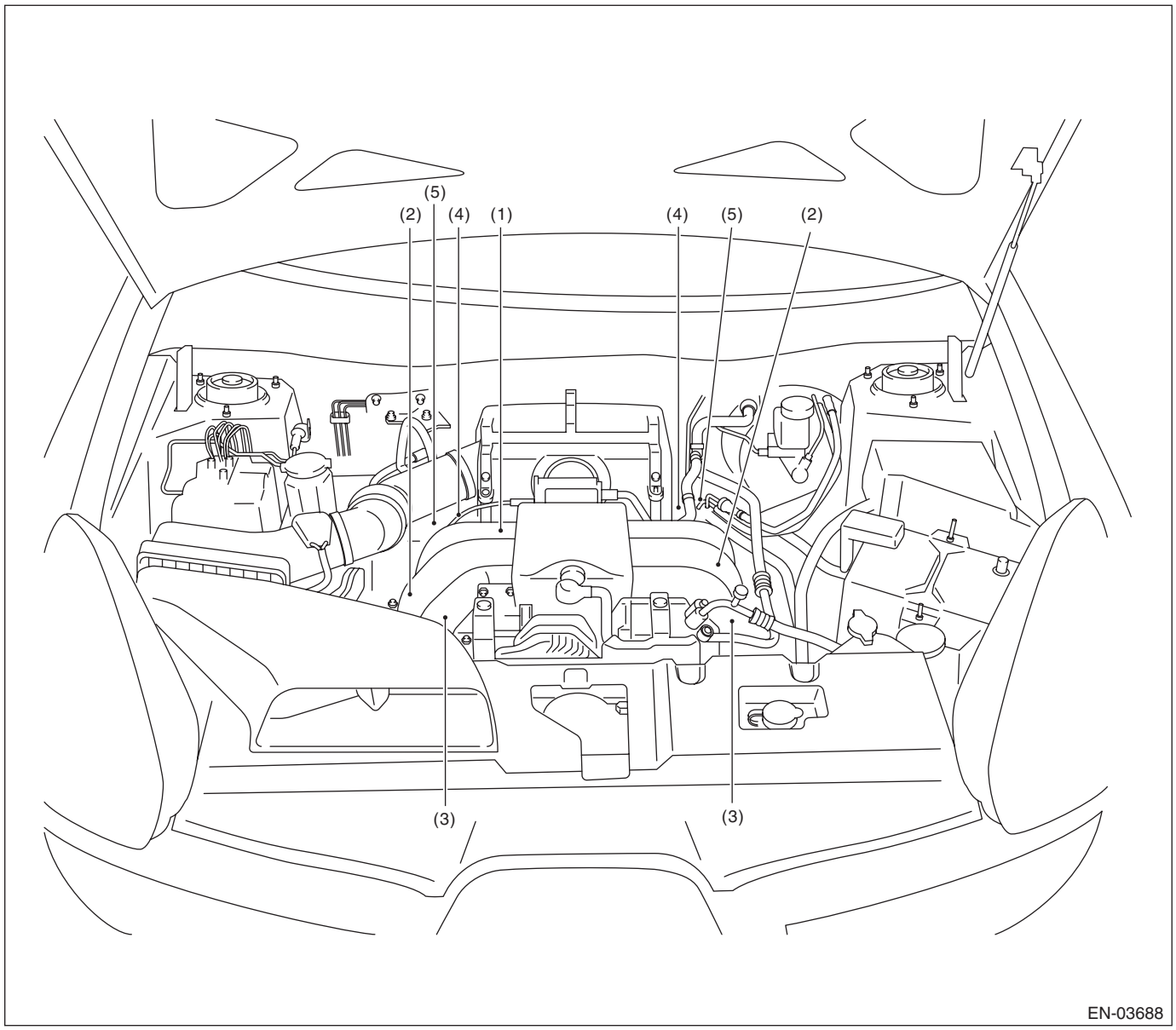
(1) Fuel level sensor
(2) Fuel temperature sensor
(3) Fuel tank pressure sensor
(4) Fuel sub level sensor



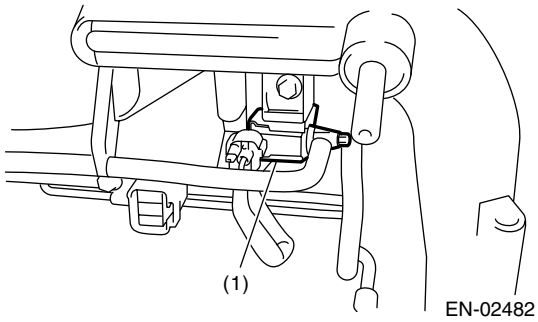


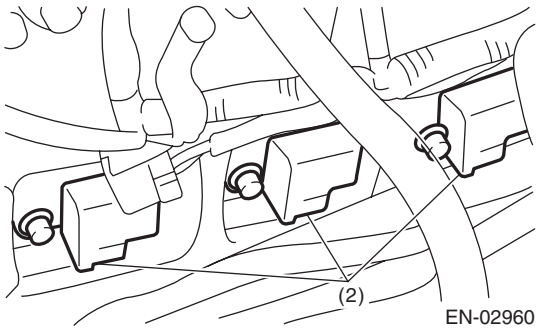


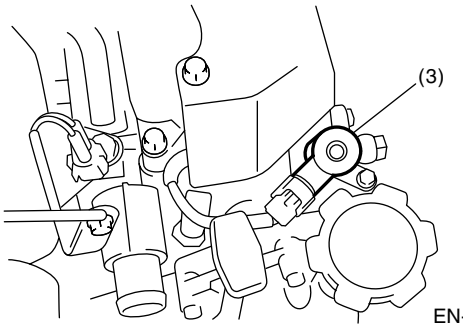
- Solenoid valve, actuator, emission control system parts and ignition system parts

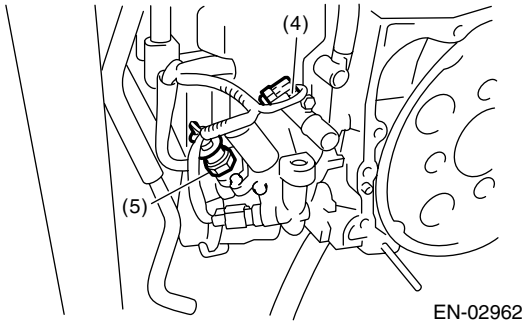


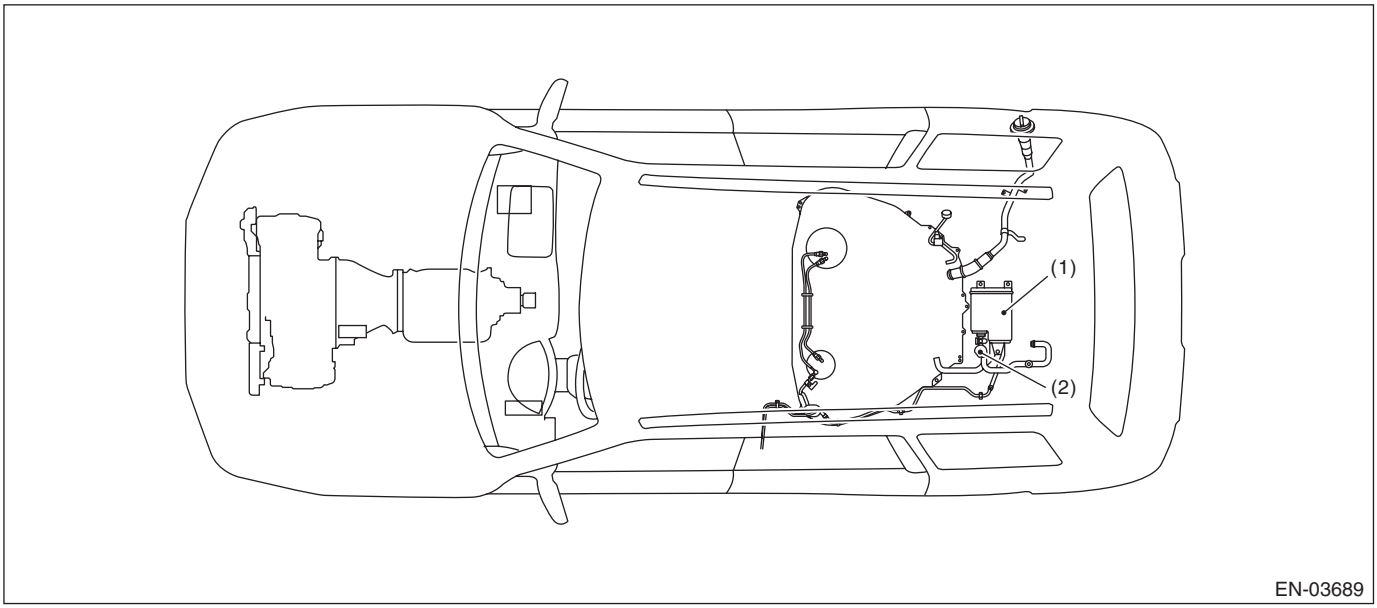
(1) Purge control solenoid valve
(2) Ignition coil
(3) Oil flow control solenoid valve
(4) Oil switching solenoid valve
(5) Variable valve lift diagnosis oil pressure switch



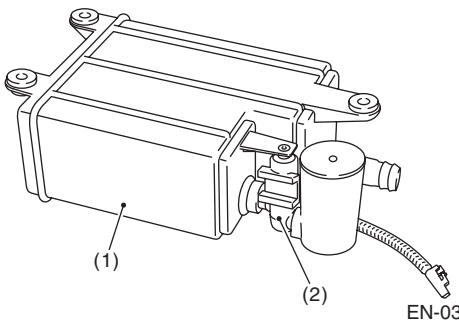


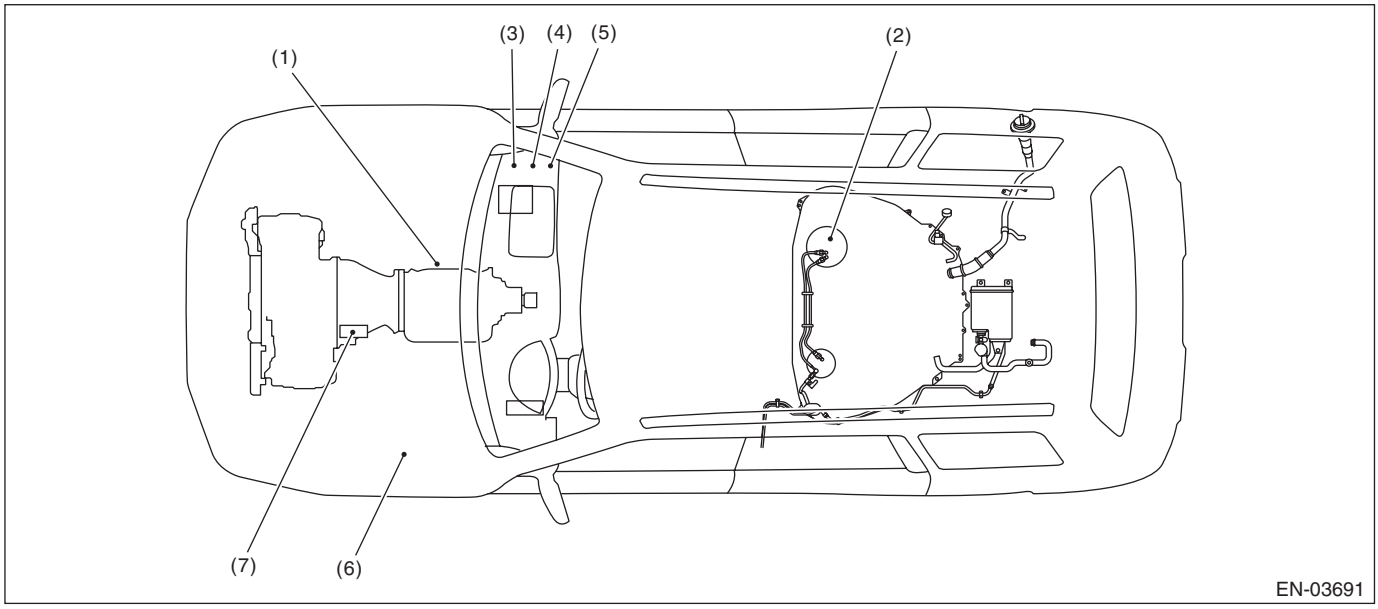




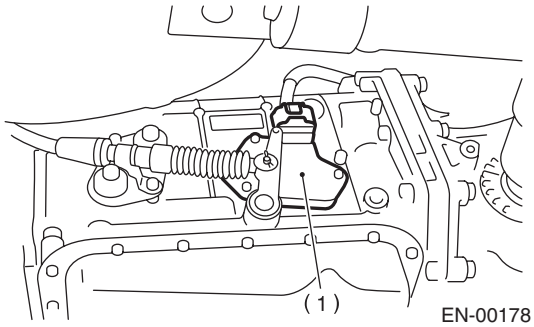


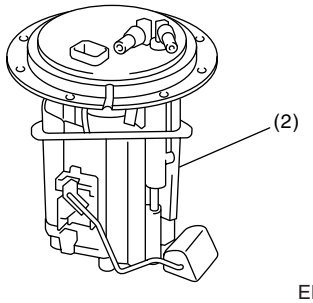
(1) Canister (2) Drain valve

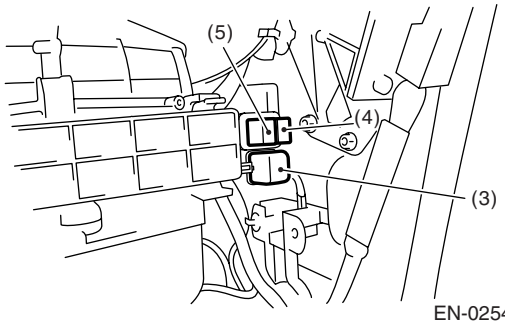


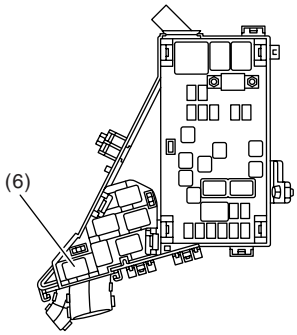


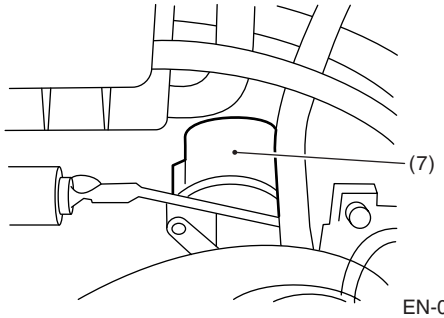
(1) Inhibitor switch
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Electronic throttle control relay
(6) Radiator fan relay
(7) Starter





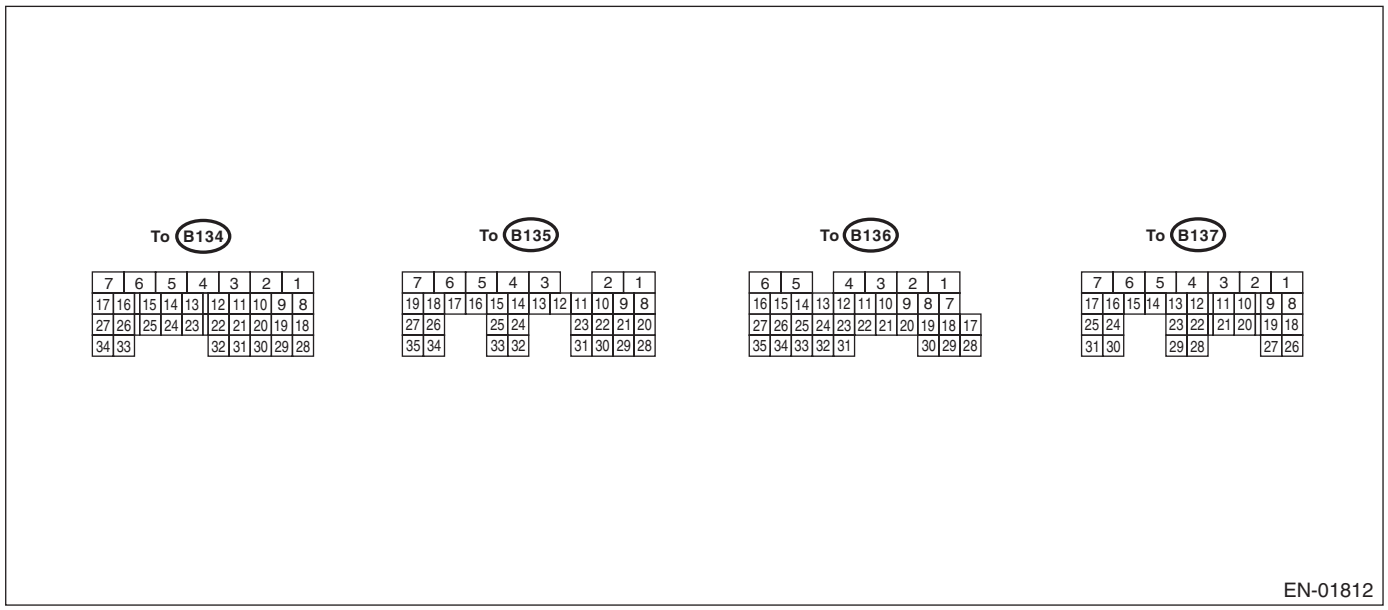






5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



Description		Connector No.	Terminal No.	Signal (V)		Reference
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft Position Sensor	Signal (+)	B134	13	0	–7 — +7	Waveform
	Signal (–)	B134	14	0	0	—
	Shield	B134	24	0	0	—
Camshaft position sensor (LH)		B134	11	0.275	0 or 5	Waveform
Camshaft position sensor (RH)		B134	21	0.275	0 or 5	Waveform
Camshaft position sensor (ground)		B134	22	0	0	—
Electronic throttle control	Main	B134	18	0.64 — 0.94 Fully opened: 4.01	0.64 — 0.72 (After engine is warmed-up.)	Fully closed: 0.6 Fully opened: 4.01
	Sub	B134	28	1.51 — 1.76 Fully opened: 4.23	1.51 — 1.58 (After engine is warmed-up.)	Fully closed: 1.48 Fully opened: 4.23
Electronic throttle control motor (+)		B137	5	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor (–)		B137	4	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor power supply		B136	1	10 — 13	12 — 14	—
Electronic throttle control motor relay		B136	21	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	When ignition switch is turned to ON: ON
Accelerator pedal position sensor	Main	B135	23	Fully closed: 0.7 Fully opened: 3.5	Fully closed: 0.7 Fully opened: 3.5	—
	Power supply (main)	B135	21	5	5	—
	Ground (main)	B135	29	0	0	—
	Sub	B135	31	Fully closed: 0.7 Fully opened: 3.5	Fully closed: 0.7 Fully opened: 3.5	—
Engine coolant temperature sensor		B134	34	1.0 — 1.4	1.0 — 1.4	After engine is warmed-up.

Description		Connector No.	Terminal No.	Signal (V)		Reference
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Starter switch		B136	32	0	0	Cranking: 8 — 14
Starter relay		B136	20	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
A/C switch		B136	24	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
A/C middle pressure switch		B136	33	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Ignition switch		B135	19	10 — 13	13 — 14	—
Neutral position switch		B136	31	ON: 0 OFF: 12±0.5		Switch is ON when select lever is shifted into “P” or “N” range.
Test mode connector		B135	27	10 — 13	12 — 14	When connected: 0
Knock sensor 1	Signal	B134	15	2.4	2.4	—
	Shield	B134	25	0	0	—
Knock sensor 2	Signal	B134	16	2.4	2.4	—
	Shield	B134	25	0	0	—
Back-up power supply		B135	5	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control module power supply		B134	7	10 — 13	13 — 14	—
		B135	2	10 — 13	13 — 14	—
Sensor power supply (engine side)		B134	19	5	5	—
Sensor ground (engine side)		B134	29	0	0	—
Sensor power supply (body side)		B135	22	5	5	—
Sensor ground (body side)		B135	30	0	0	—
Ignition control	#1	B137	18	0	1 — 14	Waveform
	#2	B137	19	0	1 — 14	Waveform
	#3	B137	20	0	1 — 14	Waveform
	#4	B137	21	0	1 — 14	Waveform
	#5	B137	22	0	1 — 14	Waveform
	#6	B137	23	0	1 — 14	Waveform
Fuel Injector	#1	B137	8	10 — 13	1 — 14	Waveform
	#2	B137	9	10 — 13	1 — 14	Waveform
	#3	B137	10	10 — 13	1 — 14	Waveform
	#4	B137	11	10 — 13	1 — 14	Waveform
	#5	B137	12	10 — 13	1 — 14	Waveform
	#6	B137	13	10 — 13	1 — 14	Waveform
A/C relay control		B136	9	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan control		B136	18	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan control power supply		B136	29	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Self-shutoff control		B136	23	0	0	—
Malfunction indicator light		B136	11	—	—	Light: 1 or less Extinguish: 10 — 14
Engine speed output		B136	22	—	0 — 13 or more	Waveform
Purge control solenoid valve		B137	29	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Power steering switch		B134	33	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—

Description		Connector No.	Terminal No.	Signal (V)		Reference
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Manifold absolute pressure sensor		B134	6	3.5 — 4.8	1.1 — 1.9	—
Air flow sensor	Signal	B135	26	0.74	0.3 — 4.5	—
	Shield	B135	35	0	0	—
	Ground	B135	34	0	0	—
Intake air temperature sensor		B135	18	3.15 — 3.33	3.15 — 3.33	Intake air temperature 25°C (75°F)
Front oxygen (A/F) sensor RH	Signal (+)	B135	9	2.8 — 3.2	2.8 — 3.2	—
	Signal (–)	B135	8	2.4 — 2.7	2.4 — 2.7	—
	Shield	B135	1	0	0	—
Front oxygen (A/F) sensor heater RH	Signal 1	B136	3	12 — 14	—	Waveform
	Signal 2	B136	2	12 — 14	—	Waveform
Front oxygen (A/F) sensor LH	Signal (+)	B135	11	2.8 — 3.2	2.8 — 3.2	—
	Signal (–)	B135	10	2.4 — 2.7	2.4 — 2.7	—
	Shield	B135	1	0	0	—
Front oxygen (A/F) sensor heater LH	Signal 1	B135	7	12 — 14	—	Waveform
	Signal 2	B135	6	12 — 14	—	Waveform
Rear oxygen sensor RH	Signal	B135	4	0	0 — 0.9	—
	Shield	B135	1	0	0	—
Rear oxygen sensor heater RH signal		B136	4	12 — 14	—	Waveform
Rear oxygen sensor LH	Signal	B135	15	0	0 — 0.9	—
	Shield	B135	1	0	0	—
Rear oxygen sensor heater LH signal		B136	5	12 — 14	—	Waveform
Immobilizer communication 1		B136	26	10	10	—
Immobilizer communication 2		B136	34	10	10	—
Fuel pump control unit	Diagnosis signal	B135	33	10 — 13	13 — 14	—
	Control	B136	12	0	0 or 5	—
Brake switch 1		B135	20	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	When brake pedal is depressed: 0 When brake pedal is released: 13 — 14	—
Brake switch 2		B135	28	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	When brake pedal is depressed: 13 — 14 When brake pedal is released: 0	—
Cruise control command switch		B135	24	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 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 SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	—
Cruise control main switch		B135	12	ON: 0 OFF: 5	ON: 0 OFF: 5	—
Oil flow control solenoid valve RH	Signal (+)	B137	17	0	0.6	—
	Signal (–)	B137	16	0	0	—
Oil flow control solenoid valve LH	Signal (+)	B137	15	0	0.6	—
	Signal (–)	B137	14	0	0	—

Description		Connector No.	Terminal No.	Signal (V)		Reference
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Oil switching solenoid valve RH	Signal (+)	B137	25	0	1.9	—
	Signal (–)	B137	24	0	0	—
Oil switching solenoid valve LH	Signal (+)	B137	31	0	1.9	—
	Signal (–)	B137	30	0	0	—
Oil temperature sensor signal		B134	23	1.0 — 1.4	1.0 — 1.4	After engine is warmed-up.
Variable valve lift diagnosis oil pressure switch RH		B134	31	0	0	—
Variable valve lift diagnosis oil pressure switch LH		B134	32	0	0	—
Generator control		B136	10	0 — 6.5	0 — 6.5	—
SSM communication		B136	16	1 or less ←→ 4 or more	1 or less ←→ 4 or more	—
Fuel tank pressure sensor		B135	32	2.3	2.7	—
Drain valve		B136	17	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Fuel temperature sensor		B135	17	2.5 — 3.8	2.5 — 3.8	Ambient temperature: 25°C (75°F)
CAN communication line (+)		B136	27	More than 2.0 ←→ Less than 4.5	More than 2.0 ←→ Less than 4.5	—
CAN communication (–)		B136	35	More than 0.5 ←→ Less than 3.0	More than 0.5 ←→ Less than 3.0	—
Ground (injector system 1)		B137	26	0	0	—
Ground (injector system 2)		B137	6	0	0	—
Ground (engine 1)		B134	5	0	0	—
Ground (engine 2)		B137	7	0	0	—
Ground (engine 3)		B137	2	0	0	—
Ground (engine 4)		B137	1	0	0	—
Ground (engine 5)		B137	3	0	0	—
Ground (engine 6)		B134	3	0	0	—
Ground (body)		B136	6	0	0	—

6. Engine Condition Data

A: ELECTRICAL SPECIFICATION

Description	Specification
Engine load	17.9 — 38.8(%): Idling
	16.6 — 33.7(%): 2,500 rpm racing

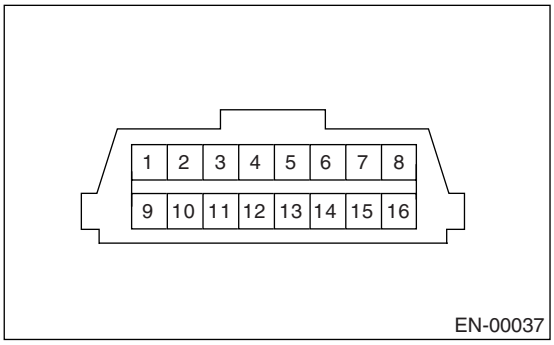
Measuring condition:
- After engine is warmed-up.
- Gear position is in “N” or “P” range.
- Turn the A/C to OFF.
- Turn all the accessory switches to OFF.

7. Data Link Connector

A: NOTE

This connector is used for Subaru Select Monitor.

CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool because the circuit for Subaru Select Monitor may be damaged.



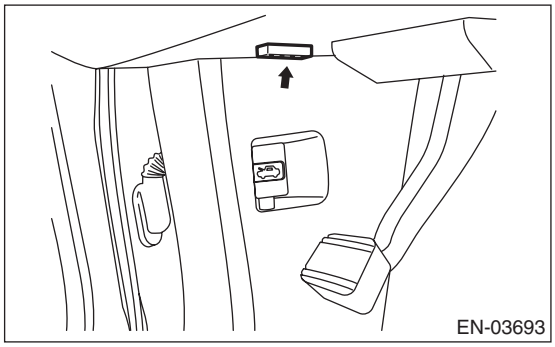
Terminal No.	Description	Terminal No.	Description
1	Power supply	9	Empty
2	Empty	10	Subaru Select Monitor signal
3	Empty	11	Empty
4	Empty	12	Ground
5	Empty	13	Ground
6	Empty	14	Empty
7	Empty	15	Empty
8	Empty	16	Empty

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) Open the cover and 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 DTC and freeze frame 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
Read out the data according to repair procedures. (For detailed operation procedure, refer to the general scan tool instruction manual.)

NOTE:
For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)".
<Ref. to EN(H6DO)(diag)-69, 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	ON/OFF
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim (Bank 1)	%
07	Long term fuel trim (Bank 1)	%
08	Short term fuel trim (Bank 2)	%
09	Long term fuel trim (Bank 2)	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
0F	Intake air temperature	°C
10	Air flow rate of manifold absolute pressure sensor	g/sec
11	Throttle valve opening angle	%
13	Check whether oxygen sensor is installed.	—
15	Oxygen sensor output voltage (Bank 1 Sensor 2)	V
15	Oxygen sensor compensation (Bank 1 Sensor 2)	%
19	Oxygen sensor output voltage (Bank 2 Sensor 2)	V
1C	On-board diagnostic system	—
24	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (bank 1)	V and %
28	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (bank 2)	V and %
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

NOTE:
Refer to general scan tool manufacturer's operation manual to access generic OBD-II PIDs (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 CARB required freeze frame data storage	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim (Bank 1)	%
07	Long term fuel trim (Bank 1)	%
08	Short term fuel trim (Bank 2)	%
09	Long term fuel trim (Bank 2)	%
0B	Intake manifold absolute pressure	kPa
0C	Engine speed	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
0F	Intake air temperature	°C
10	Air flow rate of manifold absolute pressure sensor	g/sec
11	Throttle valve opening angle	%
15	Oxygen sensor output voltage (Bank 1 Sensor 2)	V
15	Oxygen sensor compensation (Bank 1 Sensor 2)	%
16	Oxygen sensor output voltage (Bank 2 Sensor 2)	V
16	Oxygen sensor compensation (Bank 2 Sensor 2)	%
1C	On-board diagnostic system	—

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)-69, List of Diagnostic Trouble Code (DTC).>

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 operation manual to clear or reset emission-related diagnostic information (MODE $04).

6. MODE $06

Refer to the test value of troubleshooting and data of test specification on the support data bit sequence table. A list of the support data is shown in the following table.

TID	CID	Test value & Test specification
$81	$01	Catalyst system efficiency
$83	$01	Evaporative emission control system 0.04 inch leak
	$02	Evaporative emission control system 0.04 inch leak
	$03	Evaporative emission control system 0.04 inch leak
	$04	Evaporative emission control system 0.04 inch leak
	$05	Evaporative emission control system 0.02 inch leak
	$06	Evaporative emission control system 0.02 inch leak
$84	$01	A/F sensor circuit slow response (Bank 1 Sensor 1)
$85	$01	O2 sensor circuit slow response (Bank 1 Sensor 2) (rich → lean)
	$02	O2 sensor circuit slow response (Bank 1 Sensor 2) (lean → rich)
$87	$01	A/F sensor circuit slow response (Bank 2 Sensor 1)
$88	$01	O2 sensor circuit slow response (Bank 2 Sensor 2) (rich → lean)
	$02	O2 sensor circuit slow response (Bank 2 Sensor 2) (lean → rich)
$41	$01	O2 sensor circuit no activity detected (Bank1 Sensor2)
	$02	O2 sensor circuit no activity detected (Bank1 Sensor2)
$43	$01	O2 sensor circuit no activity detected (Bank2 Sensor2)
	$02	O2 sensor circuit no activity detected (Bank2 Sensor2)

7. MODE $07

Refer to the data of DTC (pending code) for troubleshooting result about emission in the first time.

8. MODE $09

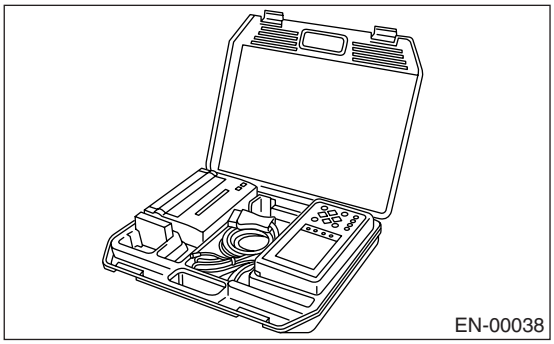
Refer to the data of vehicle specification (VIN, calibration ID, diagnosis frequency, etc.).

9. Subaru Select Monitor

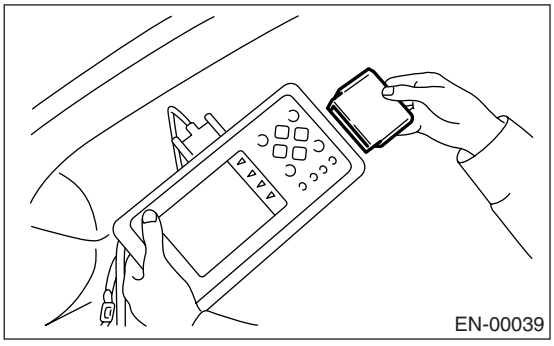
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

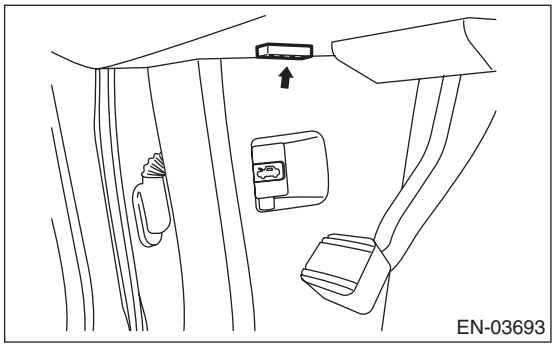
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>



2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>

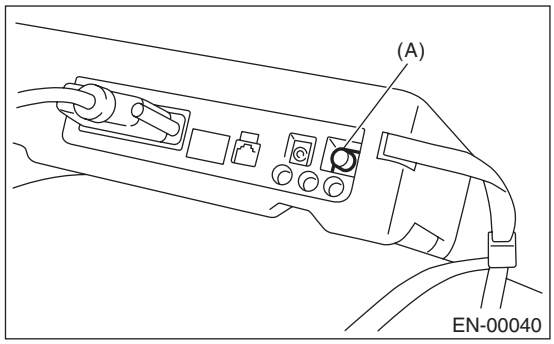


4) Connect the Subaru Select Monitor to the data link connector at the lower portion of instrument panel (on the driver's side).



CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

6) Using the Subaru Select Monitor, call up DTCs and data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE)

Refer to "Read Diagnostic Trouble Code" for information about how to indicate DTC. <Ref. to EN(H6DO)(diag)-34, Read Diagnostic Trouble Code (DTC).>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (OBD MODE)

Refer to "Read Diagnostic Trouble Code" for information about how to indicate DTC. <Ref. to EN(H6DO)(diag)-34, Read Diagnostic Trouble Code (DTC).>

4. READ CURRENT DATA FOR ENGINE (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» screen, select the {Data Display} and press the [YES] key.
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.

Description	Display	Unit of measure	Note (at idling)
Engine load	Engine load	%	3.5%
Engine coolant temperature signal	Coolant Temp.	°C or °F	≥ 75°C or 167°F (After engine is warmed-up.)
A/F compensation 1	A/F Compensation 1	%	3.1%
A/F learning 1	A/F learning 1	%	0.0%
A/F compensation 2	A/F Compensation 2	%	4.7%
A/F learning 2	A/F learning 2	%	0.0%
Intake manifold absolute pressure	Mani. Absolute Pressure	mmHg, kPa, inHg or psig	200 — 300 mmHg, 26.7 — 40 kPa, 7.8 — 11.8 inHg or 3.8 — 5.8 psig
Engine speed signal	Engine speed	rpm	600 — 800 rpm
Meter vehicle speed signal	Meter 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 temperature	°C or °F	(Ambient air temperature)
Amount of intake air	Mass Air Flow	g/s or lb/m	3.8 g/s or 0.5 lb/m
Throttle opening angle signal	Throttle valve angle	%	1.2 — 1.6%
Front oxygen sensor voltage value 1	Front oxygen sensor voltage value 1	V	0.035 V
Front oxygen sensor voltage value 2	Front oxygen sensor voltage value 2	V	0.020 V
Battery voltage	Battery Voltage	V	12 — 14 V
Mass air flow voltage	Mass air flow voltage	V	1.1 — 1.2 V
Injection 1 pulse width	Injection 1 pulse width	ms	2.82 ms
Injection 2 pulse width	Injection 2 pulse width	ms	2.82 ms
Knock sensor compensation	Knock correction	deg	0 deg
Atmospheric pressure signal	Atmospheric pressure	mmHg, kPa, inHg or psig	(Atmospheric pressure)
Intake manifold relative pressure	Intake manifold relative pressure	mmHg, kPa, inHg or psig	(Intake manifold absolute pressure — atmospheric pressure)
Acceleration opening angle signal	Acceleration opening angle	%	0%
Radiator fan output	Radiator fan output	%	0%
Purge control solenoid valve duty ratio	CPC Duty	%	0 — 3%
Generator duty	ALT duty	%	0%
Fuel pump duty	Fuel pump duty	%	33%
Variable valve timing advance angle amount R	VVT advance angle amount R	deg	0 deg
Variable valve timing advance angle amount L	VVT advance angle amount L	deg	0 deg
Oil flow control solenoid valve duty R	OCV duty R	%	9.4%
Oil flow control solenoid valve duty L	OCV duty L	%	9.4%
Oil flow control solenoid valve current R	OCV current R	mA	64 mA
Oil flow control solenoid valve current L	OCV current L	mA	64 mA
Front oxygen (A/F) sensor current value 1	A/F sensor current value 1	mA	0.0 mA
Front oxygen (A/F) sensor current value 2	A/F sensor current value 2	mA	0.0 mA
Front oxygen (A/F) sensor resistance value 1	A/F sensor resistance value 1	Ω	31 Ω

Description	Display	Unit of measure	Note (at idling)
Front oxygen (A/F) sensor resistance value 2	A/F sensor resistance value 2	Ω	31 Ω
Front oxygen (A/F) sensor output lambda 1	A/F sensor output lambda 1	—	1.00
Front oxygen (A/F) sensor output lambda 2	A/F sensor output lambda 2	—	1.00
Fuel tank pressure signal	Fuel Tank Pressure	mmHg, kPa, inHg or psig	+8.8 mmHg, +1.2 kPa, +0.4 inHg or +0.17 psig
Fuel temperature signal	Fuel Temp.	°C or °F	+28°C or +82°F
A/F compensation 3	A/F Compensation 3	%	–0.16%
A/F learning 3	A/F learning 3	%	0.0%
Throttle motor duty	Throttle motor duty	%	–27%
Throttle power supply voltage	Throttle power supply voltage	V	(Battery voltage)
Sub throttle sensor voltage	Sub throttle sensor voltage	V	1.50 V
Main throttle sensor voltage	Main throttle sensor voltage	V	0.64 V
Sub acceleration sensor voltage	Sub acceleration sensor voltage	V	0.7 V
Main acceleration sensor voltage	Main acceleration sensor voltage	V	0.7 V
Memory vehicle speed	Memory vehicle speed	km/h or MPH	0 km/h or 0 MPH
A/F compensation 4	A/F Compensation 4	%	0.31%
A/F learning 4	A/F learning 4	%	0.0%
Fuel level sensor resistance	Fuel level resistance	Ω	4 — 96 Ω
Oil temperature	Oil Temperature	°C	≥ 85°C (After engine is warmed-up.)
Oil switching solenoid valve duty R	OSV duty R	%	17.3%
Oil switching solenoid valve duty L	OSV duty L	%	17.3%
Oil switching solenoid valve current R	OSV current R	mA	192 mA
Oil switching solenoid valve current L	OSV current L	mA	192 mA
Variable valve lift mode	VVL Lift Mode	—	1
#1 cylinder roughness monitor	#1 cylinder roughness monitor	—	0
#2 cylinder roughness monitor	#2 cylinder roughness monitor	—	0
#3 cylinder roughness monitor	#3 cylinder roughness monitor	—	0
#4 cylinder roughness monitor	#4 cylinder roughness monitor	—	0
#5 cylinder roughness monitor	#5 cylinder roughness monitor	—	0
#6 cylinder roughness monitor	#6 cylinder roughness monitor	—	0
Test mode terminal	Test mode terminal	—	U check
Neutral position switch signal	Neutral SW	—	Neutral
Idle switch signal	Soft idle SW	—	In idle
Ignition switch signal	Ignition SW	—	ON input
Power steering switch signal	Power steering SW input signal	—	OFF input (when OFF)
Air conditioning switch signal	A/C SW	—	OFF input (when OFF)
Starter switch signal	Starter SW	—	OFF input
Front oxygen monitor 1	Front oxygen monitor 1	—	Rich
Front oxygen monitor 2	Front oxygen monitor 2	—	Rich
Knocking signal	Knock signal	—	OFF
Crankshaft position sensor signal	Crankshaft angle signal	—	Yes
Camshaft position sensor signal	Camshaft angle signal	—	Yes
Drain valve signal	Vent. Solenoid Valve	—	OFF output (when OFF)
Rear defogger switch signal	Rear defogger SW	—	OFF input (when OFF)
Blower fan switch signal	Blower fan SW	—	OFF input (when OFF)
Light switch signal	Light SW	—	OFF input (when OFF)
Wiper switch signal	Wiper SW	—	OFF input (when OFF)
A/C middle pressure switch signal	A/C middle pressure SW	—	OFF input
A/C compressor relay signal	A/C compressor relay output	—	OFF output
AT coordinate retard angle demand signal	AT coordinate retard angle demand	—	Yes

Description	Display	Unit of measure	Note (at idling)
AT coordinate fuel cut demand signal	AT coordinate fuel cut demand	—	OFF
Vehicle dynamics control (VDC) torque down prohibition output	Ban of Torque Down	—	Permission
Vehicle dynamics control (VDC) torque down demand	VDC torque down demand	—	OFF
AT coordinate permission signal	AT coordinate permission signal	—	Permission
Electronic throttle control motor relay signal	ETC motor relay	—	ON
Stop light switch signal	Stop Light Switch	—	OFF
SET/COAST switch signal	SET/COAST SW	—	OFF
RESUME/ACCEL switch signal	RESUME/ACCEL SW	—	OFF
Brake switch signal	Brake SW	—	OFF
Main switch signal	Main SW	—	OFF
Body integrated unit data reception	Body Int. Unit Data	—	Yes
Body integlated unit counter update	Body Int. Unit Count	—	Yes
Cruise control cancel switch signal	CC Cancel SW	—	OFF
Variable valve lift diagnosis oil pressure switch signal 1	Oil Temperature SW1	—	ON
Variable valve lift diagnosis oil pressure switch signal 2	Oil Temperature SW2	—	ON

5. READ CURRENT DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
6) On the «Data Display Menu» screen, select the {Data Display} and press the [YES] key.
7) 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.

Description	Display	Unit of measure
Number of diagnosis code	Number of Diag. Codes:	0
Condition of malfunction indicator light	MI (MIL)	ON or OFF
Monitoring test of misfire	Misfire monitoring	Finish
Monitoring test of fuel system	Fuel system monitoring	Finish
Monitoring test of comprehensive component	Component monitoring	Finish
Test of catalyst	Catalyst Diagnosis	Finish or incomplete
Test of heating-type catalyst	Heated catalyst	No
Test of evaporative emission purge control system	Evaporative purge system	Finish or incomplete
Test of secondary air system	Secondary air system	No
Test of air conditioning system refrigerant	A/C system refrigerant	No
Test of oxygen sensor	Oxygen senor	Finish or incomplete
Test of oxygen sensor heater	Oxygen sensor heater	Finish
Test of EGR system	EGR system	No support
A/F control #1	Fuel system for Bank 1	OPEN early period
A/F control #2	Fuel system for Bank 2	OPEN early period
Calculated load valve	Calculated load valve	%
Engine coolant temperature	Coolant Temp.	°C
A/F compensation #1	Short term fuel trim B1	%
A/F learning #1	Long term fuel trim B1	%
A/F compensation #2	Short term fuel trim #2	%
A/F learning #2	Long term fuel trim B2	%

Description	Display	Unit of measure
Intake manifold absolute pressure	Mani. Absolute Pressure	mmHg, kPa, inHg or psig
Engine speed	Engine speed	rpm
Vehicle speed	Vehicle speed	km/h or MPH
Ignition timing #1	Ignition timing adv.#1	°
Intake air temperature	Intake Air Temp.	°C or °F
Amount of intake air	Mass Air Flow	g/s or lb/m
Throttle valve angle	Throttle Opening Angle	%
Oxygen sensor #12	Oxygen sensor #12	V
A/F compensation #12	Short term fuel trim #12	%
Oxygen sensor #22	Oxygen sensor #22	%
A/F compensation #22	Short term fuel trim #22	%
OBD system	OBD System	—
Oxygen sensor #11	Oxygen sensor #11	support
Oxygen sensor #12	Oxygen sensor #12	support
Oxygen sensor #21	Oxygen sensor #21	support
Oxygen sensor #22	Oxygen sensor #22	support
A/F sensor #11	A/F sensor #11	—
A/F sensor #11	A/F sensor #11	V
A/F sensor #21	A/F sensor #21	—
A/F sensor #21	A/F sensor #21	V
A/F sensor #11	A/F sensor #11	—
A/F sensor #11	A/F sensor #11	mA
A/F sensor #21	A/F sensor #21	—
A/F sensor #21	A/F sensor #21	mA

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

6. READ FREEZE FRAME DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Freeze Frame Data} and press the [YES] key.

• A list of the support data is shown in the following table.

Description	Display	Unit of measure
DTC of freeze frame data	Freeze frame data	DTC
Air fuel ratio control system for bank 1	Fuel system for Bank1	—
Air fuel ratio control system for bank 2	Fuel system for Bank2	—
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor (Bank 1)	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor (Bank 1)	Long term fuel trim B1	%
Short term fuel trim by front oxygen (A/F) sensor (Bank 2)	Short term fuel trim B2	%
Long term fuel trim by front oxygen (A/F) sensor (Bank 2)	Long term fuel trim B2	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg, kPa, inHg or psig
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH
Ignition timing #1	Ignition timing adv. #1	°
Intake air temperature	Intake Air Temp.	°C
Amount of intake air	Mass Air Flow	g/s
Throttle valve angle	Throttle Opening Angle	%
Oxygen sensor #12	Oxygen sensor #12	V
A/F compensation #12	Short term fuel trim #12	%
Oxygen sensor #22	Oxygen sensor #22	V
A/F compensation #12	Short term fuel trim #22	%
Oxygen sensor #11	Oxygen sensor #11	support
Oxygen sensor #12	Oxygen sensor #12	support
Oxygen sensor #21	Oxygen sensor #21	support
Oxygen sensor #22	Oxygen sensor #22	support

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

7. LED OPERATION MODE FOR ENGINE

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display» screen, select the {Data LED Display} and press the [YES] key.
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.

Description	Display	Message	When LED "ON" required
Test mode signal	Test mode terminal	D check/U check	D check
Neutral position switch signal	Neutral SW	Neutral/Other than neutral	Neutral
Idle switch signal	Soft idle SW	Idle/Other than idle	In idle
Ignition switch signal	Ignition SW	ON Input/OFF Input	ON input
Power steering switch signal	Power steering SW	ON Input/OFF Input	ON input
Air conditioning switch signal	A/C SW	ON Input/OFF Input	ON input
Starter switch signal	Starter SW	ON Input/OFF Input	ON input
Front oxygen monitor 1	FtO2 monitor 1	Lean/Rich	Rich
Front oxygen monitor 2	FtO2 monitor 2	Lean/Rich	Rich
Knocking signal	Knock signal	Yes/No	Yes
Crankshaft position sensor signal	Crankshaft angle signal	Yes/No	Yes
Camshaft position sensor signal	Camshaft angle signal	Yes/No	Yes
Rear defogger switch signal	Rear defogger SW	ON Input/OFF Input	ON input
Blower fan switch signal	Blower fan SW	ON Input/OFF Input	ON input
Light switch signal	Light SW	ON Input/OFF Input	ON input
Wiper switch signal	Wiper SW	ON Input/OFF Input	ON input
A/C middle pressure switch signal	A/C middle pressure SW	ON Input/OFF Input	ON input
Air conditioner compressor relay signal	Compressor relay	ON output/OFF output	ON output
Drain valve signal	Vent. Solenoid Valve	ON or OFF	When drain valve is ON.
AT retard angle demand signal	AT retard angle demand	Yes/No	Yes
AT fuel cut signal	AT fuel cut	Yes/No	Yes
VDC torque down prohibition output	Torque down output	ON/OFF	Prohibition
VDC torque down demand	Torque down demand	Yes/No	Yes
AT coordinate permission signal	AT coordinate permission signal	ON/OFF	Permission
Electronic throttle control motor relay signal	ETC motor relay	ON/OFF	ON
Stop light switch signal	Stop SW	ON Input/OFF Input	ON input
SET/COAST switch signal	SET/CST SW	ON Input/OFF Input	ON input
RESUME/ACCEL switch signal	RES/ACC SW	ON Input/OFF Input	ON input
Brake switch signal	Brake SW	ON Input/OFF Input	ON input
Main switch signal	Main SW	ON Input/OFF Input	ON input
Body integrated unit data reception	Body Int. Unit Data	Yes/No	Yes
Body integrated unit counter update	Body Int. Unit Count	Yes/No	Yes
Cruise control cancel switch signal	CC Cancel SW	ON Input/OFF Input	ON input
Variable valve lift diagnosis oil pressure switch signal 1	Oil Temperature SW1	ON/OFF	ON
Variable valve lift diagnosis oil pressure switch signal 2	Oil Temperature SW2	ON/OFF	ON

NOTE:
For detailed operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".

8. VIN REGISTRATION

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {VIN Registration} and press the [YES] key.
5) Perform the procedure shown on display screen.

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

10.Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» screen, select the {DTC Display}, and then press the [YES] key.
5) On the «Diagnostic Code(s) Display» screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)}, and then press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the Diagnostic Code(s) Display and press the [YES] key.
6) Make sure DTC is shown on the screen.

NOTE:
• For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”.
<Ref. to EN(H6DO)(diag)-69, 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)-69, 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

When performing the diagnosis not listed in “List of Diagnostic Trouble Code (DTC)”, refer the item on the drive cycle. <Ref. to EN(H6DO)(diag)-40, Drive Cycle.>

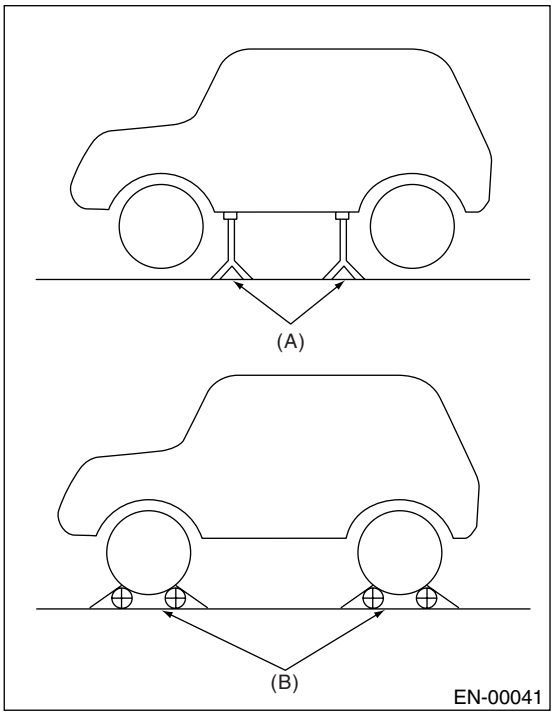
DTC	Item	On condition
P0011	Intake Camshaft Position Timing - Over-Advanced (Bank 1)	—
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1)	—
P0018	Crankshaft Position - Camshaft Position Correlation (Bank 2)	—
P0021	Intake Camshaft Position Timing - Over-Advanced (Bank 2)	—
P0031	HO2S 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)	—
P0077	Intake Valve Control Circuit High (Bank 1)	—
P0083	Intake Valve Control Circuit High (Bank 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 Circuit Low Input	—
P0113	Intake Air Temperature Circuit High Input	—
P0117	Engine Coolant Temperature Circuit Low Input	—
P0118	Engine Coolant Temperature Circuit High Input	—
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low Input	—
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High Input	—
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 (Bank 1 Sensor 2)	—
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 (Bank 2 Sensor 2)	—
P0182	Fuel Temperature Sensor “A” Circuit Low Input	—
P0183	Fuel Temperature Sensor “A” Circuit High Input	—
P0197	Engine Oil Temperature Sensor Circuit Low	—
P0198	Engine Oil Temperature Sensor Circuit High	—
P0222	Throttle/Pedal Position Sensor/Switch “B” Circuit Low Input	—
P0223	Throttle/Pedal Position Sensor/Switch “B” Circuit High Input	—
P0230	Fuel Pump Primary Circuit	—
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	—
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	—
P0332	Knock Sensor 2 Circuit Low Input (Bank 2)	—
P0333	Knock Sensor 2 Circuit High Input (Bank 2)	—
P0335	Crankshaft Position Sensor “A” Circuit	—
P0336	Crankshaft Position Sensor “A” Circuit Range/Performance	—

DTC	Item	On condition
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	—
P0345	Camshaft Position Sensor “A” 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 Control System Purge Control Valve Circuit Low	—
P0462	Fuel Level Sensor Circuit Low Input	—
P0463	Fuel Level Sensor Circuit High Input	—
P0500	Vehicle Speed Sensor	—
P0512	Starter Request Circuit	—
P0513	Incorrect Immobilizer Key	—
P0519	Idle Control System Malfunction (Fail-Safe)	—
P0600	Serial Communication Link	—
P0604	Internal Control Module Random Access Memory (RAM) Error	—
P0605	Internal Control Module Read Only Memory (ROM) Error	—
P0607	Control Module Performance	—
P0638	Throttle Actuator Control Range/Performance (Bank 1)	—
P0691	Cooling Fan 1 Control Circuit Low	—
P0692	Cooling Fan 1 Control Circuit High	—
P0700	Transmission Control System (MIL Request)	—
P1152	O2 Sensor Circuit Range/Performance (Low) (Bank 1 Sensor 1)	—
P1153	O2 Sensor Circuit Range/Performance (High) (Bank 1 Sensor 1)	—
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 (Except Antenna Circuit)	—
P1574	Key Communication Failure	—
P1576	EGI Control Module EEPROM	—
P1577	IMM Control Module EEPROM	—
P1578	Meter Failure	—
P2088	OCV Solenoid Valve Signal A Circuit Open (Bank 1)	—
P2089	OCV Solenoid Valve Signal A Circuit Short (Bank 1)	—
P2092	OCV Solenoid Valve Signal A Circuit Open (Bank 2)	—
P2093	OCV Solenoid Valve Signal A Circuit Short (Bank 2)	—
P2101	Throttle Actuator Control Motor Circuit Range/Performance	—
P2102	Throttle Actuator Control Motor Circuit Low	—
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 Rationality	—
P2138	Throttle/Pedal Position Sensor/Switch “D”/“E” Voltage Rationality	—
P2227	Barometric Pressure Circuit Range/Performance	—
P2228	Barometric Pressure Circuit Low Input	—
P2229	Barometric Pressure Circuit High Input	—

1. PREPARATION FOR THE INSPECTION MODE

1) Check battery voltage is more than 12 V and fuel remains half [20 to 40 ℓ (5.3 to 10.6 US gal, 4.4 to 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.

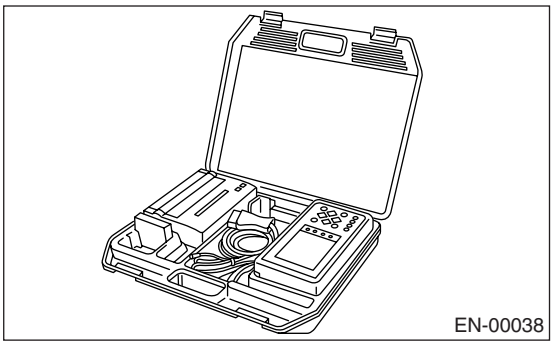
WARNING:
• Before lifting-up the vehicle, ensure parking brakes are applied.
• Do not use a pantograph jack in place of a rigid rack.
• Secure a rope or wire to the front or rear towing hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release clutch pedal or accelerator pedal during works even when the engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the rigid racks and vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



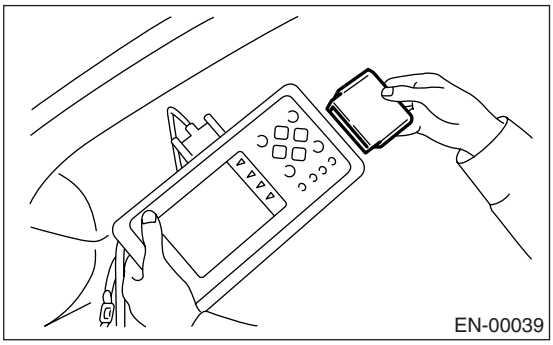
(A) Rigid racks
(B) Free rollers

2. SUBARU SELECT MONITOR

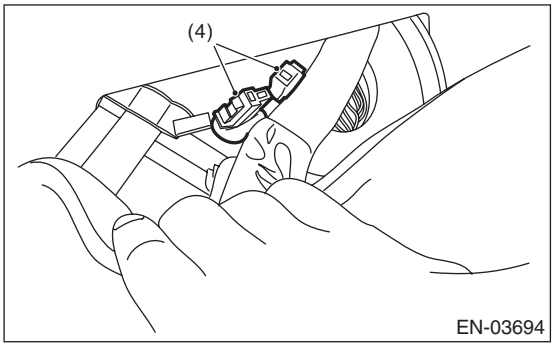
1) After clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H6DO)(diag)-45, Clear Memory Mode.>
2) Idle the engine.
3) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>



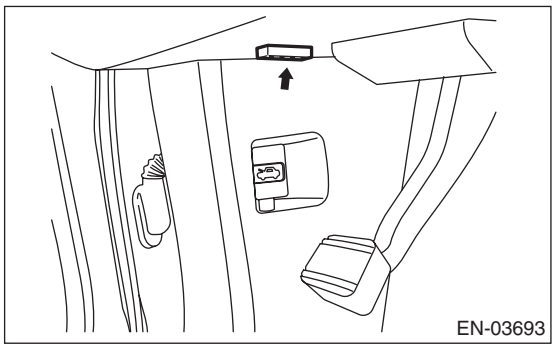
4) Connect the diagnosis cable to Subaru Select Monitor.
5) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>



6) Connect the test mode connector (A) located under the glove box.

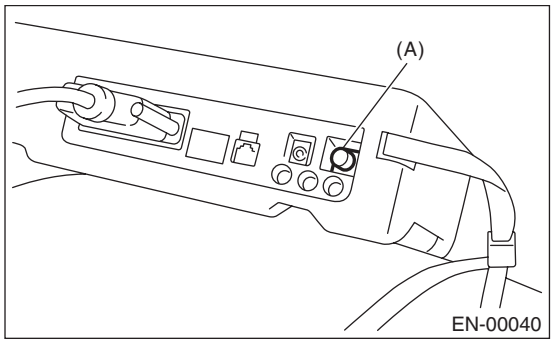


7) Connect the Subaru Select Monitor to the data link connector at the lower portion of instrument panel (on the driver's side).



CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.

8) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



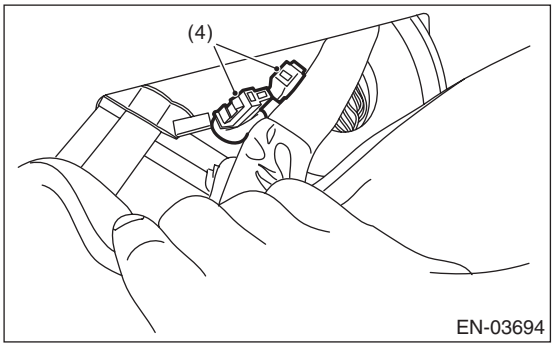
(A) Power switch

9) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
10) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
11) Press the [YES] key after the information of engine type has been displayed.
12) On the «Engine Diagnosis» display screen, select the {D Check} and press the [YES] key.
13) When the “Perform D Check?” is shown on the screen, press the [YES] key.
14) 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 procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”.
<Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>
• Release the parking brake.
• The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis function.

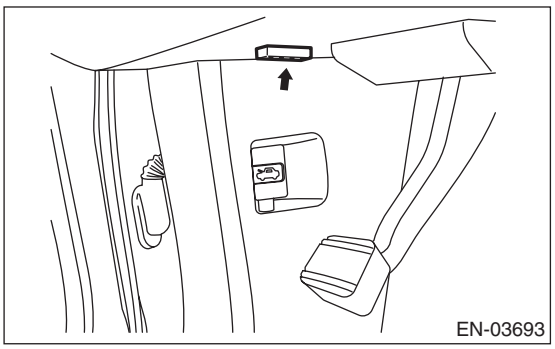
3. GENERAL SCAN TOOL

1) After performing the diagnostics and clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H6DO)(diag)-45, Clear Memory Mode.>
2) Idle the engine.
3) Connect the test mode connector (A) located under the glove box.



4) Connect the Subaru Select Monitor to the data link connector at the lower portion of instrument panel (on the driver’s side).

CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.



5) Start the engine.

NOTE:
Make sure the select lever is placed in “P” position before starting.

6) Using the select lever, turn the “P” position switch and the “N” position switch to ON.
7) Depress the brake pedal to turn brake switch ON.
8) Keep the engine speed in 2,500 — 3,000 rpm range for 40 seconds.
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 light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

10) Using the general scan tool, check DTC and record the result(s).

NOTE:
• For detailed operation procedure, 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)-69, List of Diagnostic Trouble Code (DTC).>

12.Drive Cycle

A: PROCEDURE

For the troubleshooting, there are five driving patterns of drive cycles A to E. Driving in the specified pattern allows to diagnose malfunctioning items listed below. After the repair of the following trouble items, be sure to drive the vehicle with the specified drive patterns to check whether the function is resumed correctly.

1. PREPARATION FOR DRIVE CYCLE

1) Check battery voltage is more than 12 V and fuel remains half [20 to 40 ℓ (5.3 to 10.6 US gal, 4.4 to 8.8 Imp gal)].
2) After performing the diagnostics and clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H6DO)(diag)-45, Clear Memory Mode.>
3) Disconnect the test mode connectors.

NOTE:
• Perform the diagnosis after warming up the engine except when the engine coolant temperature at starting is specified.
• Perform the diagnosis twice if the DTC marked with *. After completing the first diagnosis, stop the engine and perform second diagnosis in same condition.

2. DRIVE CYCLE A — DRIVE THE VEHICLE WITH 80 KM/H (50 MPH) FOR 20 MINUTES, AND THEN IDLE THE ENGINE FOR A MINUTE.

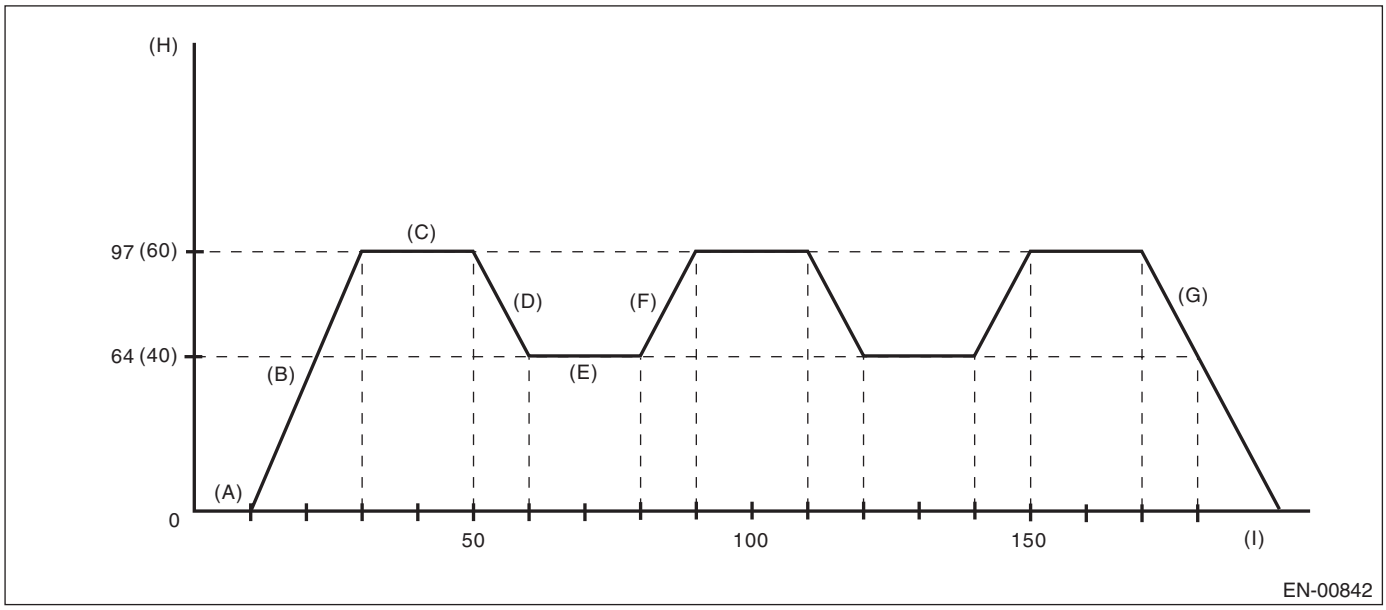
DTC	Item	On condition
*P0125	Insufficient Coolant Temperature For Closed Loop Fuel Control	Engine coolant temperature at engine start is 20°C (68°F) or less.
*P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	—
*P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	—
*P0153	O2 Sensor Circuit Slow Response (Bank 2 Sensor 1)	—
*P0171	System Too Lean (Bank 1)	Complete diagnosis for drive cycle B or C
*P0172	System Too Rich (Bank 1)	Complete diagnosis for drive cycle B or C
*P0174	System Too Lean (Bank 2)	Complete diagnosis for drive cycle B or C
*P0175	System Too Rich (Bank 2)	Complete diagnosis for drive cycle B or C
*P0196	Engine Oil Temperature Sensor Circuit Range/performance	—
*P0301	Cylinder 1 Misfire Detected	Complete diagnosis for drive cycle B or C
*P0302	Cylinder 2 Misfire Detected	Complete diagnosis for drive cycle B or C
*P0303	Cylinder 3 Misfire Detected	Complete diagnosis for drive cycle B or C
*P0304	Cylinder 4 Misfire Detected	Complete diagnosis for drive cycle B or C
*P0305	Cylinder 5 Misfire Detected	Complete diagnosis for drive cycle B or C
*P0306	Cylinder 6 Misfire Detected	Complete diagnosis for drive cycle B or C
*P0420	Catalyst System Efficiency Below Threshold (Bank 1)	—
*P0442	Evaporative Emission Control System Leak Detected (Small Leak)	Engine coolant temperature at engine start is 25°C (77°F) or less.
*P0451	Evaporative Emission Control System Pressure Sensor	—
*P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)	Engine coolant temperature at engine start is 25°C (77°F) or less.
*P0457	Evaporative Emission Control System Leak Detected (Fuel Cap Loose/ Off)	Engine coolant temperature at engine start is 25°C (77°F) or less.
*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 for drive cycle B or C
*P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	Complete diagnosis for drive cycle B or C
*P2098	Post Catalyst Fuel Trim System Too Lean (Bank 2)	Complete diagnosis for drive cycle B or C
*P2099	Post Catalyst Fuel Trim System Too Rich (Bank 2)	Complete diagnosis for drive cycle B or C
P2103	Throttle Actuator Control Motor Circuit High	Complete diagnosis for drive cycle B or C

3. DRIVE CYCLE B — 10 MINUTES IDLING

NOTE:
Drive the vehicle in more than 10 km/h (6 MPH) before diagnosis.

DTC	Item	On condition
*P0126	Insufficient Coolant Temperature for Stable Operation	—
*P0171	System Too Lean (Bank 1)	Complete diagnosis for drive cycle A or C
*P0172	System Too Rich (Bank 1)	Complete diagnosis for drive cycle A or C
*P0174	System Too Lean (Bank 2)	Complete diagnosis for drive cycle A or C
*P0175	System Too Rich (Bank 2)	Complete diagnosis for drive cycle A or C
*P0301	Cylinder 1 Misfire Detected	Complete diagnosis for drive cycle A or C
*P0302	Cylinder 2 Misfire Detected	Complete diagnosis for drive cycle A or C
*P0303	Cylinder 3 Misfire Detected	Complete diagnosis for drive cycle A or C
*P0304	Cylinder 4 Misfire Detected	Complete diagnosis for drive cycle A or C
*P0305	Cylinder 5 Misfire Detected	Complete diagnosis for drive cycle A or C
*P0306	Cylinder 6 Misfire Detected	Complete diagnosis for drive cycle A or C
*P0459	Evaporative Emission Control System Purge Control Valve Circuit High	—
*P0483	Cooling Fan Rationality Check	—
*P0506	Idle Control System RPM Lower Than Expected	—
*P0507	Idle Control System RPM Higher Than Expected	—
*P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	Complete diagnosis for drive cycle A or C
*P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	Complete diagnosis for drive cycle A or C
*P2098	Post Catalyst Fuel Trim System Too Lean (Bank 2)	Complete diagnosis for drive cycle A or C
*P2099	Post Catalyst Fuel Trim System Too Rich (Bank 2)	Complete diagnosis for drive cycle A or C
P2103	Throttle Actuator Control Motor Circuit High	Complete diagnosis for drive cycle A or C

4. DRIVE CYCLE C — DRIVE THE VEHICLE WITH FOLLOWING DRIVE PATTERNS



(A) Idle the engine for more than 10 seconds.
(B) Accelerate the vehicle to 97 km/h (60 MPH) within 20 seconds.
(C) Drive the vehicle at 97 km/h (60 MPH) for 20 seconds.
(D) Decelerate the vehicle to 64 km/h (40 MPH) with throttle fully closed.
(E) Drive the vehicle at 64 km/h (40 MPH) for 20 seconds.
(F) Accelerate the vehicle to 97 km/h (60 MPH) within 10 seconds.
(G) Stop the vehicle with throttle fully closed.
(H) Vehicle speed km/h (MPH)
(I) Sec.

DTC	Item	On condition
P0026	Intake Valve Control Solenoid Circuit Range/Performance (Bank 1)	—
P0028	Intake Valve Control Solenoid Circuit Range/Performance (Bank 2)	—
*P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	—
*P0050	HO2S Heater Control Circuit (Bank 2 Sensor 1)	—
*P0068	MAP/MAF - Throttle Position Correlation	—
P0076	Intake Valve Control Circuit Low (Bank 1)	—
P0082	Intake Valve Control Circuit Low (Bank 2)	—
*P0101	Mass or Volume Air Flow Circuit Range/Performance	—
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	—
*P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	—
P0154	O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 1)	—
*P0159	O2 Sensor Circuit Slow Response (Bank 2 Sensor 2)	—
*P0171	System Too Lean (Bank 1)	Complete diagnosis for drive cycle A or B
*P0172	System Too Rich (Bank 1)	Complete diagnosis for drive cycle A or B
*P0174	System Too Lean (Bank 2)	Complete diagnosis for drive cycle A or B
*P0175	System Too Rich (Bank 2)	Complete diagnosis for drive cycle A or B
*P0301	Cylinder 1 Misfire Detected	Complete diagnosis for drive cycle A or B
*P0302	Cylinder 2 Misfire Detected	Complete diagnosis for drive cycle A or B
*P0303	Cylinder 3 Misfire Detected	Complete diagnosis for drive cycle A or B
*P0304	Cylinder 4 Misfire Detected	Complete diagnosis for drive cycle A or B
*P0305	Cylinder 5 Misfire Detected	Complete diagnosis for drive cycle A or B
*P0306	Cylinder 6 Misfire Detected	Complete diagnosis for drive cycle A or B
P2103	Throttle Actuator Control Motor Circuit High	Complete diagnosis for drive cycle A or B

5. DRIVE CYCLE D

Drift Diagnosis

1) Check that the engine coolant temperature at engine start is 30°C (86°F) or less.
2) Check that the battery voltage is more than 10.9 V and that more than 9.6 ℓ (2.5 US gal, 2.1 Imp gal) of fuel remains.
3) Start the engine, and check that the engine coolant temperature increases over 10°C (50°F), and reaches 75°C (167°F) or more, when the engine is warmed up.
4) After the engine has reached the state of procedure 3), idle the engine for more than 120 seconds.

Stuck Diagnosis

1) Check that the battery voltage is over 10.9 V.
2) Perform the clear memory mode. <Ref. to EN(H6DO)(diag)-45, 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 while diagnosing. (Data will be cleared by disconnecting the battery terminals.)

DTC	Item	On condition
P0181	Fuel Temperature Sensor “A” Circuit Range/Performance	—

6. DRIVE CYCLE E

1) Check that the battery voltage is over 10.9 V.
2) Perform the clear memory mode. <Ref. to EN(H6DO)(diag)-45, 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.)

DTC	Item	On condition
P0461	Fuel Level Sensor Circuit Range/Performance	—

7. DRIVE CYCLE F

1) Check that the engine coolant temperature at engine start is 30°C (86°F) or less.
2) Start the engine, and warm it up until engine coolant temperature increases over 95°C (203°F).
3) After the engine has reached the state of procedure 2), idle the engine for more than 10 minutes.

NOTE:
Do not disconnect the battery terminals while diagnosing. (Data will be cleared by disconnecting the battery terminals.)

DTC	Item	On condition
P0111	Intake Air Temperature Circuit Range/Performance	—

13.Clear Memory Mode

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Memory Clear} and press the [YES] key.
5) When the “Done” and “Turn Ignition Switch OFF” are shown on the display screen, turn the ignition switch to OFF and then Subaru Select Monitor switch to OFF.

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.
• For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select {DTC Clear} and press the [YES] key.
6) When the “Perform Diagnostic Code(s) Clear?” is shown on the screen, press the [YES] key.
7) Turn the ignition switch to OFF and then turn the Subaru Select Monitor switch to OFF.

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.
• For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

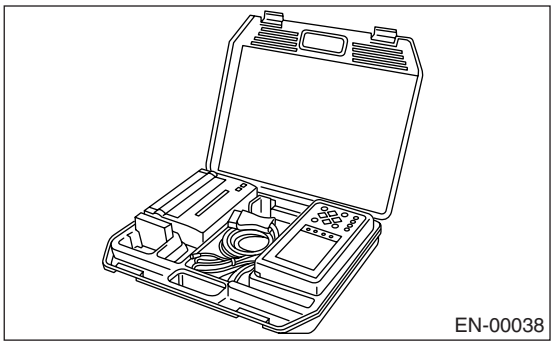
3. GENERAL SCAN TOOL

For procedures clearing memory using the general scan tool, refer to the general scan tool operation manual.

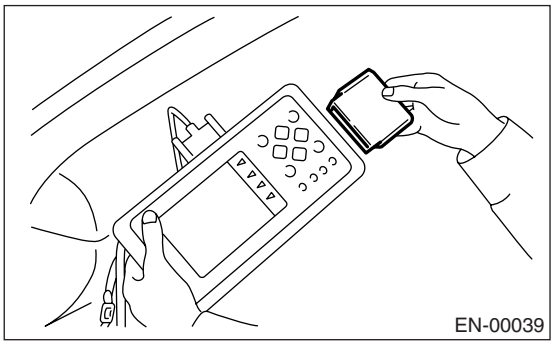
14.Compulsory Valve Operation Check Mode

A: OPERATION

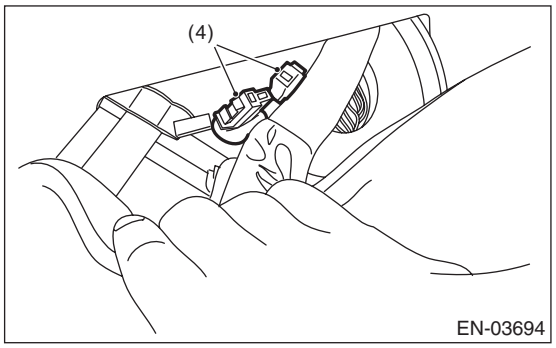
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>



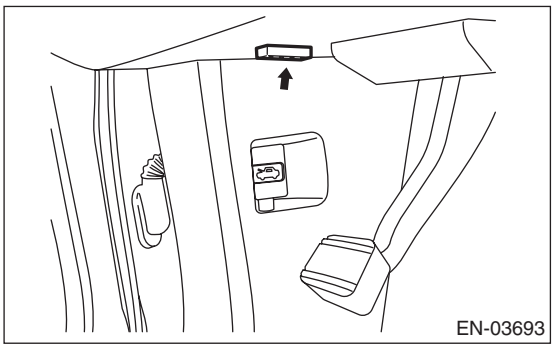
2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>



4) Connect the test mode connector (A) located under the glove box.

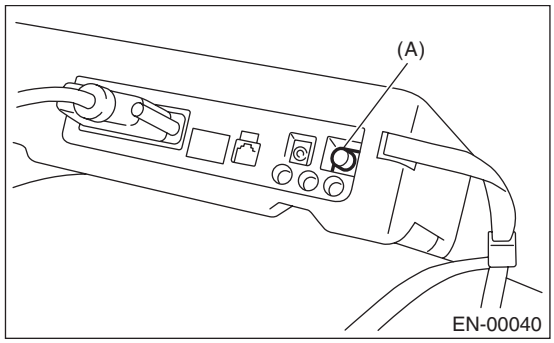


5) Connect the Subaru Select Monitor to the data link connector at the lower portion of instrument panel (on the driver's side).



CAUTION:
Do not connect any scan tools except Subaru Select Monitor or general scan tool.

6) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

7) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
8) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
9) Press the [YES] key after the information of engine type has been displayed.
10) On the «Engine Diagnosis» display screen, select the {System Operation Check Mode} and press the [YES] key.
11) On the «System Operation Check Mode» display screen, select the {Actuator ON/OFF Operation} and press the [YES] key.
12) Select the desired compulsory actuator on the «Actuator ON/OFF Operation» display screen and press the [YES] key.

13) Pressing the [NO] key completes the compulsory valve operation check mode. The display will then return to the «Actuator ON/OFF Operation» screen.

• A list of the support data is shown in the following table.

Description	Display
Compulsory fuel pump relay operation check	Fuel Pump
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Compressor Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid
Compulsory drain valve operation check	Vent Control Solenoid

NOTE:

• The following parts will be displayed but not functional.

Display
EGR Solenoid
ASV Solenoid
FICD Solenoid
Pressure Switching Solenoid 1
Pressure Switching Solenoid 2
Wastegate Control Solenoid
AAI Solenoid
Exhaust Bypass Valve Control Permit Flag
PCV Solenoid
Fuel tank sensor control valve

• For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

15.Malfunction Indicator Light

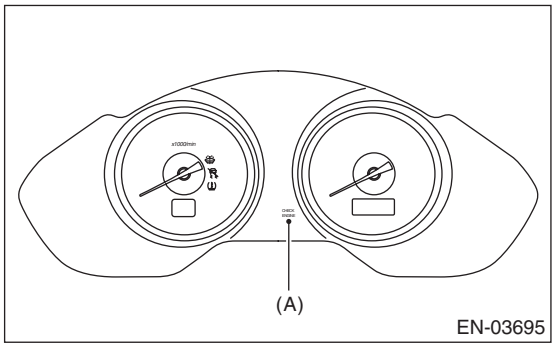
A: PROCEDURE

1. Activation of malfunction indicator light. <Ref. to EN(H6DO)(diag)-49, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Malfunction indicator light does not come on. <Ref. to EN(H6DO)(diag)-50, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Malfunction indicator light does not go off. <Ref. to EN(H6DO)(diag)-52, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF., Malfunction Indicator Light.>
↓
4. Malfunction indicator light does not blink. <Ref. to EN(H6DO)(diag)-53, MALFUNCTION INDICATOR LIGHT DOES NOT BLINK., Malfunction Indicator Light.>
↓
5. Malfunction indicator light keep blinking. <Ref. to EN(H6DO)(diag)-55, MALFUNCTION INDICATOR LIGHT REMAINS BLINKING., Malfunction Indicator Light.>

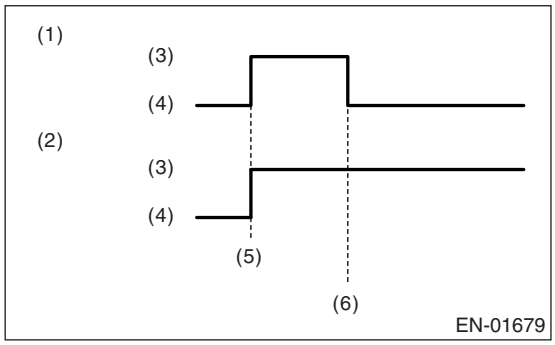
B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light (A) in the combination meter illuminates.

NOTE:
If the engine malfunction indicator light does not illuminate, perform diagnostics of malfunction indicator light circuit or the combination meter circuit. <Ref. to EN(H6DO)(diag)-50, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>

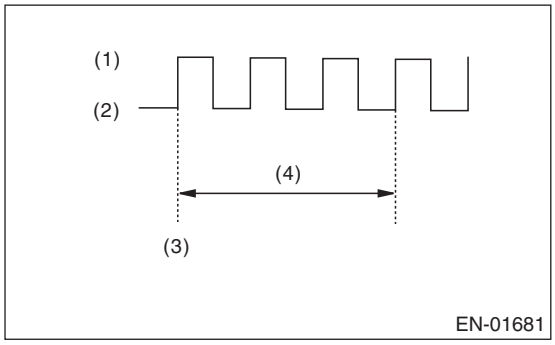


2) After starting the engine, the malfunction indicator light goes out. If it does not go off, either the engine or emission control system has malfunction.



(1) No faulty
(2) Trouble occurs
(3) ON
(4) OFF
(5) Ignition switch ON
(6) Engine start

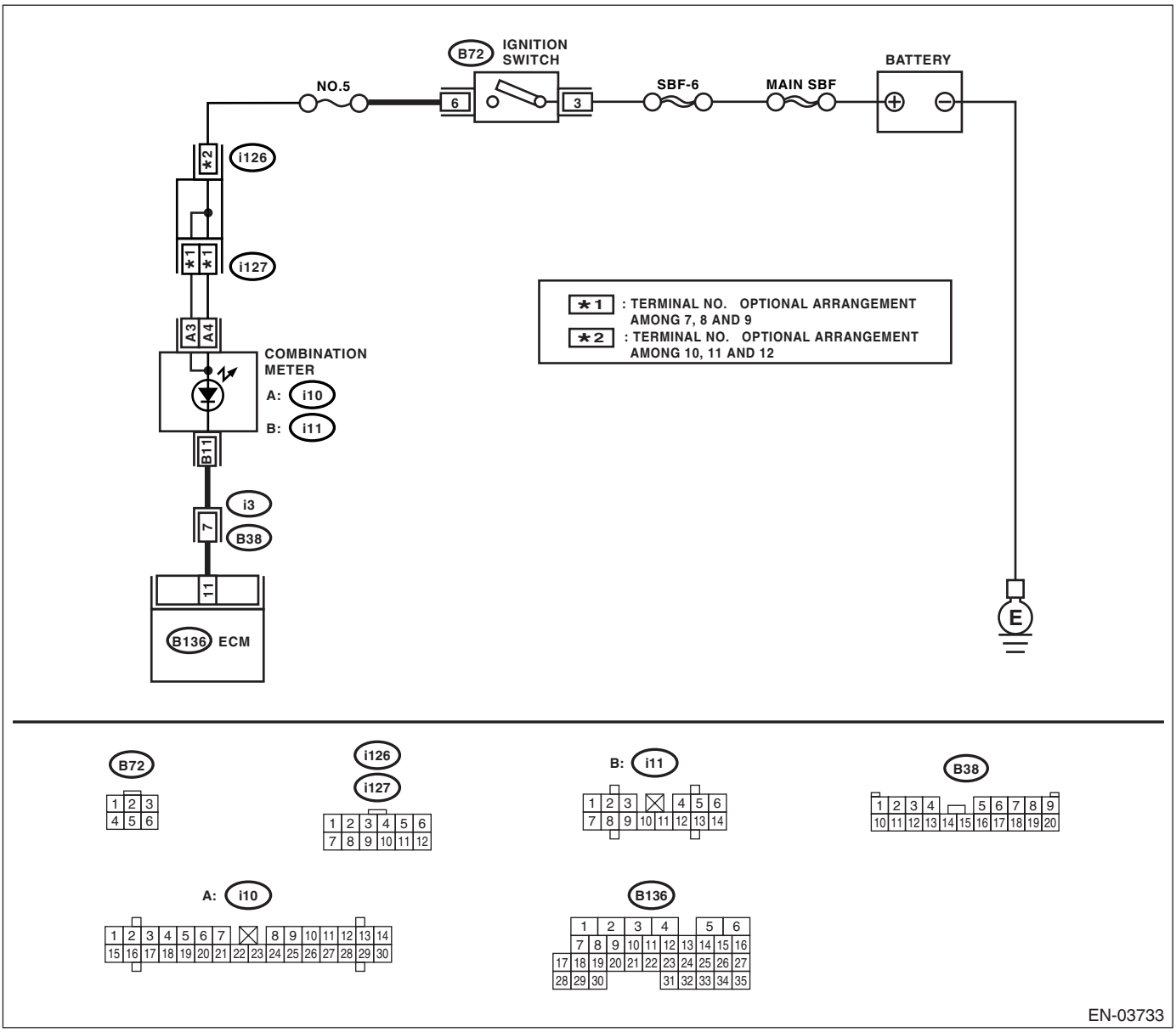
3) Turn the ignition switch to OFF and connect the test mode connector.
(1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light illuminates.
(2) After the engine starts, malfunction indicator light blinks in a cycle of 0.5 Hz.(During diagnosis)
(3) Malfunction indicator 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

C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

DIAGNOSIS:
The malfunction indicator light circuit is open or shorted.
TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), malfunction indicator light does not come on.
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 11 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4**.	Go to step **2**.
2	**CHECK POOR CONTACT.** Check for poor connection by shaking or pulling ECM connector and harness.	Does the malfunction indicator light illuminate?	Repair poor contact in ECM connector.	Go to step **3**.

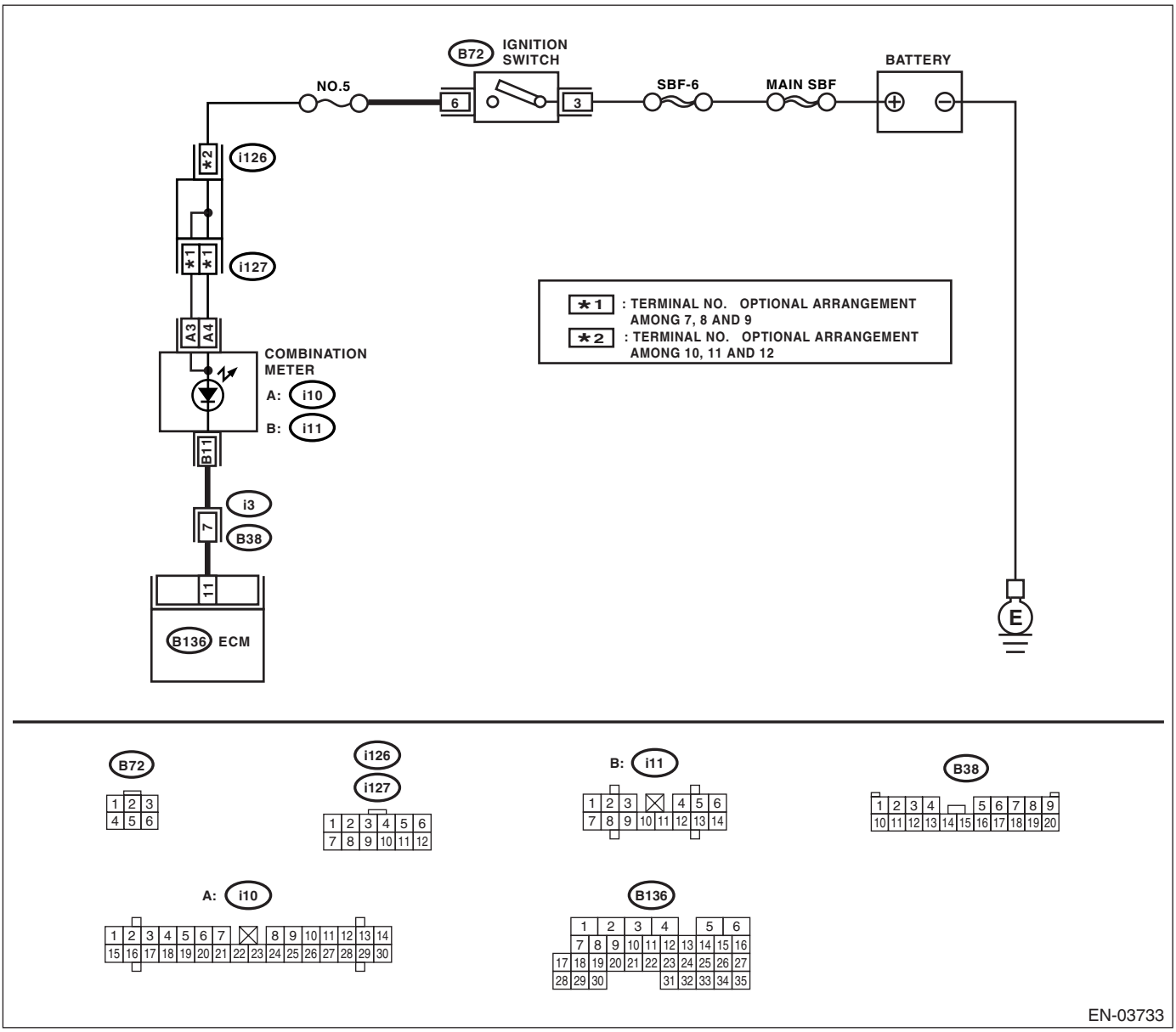
	Step	Check	Yes	No
3	**CHECK ECM CONNECTOR.** Check the connection of ECM connector.	Is the ECM connector correctly connected?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Repair the connection of ECM connector.
4	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. <Ref. to IDI-11, Combination Meter.> 3) Disconnect the connector from ECM and combination meter. 4) Measure the resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B136) No. 11 — (i11) No. 11:***	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 and combination meter connector • Poor contact of coupling connector
5	**CHECK POOR CONTACT.** Check poor contact of combination meter connector.	Is there poor contact in combination meter connector?	Repair the poor contact of combination meter connector.	Go to step **6**.
6	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 3 (+) — Chassis ground (–):*** ***(i10) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the combination meter board. <Ref. to IDI-11, Combination Meter.>	Check the following item and repair if necessary. NOTE: • Blown out of fuse (No. 5) • Open or short circuit of harness between fuse (No. 5) and battery terminal • Poor contact of ignition switch connector

D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF.

DIAGNOSIS:
The malfunction indicator light circuit is shorted.

TROUBLE SYMPTOM:
Although malfunction indicator light comes on when the engine runs, DTC is not shown on the Subaru Select Monitor display.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light illuminate?	Repair the short circuit of harness between combination meter and ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

E: MALFUNCTION INDICATOR LIGHT DOES NOT BLINK.

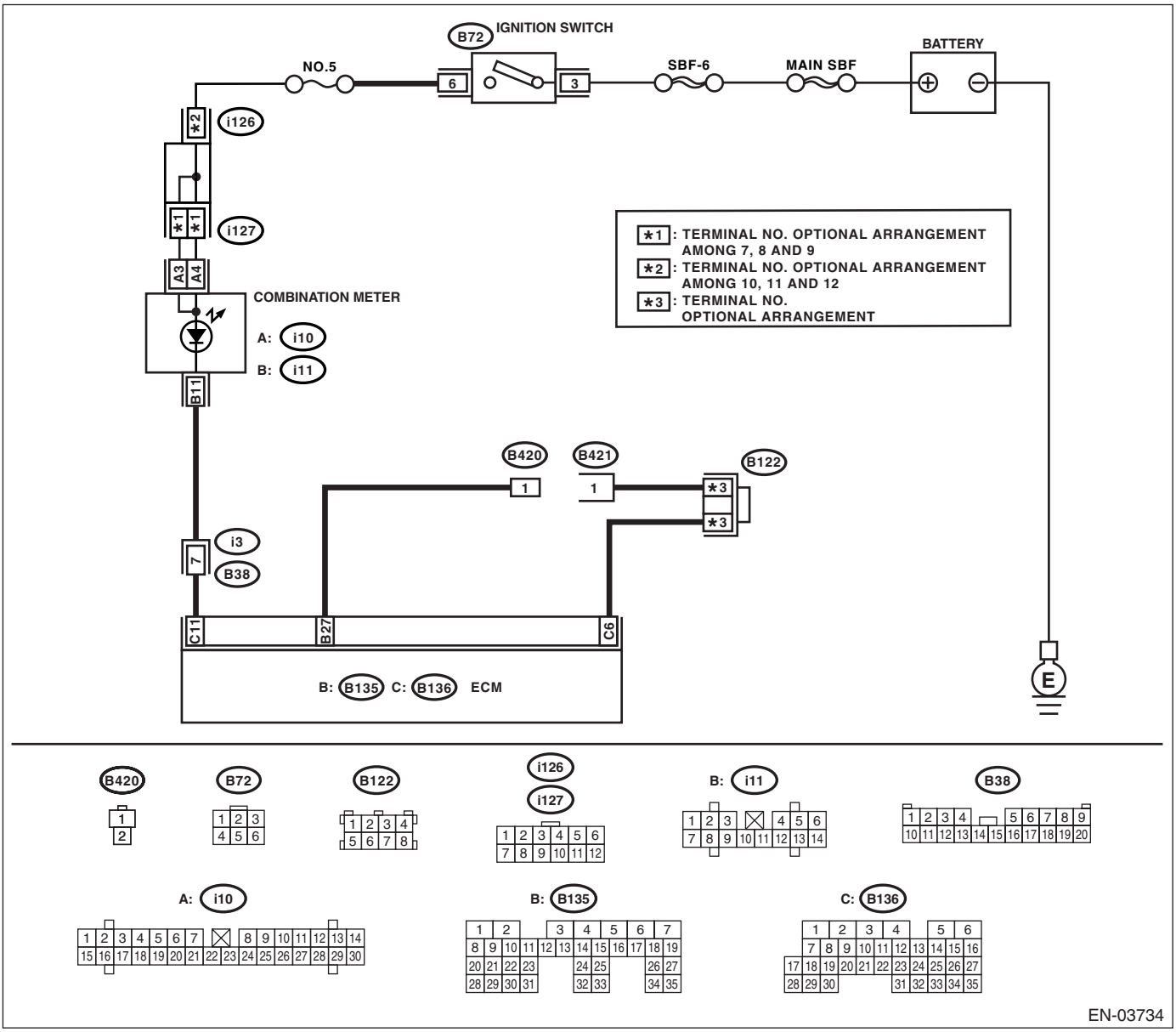
DIAGNOSIS:

- The malfunction indicator light circuit is open or shorted.
- Test mode connector circuit is open.

TROUBLE SYMPTOM:

Malfunction indicator light does not blink during inspection mode.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the test mode connectors. 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)-50, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light illuminate?	Repair the short circuit of harness between combination meter and ECM connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B421) No. 1 — Chassis ground:***	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 of harness between test mode connector and chassis ground
4	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Go to step **5**.
5	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Connect the test mode connector. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 27 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between ECM and test mode connector.
6	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

F: MALFUNCTION INDICATOR LIGHT REMAINS BLINKING.

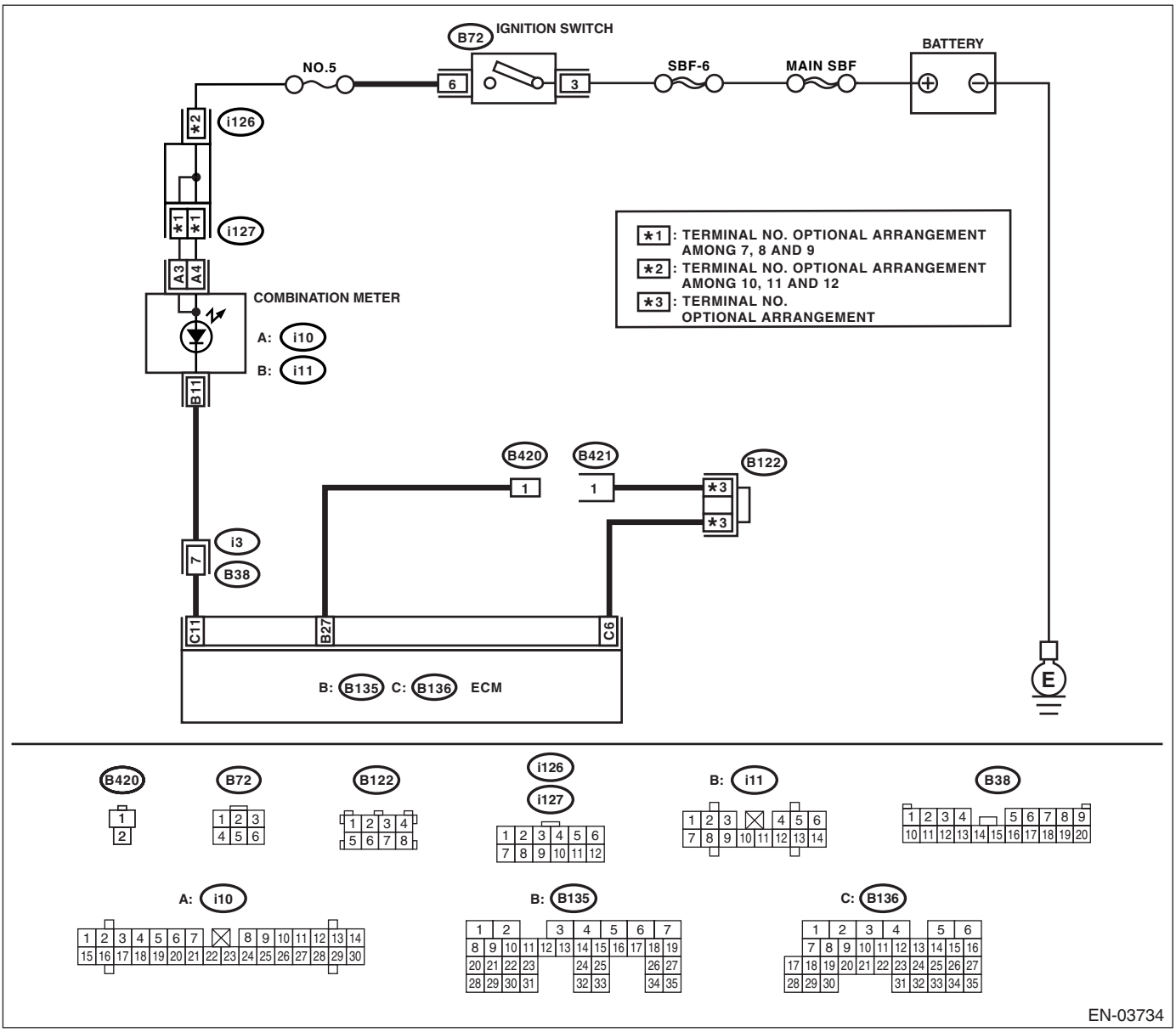
DIAGNOSIS:

Test mode connector circuit is shorted.

TROUBLE SYMPTOM:

Malfunction indicator light blinks when test mode connector is not connected.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK TEST MODE CONNECTOR.** 1) Disconnect the test mode connectors. 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 when test mode connector is connected.
2	**CHECK HARNESS BETWEEN ECM CONNECTOR AND CHASSIS GROUND TERMINAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 27 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the short circuit of harness between ECM and test mode connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

16.Diagnostics for Engine Starting Failure

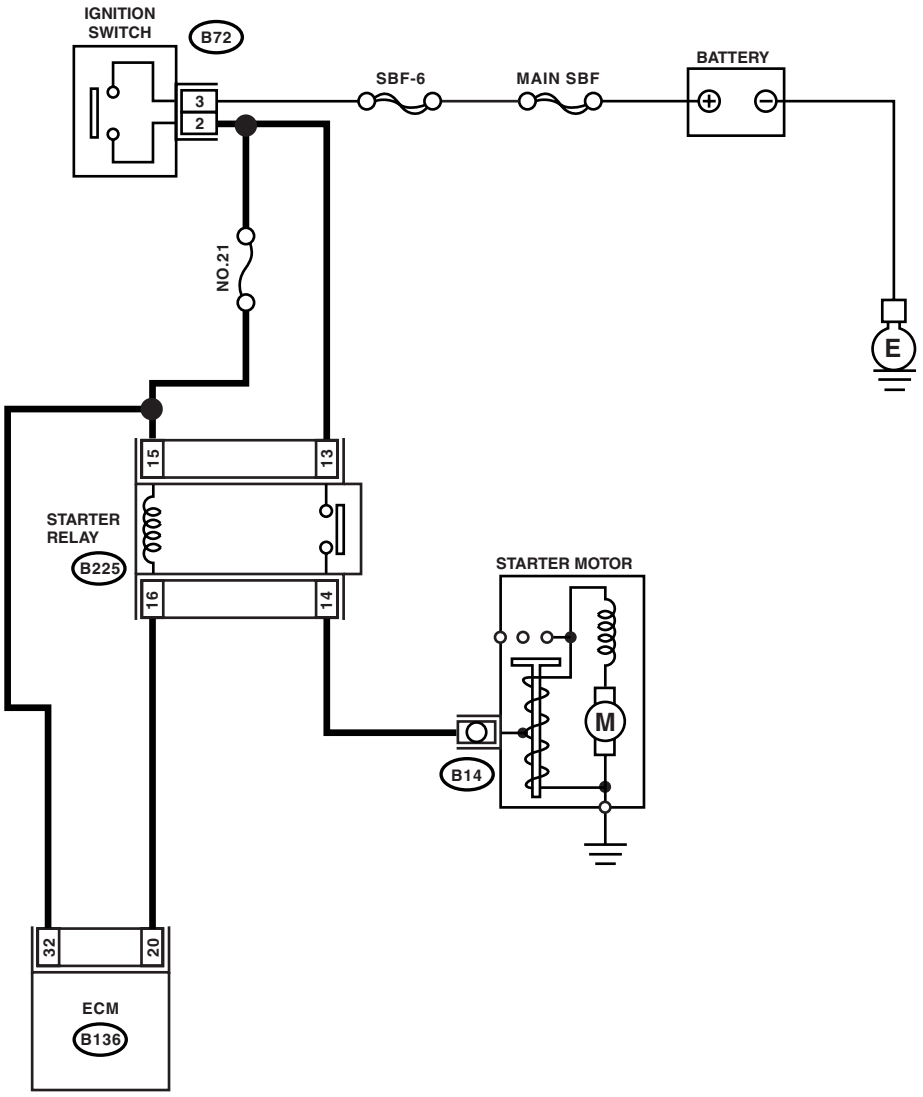
A: PROCEDURE

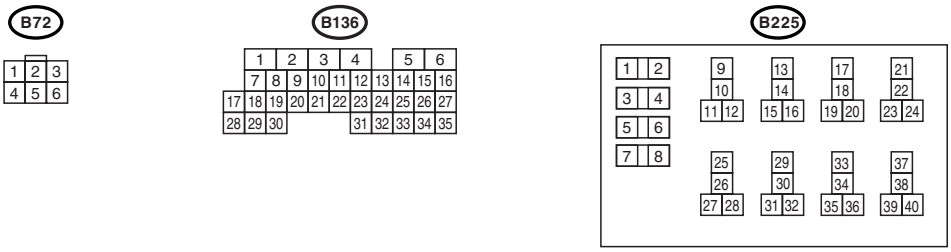
1. Check for fuel amount.
↓
2. Inspection of starter motor circuit. <Ref. to EN(H6DO)(diag)-58, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ECM power supply and ground line. <Ref. to EN(H6DO)(diag)-61, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
4. Inspection of ignition control system. <Ref. to EN(H6DO)(diag)-63, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit <Ref. to EN(H6DO)(diag)-66, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel injector circuit <Ref. to EN(H6DO)(diag)-67, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03735

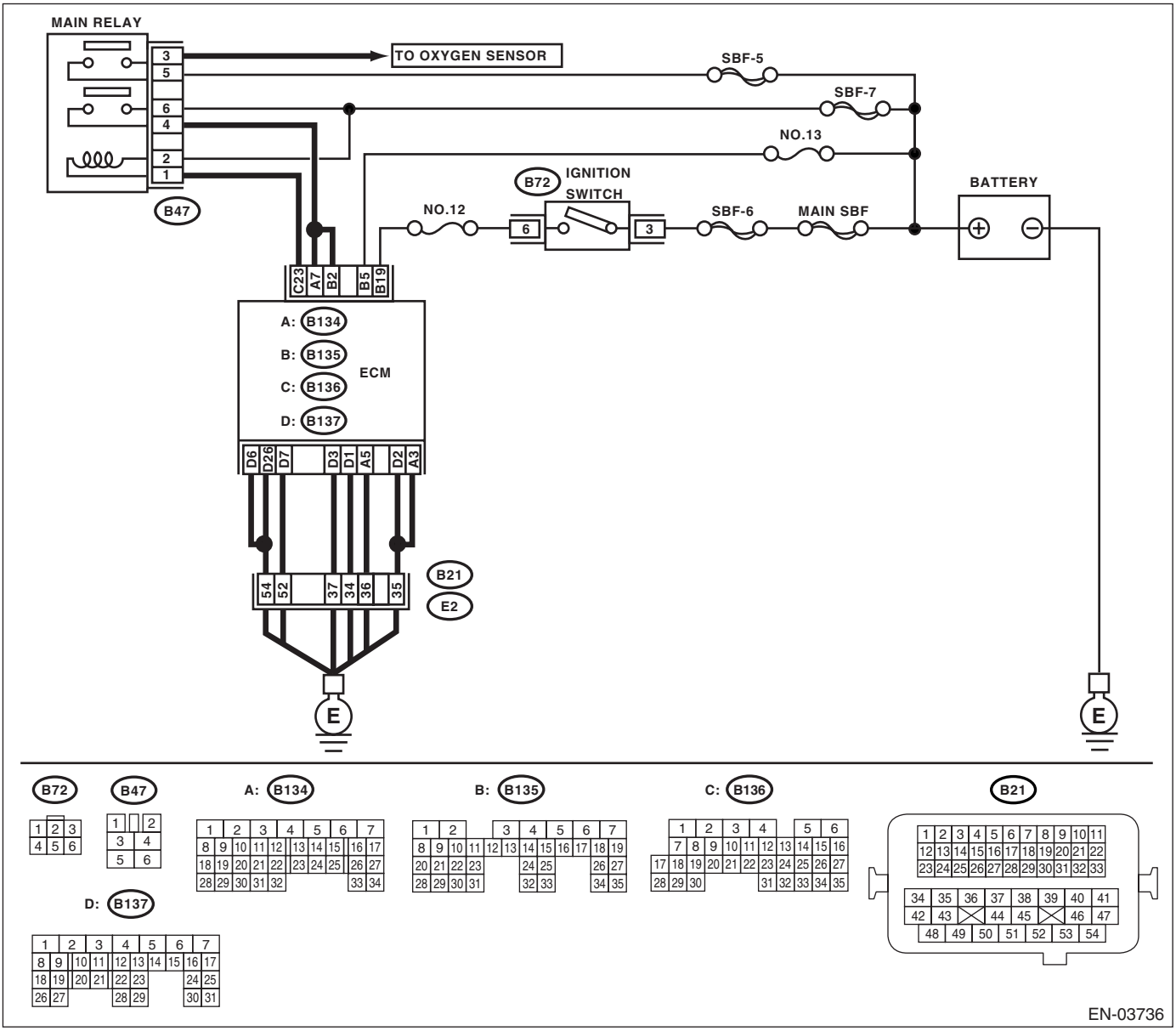
	Step	Check	Yes	No
1	**CHECK BATTERY.** Check the battery voltage.	Is the voltage more than 12 V?	Go to step **2**.	Charge or replace the battery.
2	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate?	Go to step **3**.	Go to step **4**.
3	**CHECK DTC.**	Is DTC displayed? <Ref. to EN(H6DO)(diag)-34, OPERATION, Read Diagnostic Trouble Code (DTC).>	Check the appropriate DTC using the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Repair poor contact in ECM connector.
4	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Turn the ignition switch to START. 4) Measure the power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (–):*** NOTE: Place the select lever in “P” or “N” range.	Is the voltage more than 10 V?	Check the starter motor. <Ref. to SC(H6DO)-6, Starter.>	Go to step **5**.
5	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Disconnect the connector from ignition switch. 2) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Repair the open circuit of harness between ignition switch and battery, and check fuse SBF No. 7 and SBF No. 1.
6	**CHECK IGNITION SWITCH.** 1) Disconnect the connector from ignition switch. 2) Measure the resistance between ignition switch terminals after turning the ignition switch to START position. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance less than 5 Ω?	Go to step **7**.	Replace the ignition switch.
7	**CHECK INPUT VOLTAGE OF STARTER RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter relay. 3) Connect the connector to ignition switch. 4) Measure the input voltage between starter relay connector and chassis ground after turning the ignition switch to START position. ***Connector & terminal*** ***(B225) No. 13 (+) — Chassis ground (–):*** ***(B225) No. 15 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8**.	Repair the open circuit of harness between starter relay and ignition switch.

	Step	Check	Yes	No
8	**CHECK STARTER RELAY.** 1) Connect the battery to starter relay terminals No. 15 and No. 16. 2) Measure the resistance between starter relay terminals. ***Terminals*** ***No. 13 — No. 14:***	Is the resistance less than 1 Ω?	Go to step **9**.	Replace the starter relay.
9	**CHECK INPUT VOLTAGE FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to starter relay. 3) Disconnect the connectors from ECM. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 32 (+) — Chassis ground (–):*** ***(B136) No. 20 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Repair the open or ground short circuit of harness between ECM and starter relay.

C: CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM)

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



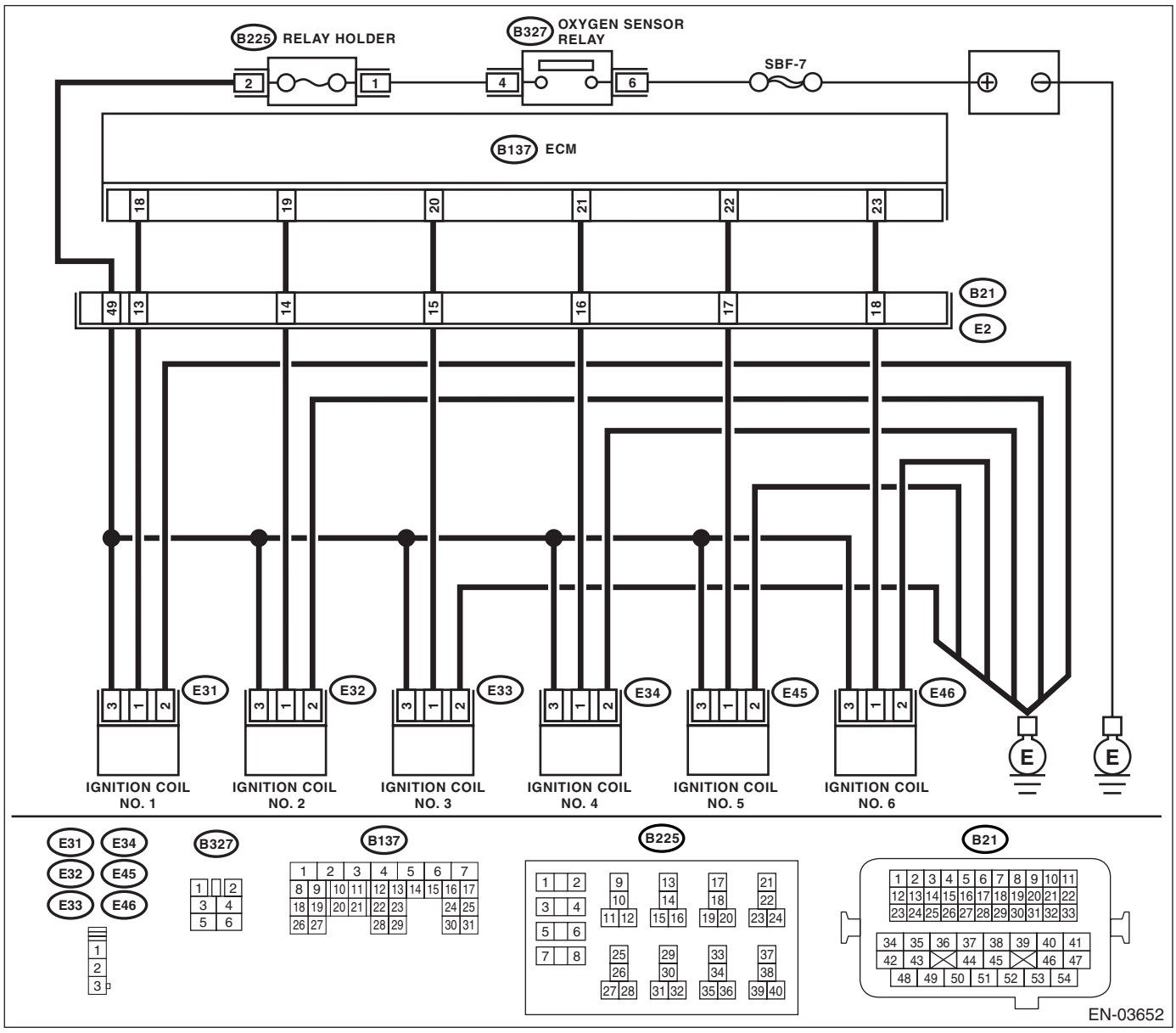
Step		Check	Yes	No
1	**CHECK MAIN RELAY** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 1 and No. 2. 4) Measure the resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **2**.	Replace the main relay.

	Step	Check	Yes	No
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 5 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — Chassis ground:*** ***(B137) No. 3 — Chassis ground:*** ***(B137) No. 6 — Chassis ground:*** ***(B137) No. 7 — Chassis ground:*** ***(B137) No. 26 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3**.	Repair the open circuit of harness between ECM connector and engine grounding terminal.
3	**CHECK INPUT VOLTAGE FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Repair the open or ground short circuit of power supply circuit.
4	**CHECK INPUT VOLTAGE FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5**.	Repair the open or ground short circuit of power supply circuit.
5	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Repair the open circuit of harness between ECM connector and main relay connector.
6	**CHECK INPUT VOLTAGE FROM ECM.** 1) Connect the connectors to ECM and main relay. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Repair the open or ground short circuit of harness between ECM connector and main relay connector.
7	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (–):*** ***(B47) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8**.	Repair the open or ground short circuit of harness of power supply circuit.
8	**CHECK INPUT VOLTAGE FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 7 (+) — Chassis ground (–):*** ***(B135) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(H6DO)(diag)-63, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the open or ground short circuit of harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Diagnostics for Engine Starting Failure

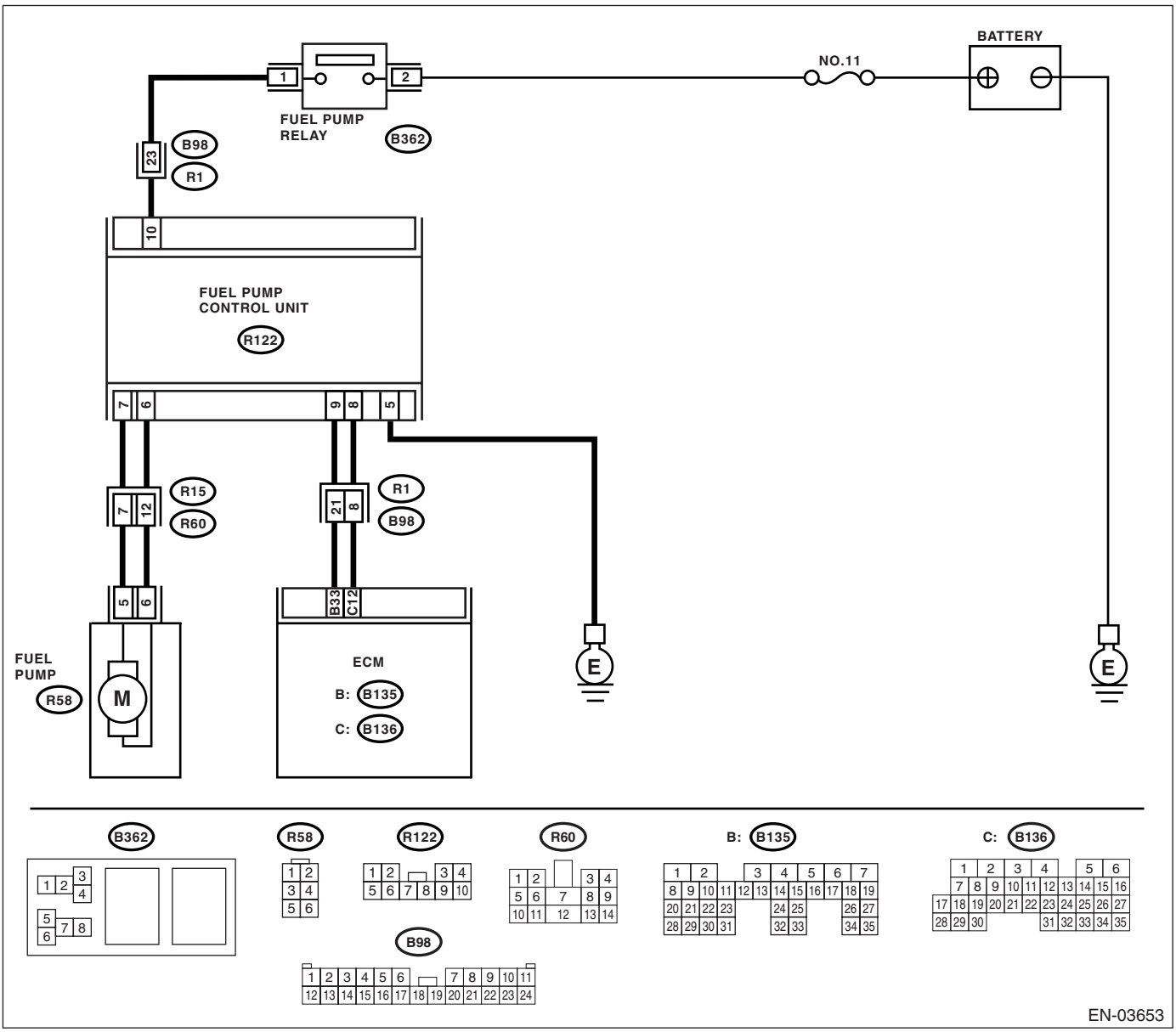
	Step	Check	Yes	No
1	**CHECK SPARK PLUG CONDITION.** 1) Remove the spark plug. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.> 2) Check the spark plug condition. <Ref. to IG(H6DO)-5, INSPECTION, Spark Plug.>	Is the spark plug status OK?	Go to step **2**.	Replace the spark plug.
2	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Connect the spark plug to ignition coil. 2) Release the fuel pressure. 3) Contact the spark plug thread portion on engine. 4) While opening the throttle valve fully, start the engine to check if spark occurs at each cylinder.	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN(H6DO)(diag)-66, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3**.
3	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL AND IGNITOR ASSEMBLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil & ignitor assembly. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil and ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E31) No. 3 (+) — Engine ground (–):*** ***(E32) No. 3 (+) — Engine ground (–):*** ***(E33) No. 3 (+) — Engine ground (–):*** ***(E34) No. 3 (+) — Engine ground (–):*** ***(E45) No. 3 (+) — Engine ground (–):*** ***(E46) No. 3 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between the ignition coil and ignitor assembly, and ignition switch connector • Poor contact of coupling connector
4	**CHECK HARNESS OF IGNITION COIL AND IGNITOR ASSEMBLY GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between the ignition coil and ignitor assembly connector and engine ground. ***Connector & terminal*** ***(E31) No. 2 — Engine ground:*** ***(E32) No. 2 — Engine ground:*** ***(E33) No. 2 — Engine ground:*** ***(E34) No. 2 — Engine ground:*** ***(E45) No. 2 — Engine ground:*** ***(E46) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ignition coil and ignitor assembly connector & engine grounding terminal

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL AND IGNITOR ASSEMBLY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connector from ignition coil & ignitor assembly. 4) Measure the resistance of harness between ECM and ignition coil and ignitor assembly connector. ***Connector & terminal*** ***(B137) No. 18 — (E31) No. 1:*** ***(B137) No. 19 — (E32) No. 1:*** ***(B137) No. 20 — (E33) No. 1:*** ***(B137) No. 21 — (E34) No. 1:*** ***(B137) No. 22 — (E45) No. 1:*** ***(B137) No. 23 — (E46) No. 1:***	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 and ignition coil and ignitor assembly connector • Poor contact of coupling connector
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL AND IGNITOR ASSEMBLY CONNECTOR.** Measure the resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B137) No. 18 — Engine ground:*** ***(B137) No. 19 — Engine ground:*** ***(B137) No. 20 — Engine ground:*** ***(B137) No. 21 — Engine ground:*** ***(B137) No. 22 — Engine ground:*** ***(B137) No. 23 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair the ground short circuit of harness between ECM and ignition coil & ignitor assembly connector.
7	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Check the fuel pump circuit. <Ref. to EN(H6DO)(diag)-66, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

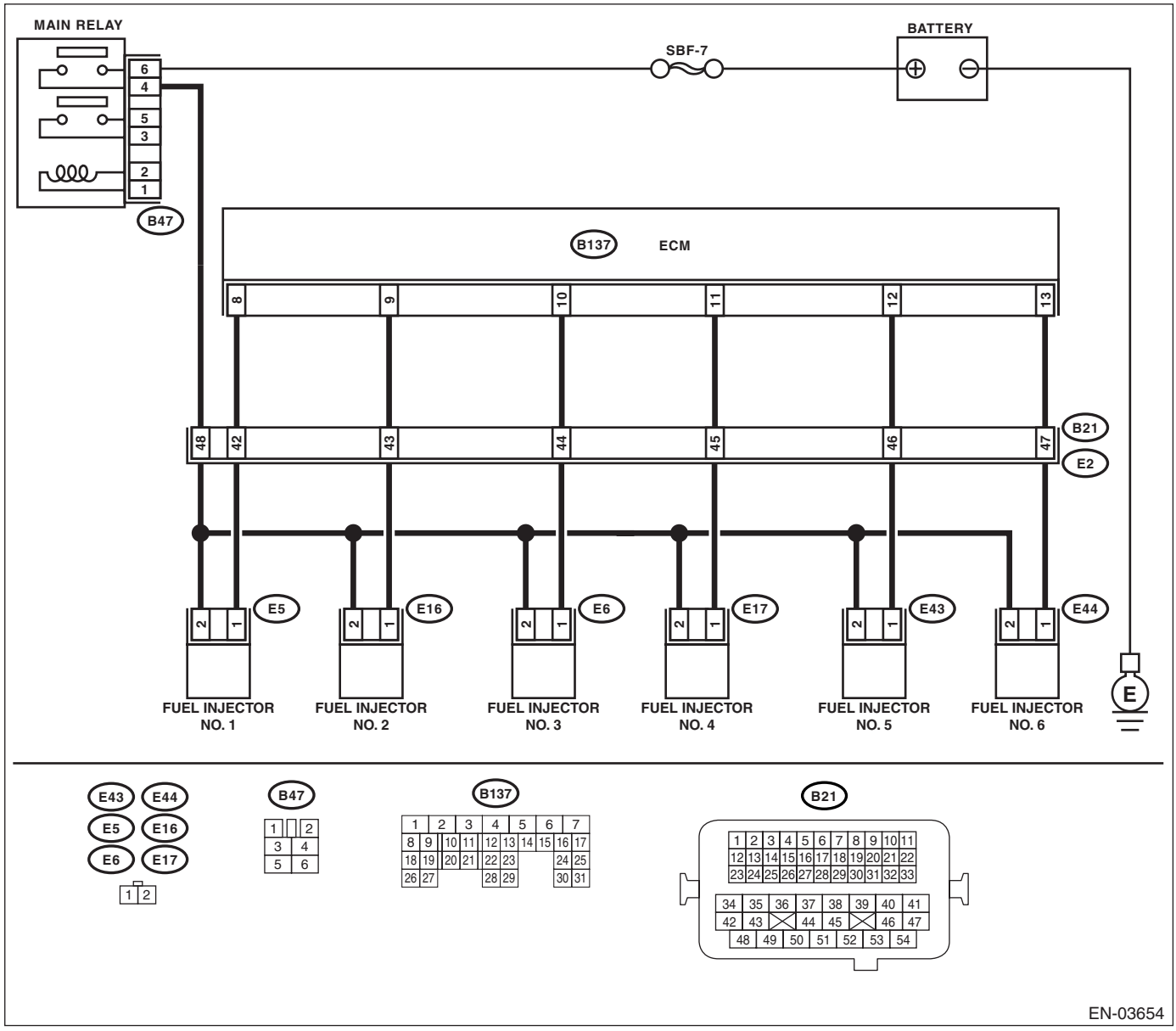


Step		Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Make sure that the fuel pump operates for two seconds when turning the ignition switch to ON. NOTE: Fuel pump operation can also be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H6DO)(diag)-46, Compulsory Valve Operation Check Mode.>	Does the fuel pump emit operating sound?	Check the fuel injector circuit. <Ref. to EN(H6DO)(diag)-67, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Display DTC. <Ref. to EN(H6DO)(diag)-34, OPERATION, Read Diagnostic Trouble Code (DTC).>

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.**

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check each fuel injector emits operating sound. Use a sound scope or apply a screwdriver to the injector for this check.	Does the fuel pump emit operating sound?	Check the fuel pressure. <Ref. to ME(H6DO)-26, INSPECTION, Fuel Pressure.>	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):*** ***#5 (E43) No. 2 (+) — Engine ground (–):*** ***#6 (E44) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between main relay and fuel injector connector • Poor contact of main relay connector • Poor contact of coupling connector • Poor contact of fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B137) No. 8 — (E5) No. 1:*** ***#2 (B137) No. 9 — (E16) No. 1:*** ***#3 (B137) No. 10 — (E6) No. 1:*** ***#4 (B137) No. 11 — (E17) No. 1:*** ***#5 (B137) No. 12 — (E43) No. 1:*** ***#6 (B137) No. 13 — (E44) No. 1:***	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 of harness between ECM and fuel injector connector • Poor contact of coupling connector
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B137) No. 8 — Chassis ground:*** ***#2 (B137) No. 9 — Chassis ground:*** ***#3 (B137) No. 10 — Chassis ground:*** ***#4 (B137) No. 11 — Chassis ground:*** ***#5 (B137) No. 12 — Chassis ground:*** ***#6 (B137) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the ground short circuit of harness between ECM and fuel injector connector.
5	**CHECK EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between each fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 5 — 20 Ω?	Go to step **6**.	Replace the faulty fuel injector.
6	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Inspection using “General Diagnostic Table” <Ref. to EN(H6DO)(diag)-392, INSPECTION, General Diagnostic Table.>

17.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Reference
P0011	Intake Camshaft Position Timing - Over-Advanced (Bank 1)	<Ref. to EN(H6DO)(diag)-77, DTC P0011 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1)	<Ref. to EN(H6DO)(diag)-78, DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0018	Crankshaft Position - Camshaft Position Correlation (Bank 2)	<Ref. to EN(H6DO)(diag)-79, DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0021	Intake Camshaft Position Timing - Over-Advanced (Bank 2)	<Ref. to EN(H6DO)(diag)-80, DTC P0021 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0026	Intake Valve Control Solenoid Circuit Range/Performance (Bank 1)	<Ref. to EN(H6DO)(diag)-81, DTC P0026 INTAKE VALVE CONTROL SOLENOID CIRCUIT RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0028	Intake Valve Control Solenoid Circuit Range/Performance (Bank 2)	<Ref. to EN(H6DO)(diag)-83, DTC P0028 INTAKE VALVE CONTROL SOLENOID CIRCUIT RANGE/PERFORMANCE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-85, 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)-88, 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)-92, 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)-95, 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)-99, 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)-102, 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)-105, 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)-109, 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)-112, DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0058	HO2S Heater Control Circuit High (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-116, 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)-119, DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0076	Intake Valve Control Circuit Low (Bank 1)	<Ref. to EN(H6DO)(diag)-121, DTC P0076 INTAKE VALVE CONTROL CIRCUIT LOW (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P0077	Intake Valve Control Circuit High (Bank 1)	<Ref. to EN(H6DO)(diag)-123, DTC P0077 INTAKE VALVE CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0082	Intake Valve Control Circuit Low (Bank 2)	<Ref. to EN(H6DO)(diag)-125, DTC P0082 INTAKE VALVE CONTROL CIRCUIT LOW (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0083	Intake Valve Control Circuit High (Bank 2)	<Ref. to EN(H6DO)(diag)-127, DTC P0083 INTAKE VALVE CONTROL CIRCUIT HIGH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0101	Mass or Volume Air Flow Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-129, 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)-131, 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)-134, 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)-136, 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)-139, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0111	Intake Air Temperature Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-142, DTC P0111 INTAKE AIR TEMPERATURE CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Circuit Low Input	<Ref. to EN(H6DO)(diag)-144, DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Circuit High Input	<Ref. to EN(H6DO)(diag)-146, DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low Input	<Ref. to EN(H6DO)(diag)-149, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High Input	<Ref. to EN(H6DO)(diag)-151, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0122	Throttle/Pedal Position Sensor/ Switch “A” Circuit Low Input	<Ref. to EN(H6DO)(diag)-154, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle/Pedal Position Sensor/ Switch “A” Circuit High Input	<Ref. to EN(H6DO)(diag)-157, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0125	Insufficient Coolant Temperature For Closed Loop Fuel Control	<Ref. to EN(H6DO)(diag)-160, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0126	Insufficient Coolant Temperature for Stable Operation	<Ref. to EN(H6DO)(diag)-161, DTC P0126 INSUFFICIENT COOLANT TEMPERATURE FOR STABLE OPERATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	<Ref. to EN(H6DO)(diag)-163, DTC P0128 COOLANT THERMOSTAT (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)-164, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-167, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-170, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (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)-173, 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)-176, 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)-180, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-184, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0140	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-187, DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0151	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-191, DTC P0151 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0152	O2 Sensor Circuit High Voltage (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-194, DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0153	O2 Sensor Circuit Slow Response (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-197, DTC P0153 O2 SENSOR CIRCUIT SLOW RESPONSE (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)-200, 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)-203, 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)-207, DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0159	O2 Sensor Circuit Slow Response (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-211, DTC P0159 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0160	O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-214, DTC P0160 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H6DO)(diag)-217, 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)-217, 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)-217, 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)-218, 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)-220, DTC P0181 FUEL TEMPERATURE SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P0182	Fuel Temperature Sensor “A” Circuit Low Input	<Ref. to EN(H6DO)(diag)-222, 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)-224, 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)-227, DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0197	Engine Oil Temperature Sensor Circuit Low	<Ref. to EN(H6DO)(diag)-229, DTC P0197 ENGINE OIL TEMPERATURE SENSOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0198	Engine Oil Temperature Sensor Circuit High	<Ref. to EN(H6DO)(diag)-231, DTC P0198 ENGINE OIL TEMPERATURE SENSOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low Input	<Ref. to EN(H6DO)(diag)-234, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0223	Throttle/Pedal Position Sensor/ Switch “B” Circuit High Input	<Ref. to EN(H6DO)(diag)-237, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0230	Fuel Pump Primary Circuit	<Ref. to EN(H6DO)(diag)-240, DTC P0230 FUEL PUMP PRIMARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 Misfire Detected	<Ref. to EN(H6DO)(diag)-242, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 Misfire Detected	<Ref. to EN(H6DO)(diag)-242, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 Misfire Detected	<Ref. to EN(H6DO)(diag)-242, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 Misfire Detected	<Ref. to EN(H6DO)(diag)-242, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0305	Cylinder 5 Misfire Detected	<Ref. to EN(H6DO)(diag)-243, DTC P0305 CYLINDER 5 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0306	Cylinder 6 Misfire Detected	<Ref. to EN(H6DO)(diag)-244, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	<Ref. to EN(H6DO)(diag)-251, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	<Ref. to EN(H6DO)(diag)-253, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0332	Knock Sensor 2 Circuit Low Input (Bank 2)	<Ref. to EN(H6DO)(diag)-255, DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW INPUT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0333	Knock Sensor 2 Circuit High Input (Bank 2)	<Ref. to EN(H6DO)(diag)-257, DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH INPUT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to EN(H6DO)(diag)-259, 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)-261, 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)-263, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P0345	Camshaft Position Sensor “A” Circuit (Bank 2)	<Ref. to EN(H6DO)(diag)-265, DTC P0345 CAMSHAFT POSITION SENSOR “A”CIRCUIT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H6DO)(diag)-267, 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)-270, 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)-272, 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)-275, 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)-277, 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)-279, 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)-282, 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)-285, 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)-287, DTC P0457 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low	<Ref. to EN(H6DO)(diag)-289, DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0459	Evaporative Emission Control System Purge Control Valve Circuit High	<Ref. to EN(H6DO)(diag)-291, DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0461	Fuel Level Sensor Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-293, DTC P0461 FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel Level Sensor Circuit Low Input	<Ref. to EN(H6DO)(diag)-293, DTC P0462 FUEL LEVEL SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0463	Fuel Level Sensor Circuit High Input	<Ref. to EN(H6DO)(diag)-293, DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0464	Fuel Level Sensor Circuit Intermittent	<Ref. to EN(H6DO)(diag)-294, DTC P0464 FUEL LEVEL SENSOR CIRCUIT INTERMITTENT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0483	Cooling Fan Rationality Check	<Ref. to EN(H6DO)(diag)-294, DTC P0483 COOLING FAN RATIONALITY CHECK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle Speed Sensor	<Ref. to EN(H6DO)(diag)-295, DTC P0500 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0506	Idle Control System RPM Lower Than Expected	<Ref. to EN(H6DO)(diag)-296, DTC P0506 IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0507	Idle Control System RPM Higher Than Expected	<Ref. to EN(H6DO)(diag)-297, DTC P0507 IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P0512	Starter Request Circuit	<Ref. to EN(H6DO)(diag)-298, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Control System Malfunction (Fail-Safe)	<Ref. to EN(H6DO)(diag)-300, DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0600	Serial Communication Link	<Ref. to EN(H6DO)(diag)-300, DTC P0600 SERIAL COMMUNICATION LINK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to EN(H6DO)(diag)-301, 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)-301, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0607	Control Module Performance	<Ref. to EN(H6DO)(diag)-302, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0638	Throttle Actuator Control Range/Performance (Bank 1)	<Ref. to EN(H6DO)(diag)-303, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0691	Cooling Fan 1 Control Circuit Low	<Ref. to EN(H6DO)(diag)-303, DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0692	Cooling Fan 1 Control Circuit High	<Ref. to EN(H6DO)(diag)-304, DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0700	Transmission Control System (MIL Request)	<Ref. to EN(H6DO)(diag)-304, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1152	O2 Sensor Circuit Range/Performance (Low) (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-304, DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1153	O2 Sensor Circuit Range/Performance (High) (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-305, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1154	O2 Sensor Circuit Range/Performance (Low) (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-308, DTC P1154 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1155	O2 Sensor Circuit Range/Performance (High) (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-309, 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)-312, DTC P1160 RETURN SPRING FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1443	Vent Control Solenoid Valve Function Problem	<Ref. to EN(H6DO)(diag)-313, DTC P1443 VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H6DO)(diag)-315, 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)-318, 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).>

DTC	Item	Reference
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	OCV Solenoid Valve Signal A Circuit Open (Bank 1)	<Ref. to EN(H6DO)(diag)-320, DTC P2088 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2089	OCV Solenoid Valve Signal A Circuit Short (Bank 1)	<Ref. to EN(H6DO)(diag)-322, DTC P2089 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2092	OCV Solenoid Valve Signal A Circuit Open (Bank 2)	<Ref. to EN(H6DO)(diag)-324, DTC P2092 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2093	OCV Solenoid Valve Signal A Circuit Short (Bank 2)	<Ref. to EN(H6DO)(diag)-326, DTC P2093 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	<Ref. to EN(H6DO)(diag)-328, 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)-336, 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)-344, 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)-352, 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)-360, 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)-367, 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)-370, 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)-371, 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)-372, 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)-375, 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)-377, 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)-380, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2135	Throttle/Pedal Position Sensor/ Switch “A”/“B” Voltage Rationality	<Ref. to EN(H6DO)(diag)-382, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A”/“B” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P2138	Throttle/Pedal Position Sensor/ Switch “D”/“E” Voltage Rationality	<Ref. to EN(H6DO)(diag)-386, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D”/“E” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2227	Barometric Pressure Circuit Range/ Performance	<Ref. to EN(H6DO)(diag)-390, DTC P2227 BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2228	Barometric Pressure Circuit Low Input	<Ref. to EN(H6DO)(diag)-390, DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2229	Barometric Pressure Circuit High Input	<Ref. to EN(H6DO)(diag)-391, DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

18.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0011 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-9, DTC P0011 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)." <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Measure the AVCS system operating angle and oil flow control solenoid valve duty output using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the AVCS system operating angle approx. 0 deg., and oil flow control solenoid valve duty output approx. 10%?	Check the following item and repair or replace if necessary. • Oil pipe (clog) • Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring, clog of valve) • Intake camshaft (dirt, damage of camshaft) • Timing chain (matching of timing mark)	A temporary malfunction. Perform the following, 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.

B: DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 1)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-11, DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)." <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Measure the AVCS system operating angle and oil flow control solenoid valve duty output using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the AVCS system operating angle approx. 0 deg., and oil flow control solenoid valve duty output approx. 10%?	Check the following item and repair or replace if necessary. • Oil pipe (clog) • Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring, clog of valve) • Intake camshaft (dirt, damage of camshaft) • Timing chain (matching of timing mark)	A temporary malfunction. Perform the following, 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.

C: DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 2)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-11, DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Check the AVCS system operating angle and oil flow control solenoid valve duty output using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the AVCS system operating angle approx. 0 deg., and oil flow control solenoid valve duty output approx. 10%?	Check the following item and repair or replace if necessary. • Engine oil (amount, dirt) • Oil pipe (clog) • Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring, clog of valve) • Intake camshaft (dirt, damage of camshaft) • Timing chain (matching of timing mark)	A temporary malfunction. Perform the following, 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.

D: DTC P0021 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 2)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-11, DTC P0021 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Check the AVCS system operating angle and oil flow control solenoid valve duty output using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the AVCS system operating angle approx. 0 deg., and oil flow control solenoid valve duty output approx. 10%?	Check the following item and repair or replace if necessary. • Engine oil (amount, dirt) • Oil pipe (clog) • Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring, clog of valve) • Intake camshaft (dirt, damage of camshaft) • Timing chain (matching of timing mark)	A temporary malfunction. Perform the following, 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.

E: DTC P0026 INTAKE VALVE CONTROL SOLENOID CIRCUIT RANGE/PERFORMANCE (BANK 1)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-12, DTC P0026 INTAKE VALVE CONTROL SOLENOID CIRCUIT RANGE/PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

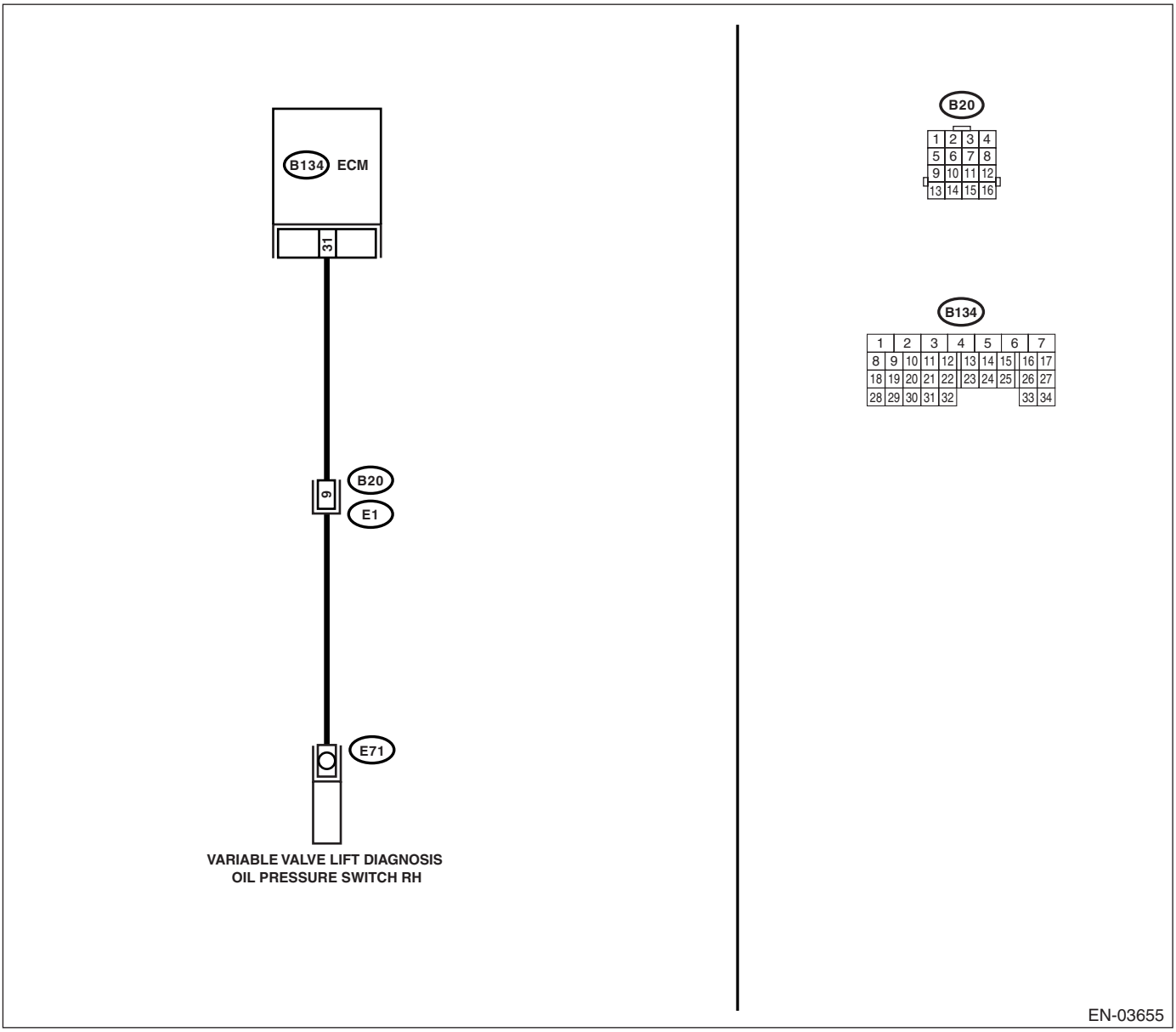
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE LIFT DIAGNOSIS OIL PRESSURE SWITCH CONNECTOR.** 1) Idle the engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connectors from ECM and variable valve lift diagnosis oil pressure switch connector. 4) Measure the resistance of harness between variable valve lift diagnosis oil pressure switch connector and engine ground. ***Connector & terminal*** ***(E71) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the ground short circuit of harness between ECM and variable valve lift diagnosis oil pressure switch connector.
3	**CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE LIFT DIAGNOSIS OIL PRESSURE SWITCH CONNECTOR.** Measure the resistance of harness between ECM and variable valve lift diagnosis oil pressure switch connector. ***Connector & terminal*** ***(B134) No. 31 — (E71) No. 1:***	Is the resistance less than 1 Ω?	Replace the variable valve lift diagnosis oil pressure switch. <Ref. to FU(H6DO)-26, Variable Valve Lift Diagnosis Oil Pressure Switch.> Go to step **4**.	Repair the open circuit of harness between ECM and variable valve lift diagnosis oil pressure switch connector.
4	**CHECK DTC.** 1) Erase the memory. <Ref. to EN(H6DO)(diag)-45, Clear Memory Mode.> 2) Check the DTC after idling the engine.	Is DTC displayed?	Replace the oil switching solenoid valve. <Ref. to ME(H6DO)-78, Oil Switching Solenoid Valve.> Go to step **5**.	END.
5	**CHECK DTC.** 1) Erase the memory. <Ref. to EN(H6DO)(diag)-45, Clear Memory Mode.> 2) Check the DTC after idling the engine.	Is DTC displayed?	Check for oil routing. Contact with SOA Service Center.	END.

F: DTC P0028 INTAKE VALVE CONTROL SOLENOID CIRCUIT RANGE/PERFORMANCE (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-15, DTC P0028 INTAKE VALVE CONTROL SOLENOID CIRCUIT RANGE/PERFORMANCE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

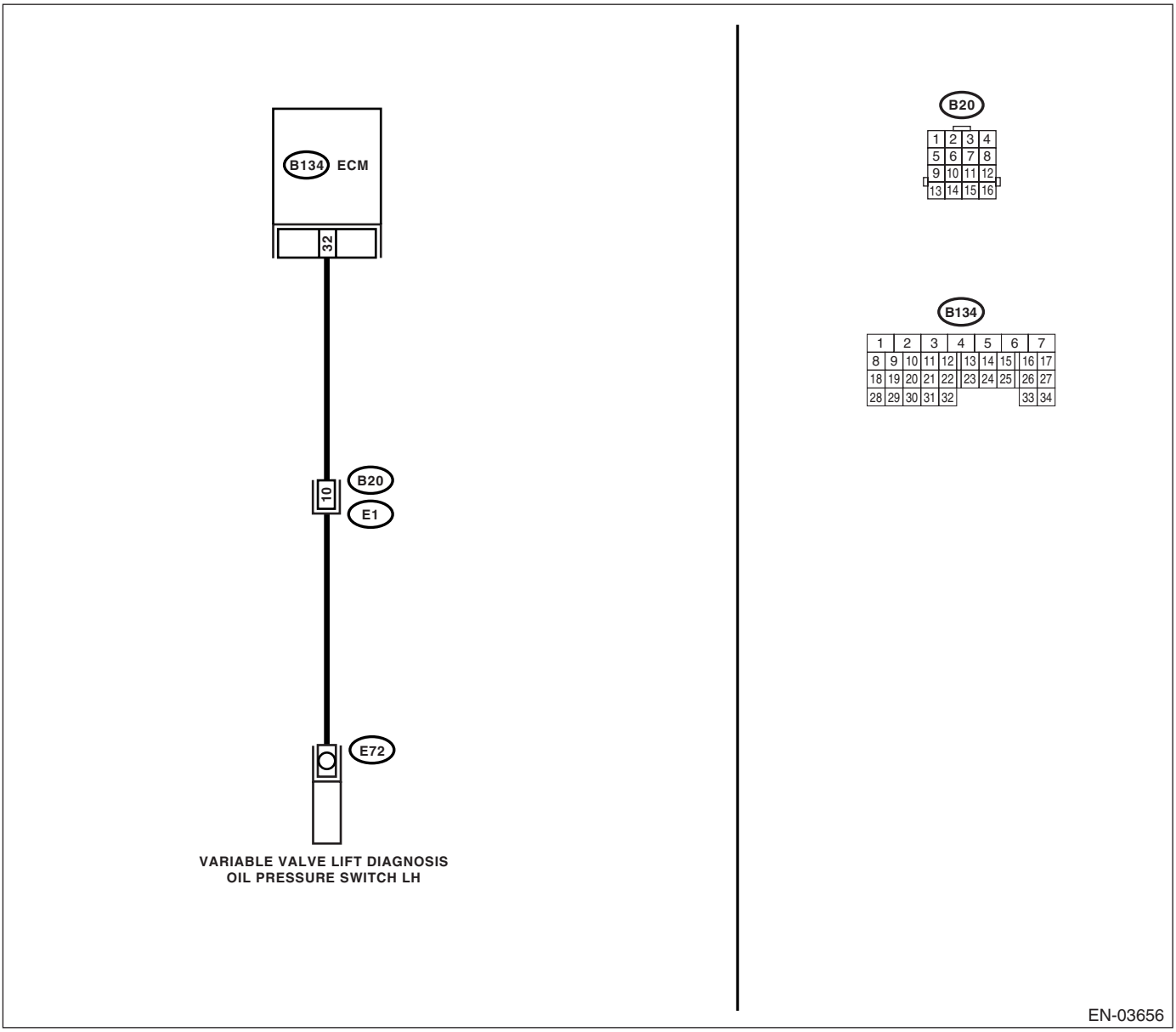
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE LIFT DIAGNOSIS OIL PRESSURE SWITCH CONNECTOR.** 1) Idle the engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connectors from ECM and variable valve lift diagnosis oil pressure switch connector. 4) Measure the resistance of harness between variable valve lift diagnosis oil pressure switch connector and engine ground. ***Connector & terminal*** ***(E72) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the ground short circuit of harness between ECM and variable valve lift diagnosis oil pressure switch connector.
3	**CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE LIFT DIAGNOSIS OIL PRESSURE SWITCH CONNECTOR.** Measure the resistance of harness between ECM and variable valve lift diagnosis oil pressure switch connector. ***Connector & terminal*** ***(B134) No. 32 — (E72) No. 1:***	Is the resistance less than 1 Ω?	Replace the variable valve lift diagnosis oil pressure switch. <Ref. to FU(H6DO)-26, Variable Valve Lift Diagnosis Oil Pressure Switch.> Go to step **4**.	Repair the open circuit of harness between ECM and variable valve lift diagnosis oil pressure switch connector.
4	**CHECK DTC.** 1) Erase the memory. <Ref. to EN(H6DO)(diag)-45, Clear Memory Mode.> 2) Check the DTC after idling the engine.	Is DTC displayed?	Replace the oil switching solenoid valve. <Ref. to ME(H6DO)-78, Oil Switching Solenoid Valve.> Go to step **5**.	END.
5	**CHECK DTC.** 1) Erase the memory. <Ref. to EN(H6DO)(diag)-45, Clear Memory Mode.> 2) Check the DTC after idling the engine.	Is DTC displayed?	Check for oil routing. Contact with SOA Service Center.	END.

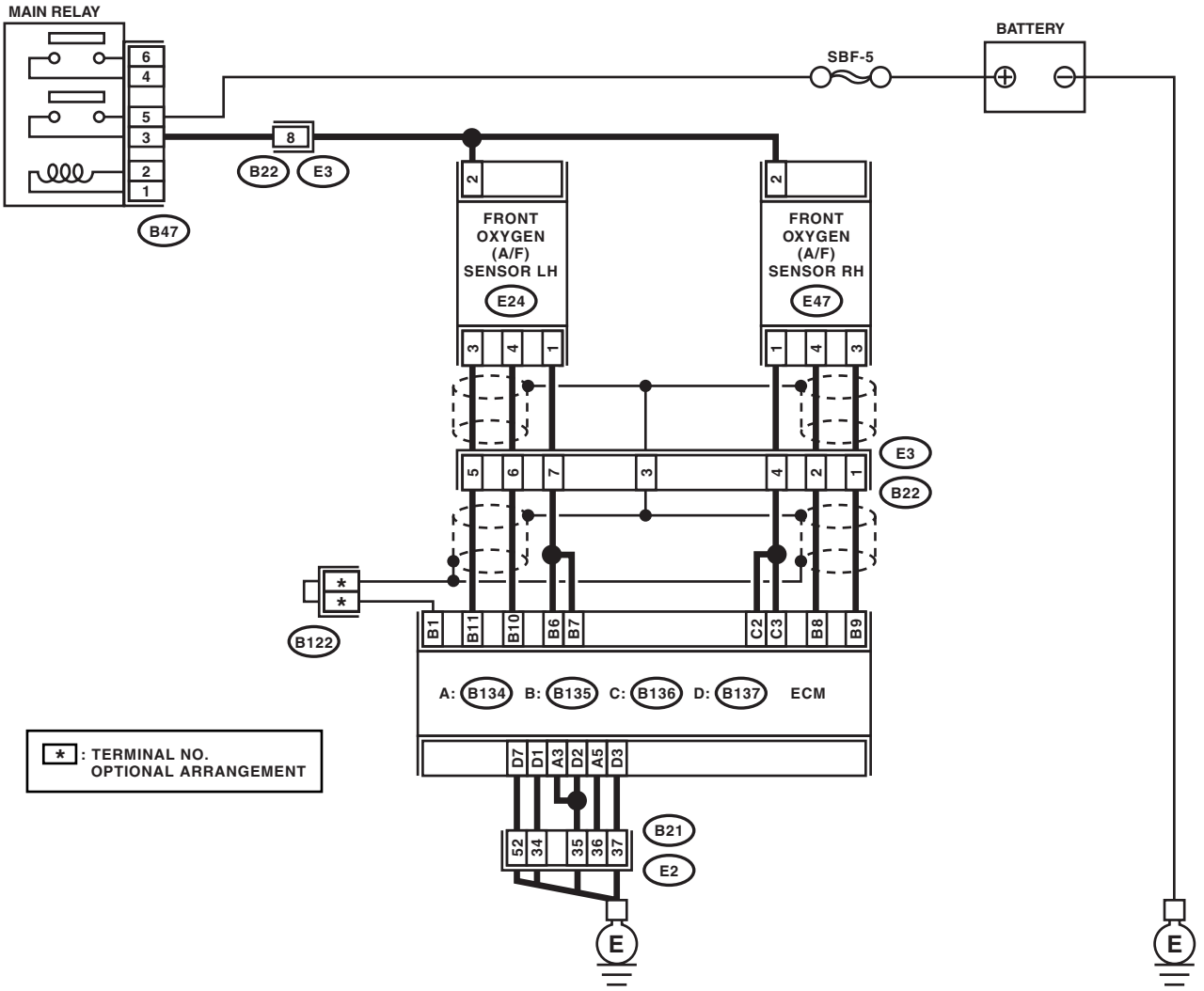
G: DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1)

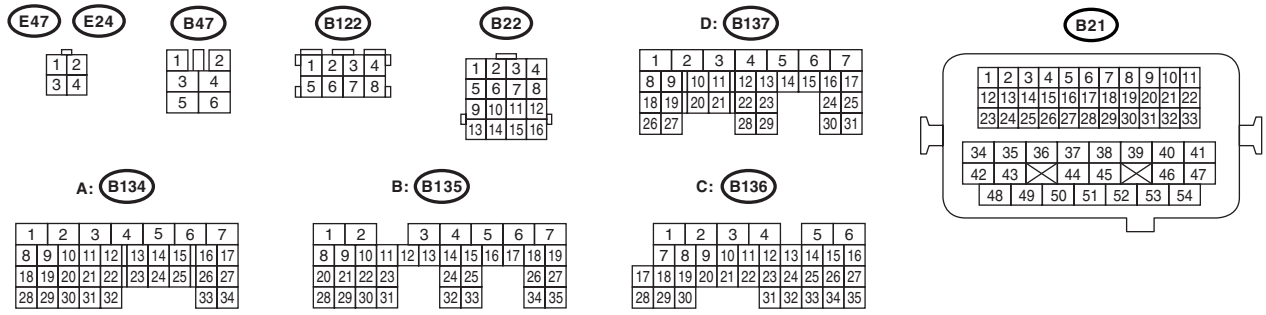
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-15, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B136) No. 2 — (E47) No. 1:*** ***(B136) No. 3 — (E47) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B135) No. 8 — (E47) No. 4:*** ***(B135) No. 9 — (E47) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN MAIN RELAY AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between main relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B47) No. 3 — (E47) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between main relay and front oxygen (A/F) sensor connector.
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 5 Ω?	Go to step **5**.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>
5	**CHECK POOR CONTACT.** Check poor contact of ECM and front oxygen (A/F) sensor connector.	Is there poor contact in 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)-28, Front Oxygen (A/F) Sensor.>

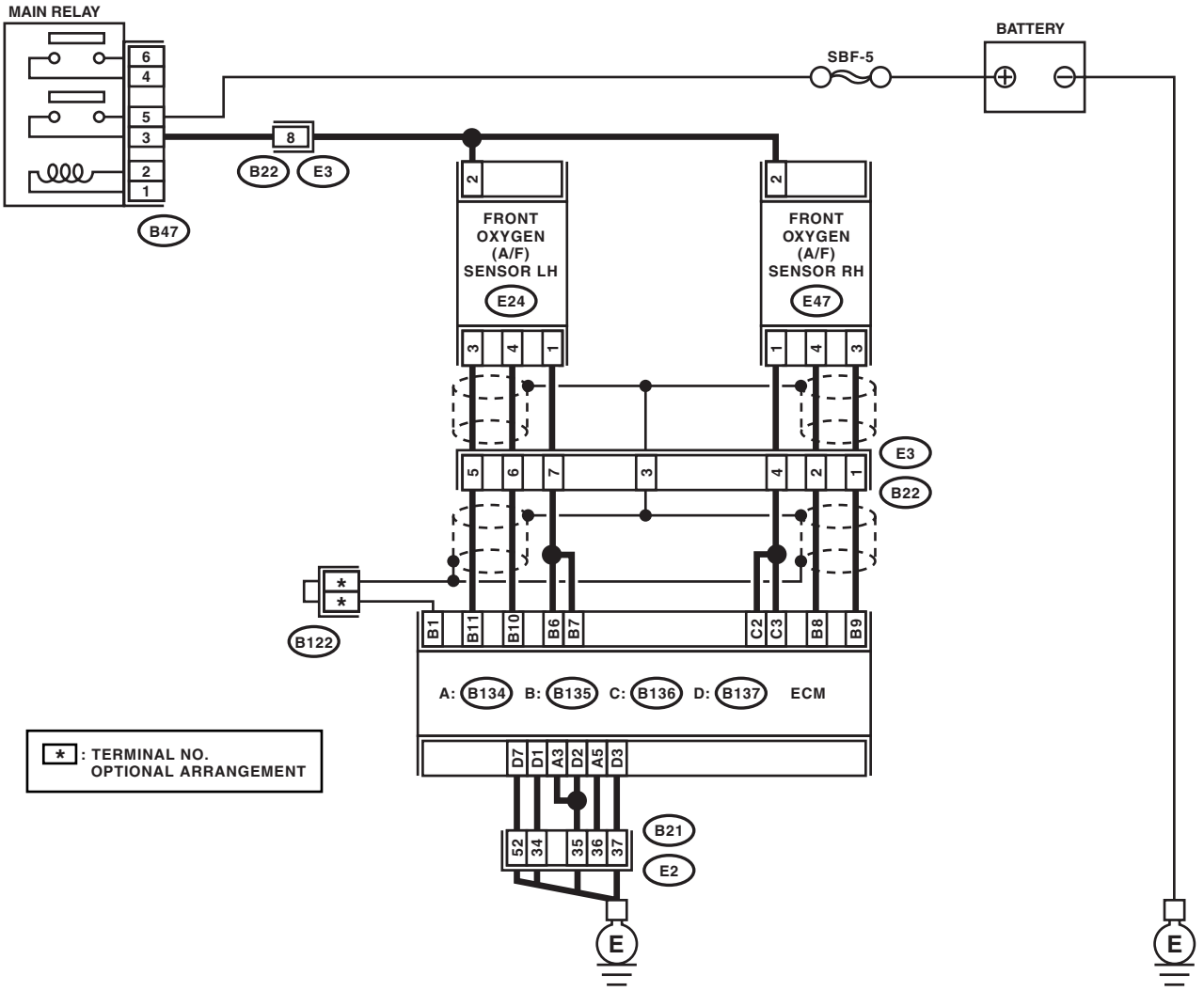
H: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

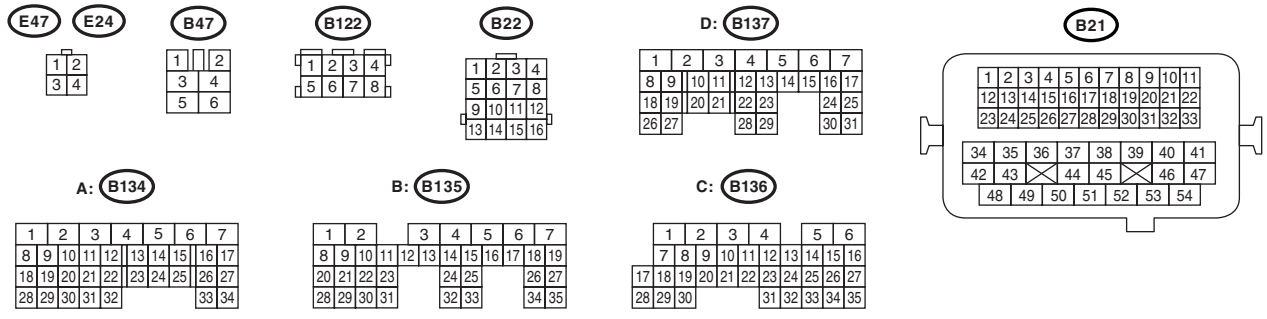
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-17, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(E47) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Repair the power supply line. NOTE: In this case, repair the following item: • Open circuit of harness between main relay and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact of main relay connector
2	**CHECK GROUND CIRCUIT FOR ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 5 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — Chassis ground:*** ***(B137) No. 3 — Chassis ground:*** ***(B137) No. 7 — Chassis ground:***	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 and engine ground terminal • Poor contact in ECM connector • Poor contact of coupling connector
3	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 0.2 A?	Repair the poor contact of connector. NOTE: In this case, repair the following item: • Poor contact in front oxygen (A/F) sensor connector • Poor contact of coupling connector • Poor contact in ECM connector	Go to step **4**.
4	**CHECK OUTPUT SIGNAL OF ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 2 (+) — Chassis ground (–):*** ***(B136) No. 3 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **6**.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 2 (+) — Chassis ground (–):*** ***(B136) No. 3 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair poor contact in ECM connector.	Go to step **6**.
6	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 10 Ω?	Repair the harness and connector. NOTE: In this case, repair the following item: • Open or ground short circuit of harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector • Poor contact of coupling connector	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>

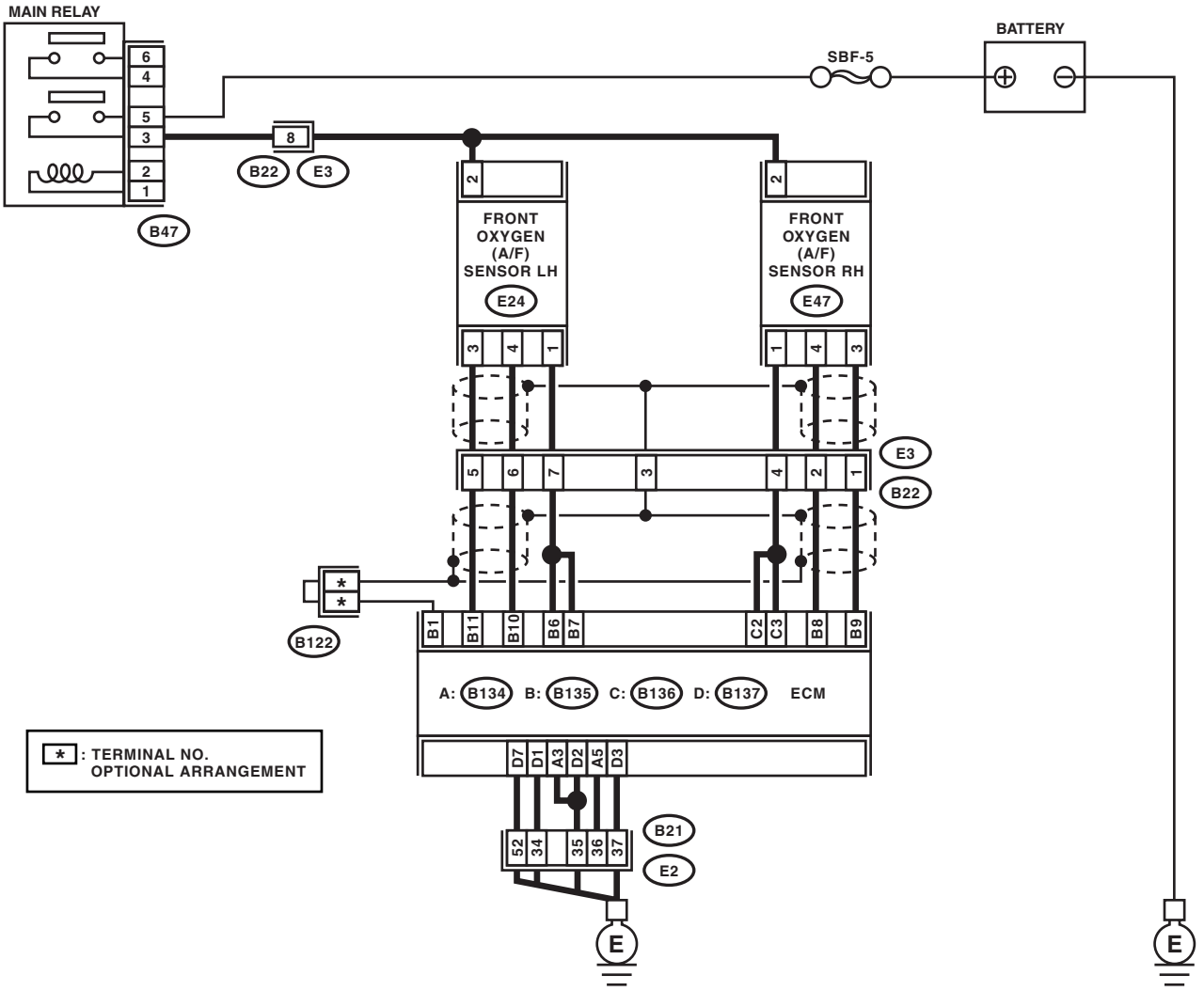
I: DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

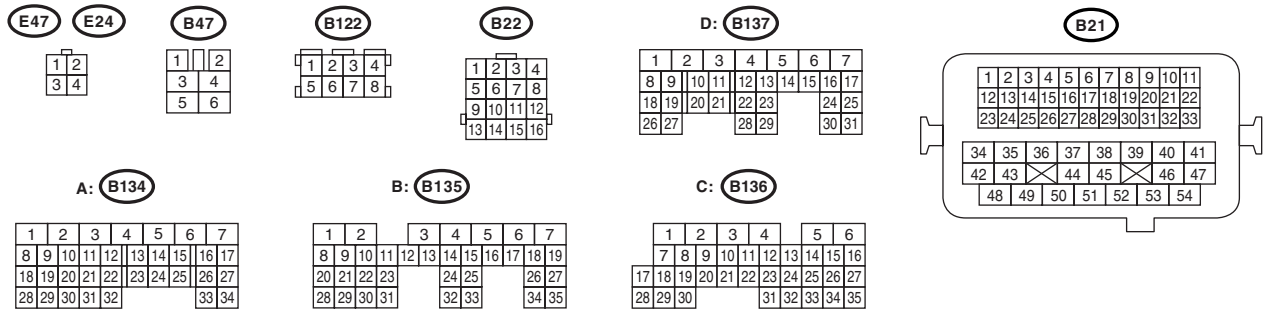
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-19, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 2 (+) — Chassis ground (–):*** ***(B136) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **2**.	Go to step **3**.

	Step	Check	Yes	No
2	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 2.3 A?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	END.
3	**CHECK OUTPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 2 (+) — Chassis ground (–):*** ***(B136) No. 3 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector.	END.

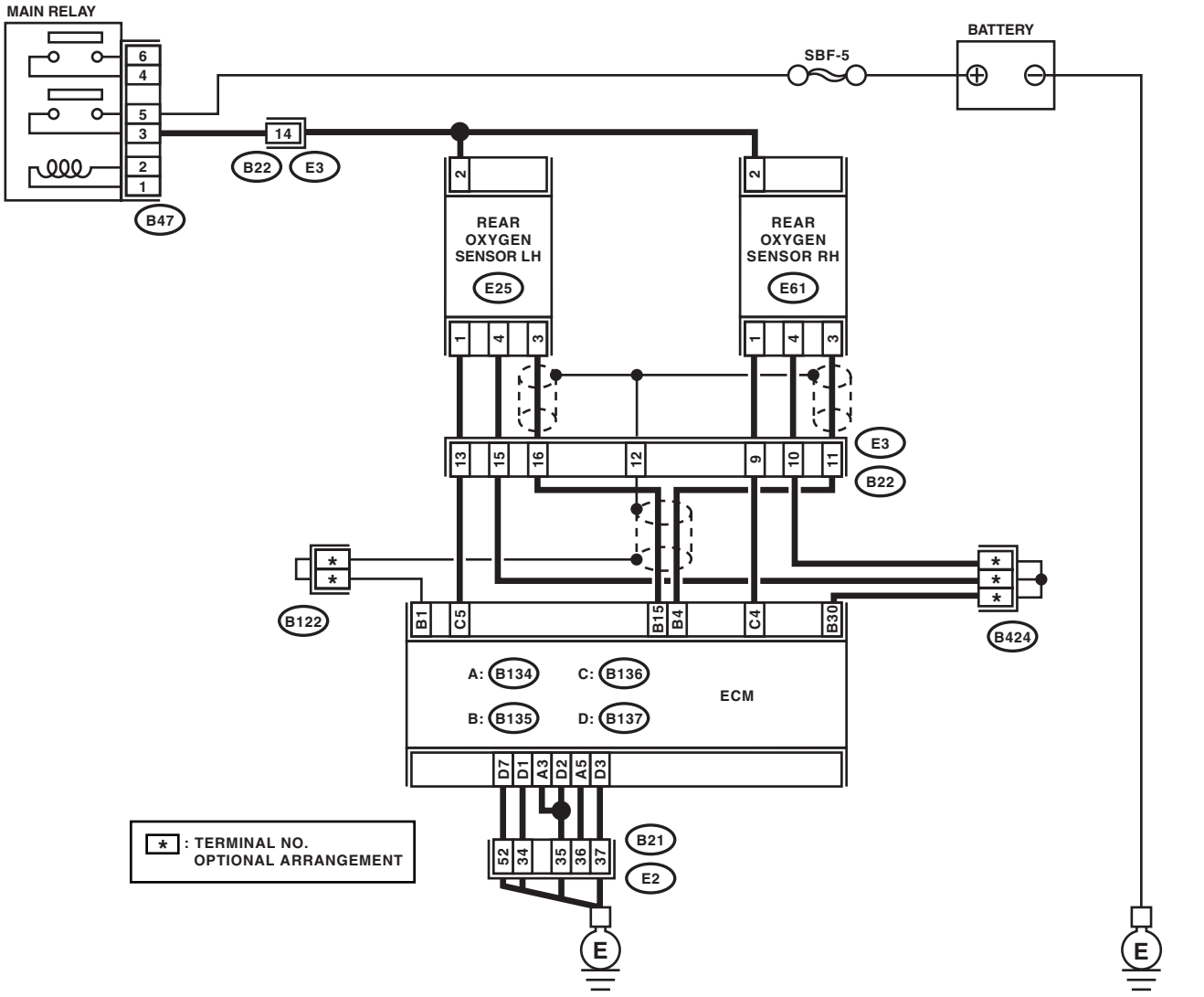
J: DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

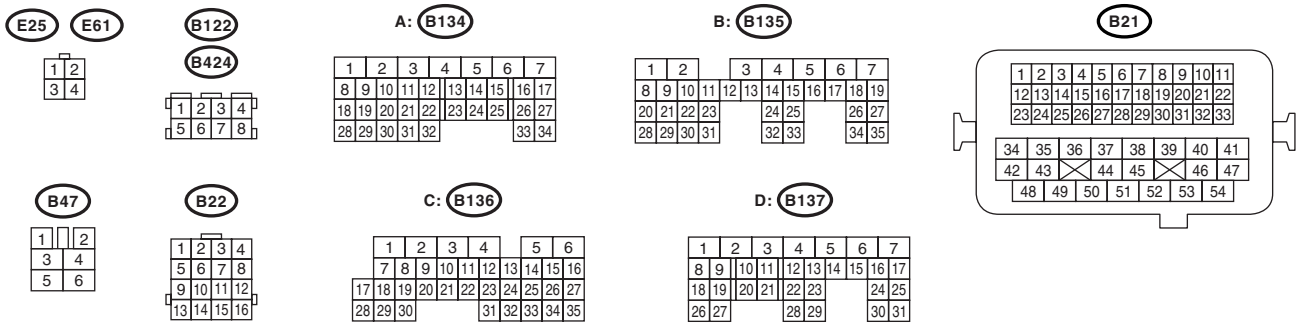
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-21, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(E61) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Repair the power supply line. NOTE: In this case, repair the following item: • Open circuit of harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact of main relay connector
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 5 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — Chassis ground:*** ***(B137) No. 3 — Chassis ground:*** ***(B137) No. 7 — Chassis ground:***	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 and engine ground terminal • Poor contact in ECM connector • Poor contact of coupling connector
3	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 0.2 A?	Repair the connector. NOTE: In this case, repair the following item: • Poor contact in rear oxygen sensor connector • Poor contact of coupling connector • Poor contact in ECM connector	Go to step **4**.
4	**CHECK OUTPUT SIGNAL OF ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **7**.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair poor contact in ECM connector.	Go to step **6**.
6	**CHECK OUTPUT SIGNAL OF ECM.** 1) Disconnect the connector from rear oxygen sensor. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Repair the battery short circuit of harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
7	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between rear oxygen sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact of coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>

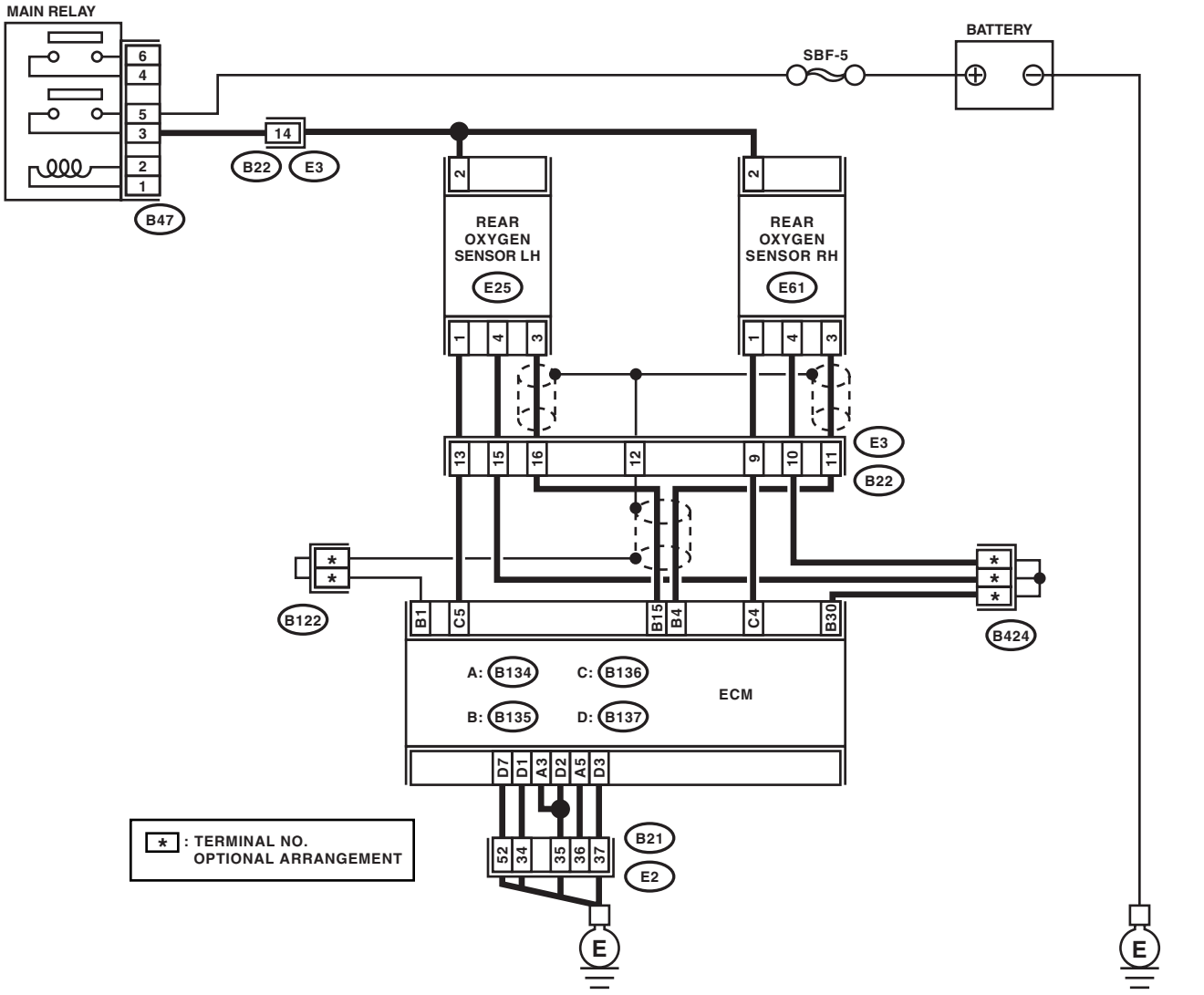
K: DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

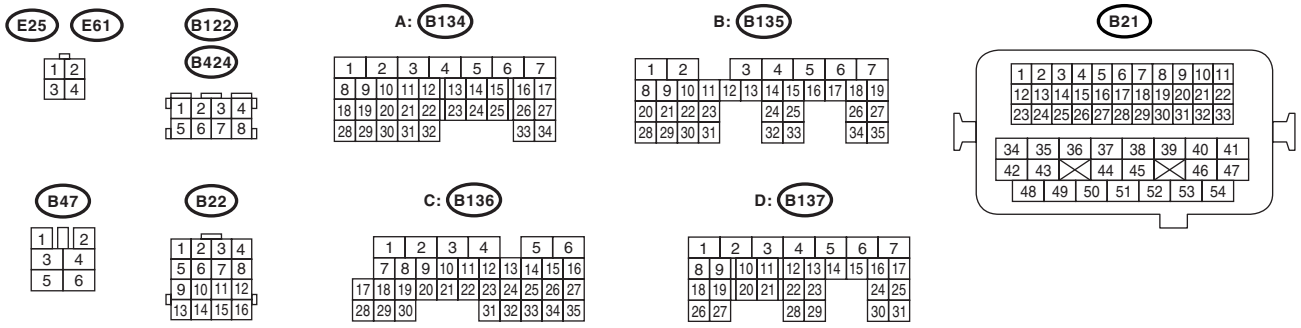
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-23, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

Step		Check	Yes	No
1	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **2**.	Go to step **3**.

	Step	Check	Yes	No
2	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit of harness between ECM and rear oxygen sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 7 A?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	END.
3	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	END.

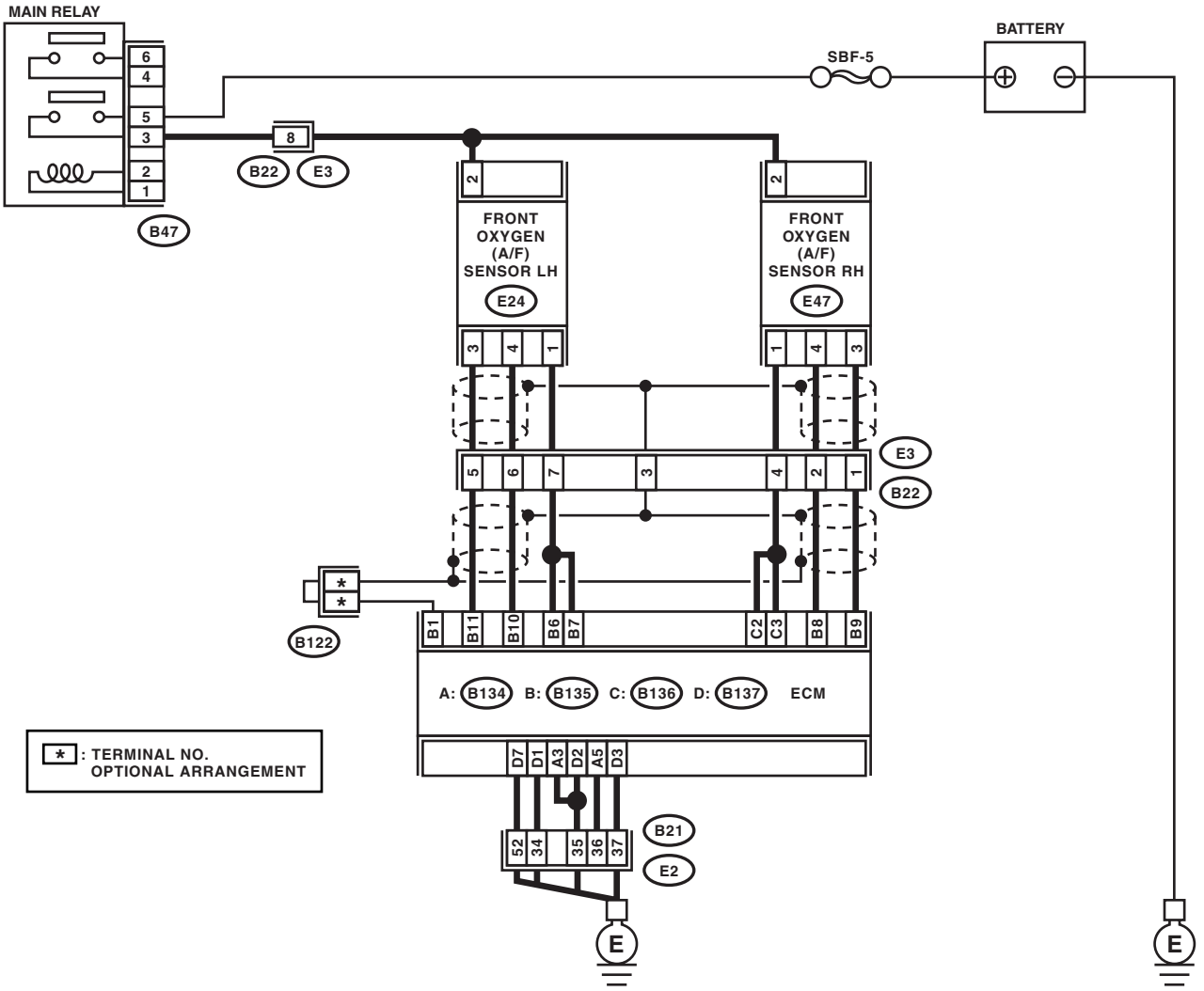
L: DTC P0050 HO2S HEATER CONTROL CIRCUIT (BANK 2 SENSOR 1)

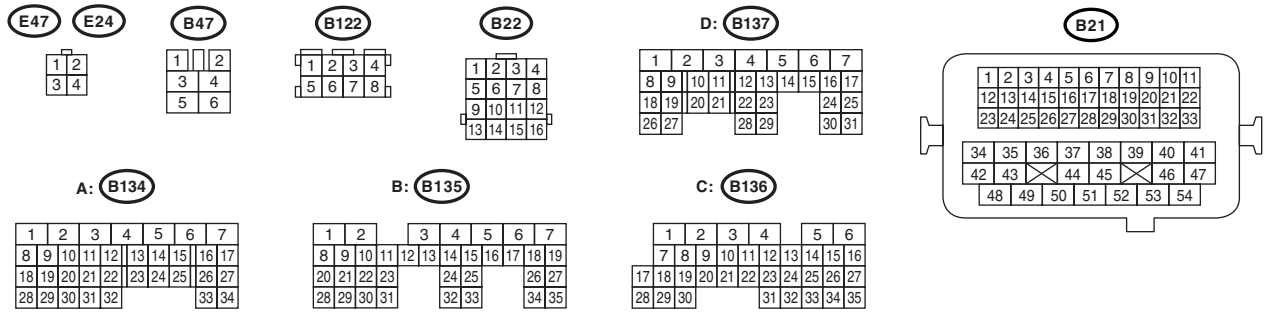
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-25, DTC P0050 HO2S HEATER CONTROL CIRCUIT (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B135) No. 6 — (E24) No. 1:*** ***(B135) No. 7 — (E24) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B135) No. 10 — (E24) No. 4:*** ***(B135) No. 11 — (E24) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN MAIN RELAY AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between main relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B47) No. 3 — (E24) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between main relay and front oxygen (A/F) sensor connector.
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 5 Ω?	Go to step **5**.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>
5	**CHECK POOR CONTACT.** Check poor contact of ECM and front oxygen (A/F) sensor connector.	Is there poor contact in 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)-28, Front Oxygen (A/F) Sensor.>

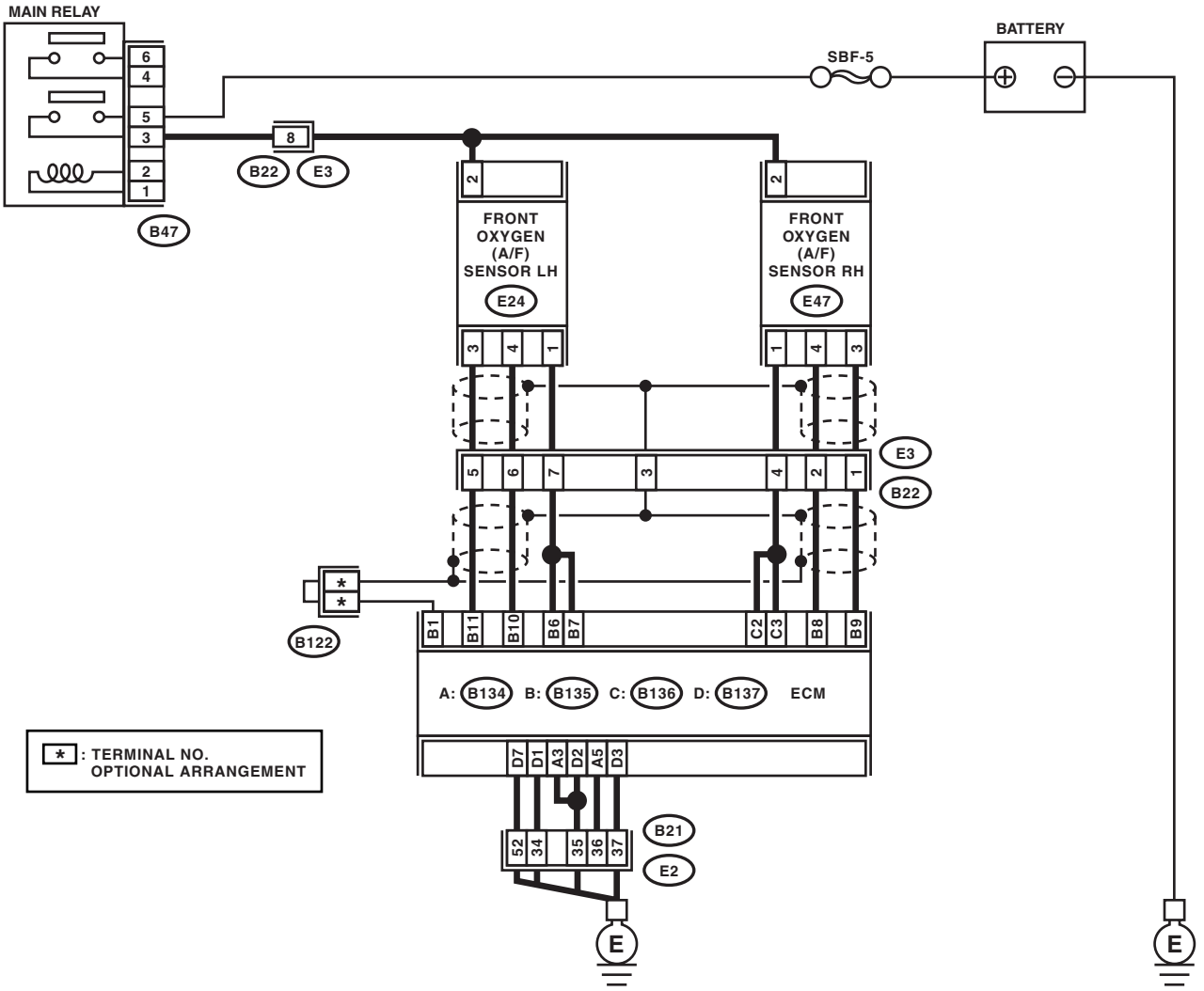
M: DTC P0051 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1)

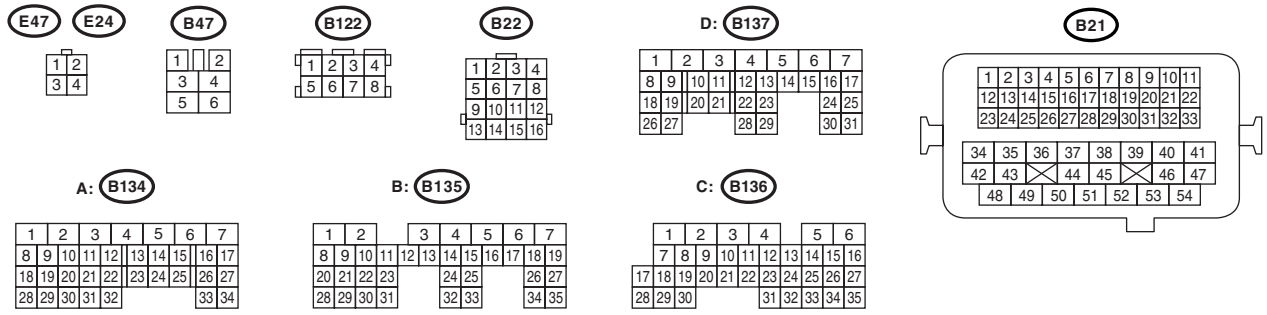
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-25, DTC P0051 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(E24) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Repair the power supply line. NOTE: In this case, repair the following item: • Open circuit of harness between main relay and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact of main relay connector
2	**CHECK GROUND CIRCUIT FOR ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 5 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — Chassis ground:*** ***(B137) No. 3 — Chassis ground:*** ***(B137) No. 7 — Chassis ground:***	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 and engine ground terminal • Poor contact in ECM connector • Poor contact of coupling connector
3	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 0.2 A?	Repair the poor contact of connector. NOTE: In this case, repair the following item: • Poor contact in front oxygen (A/F) sensor connector • Poor contact of coupling connector • Poor contact in ECM connector	Go to step **4**.
4	**CHECK OUTPUT SIGNAL OF ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 6 (+) — Chassis ground (–):*** ***(B135) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **6**.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 6 (+) — Chassis ground (–):*** ***(B135) No. 7 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair poor contact in ECM connector.	Go to step **6**.
6	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 10 Ω?	Repair the harness and connector. NOTE: In this case, repair the following item: • Open or ground short circuit of harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector • Poor contact of coupling connector	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>

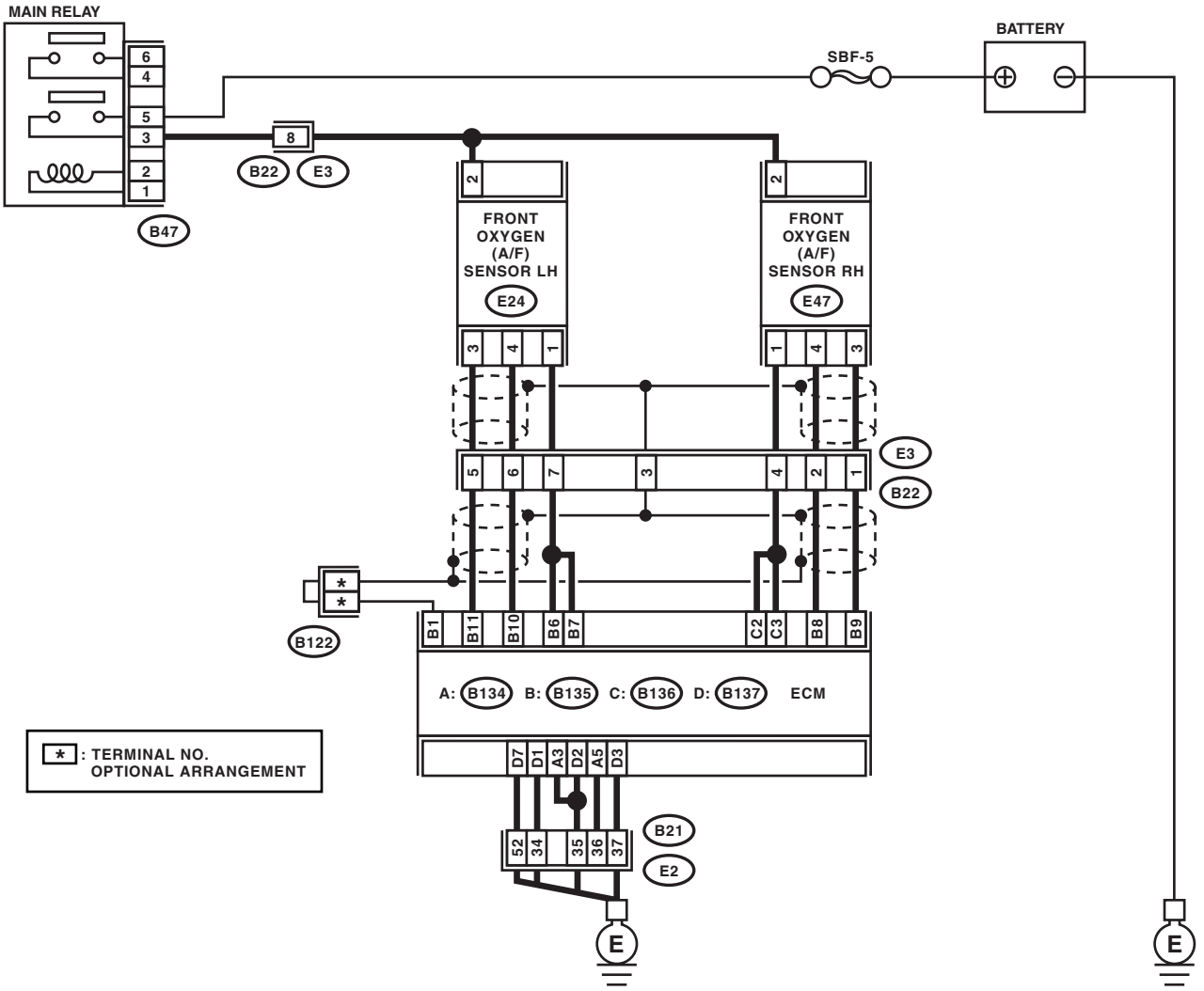
N: DTC P0052 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1)

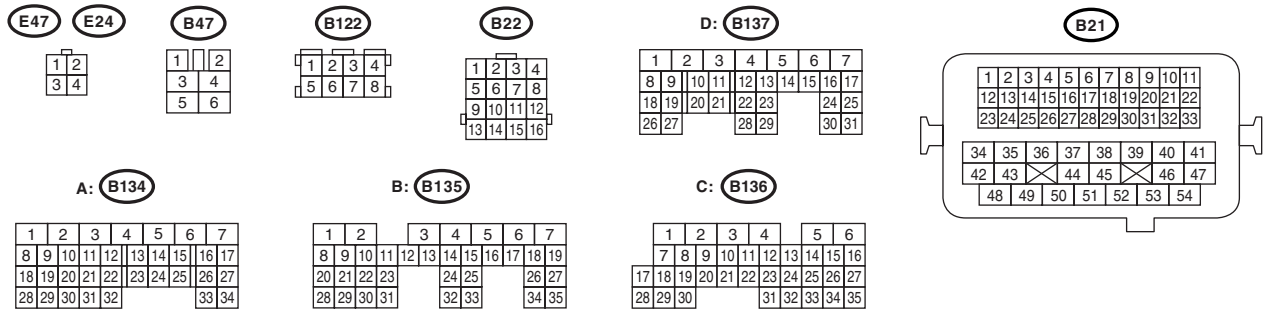
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-25, DTC P0052 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 6 (+) — Chassis ground (–):*** ***(B135) No. 7 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **2**.	Go to step **3**.

	Step	Check	Yes	No
2	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 2.3 A?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	END.
3	**CHECK OUTPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 6 (+) — Chassis ground (–):*** ***(B135) No. 7 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector.	END.

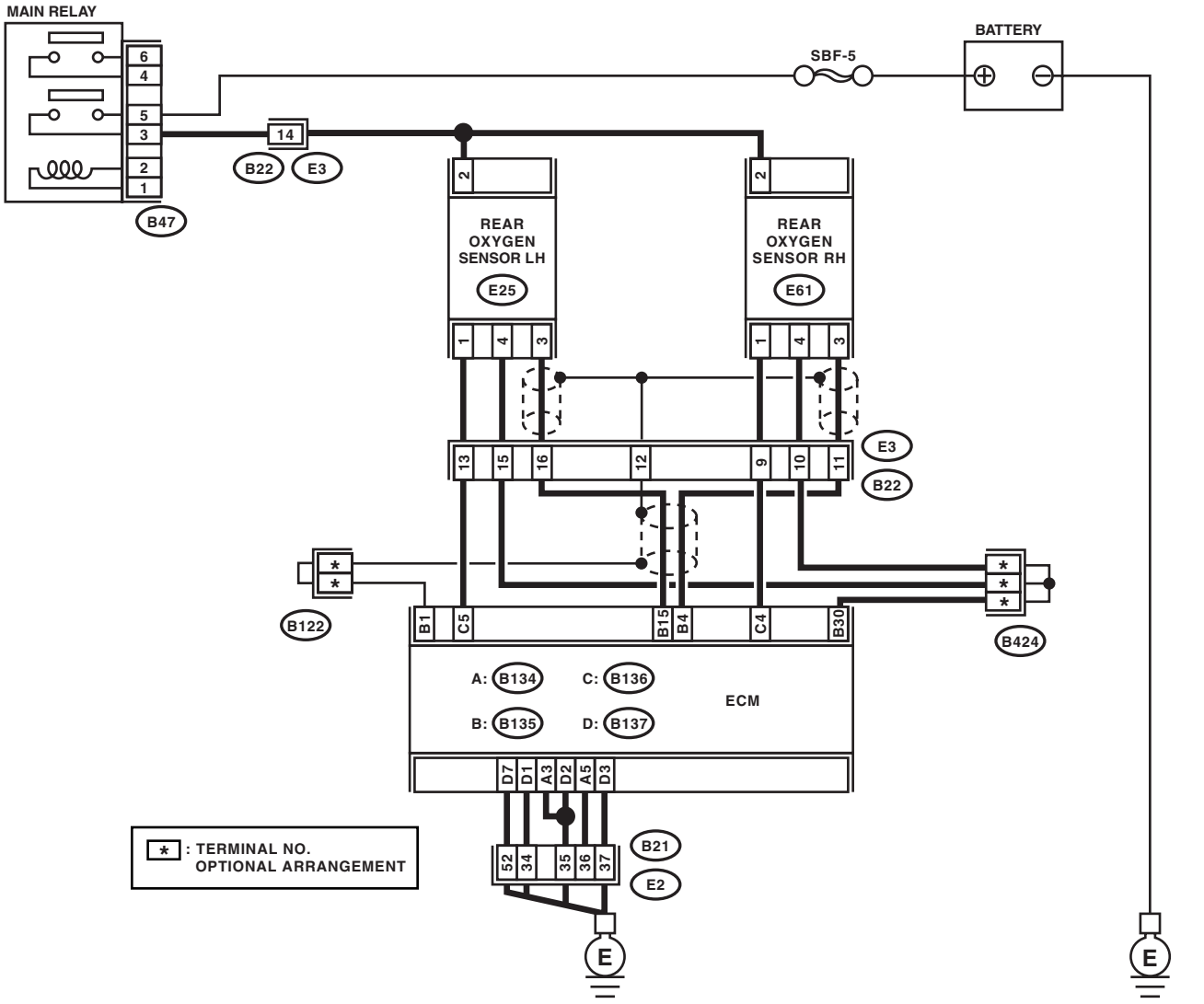
O: DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2)

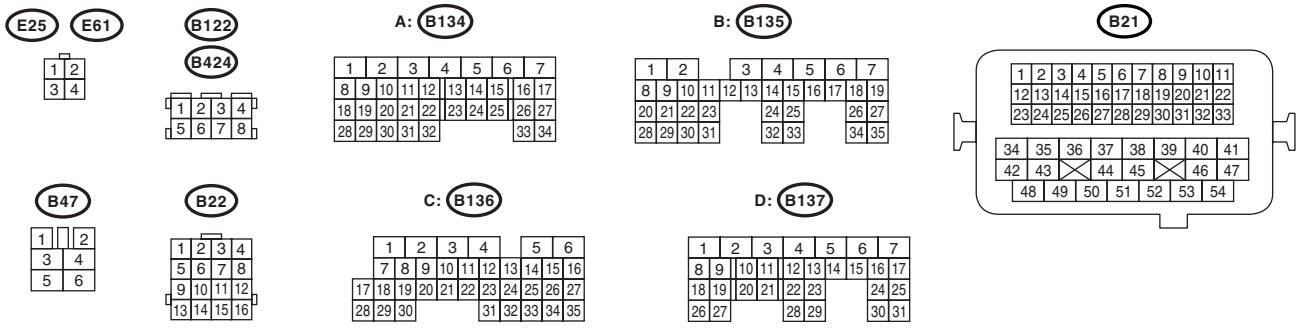
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-25, DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(E25) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Repair the power supply line. NOTE: In this case, repair the following item: • Open circuit of harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact of coupling connector
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 5 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — Chassis ground:*** ***(B137) No. 3 — Chassis ground:*** ***(B137) No. 7 — Chassis ground:***	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 and engine ground terminal • Poor contact in ECM connector • Poor contact of coupling connector
3	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 0.2 A?	Repair the connector. NOTE: In this case, repair the following item: • Poor contact in rear oxygen sensor connector • Poor contact of coupling connector • Poor contact in ECM connector	Go to step **4**.
4	**CHECK OUTPUT SIGNAL OF ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 5 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **7**.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 5 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair poor contact in ECM connector.	Go to step **6**.
6	**CHECK OUTPUT SIGNAL OF ECM.** 1) Disconnect the connector from rear oxygen sensor. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 5 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Repair the battery short circuit of harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
7	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between rear oxygen sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact of coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>

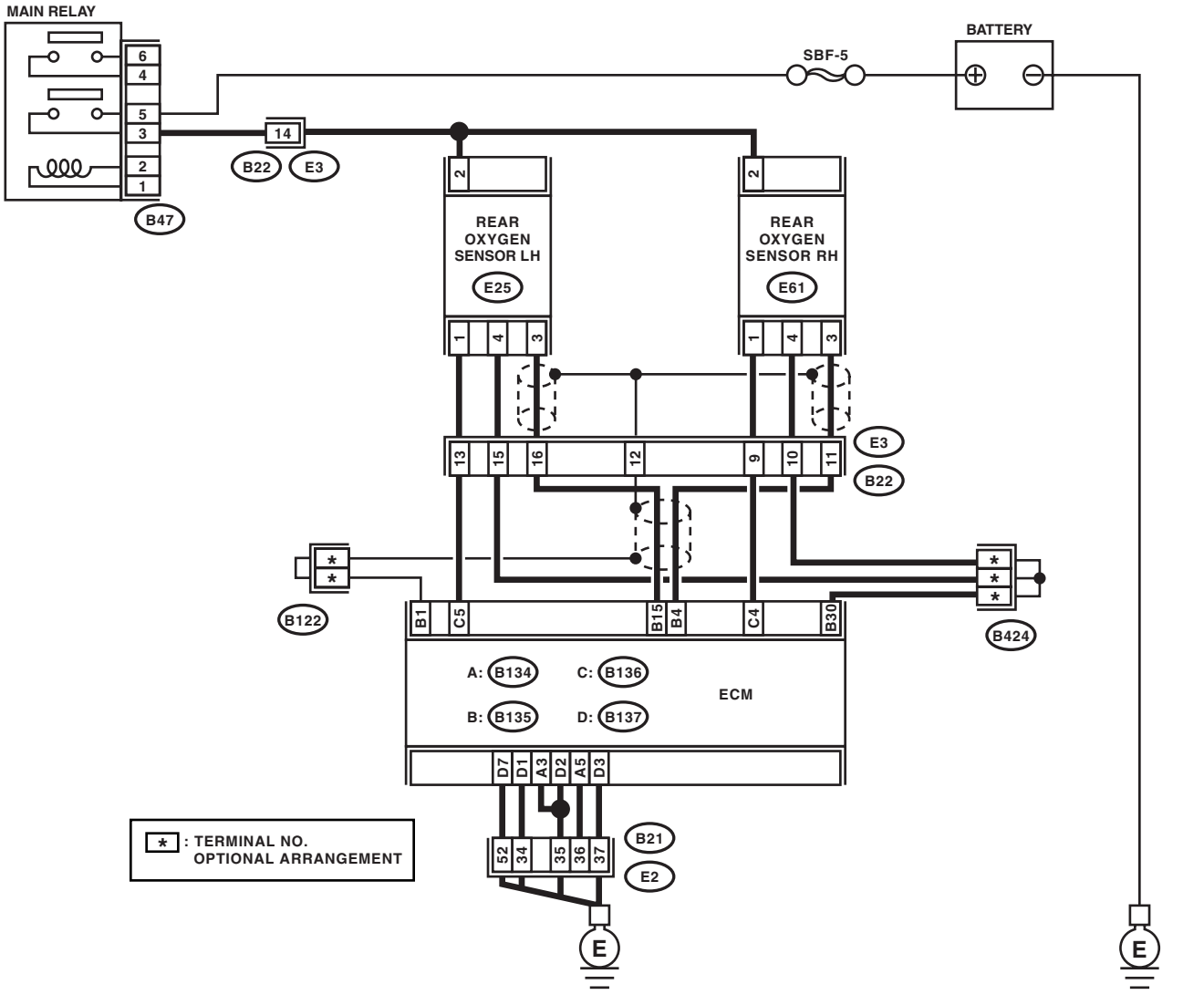
P: DTC P0058 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2)

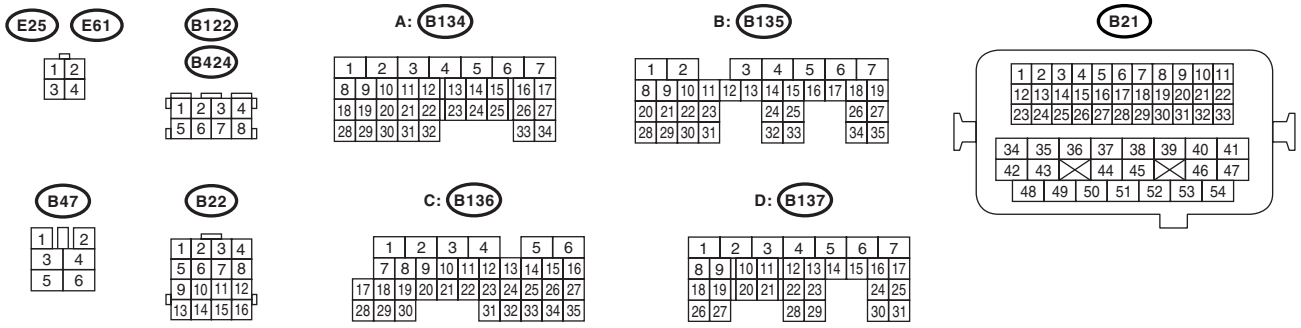
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-25, DTC P0058 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **2**.	Go to step **3**.

	Step	Check	Yes	No
2	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit of harness between ECM and rear oxygen sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the current more than 7 A?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	END.
3	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	END.

Q: 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)-26, DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>

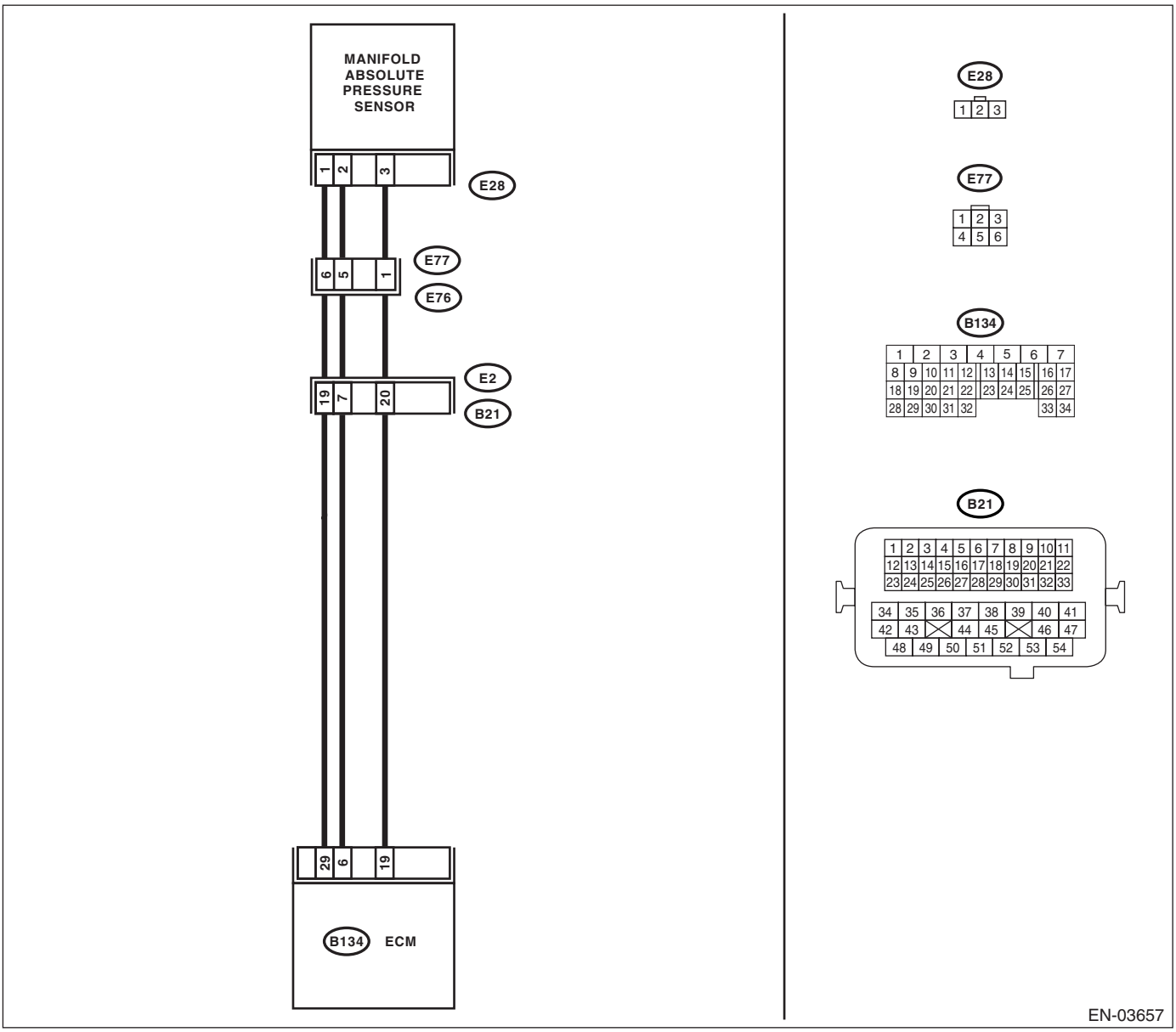
TROUBLE SYMPTOM:

Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK IDLE SWITCH SIGNAL.** 1) Turn the ignition switch to ON. 2) Operate the LED operation mode for engine using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE." <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Does the LED of {Idle Switch Signal} come on?	Go to step **2**.	Check the throttle position sensor circuit. <Ref. to EN(H6DO)(diag)-382, DTC P2135 THROTTLE/ PEDAL POSITION SENSOR/ SWITCH "A"/"B" VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0106.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the relative DTC."List of Diagnostic Trouble Code (DTC)" <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0106.	Go to step **3**.
3	**CHECK CONDITION OF MANIFOLD ABSOLUTE PRESSURE SENSOR.**	Is the manifold absolute pressure sensor installation bolt tightened securely?	Go to step **4**.	Securely tighten the manifold absolute pressure sensor installation bolt.
4	**CHECK CONDITION OF THROTTLE BODY.**	Is the throttle body installation bolt tightened securely?	Replace the manifold absolute pressure sensor. <Ref. to FU(H6DO)-22, Manifold Absolute Pressure Sensor.>	Tighten the throttle body installation bolt securely.

R: DTC P0076 INTAKE VALVE CONTROL CIRCUIT LOW (BANK 1)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-28, DTC P0076 INTAKE VALVE CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

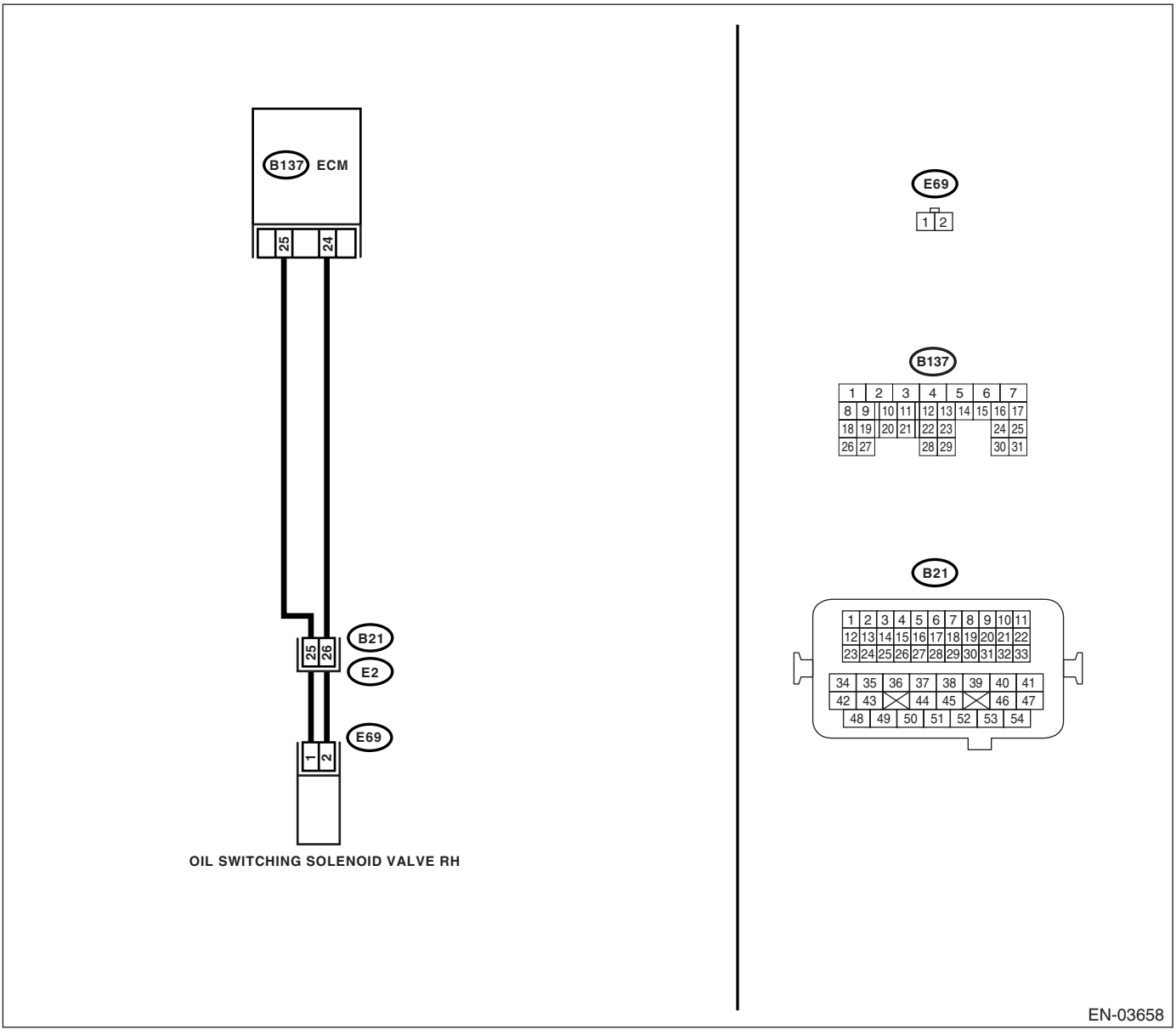
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL SWITCHING SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil switching solenoid valve. 3) Measure the resistance between ECM and oil switching solenoid valve. ***Connector & terminal*** ***(B137) No. 25 — (E69) No. 1:*** ***(B137) No. 24 — (E69) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between ECM and oil switching solenoid valve connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and oil switching solenoid valve connector • Poor contact of coupling connector
2	**CHECK OIL SWITCHING SOLENOID VALVE.** 1) Remove the oil switching solenoid valve connector. 2) Measure the resistance between oil switching solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 6 — 12 Ω?	Repair the poor contact of ECM and oil switching solenoid valve.	Replace the oil switching solenoid valve. <Ref. to ME(H6DO)-78, Oil Switching Solenoid Valve.>

S: DTC P0077 INTAKE VALVE CONTROL CIRCUIT HIGH (BANK 1)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-29, DTC P0077 INTAKE VALVE CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

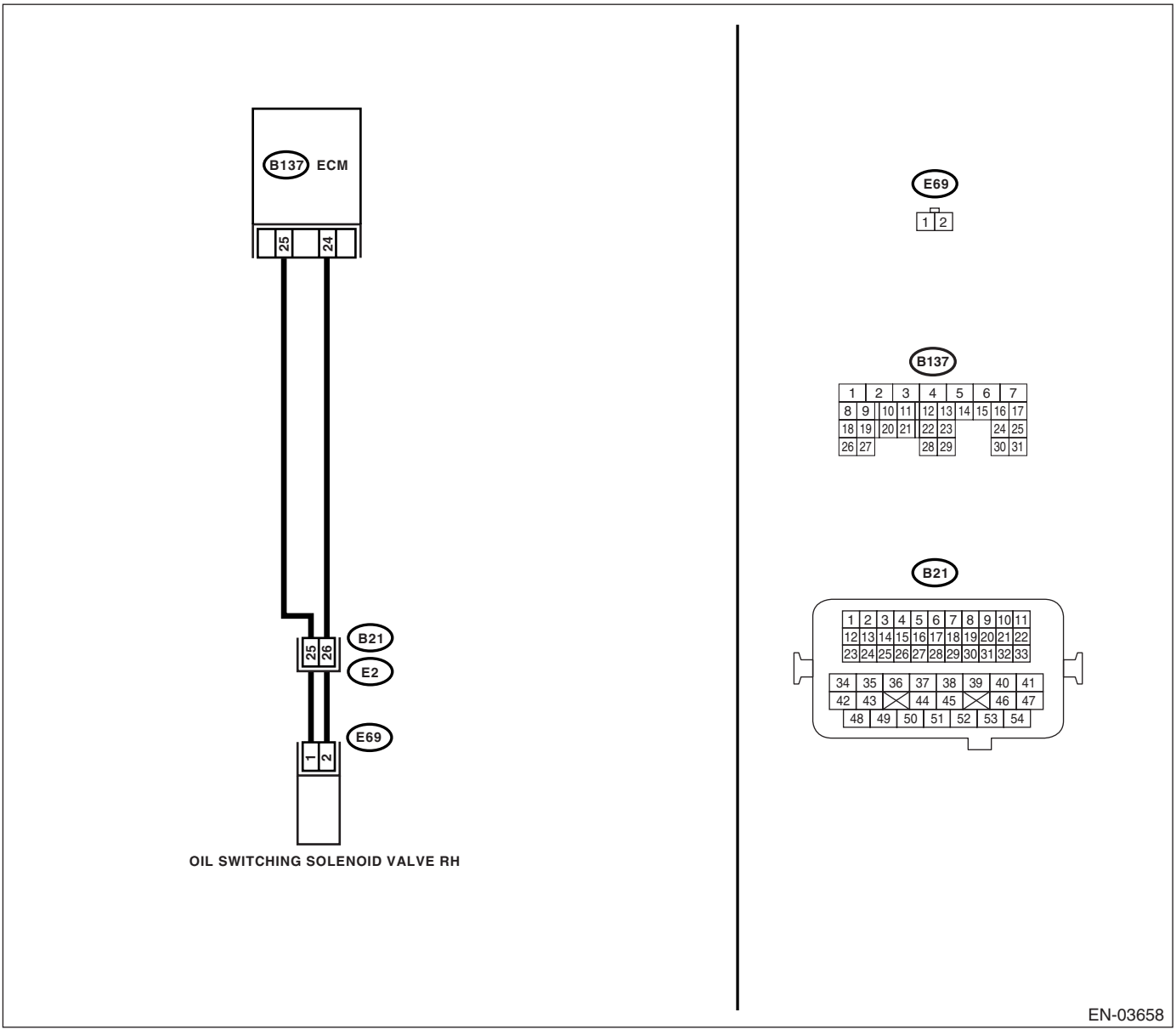
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL SWITCHING SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil switching solenoid valve. 3) Measure the resistance between oil switching solenoid valve and engine ground. ***Connector & terminal*** ***(E69) No. 1 — Engine ground:*** ***(E69) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2**.	Repair the short circuit between ECM and oil switching solenoid valve connector.
2	**CHECK OIL SWITCHING SOLENOID VALVE.** 1) Remove the oil switching solenoid valve connector. 2) Measure the resistance between oil switching solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 6 — 12 Ω?	Repair the poor contact of ECM and oil switching solenoid valve.	Replace the oil switching solenoid valve. <Ref. to ME(H6DO)-78, Oil Switching Solenoid Valve.>

T: DTC P0082 INTAKE VALVE CONTROL CIRCUIT LOW (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-30, DTC P0082 INTAKE VALVE CONTROL CIRCUIT LOW (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

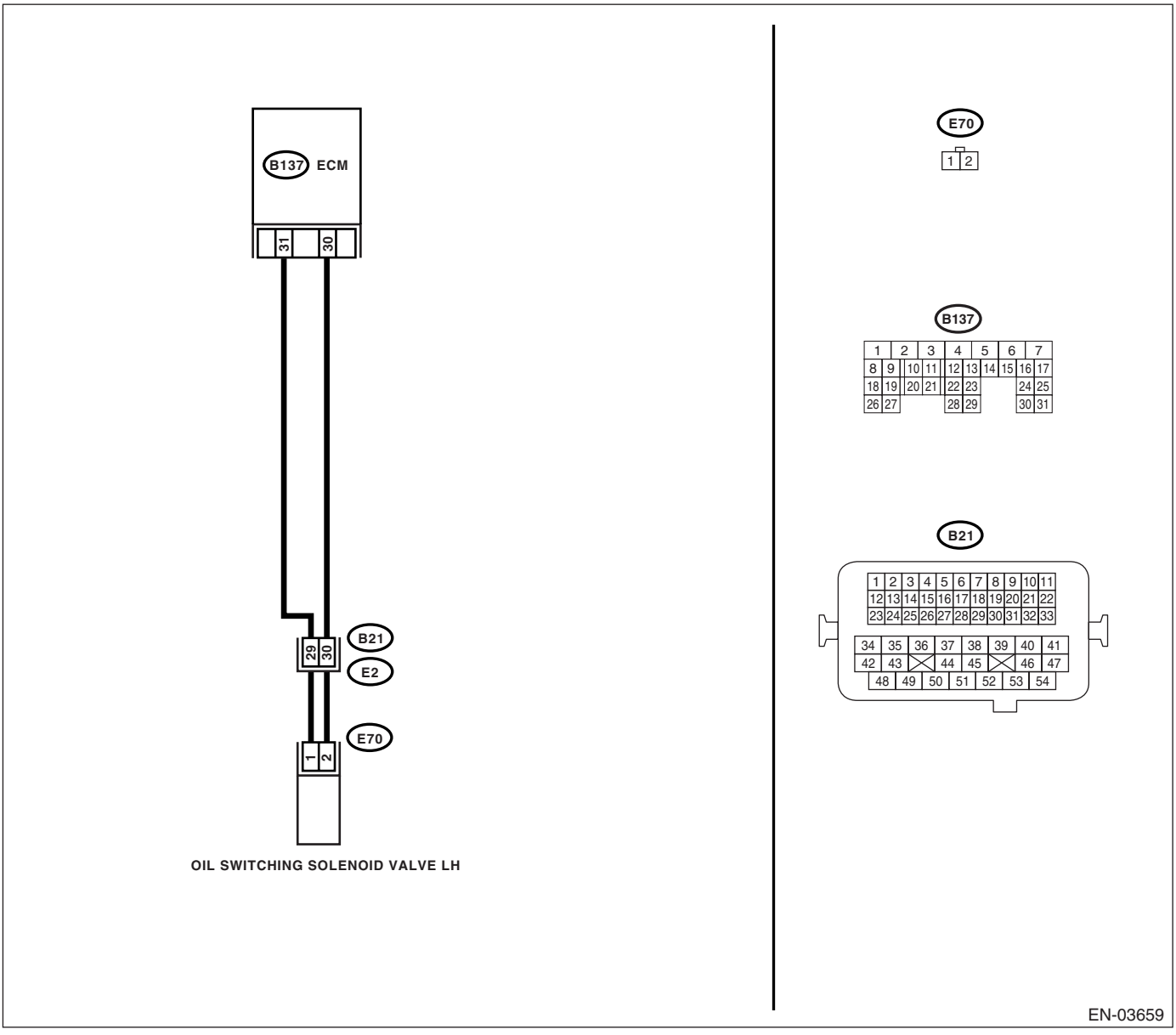
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL SWITCHING SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil switching solenoid valve. 3) Measure the resistance between ECM and oil switching solenoid valve. ***Connector & terminal*** ***(B137) No. 31 — (E70) No. 1:*** ***(B137) No. 30 — (E70) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between ECM and oil switching solenoid valve connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and oil switching solenoid valve connector • Poor contact of coupling connector
2	**CHECK OIL SWITCHING SOLENOID VALVE.** 1) Remove the oil switching solenoid valve connector. 2) Measure the resistance between oil switching solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 6 — 12 Ω?	Repair the poor contact of ECM and oil switching solenoid valve.	Replace the oil switching solenoid valve. <Ref. to ME(H6DO)-78, Oil Switching Solenoid Valve.>

U: DTC P0083 INTAKE VALVE CONTROL CIRCUIT HIGH (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-30, DTC P0083 INTAKE VALVE CONTROL CIRCUIT HIGH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

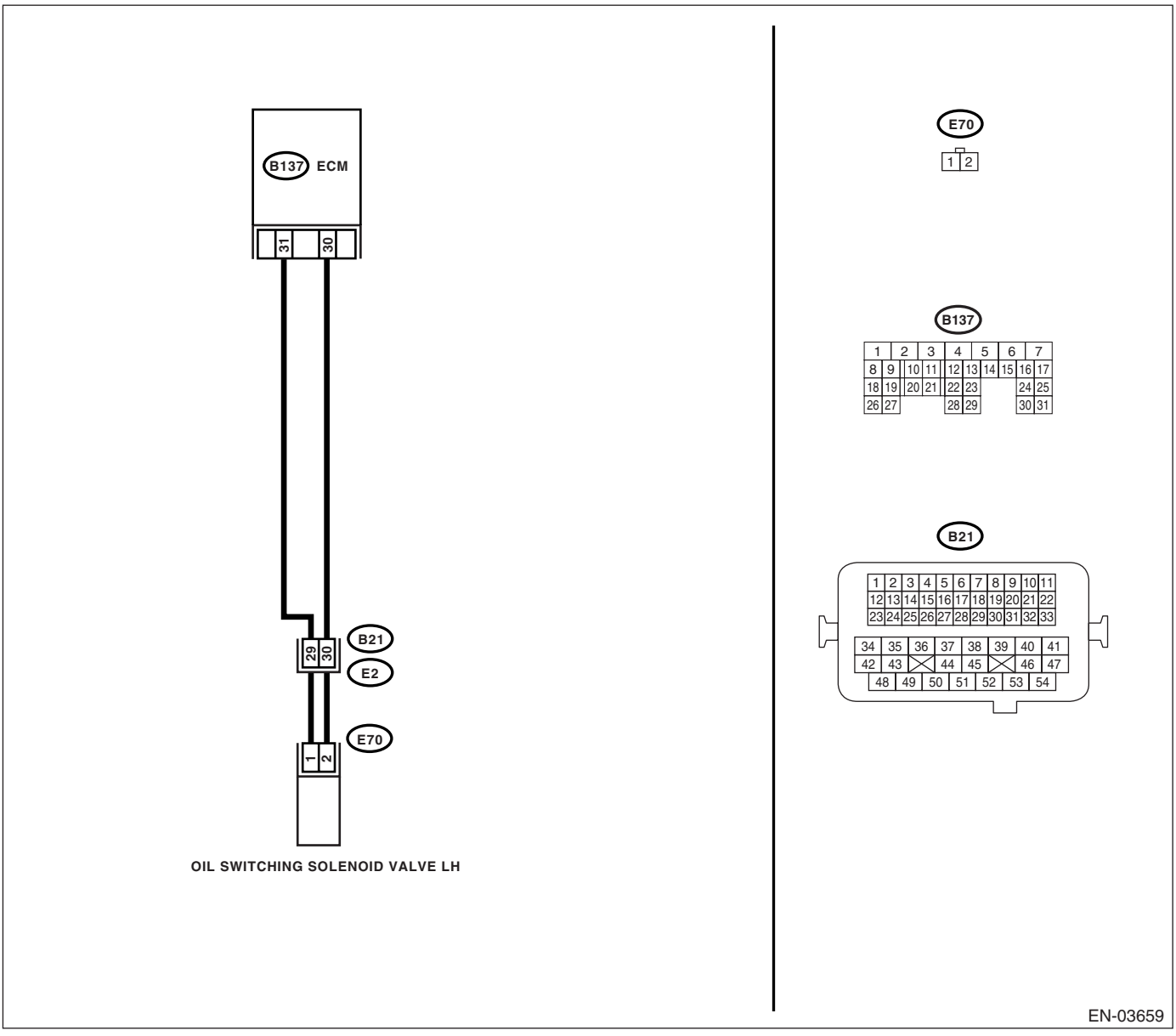
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL SWITCHING SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil switching solenoid valve. 3) Measure the resistance between oil switching solenoid valve and engine ground. ***Connector & terminal*** ***(E70) No. 1 — Engine ground:*** ***(E70) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2**.	Repair the short circuit between ECM and oil switching solenoid valve connector.
2	**CHECK OIL SWITCHING SOLENOID VALVE.** 1) Remove the oil switching solenoid valve connector. 2) Measure the resistance between oil switching solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 6 — 12 Ω?	Repair the poor contact of ECM and oil switching solenoid valve.	Replace the oil switching solenoid valve. <Ref. to ME(H6DO)-78, Oil Switching Solenoid Valve.>

V: 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)-31, DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

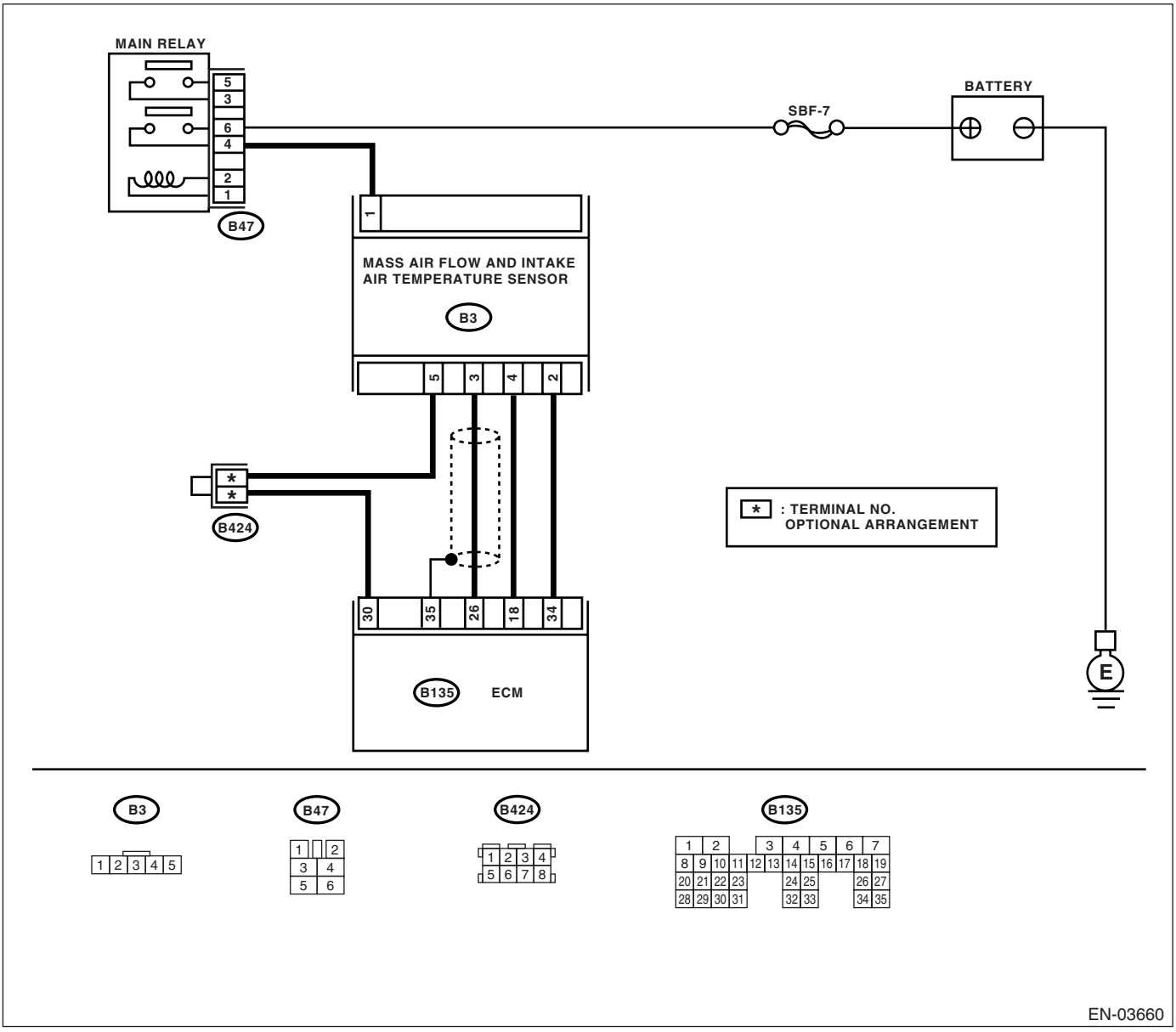
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0101.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>

W: DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-34, DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

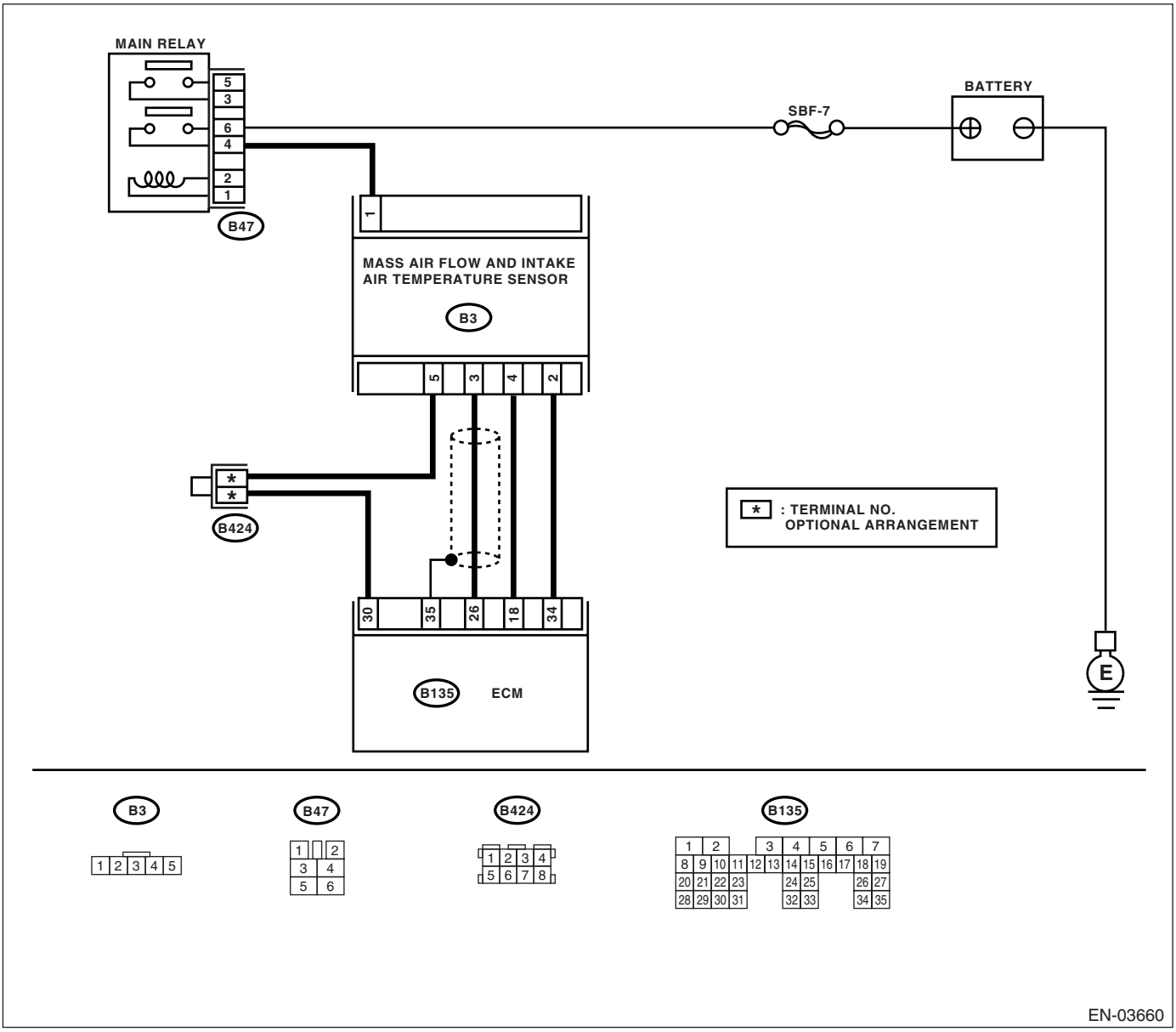
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CONNECT SUBARU SELECT MONITOR OR THE GENERAL SCAN TOOL, AND READ DATA.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or general scan tool to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor power switch to ON. 4) Start the engine. 5) Read the voltage of mass air flow sensor using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 0.2 — 4.7 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. Temporary poor contact of connector or harness may be the cause. Repair the harness or connector in mass air flow sensor. NOTE: In this case, repair the following item: • Open or ground short circuit of harness between mass air flow sensor and ECM connector • Poor contact of mass air flow sensor or ECM connector	Go to step **2**.
2	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground while engine is idling. ***Connector & terminal*** ***(B135) No. 26 (+) — Chassis ground (–):***	Is the voltage more than 0.2 V?	Go to step **4**.	Go to step **3**.
3	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Measure the voltage between ECM connector and chassis ground while engine is idling.	Does the voltage change by shaking the harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
4	**CHECK POWER SUPPLY TO MASS AIR FLOW SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 5 V?	Go to step **5**.	Repair the open circuit between mass air flow sensor and main relay.
5	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM and mass air flow sensor connector. ***Connector & terminal*** ***(B135) No. 26 — (B3) No. 3:*** ***(B135) No. 34 — (B3) No. 2:*** ***(B135) No. 30 — (B3) No. 5:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit between ECM and mass air flow sensor connector.

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 26 — Chassis ground:*** ***(B135) No. 34 — Chassis ground:*** ***(B135) No. 30 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair the ground short circuit between ECM and mass air flow sensor connector.
7	**CHECK POOR CONTACT.** Check poor contact of mass air flow sensor connector.	Is there poor contact in mass air flow sensor connector?	Repair the poor contact of mass air flow sensor connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>

X: DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-36, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

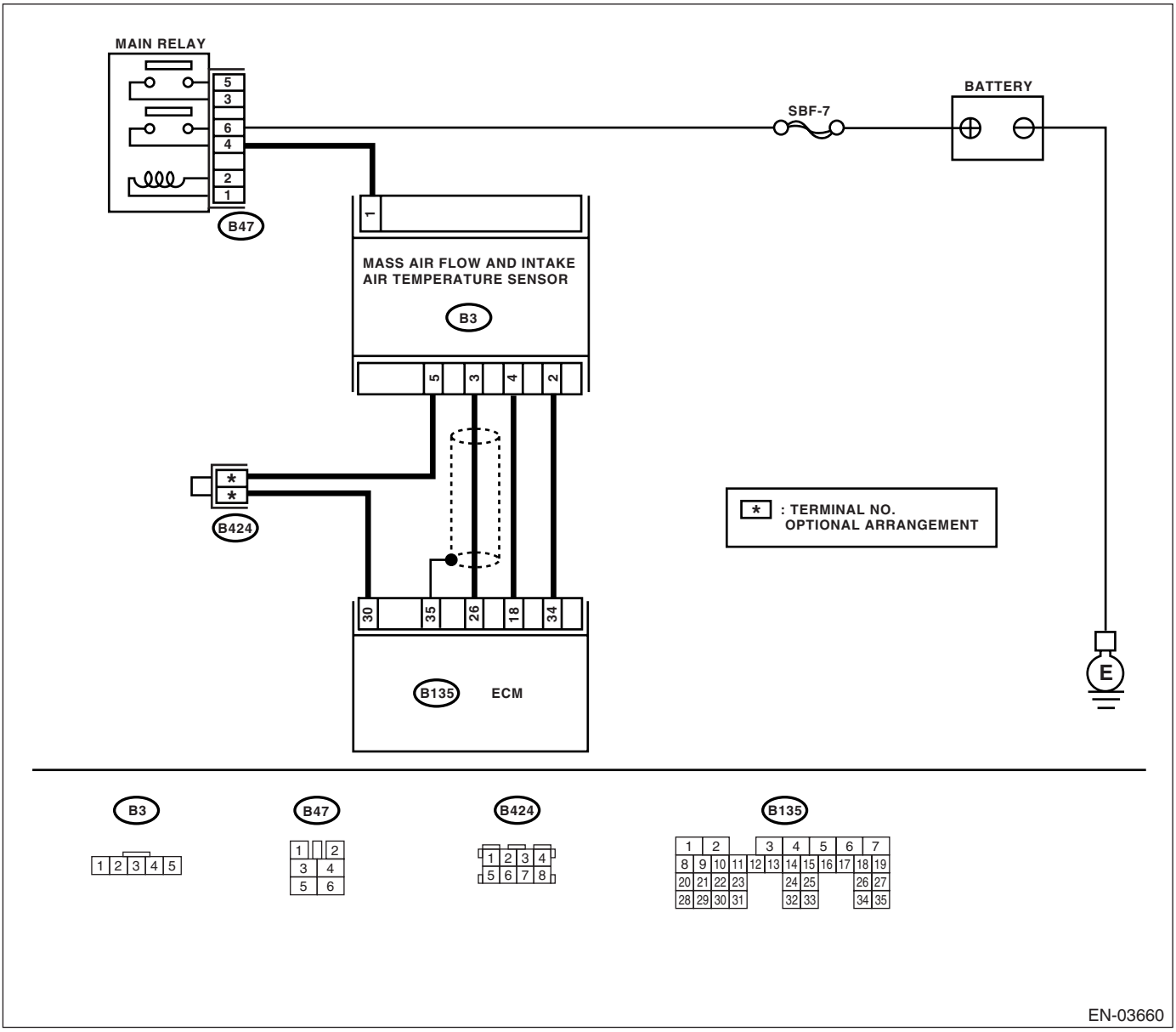
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CONNECT SUBARU SELECT MONITOR OR THE GENERAL SCAN TOOL, AND READ DATA.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or general scan tool to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor power switch to ON. 4) Start the engine. 5) Read the voltage of mass air flow sensor using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 0.2 — 4.7 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass airflow sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 5 V?	Repair the battery short circuit of harness between mass air flow sensor connector and ECM connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM connector and mass air flow sensor connector. ***Connector & terminal*** ***(B3) No. 2 — (B135) No. 34:***	Is the resistance less than 1 Ω?	Replace the mass air flow sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the open circuit of harness between mass air flow sensor connector and ECM connector.

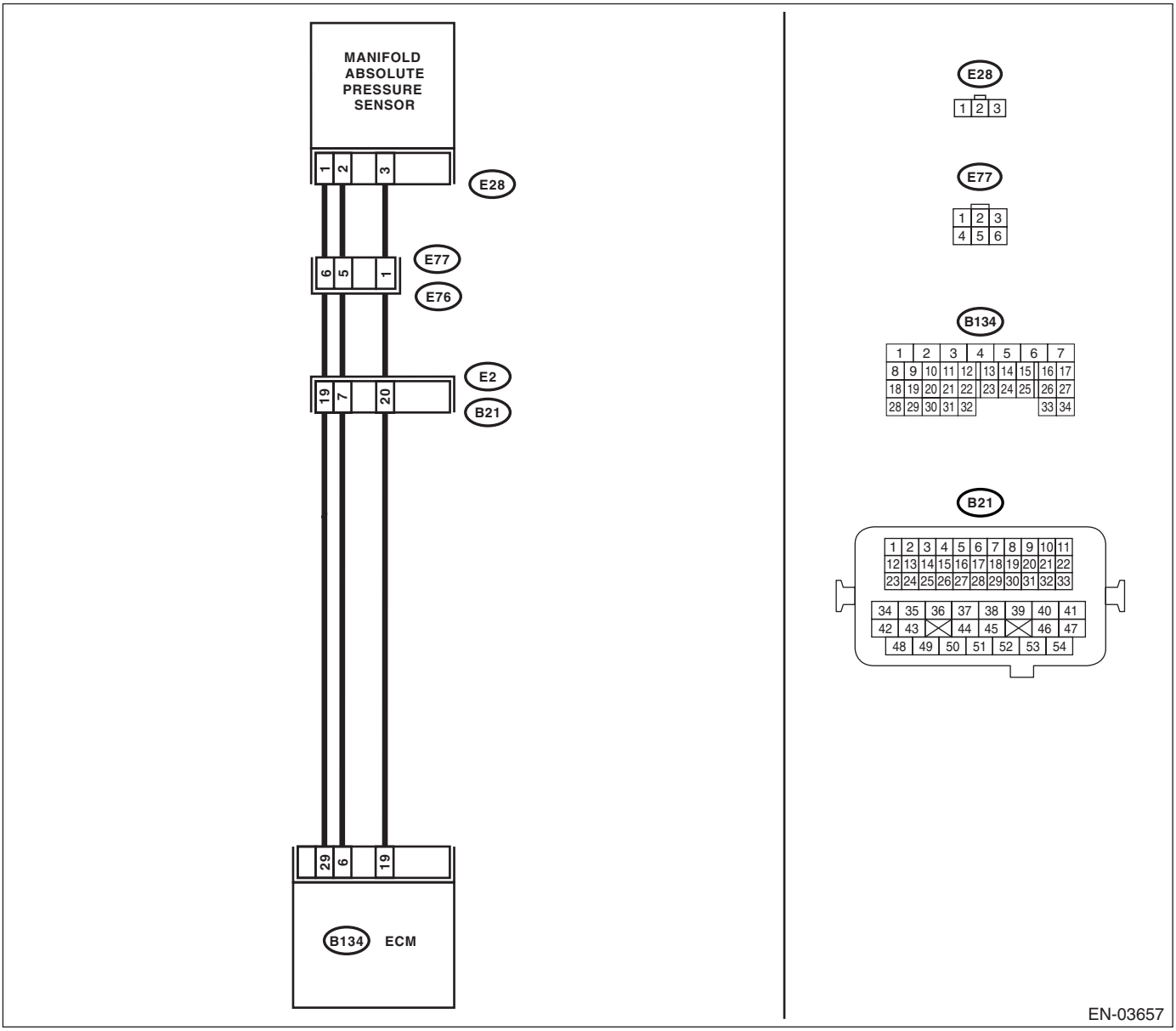
Y: DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-38, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/ BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value less than 13.3 kPa (100 mmHg, 3.94 inHg) ?	Go to step **3**.	Go to step **2**.
2	**CHECK POOR CONTACT.** Check the poor contact in ECM and manifold absolute pressure sensor connector.	Is there poor contact in ECM or manifold absolute pressure sensor connector?	Repair the poor contact in ECM or manifold absolute pressure sensor connector.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.
3	**CHECK OUTPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **5**.	Go to step **4**.
4	**CHECK OUTPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 19 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
5	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 6 (+) — Chassis ground (–):***	Is the voltage less than 0.2 V?	Go to step **7**.	Go to step **6**.
6	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the measured value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair poor contact in ECM connector.	Go to step **7**.
7	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E28) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **8**.	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B134) No. 29 — (E28) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact of manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact of manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H6DO)-22, Manifold Absolute Pressure Sensor.>

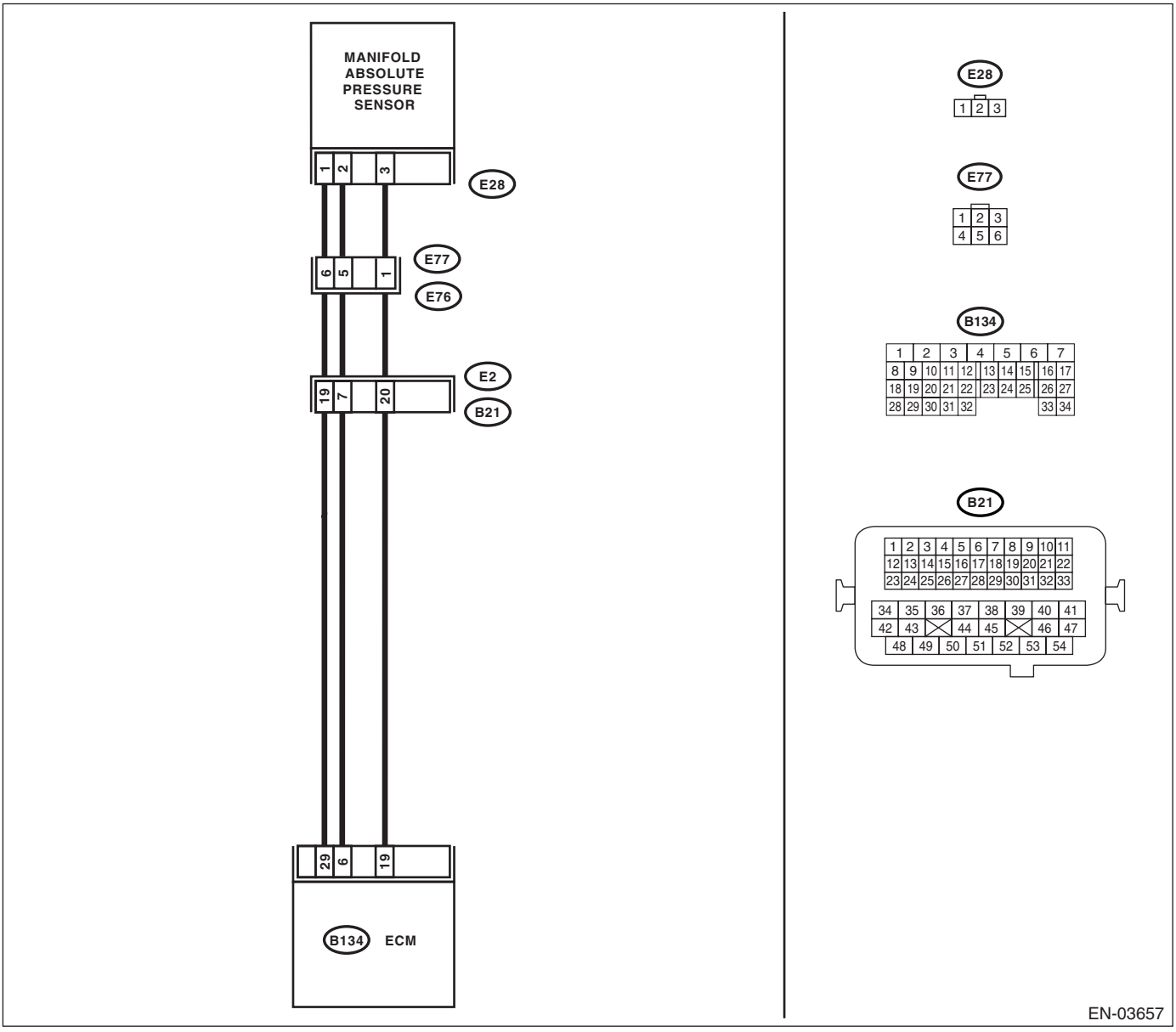
Z: DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-40, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/ BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **3**.	Go to step **2**.
2	**CHECK OUTPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 19 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
3	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **5**.	Go to step **4**.
4	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the measured value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair poor contact in ECM connector.	Go to step **5**.
5	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E28) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **6**.	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B134) No. 6 — (E28) No. 2:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
7	**CHECK HARNESS BETWEEN THE MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Repair the battery short circuit of harness between ECM and manifold absolute pressure sensor connector.	Go to step **8**.

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B134) No. 29 — (E28) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the open circuit of harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact of manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact of manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H6DO)-22, Manifold Absolute Pressure Sensor.>

AA:DTC P0111 INTAKE AIR TEMPERATURE CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-42, DTC P0111 INTAKE AIR TEMPERATURE CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

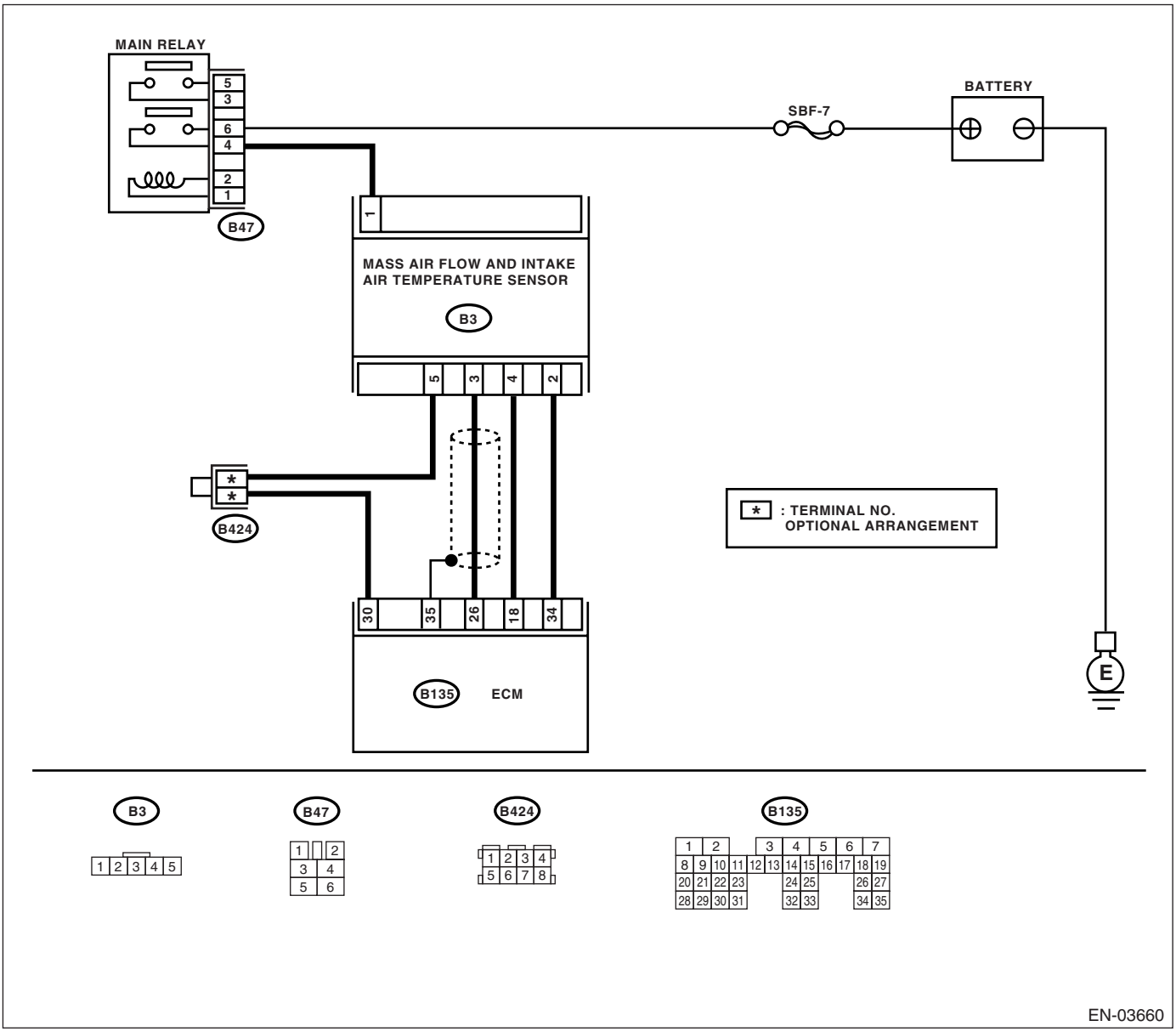
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0111.	Go to step **2**.
2	**CHECK ENGINE COOLANT TEMPERATURE.** 1) Start the engine and warm-up completely. 2) Measure the engine coolant temperature using the Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature 75 — 95°C (167 — 203°F) ?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>	Check DTC P0125 using “List of Diagnostic Trouble Code (DTC).” <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>

AB:DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-44, DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

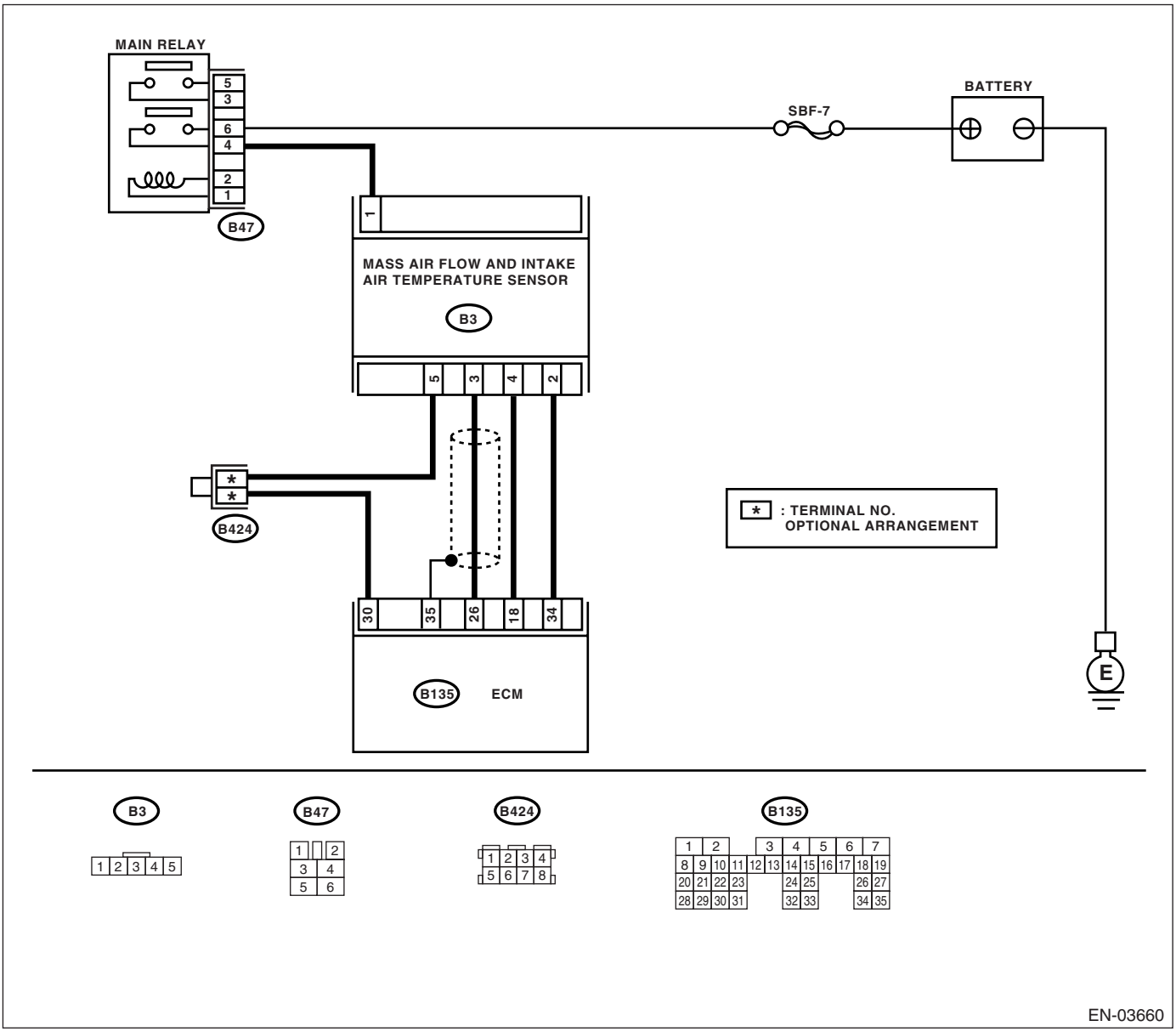
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the intake air temperature above 120°C (248°F) ?	Go to step **2**.	Repair the poor contact. NOTE: In this case, repair the following item: • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact of coupling connector • Poor contact of joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow and intake air temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the intake air temperature less than –40°C (–40°F) ?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the ground short circuit of harness between mass air flow and intake air temperature sensor and ECM connector.

AC:DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-46, DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

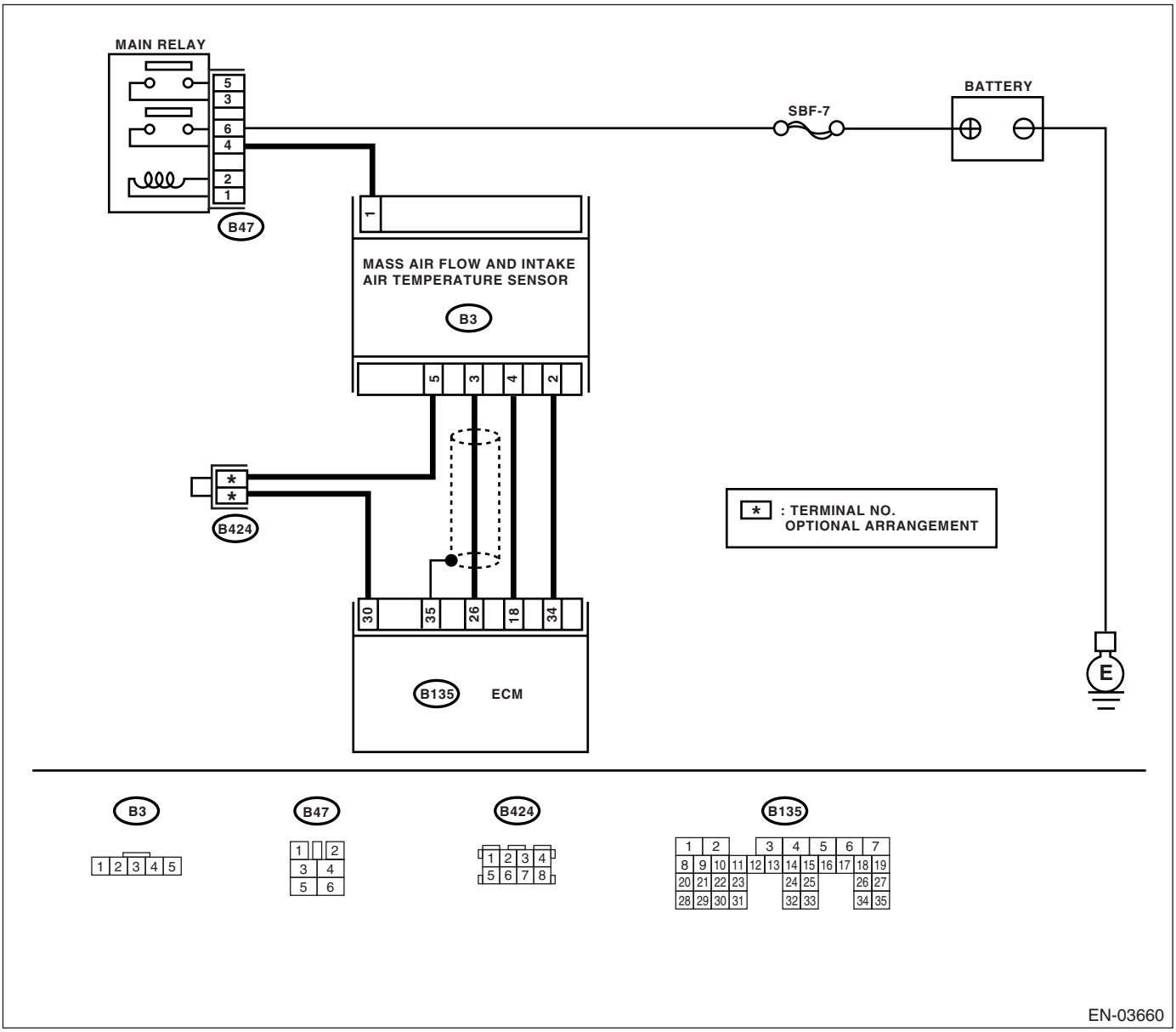
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the intake air temperature less than –40°C (–40°F) ?	Go to step **2**.	Repair the poor contact. NOTE: In this case, repair the following item: • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact of coupling connector • Poor contact of joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow and intake air temperature sensor. 3) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **4**.

	Step	Check	Yes	No
4	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (–):***	Is the voltage more than 3 V?	Go to step **5**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Broken wire between mass air flow and intake air temperature sensor and ECM connector. • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact of coupling connector • Poor contact of joint connector
5	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 5 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Broken wire between mass air flow and intake air temperature sensor and ECM connector. • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact of joint connector

AD:DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-48, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

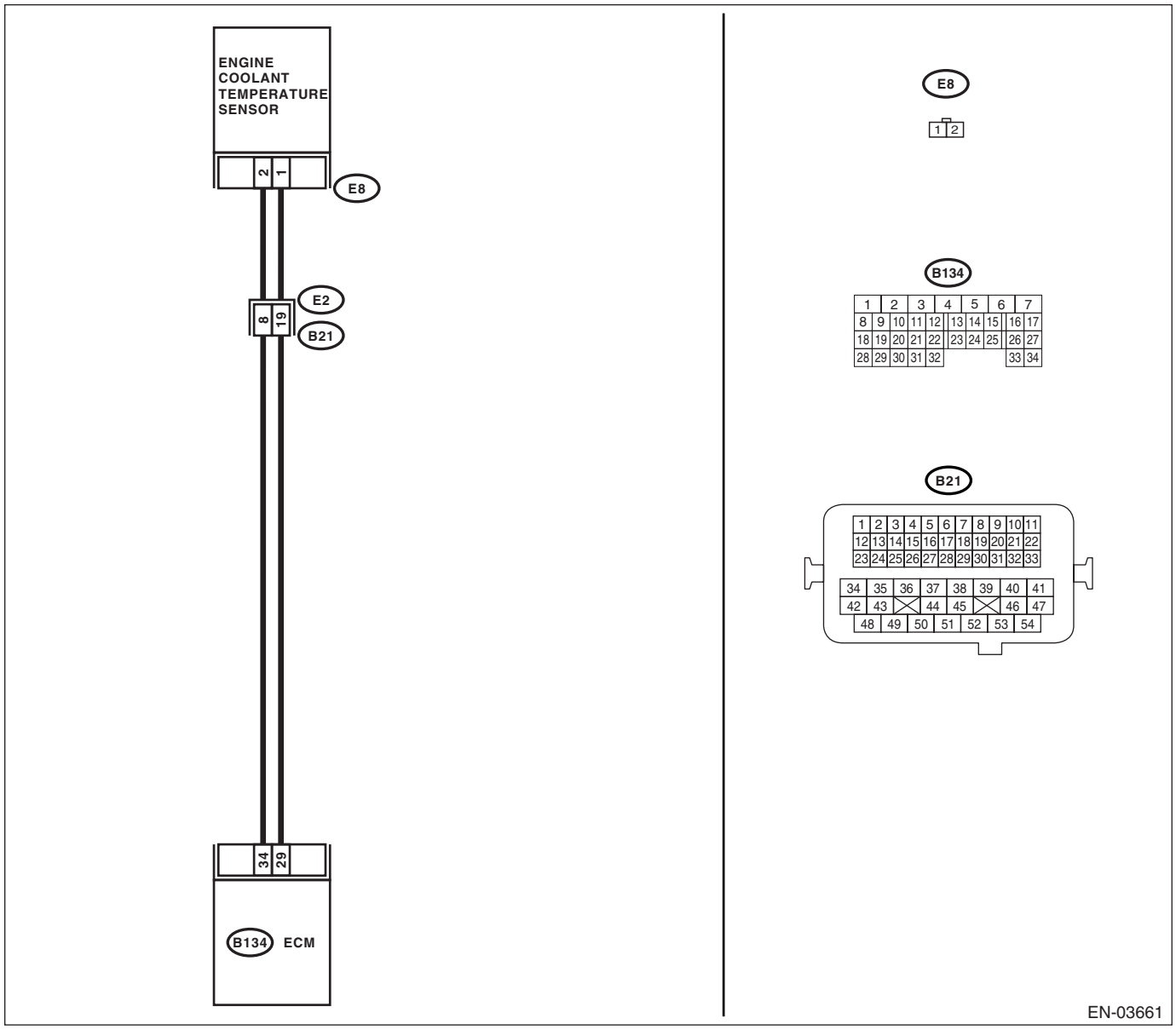
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature above 150°C (302°F) ?	Go to step **2**.	Repair the poor contact. NOTE: In this case, repair the following item: • Poor contact of engine coolant temperature sensor • Poor contact in ECM • Poor contact of coupling connector • Poor contact of joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the engine coolant temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature less than –40°C (–40°F) ?	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-17, Engine Coolant Temperature Sensor.>	Repair the ground short circuit of harness between engine coolant temperature sensor and ECM connector.

AE:DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-50, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

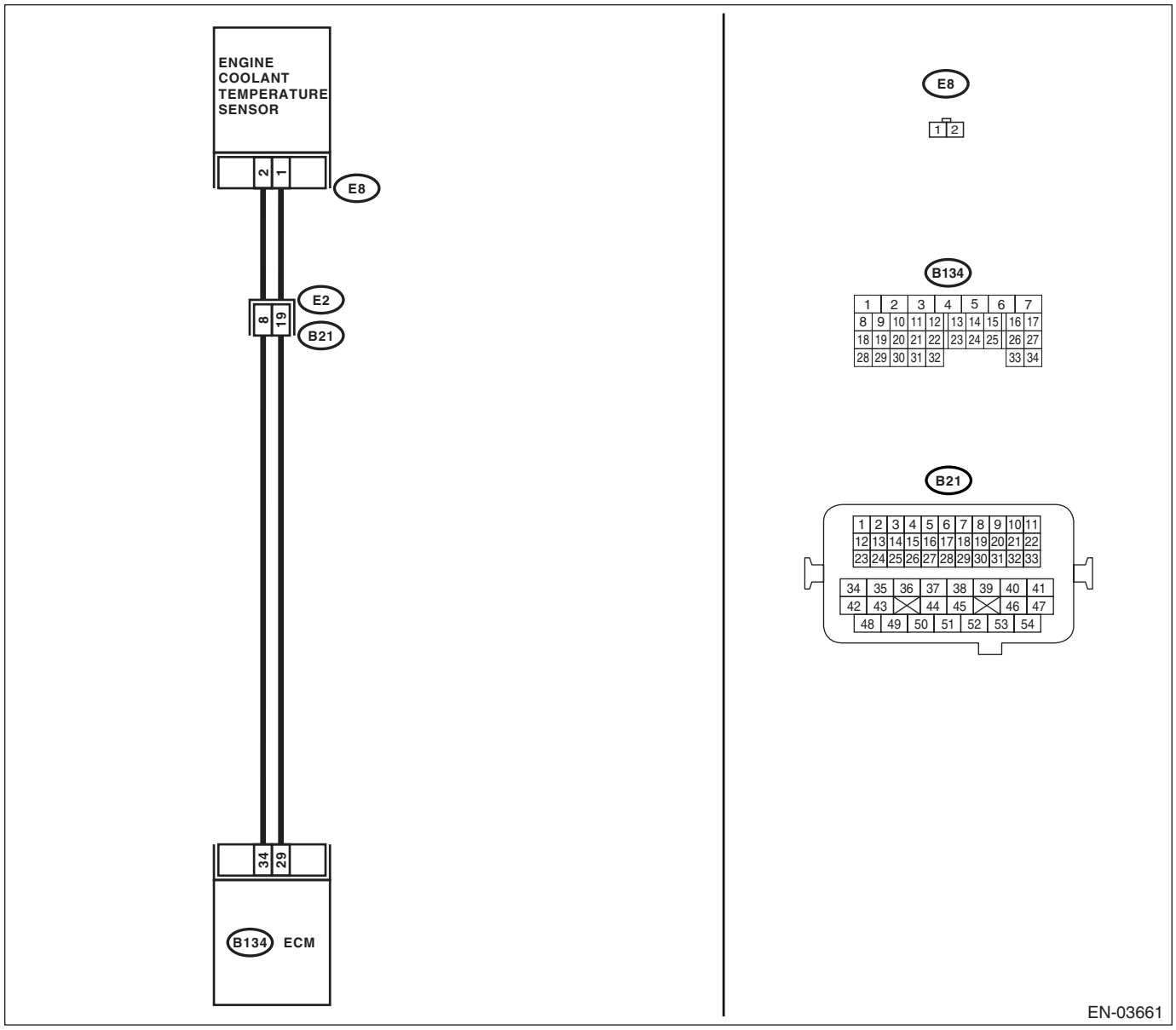
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature less than –40°C (–40°F) ?	Go to step **2**.	Repair the poor contact. NOTE: In this case, repair the following item: • Poor contact of engine coolant temperature sensor • Poor contact in ECM • Poor contact of coupling connector • Poor contact of joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the engine coolant temperature sensor. 3) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and engine coolant temperature sensor connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and engine coolant temperature sensor connector.	Go to step **4**.

	Step	Check	Yes	No
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (–):***	Is the voltage more than 4 V?	Go to step **5**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and engine coolant temperature sensor connector • Poor contact of engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact of coupling connector • Poor contact of joint connector
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-17, Engine Coolant Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and engine coolant temperature sensor connector • Poor contact of engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact of coupling connector • Poor contact of joint connector

AF:DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT

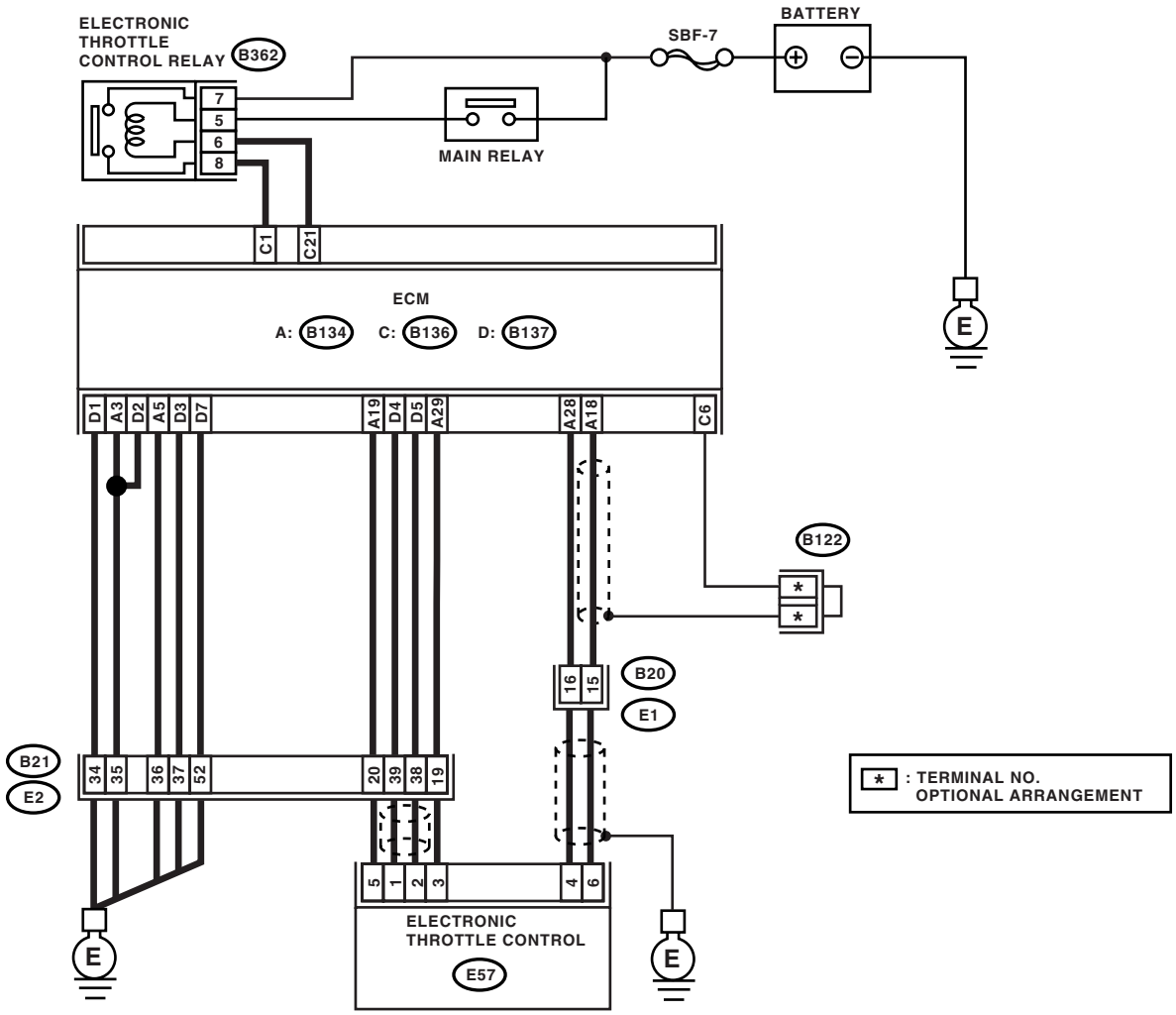
DTC DETECTING CONDITION:

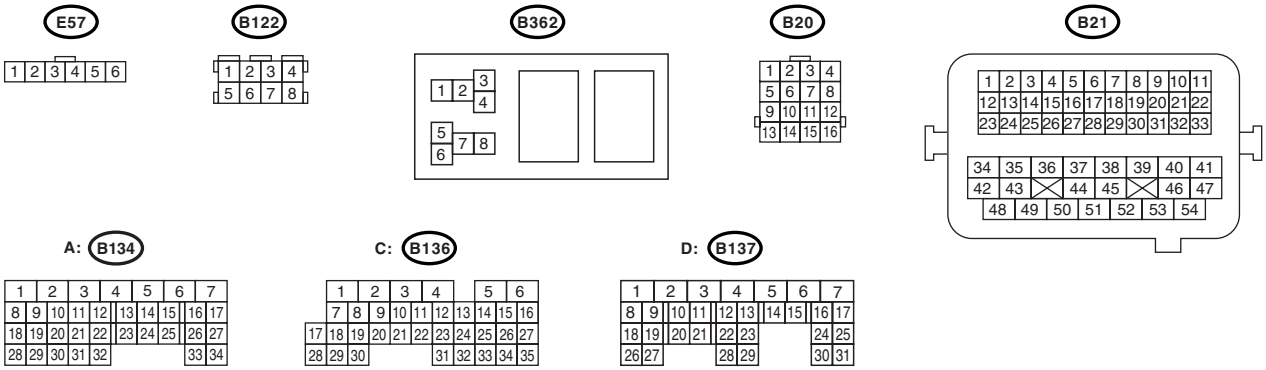
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-52, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

WIRING DIAGRAM:





EN-03739

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **2**.	Go to step **3**.
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 18 — (E57) No. 6:*** ***(B134) No. 19 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 18 — Chassis ground:*** ***(B134) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (–):***	Is the voltage 4.5 — 5.5 V?	Go to step **6**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
6	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:***	Is the resistance more than 10Ω?	Repair the poor contact of electronic throttle control connector. Replace the accelerator pedal position sensor if defective.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

AG:DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT

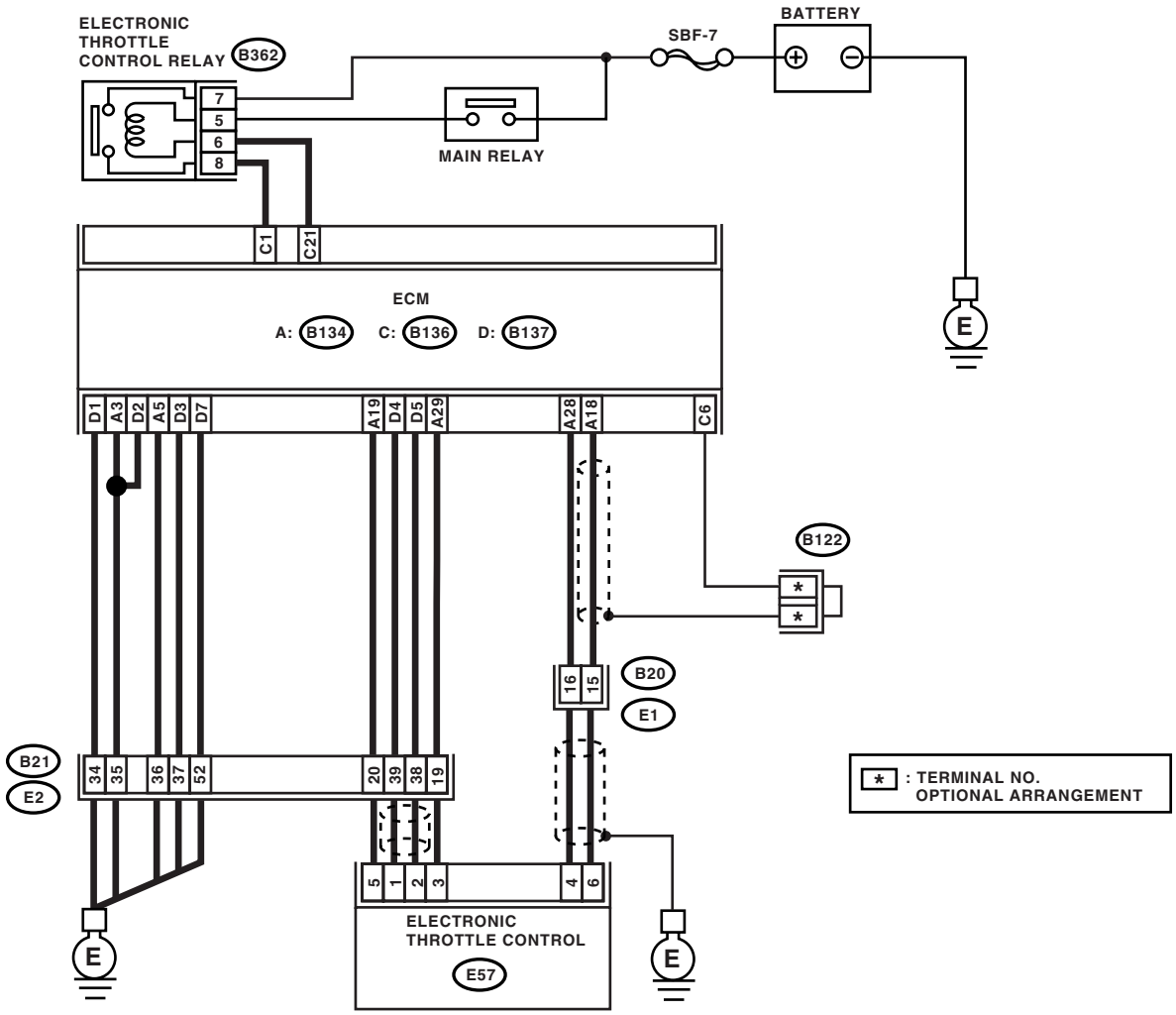
DTC DETECTING CONDITION:

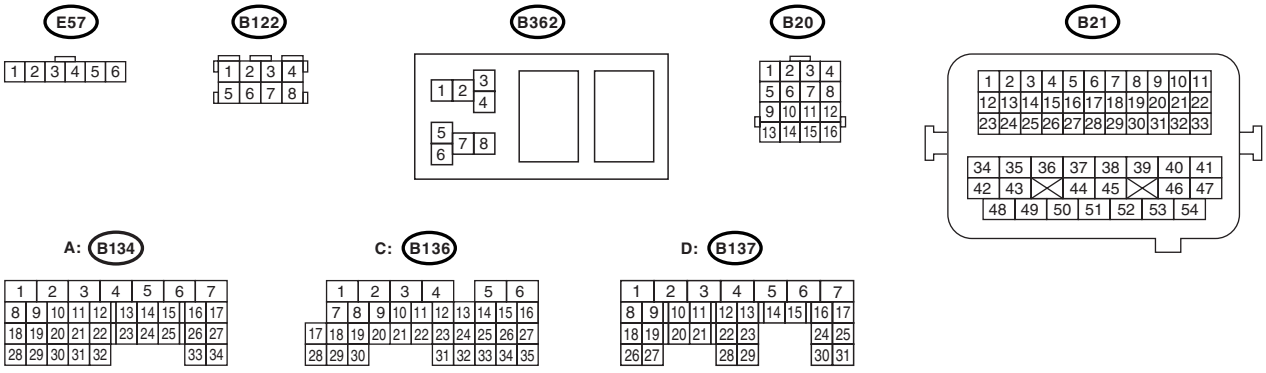
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-54, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

WIRING DIAGRAM:





EN-03739

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage less than 4.63 V?	Go to step **2**.	Go to step **3**.
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 18 — (E57) No. 6:*** ***(B134) No. 29 — (E57) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
5	**CHECK SENSOR OUTPUT POWER SUPPLY.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Replace the electronic throttle control. <Ref. to FU(H6DO)-11, Throttle Body.>	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.

AH: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)-56, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

Engine would not return to idling.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)." <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **2**.
2	**CHECK TIRE SIZE.**	Is the tire size as specified? and the same size as other three wheels?	Go to step **3**.	Replace the tire.
3	**CHECK ENGINE COOLANT.** Check the following items: • Amount of engine coolant • Engine coolant freeze • Contamination of engine coolant	Is the engine coolant normal?	Go to step **4**.	Fill or replace the engine coolant. <Ref. to CO(H6DO)-11, INSPECTION, Engine Coolant.>
4	**CHECK THERMOSTAT.**	Does the thermostat remain opened?	Replace the thermostat. <Ref. to CO(H6DO)-14, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-17, Engine Coolant Temperature Sensor.>

AI: DTC P0126 INSUFFICIENT COOLANT TEMPERATURE FOR STABLE OPERATION

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-58, DTC P0126 INSUFFICIENT COOLANT TEMPERATURE FOR STABLE OPERATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>

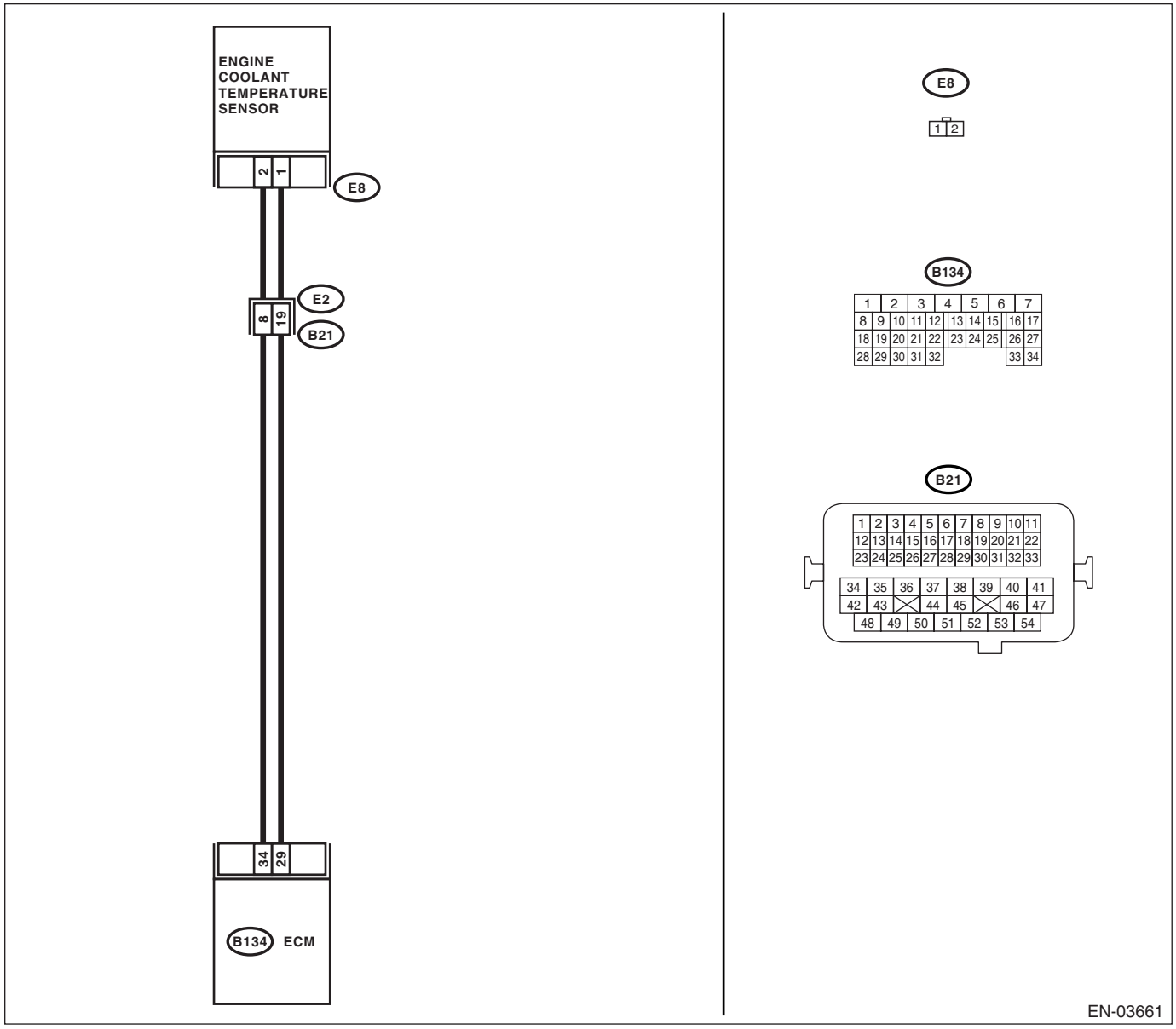
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** Measure the resistance between engine coolant temperature sensor terminals when the engine coolant is cold and after warmed-up. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance of engine coolant temperature sensor different between when engine coolant is cold and after warmed-up?	Contact with SOA Service Center.	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-17, Engine Coolant Temperature Sensor.>

AJ:DTC P0128 COOLANT THERMOSTAT (COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-60, DTC P0128 COOLANT THERMOSTAT (COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

Thermostat remains open.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK VEHICLE**	Has the vehicle driven or idled with the engine partially submerged under water?	In this case, it is not necessary to inspect DTC P0128.	Go to step **2**.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **3**.
3	**CHECK ENGINE COOLANT.**	Are the coolant level and mixture ratio of engine coolant to anti-freeze solution correct?	Go to step **4**.	Replace engine coolant. <Ref. to CO(H6DO)-10, REPLACEMENT, Engine Coolant.>
4	**CHECK RADIATOR FAN.** 1) Start the engine. 2) Check radiator fan operation.	Does the radiator fan continuously rotate for more than 3 minutes during idling?	Repair radiator fan circuit. <Ref. to CO(H6DO)-21, Radiator Main Fan and Fan Motor.> and <Ref. to CO(H6DO)-25, Radiator Sub Fan and Fan Motor.>	Replace the thermostat. <Ref. to CO(H6DO)-14, Thermostat.>

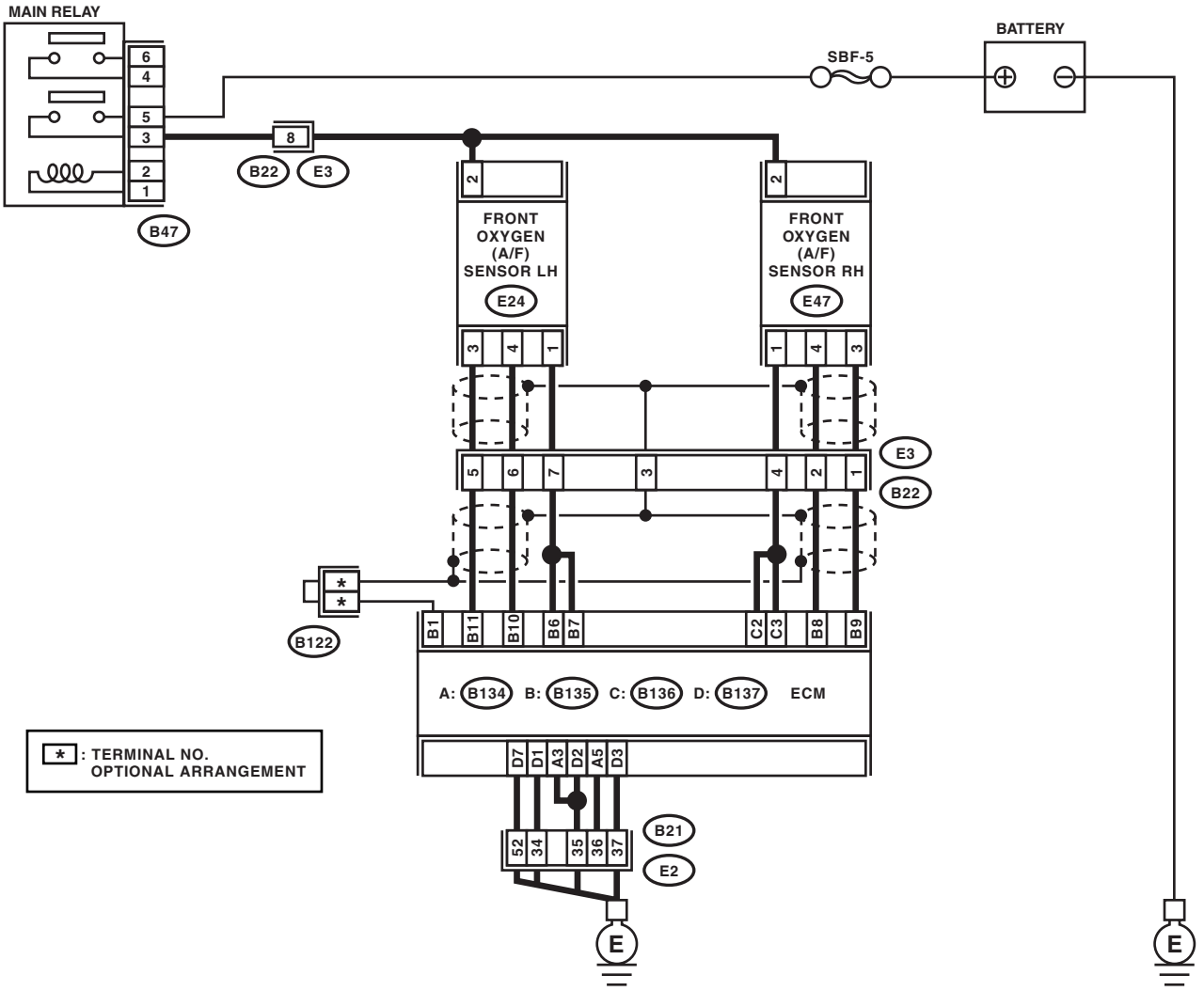
AK:DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1)

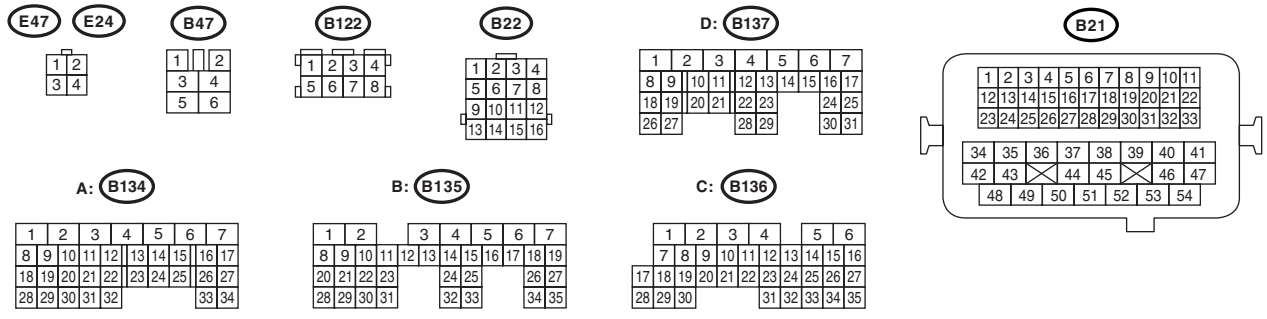
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-62, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 8 — Chassis ground:*** ***(B135) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.

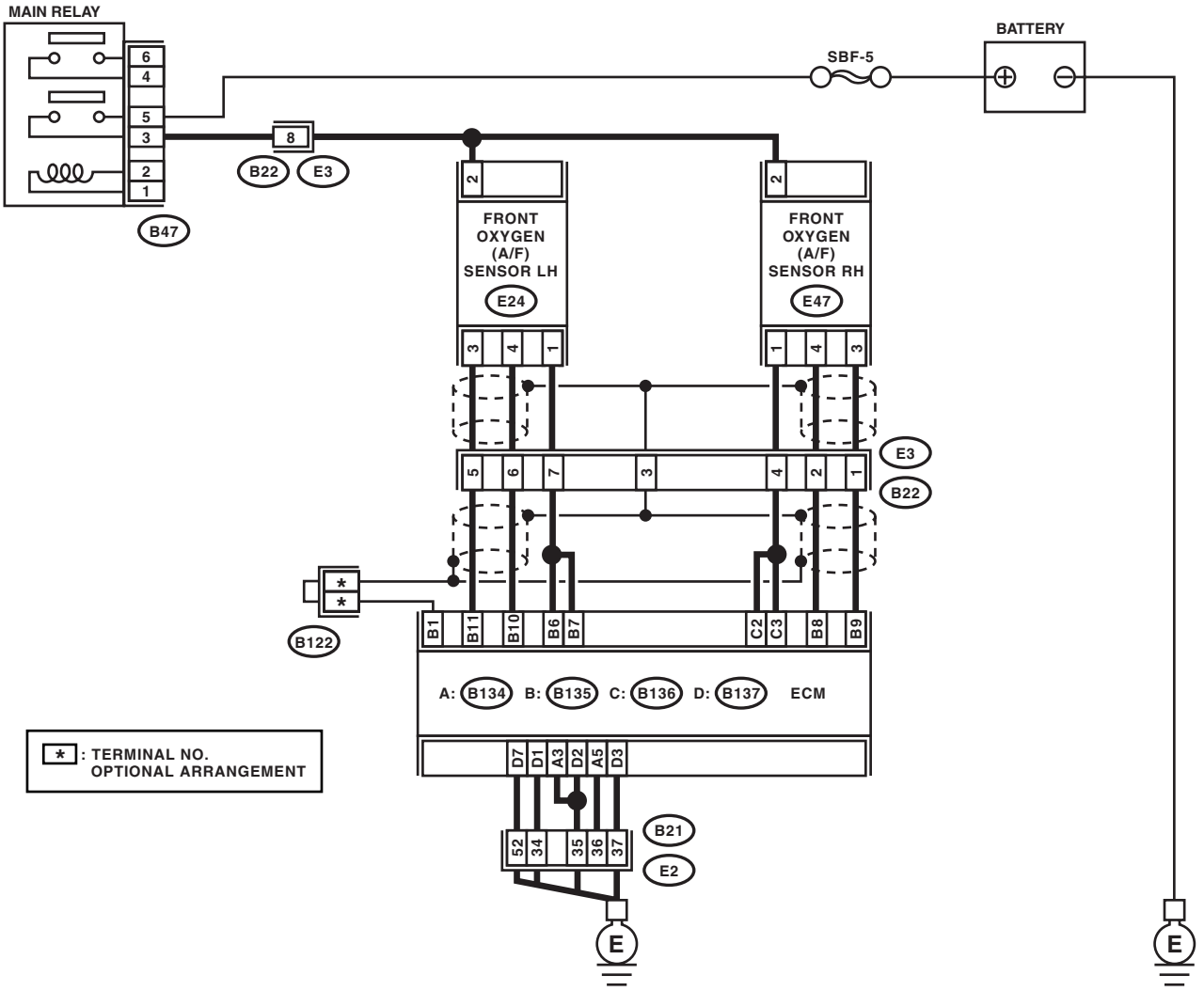
AL:DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1)

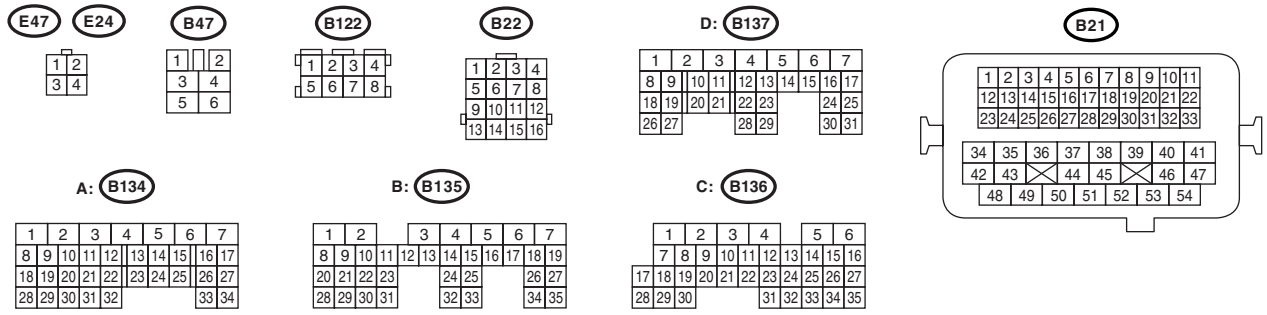
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-64, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 8 (+) — Chassis ground (–):*** ***(B135) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector.

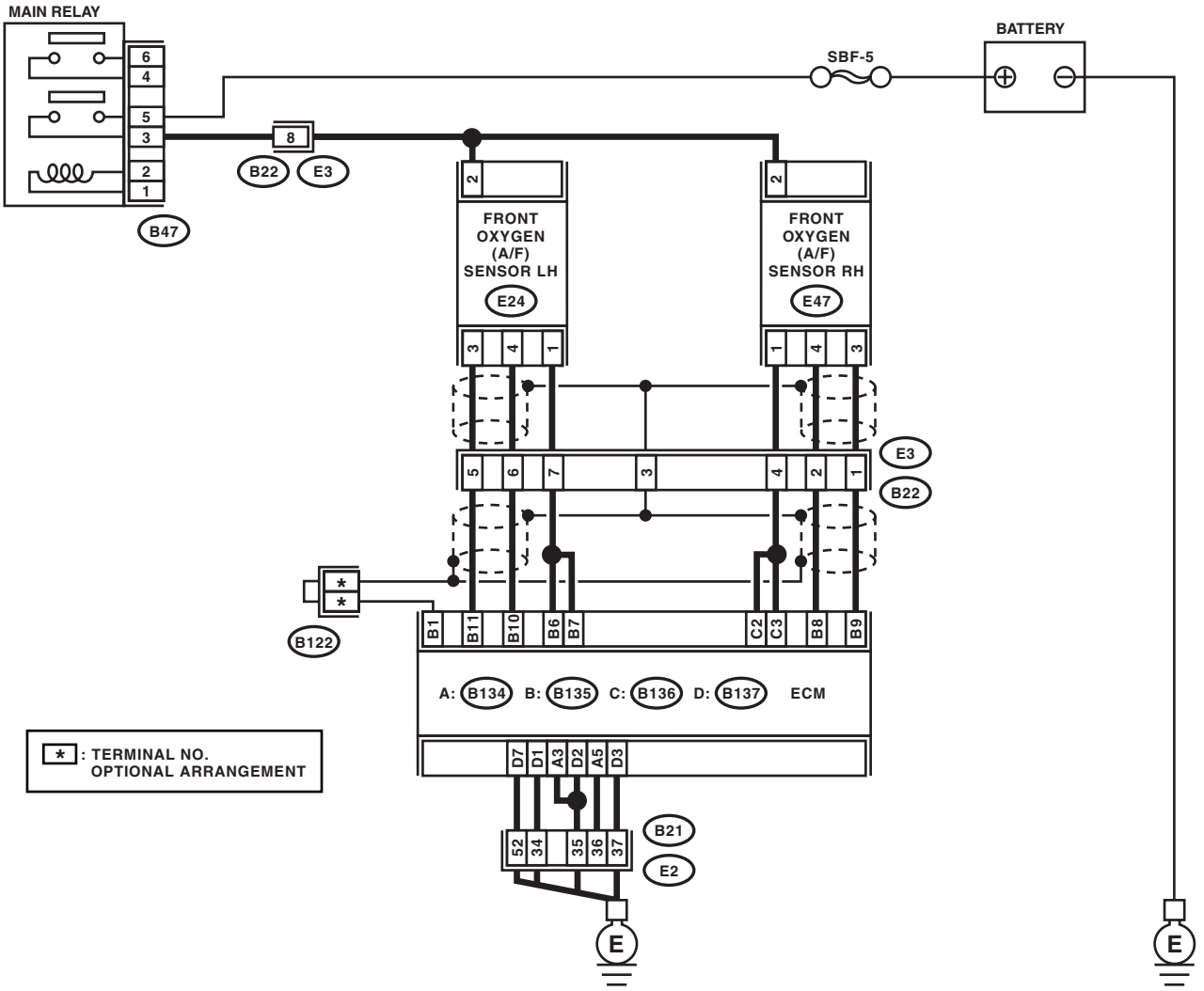
AM:DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

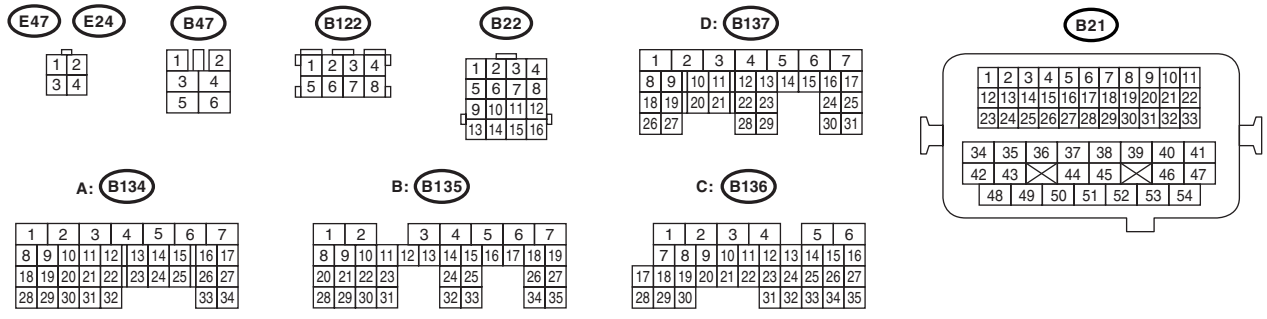
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-66, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **2**.
2	**CHECK EXHAUST SYSTEM.** NOTE: Check the following item. • Loose installation of front portion of exhaust pipe onto cylinder heads • Loose connection between front exhaust pipe and front catalytic converter • Damage of exhaust pipe resulting in a hole	Is there any fault in exhaust system?	Repair the exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>

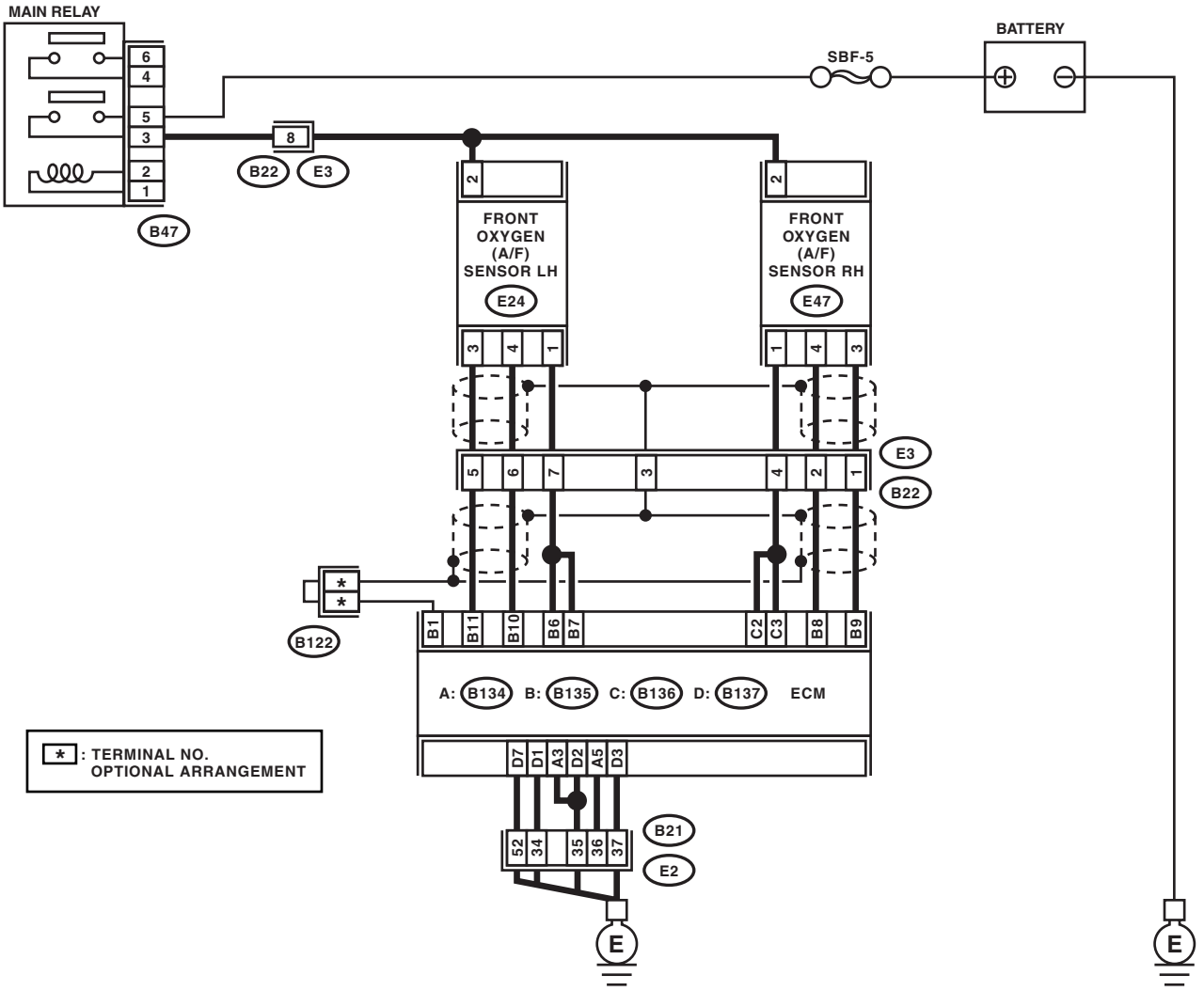
AN:DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

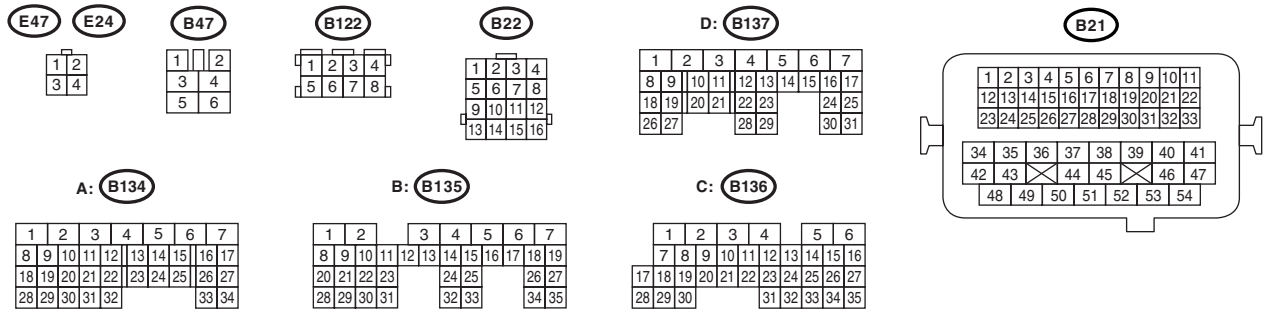
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-69, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B135) No. 8 — (E47) No. 4:*** ***(B135) No. 9 — (E47) No. 3:***	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 of harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK POOR CONTACT.** Check poor contact of front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair the poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>

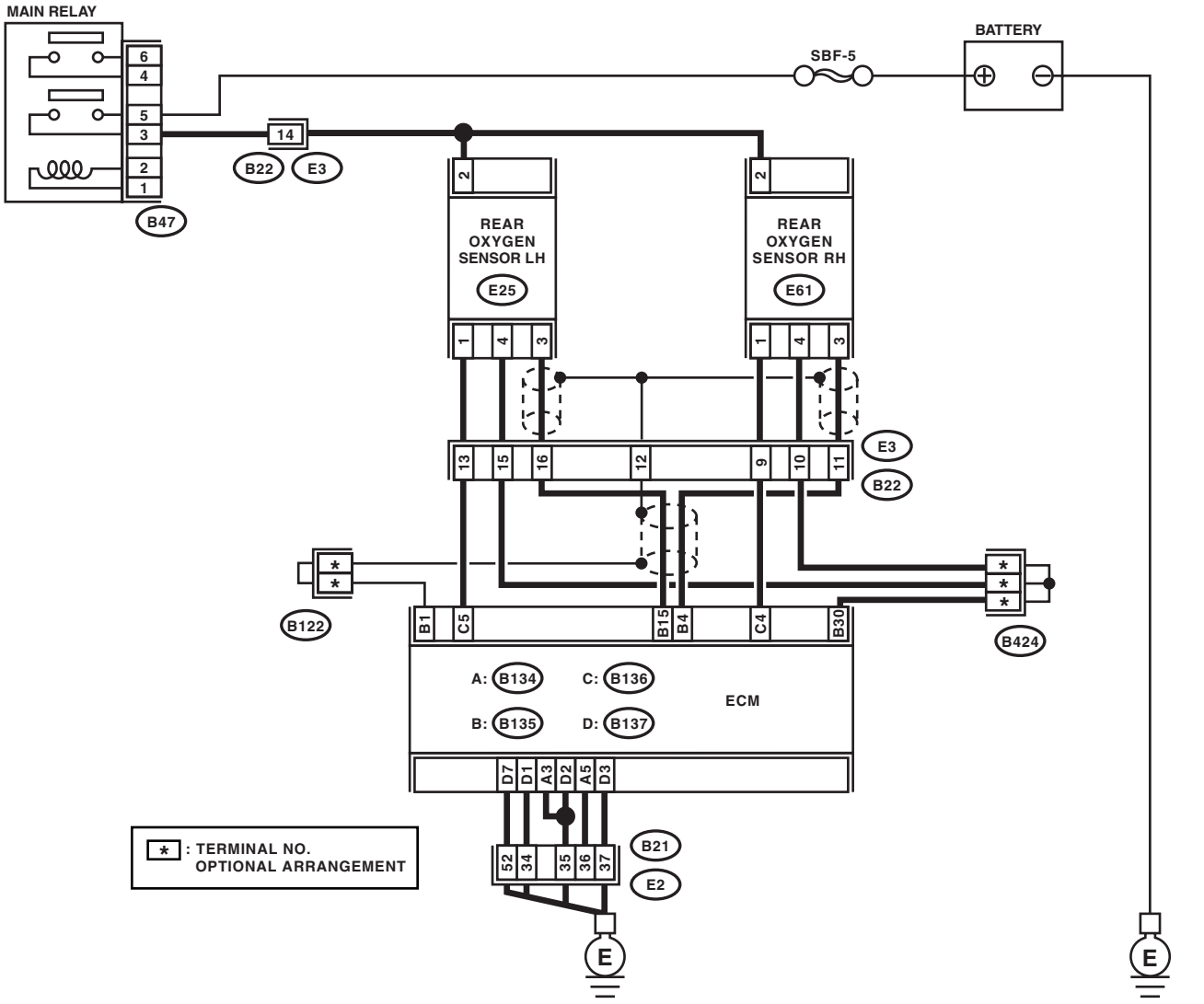
AO:DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

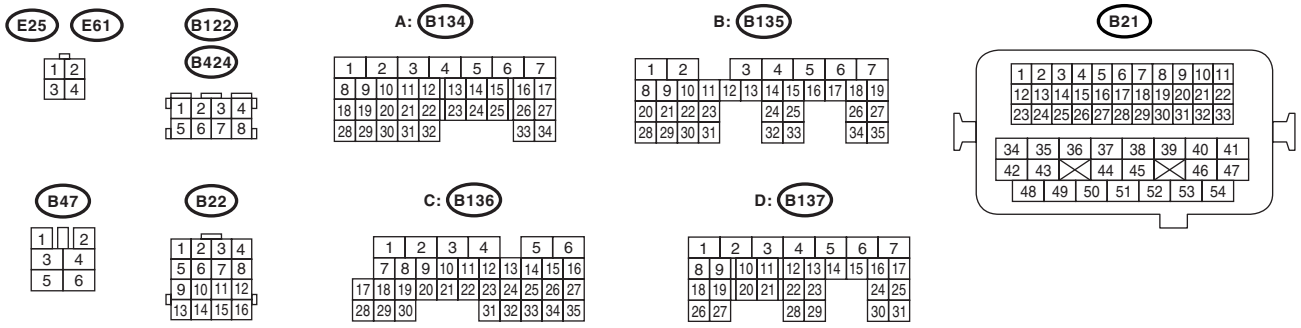
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-71, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0137.	Go to step **2**.
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 490 mV?	Go to step **5**.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B135) No. 4 — (E61) No. 3:*** ***(B135) No. 30 — (E61) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E61) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following item. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts 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)-30, Rear Oxygen Sensor.>

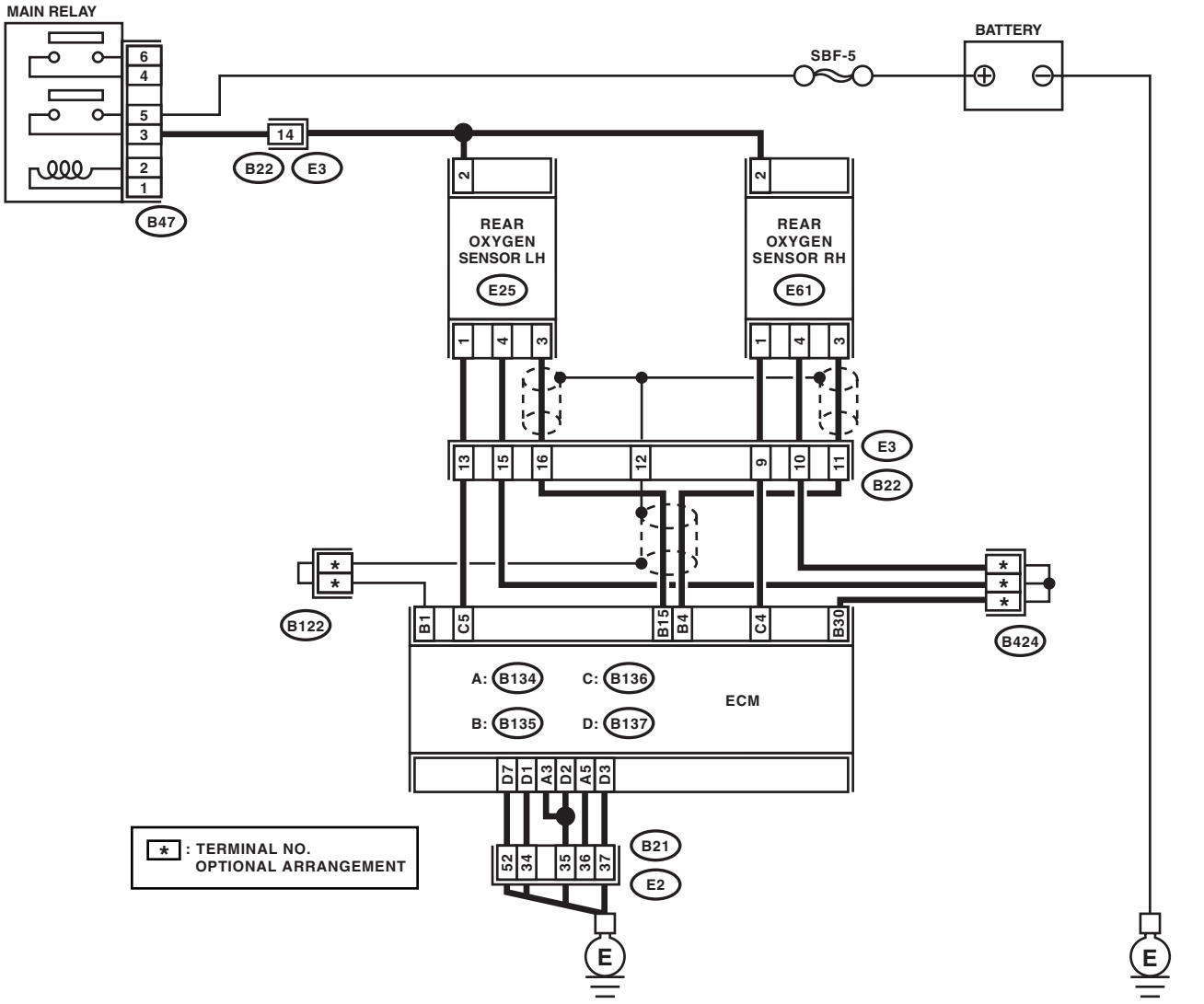
AP:DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

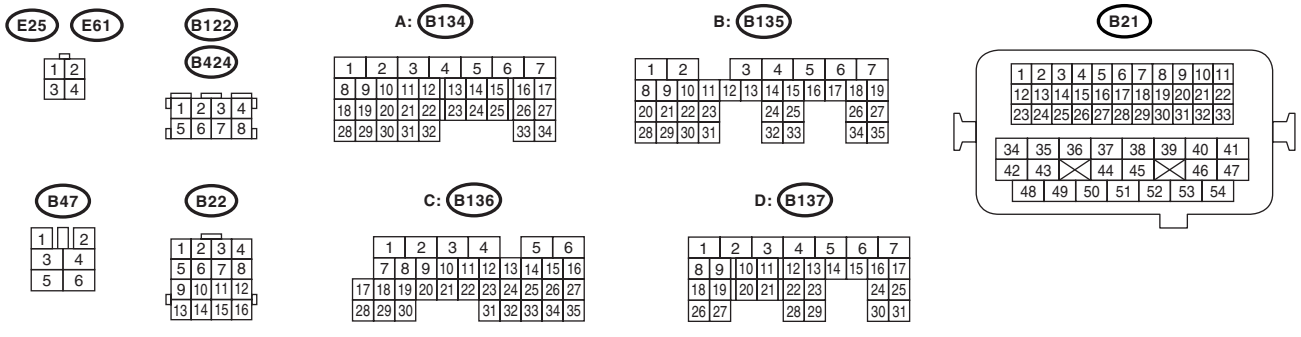
DTC DETECTING CONDITION:

- 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 repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0138.	Go to step **2**.
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and rapidly reduce the engine speed from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 250 mV or less?	Go to step **5**.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B135) No. 4 — (E61) No. 3:*** ***(B135) No. 30 — (E61) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E61) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following item. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts 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)-30, Rear Oxygen Sensor.>

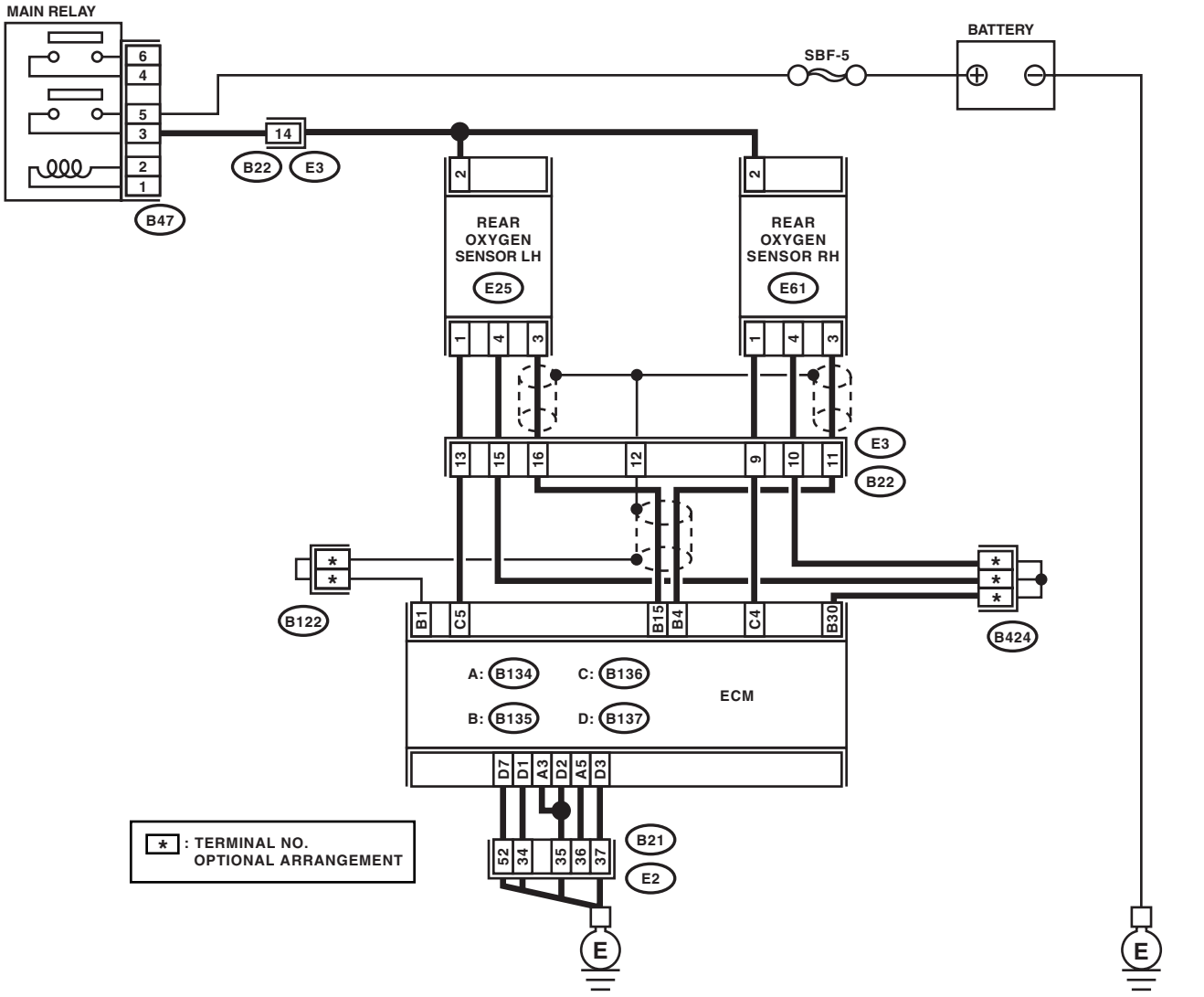
AQ:DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2)

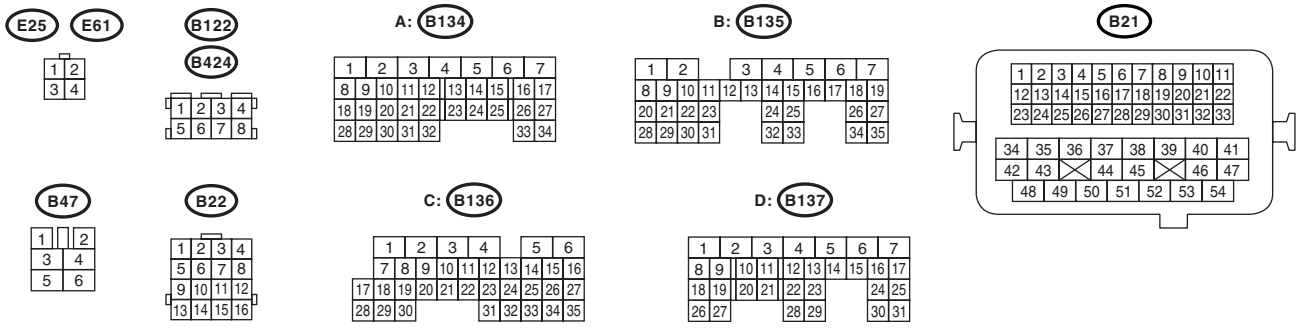
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-75, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B135) No. 4 — (E61) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between ECM and rear oxygen sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** Measure the resistance between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E61) No. 3 — Chassis ground***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair the chassis short circuit of harness.
4	**CHECK REAR OXYGEN SENSOR.** Measure the resistance between connector terminals of rear oxygen sensor. ***Terminals*** ***No. 3 — No. 4***	Is the resistance less than 1 Ω?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Temporary poor contact occurs. Check poor contact of connector.

AR:DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 2)

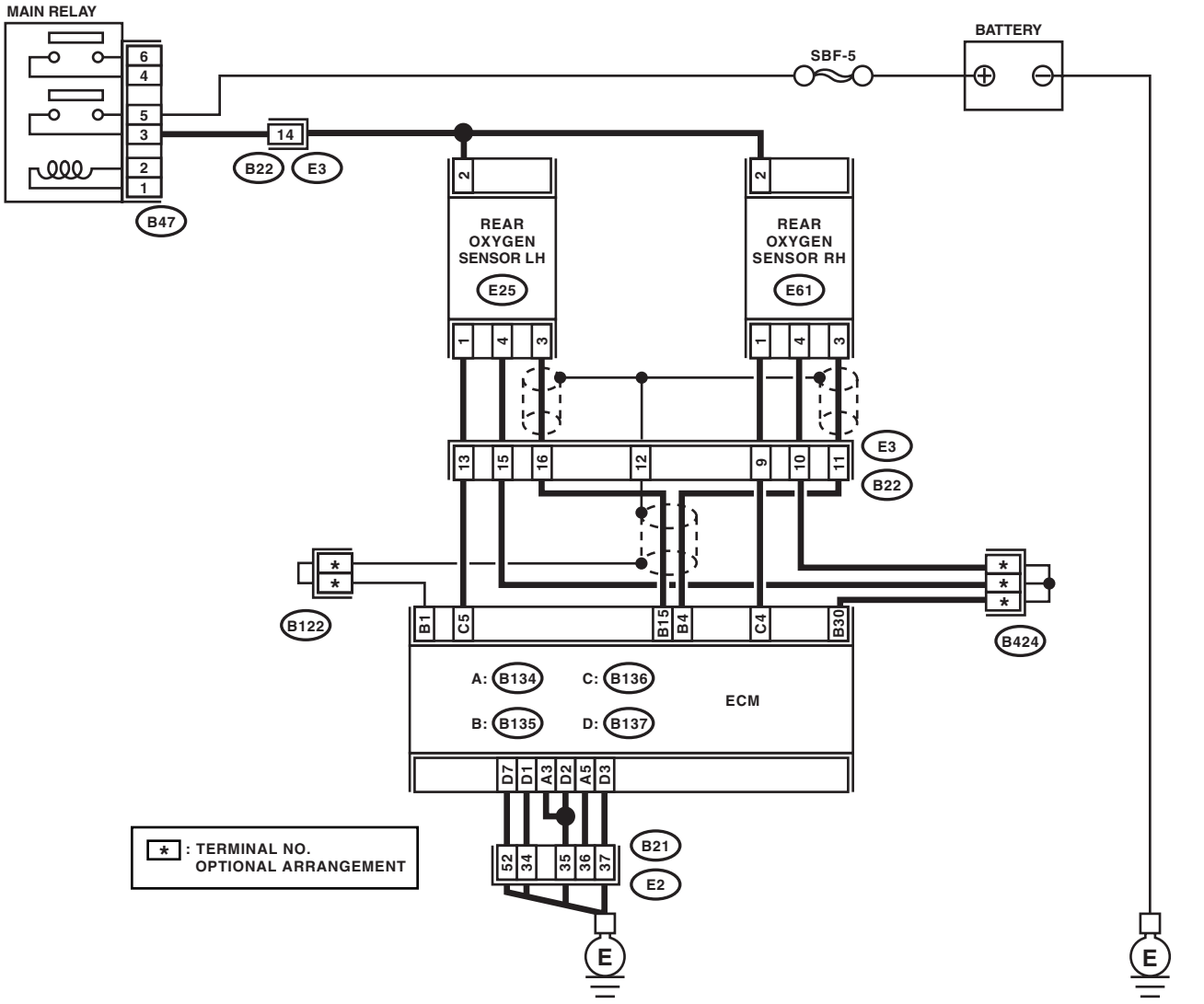
DTC DETECTING CONDITION:

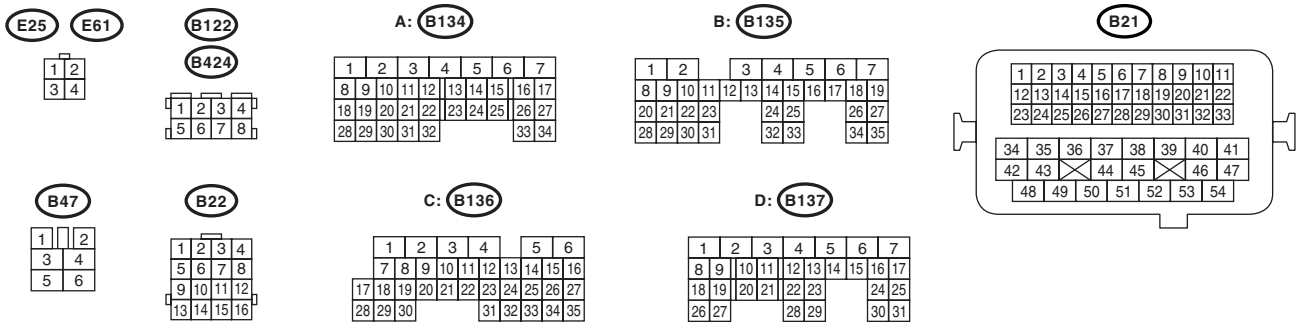
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-80, DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0137.	Go to step **2**.
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 490 mV?	Go to step **6**.	Go to step **3**.
3	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 250 mV or less?	Go to step **6**.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B135) No. 4 — (E61) No. 3:*** ***(B135) No. 30 — (E61) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E61) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following item. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts 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)-30, Rear Oxygen Sensor.>

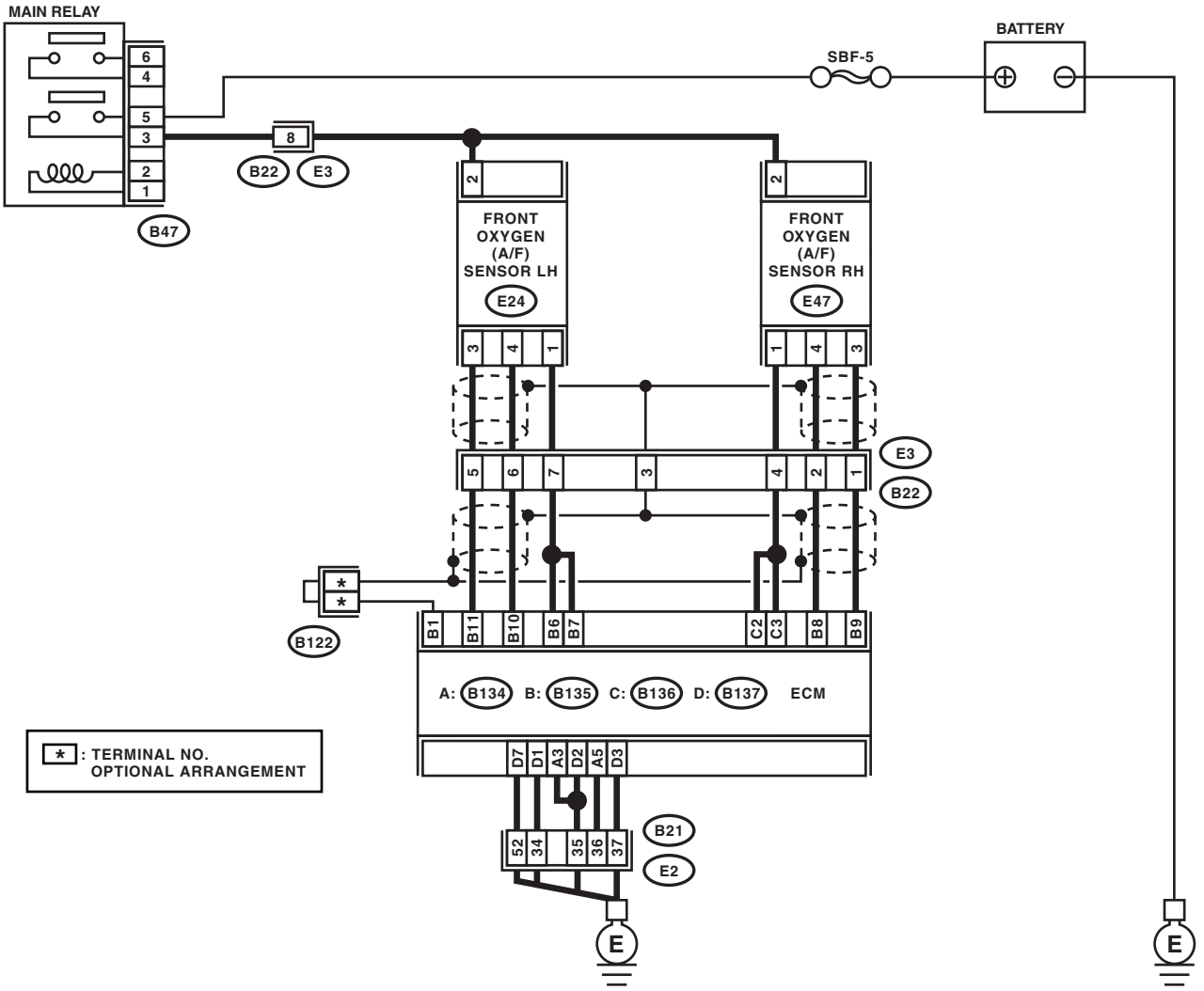
AS:DTC P0151 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 1)

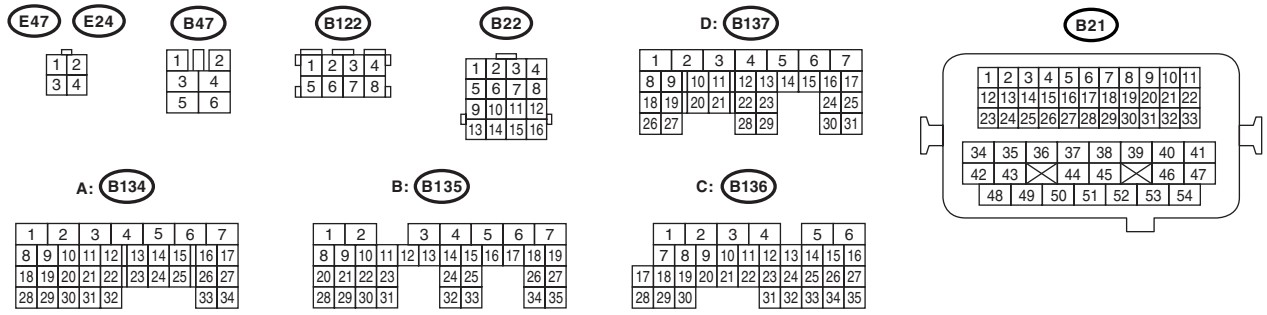
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-81, DTC P0151 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 10 — Chassis ground:*** ***(B135) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.

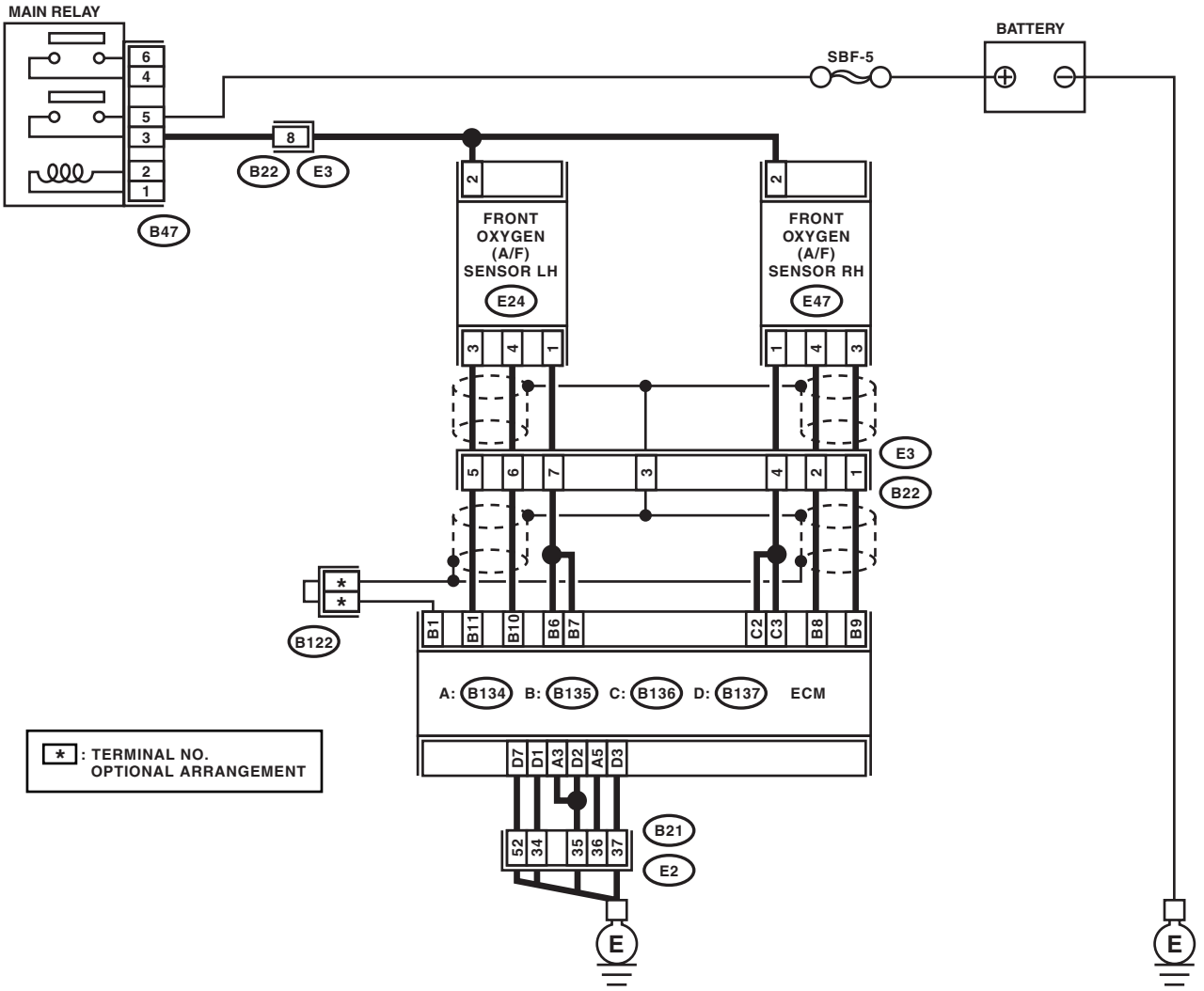
AT:DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1)

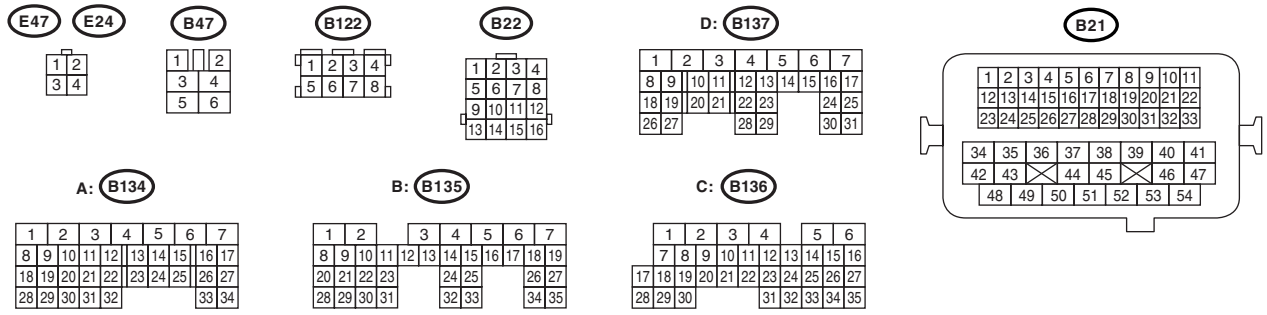
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-81, DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 10 (+) — Chassis ground (–):*** ***(B135) No. 11 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector.

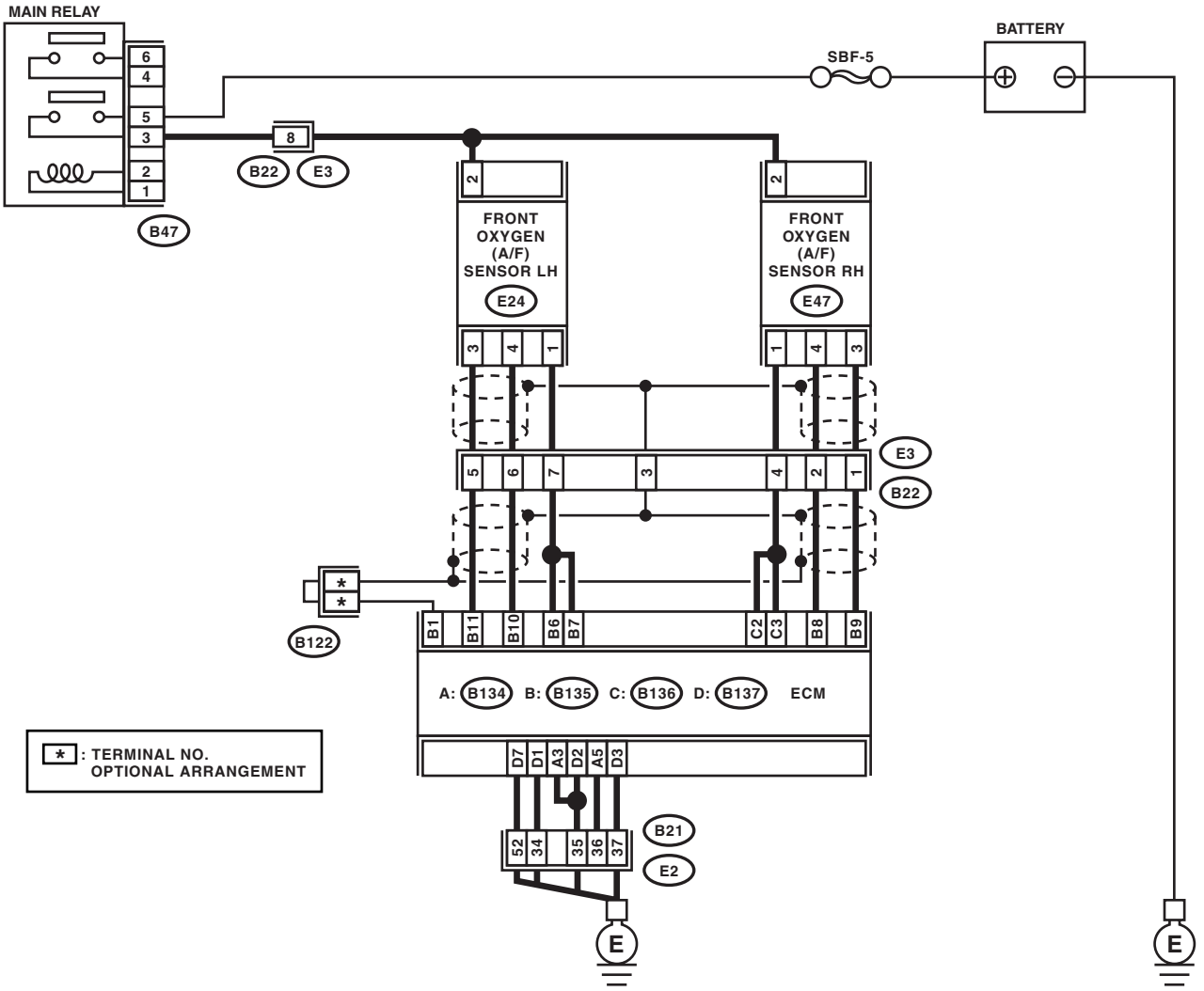
AU:DTC P0153 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 1)

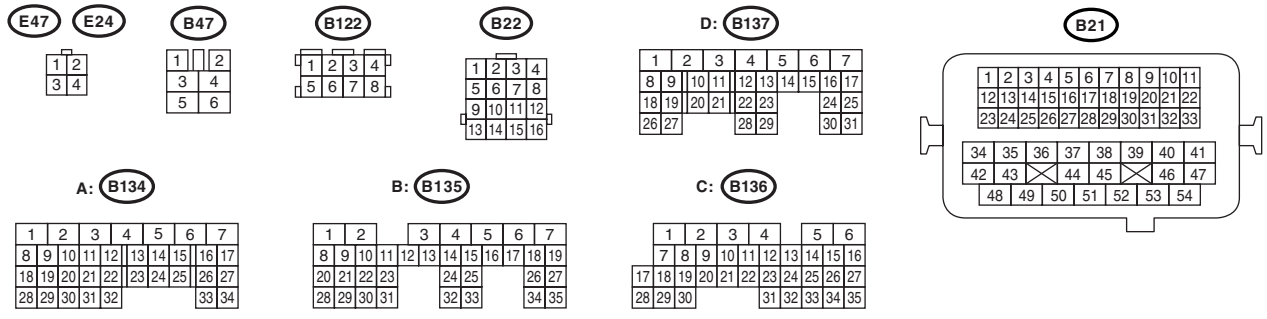
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-81, DTC P0153 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **2**.
2	**CHECK EXHAUST SYSTEM.** NOTE: Check the following item. • Loose installation of front portion of exhaust pipe onto cylinder heads • Loose connection between front exhaust pipe and front catalytic converter • Damage of exhaust pipe resulting in a hole	Is there any fault in exhaust system?	Repair the exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>

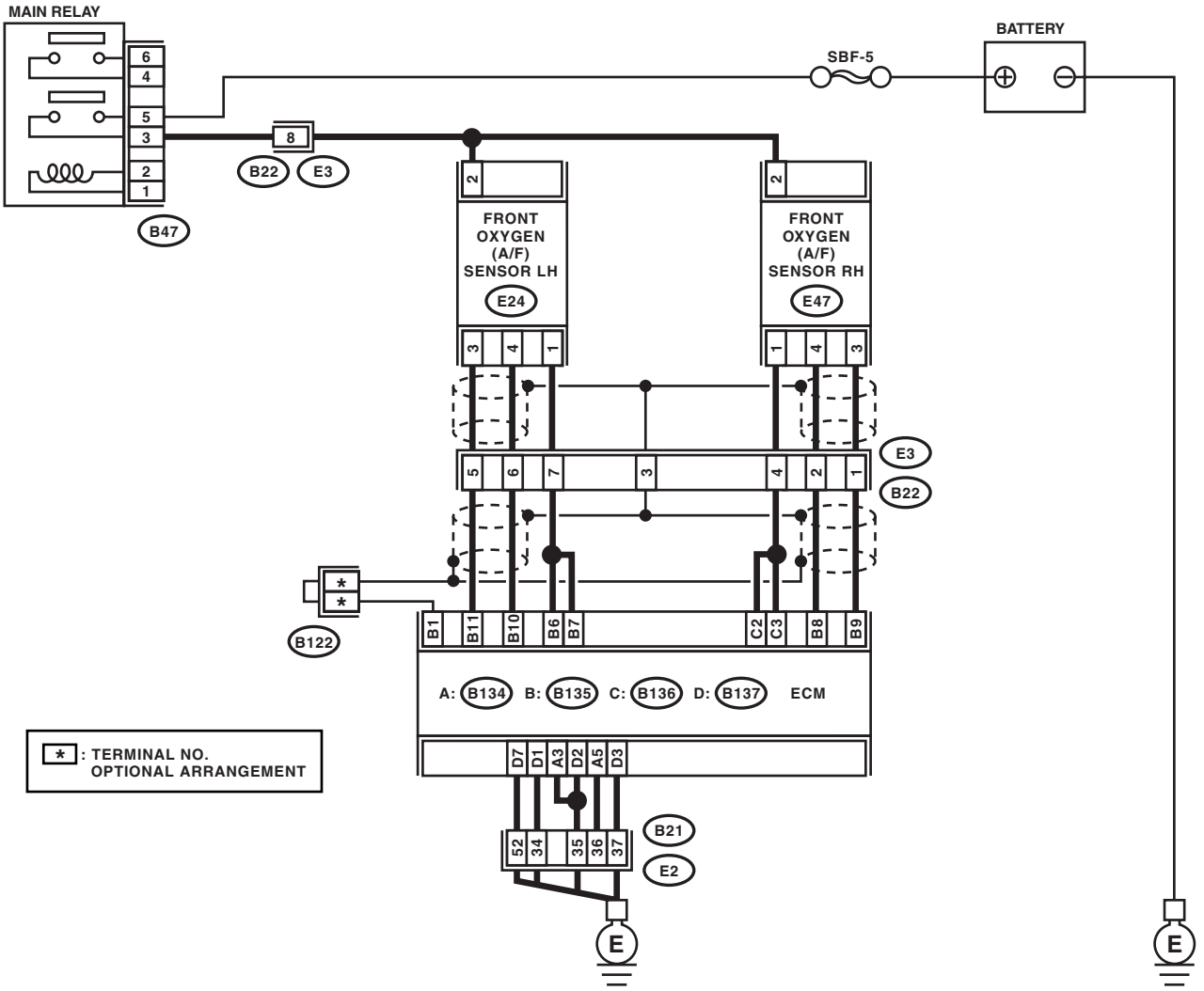
AV:DTC P0154 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 1)

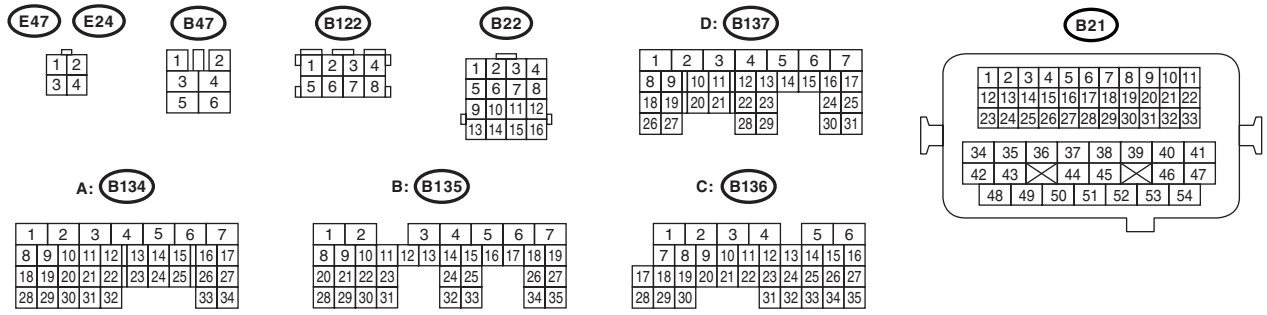
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-82, DTC P0154 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B135) No. 10 — (E24) No. 4:*** ***(B135) No. 11 — (E24) No. 3:***	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 of harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK POOR CONTACT.** Check poor contact of front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair the poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>

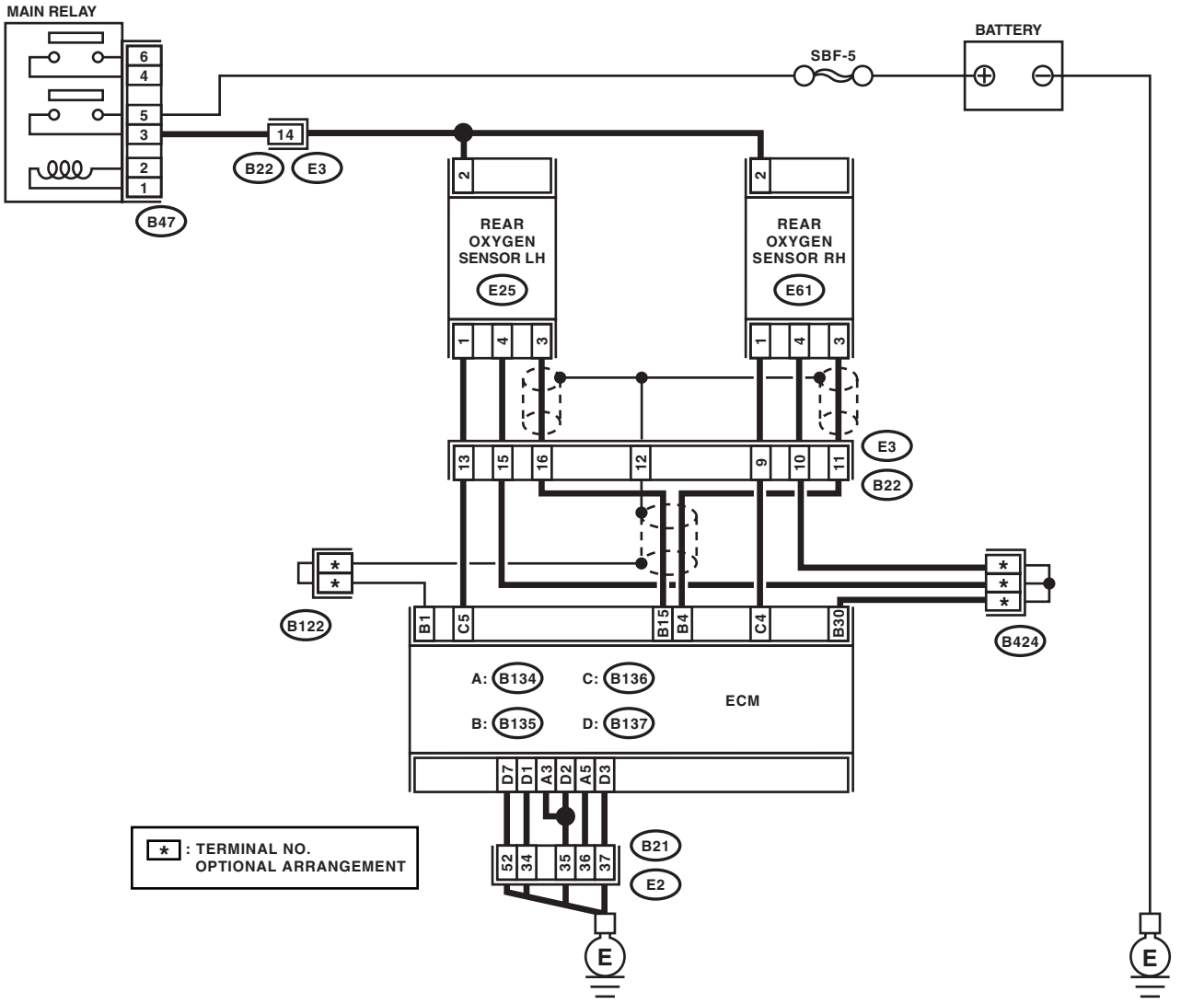
AW:DTC P0157 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2)

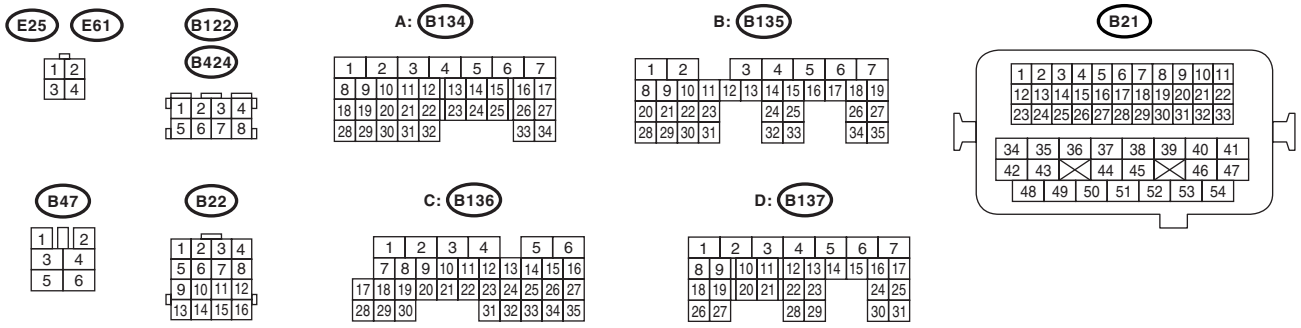
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-82, DTC P0157 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0157.	Go to step **2**.
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 490 mV?	Go to step **5**.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B135) No. 15 — (E25) No. 3:*** ***(B135) No. 30 — (E25) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following item. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts 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)-30, Rear Oxygen Sensor.>

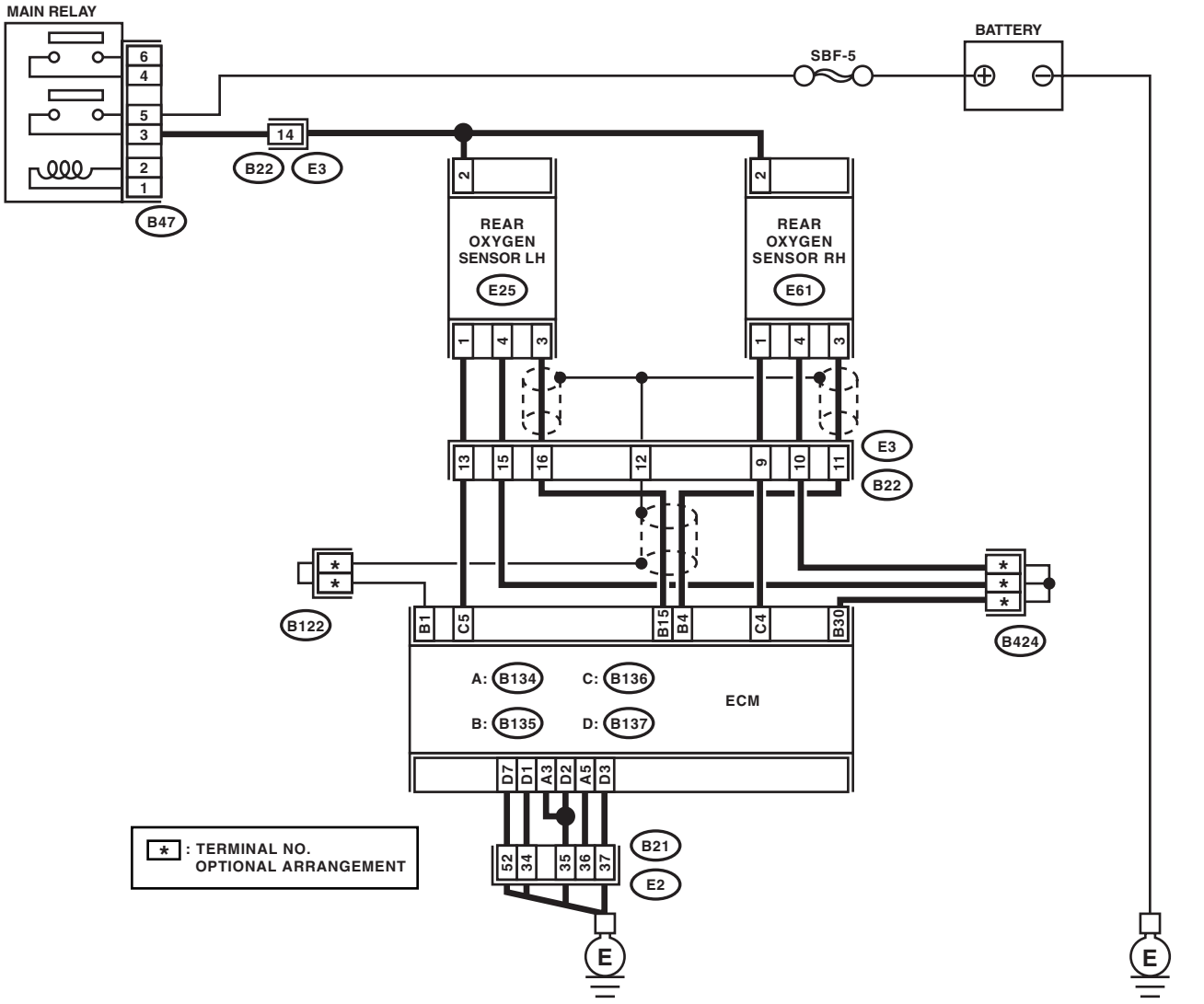
AX:DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2)

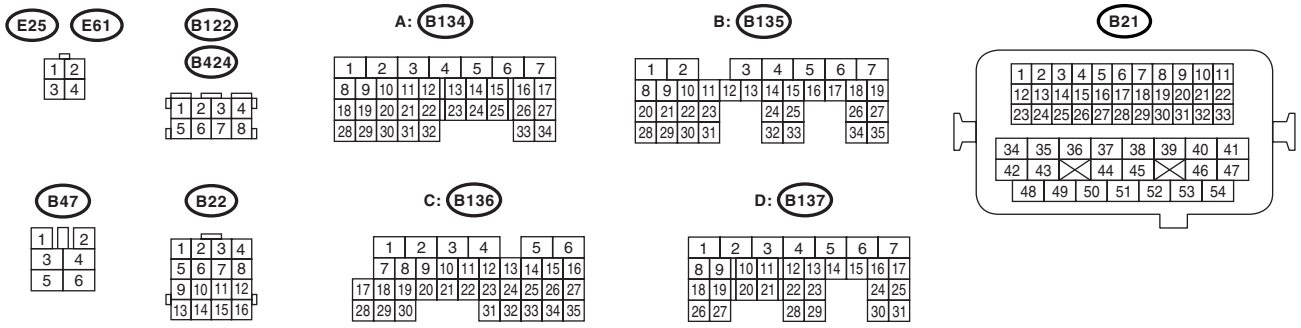
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-82, DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0138.	Go to step **2**.
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and rapidly reduce the engine speed from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 250 mV or less?	Go to step **5**.	Go to step **3**.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B135) No. 15 — (E25) No. 3:*** ***(B135) No. 30 — (E25) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following item. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts 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)-30, Rear Oxygen Sensor.>

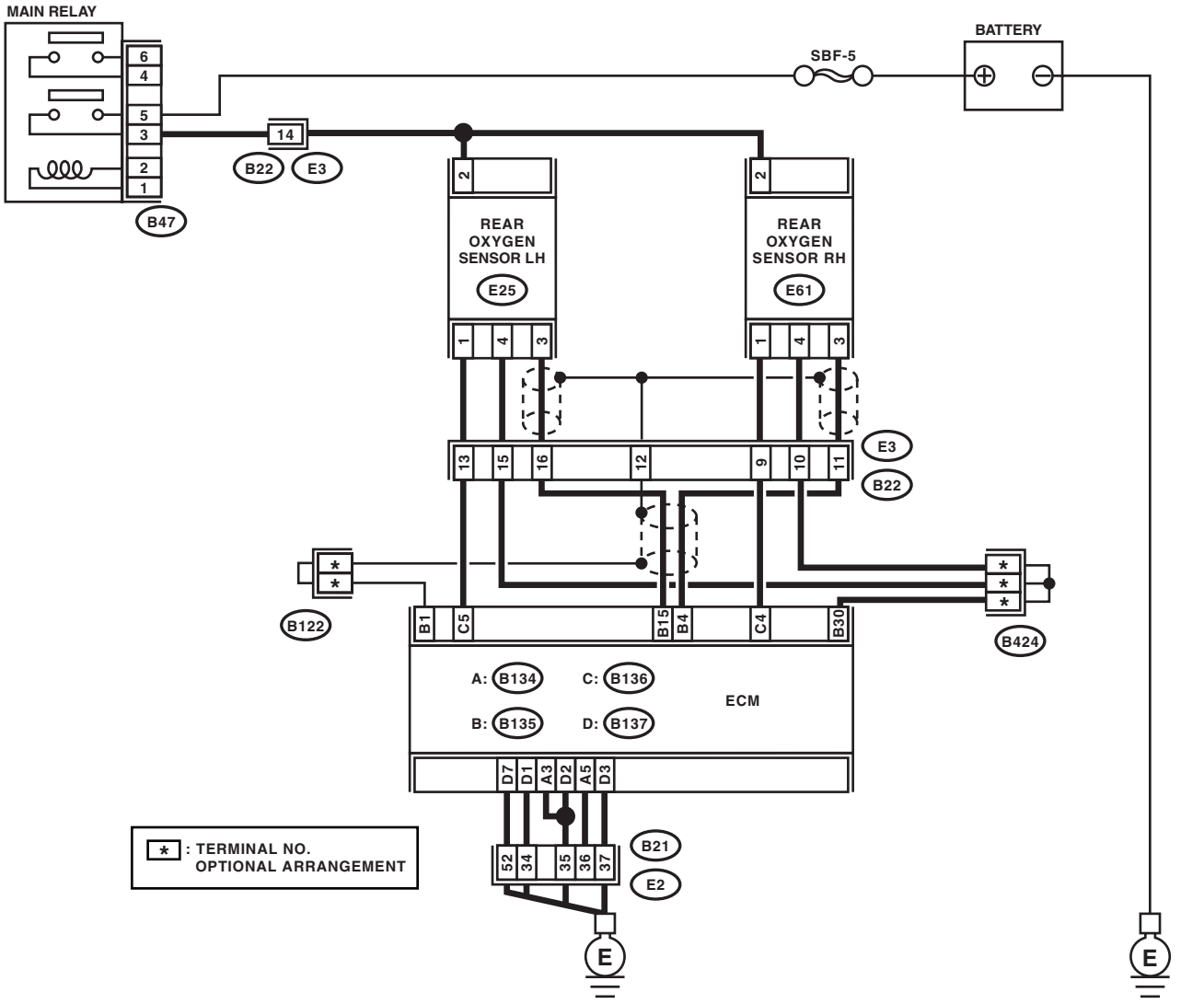
AY:DTC P0159 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 2)

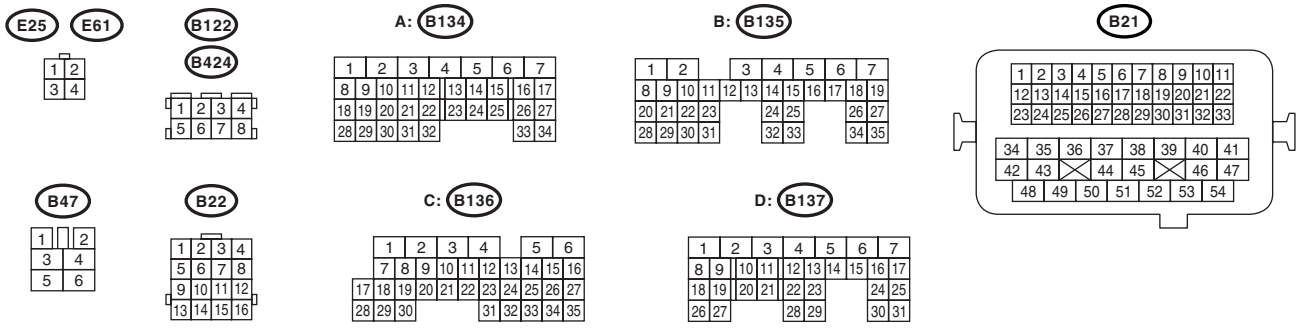
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-82, DTC P0159 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0159.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B135) No. 15 — (E25) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between ECM and rear oxygen sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** Measure the resistance between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B25) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair the chassis short circuit of harness.
4	**CHECK REAR OXYGEN SENSOR.** Measure the resistance between connector terminals of rear oxygen sensor. ***Terminals*** ***No. 3 — No. 4***	Is the resistance less than 1 Ω?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Temporary poor contact occurs. Check poor contact of connector.

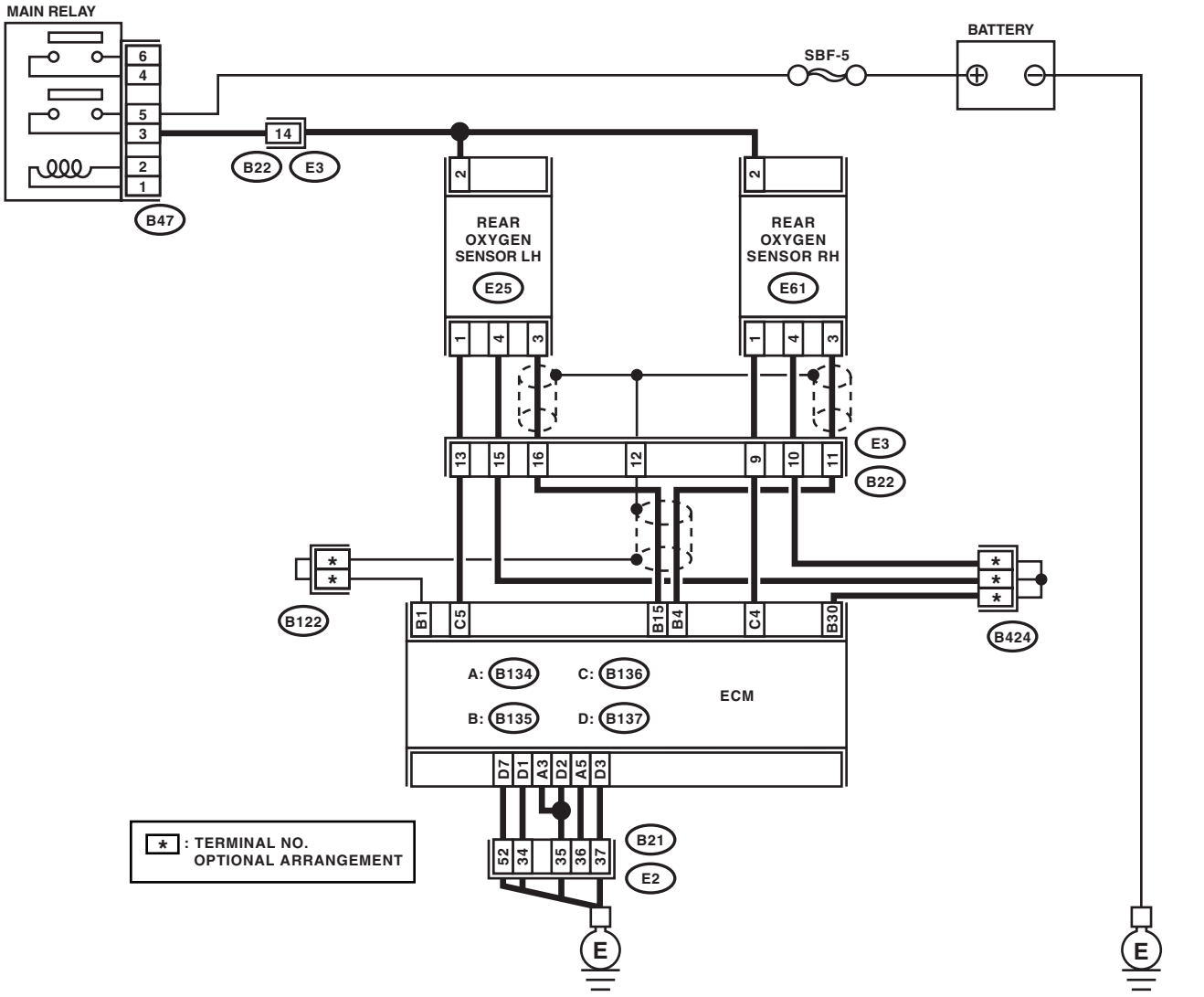
AZ:DTC P0160 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 2)

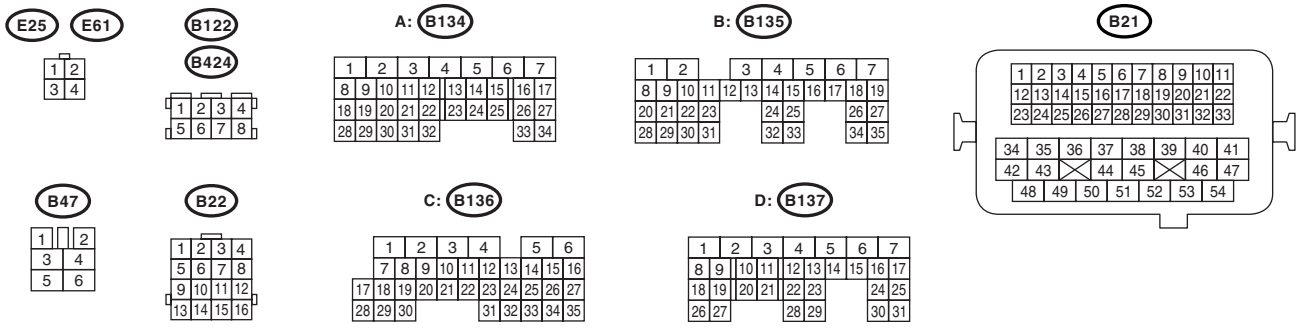
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-82, DTC P0160 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0138.	Go to step **2**.
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and rapidly reduce the engine speed from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 490 mV?	Go to step **6**.	Go to step **3**.
3	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and rapidly reduce the engine speed from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 250 mV or less?	Go to step **6**.	Go to step **4**.
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B135) No. 15 — (E25) No. 3:*** ***(B135) No. 30 — (E25) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following item. • Loose part and incomplete installation of exhaust system • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts 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)-30, Rear Oxygen Sensor.>

BA:DTC P0171 SYSTEM TOO LEAN (BANK 1)

Refer to DTC P0175 for diagnostic procedure. <Ref. to EN(H6DO)(diag)-218, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BB:DTC P0172 SYSTEM TOO RICH (BANK 1)

Refer to DTC P0175 for diagnostic procedure. <Ref. to EN(H6DO)(diag)-218, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BC:DTC P0174 SYSTEM TOO LEAN (BANK 2)

Refer to DTC P0175 for diagnostic procedure. <Ref. to EN(H6DO)(diag)-218, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BD: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)-86, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step **2**.
2	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **3**.
3	**CHECK FUEL PRESSURE** **WARNING:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel.** Measure the fuel pressure. <Ref. to ME(H6DO)-26, INSPECTION, Fuel Pressure.> **WARNING:** **Release fuel pressure before removing the fuel pressure gauge.**	Is the measured value 338 — 348 kPa (3.4 — 3.5 kg/cm^2, 49 — 50.5 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 supply line
4	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the engine coolant temperature above 60°C (140°F) ?	Go to step **5**.	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-17, Engine Coolant Temperature Sensor.>

	Step	Check	Yes	No
5	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the select lever in "N" or "P" position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the measured value 3.1 — 4.3 g/s (0.4 — 0.6 lb/m)?	Go to step **6**.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>
6	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Open the front hood. 6) Measure the ambient temperature. 7) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Subtract ambient temperature from intake air temperature. Is the obtained value –10 — 50°C (14 — 122°F)?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>

BE:DTC P0181 FUEL TEMPERATURE SENSOR “A” CIRCUIT RANGE/PERFORMANCE

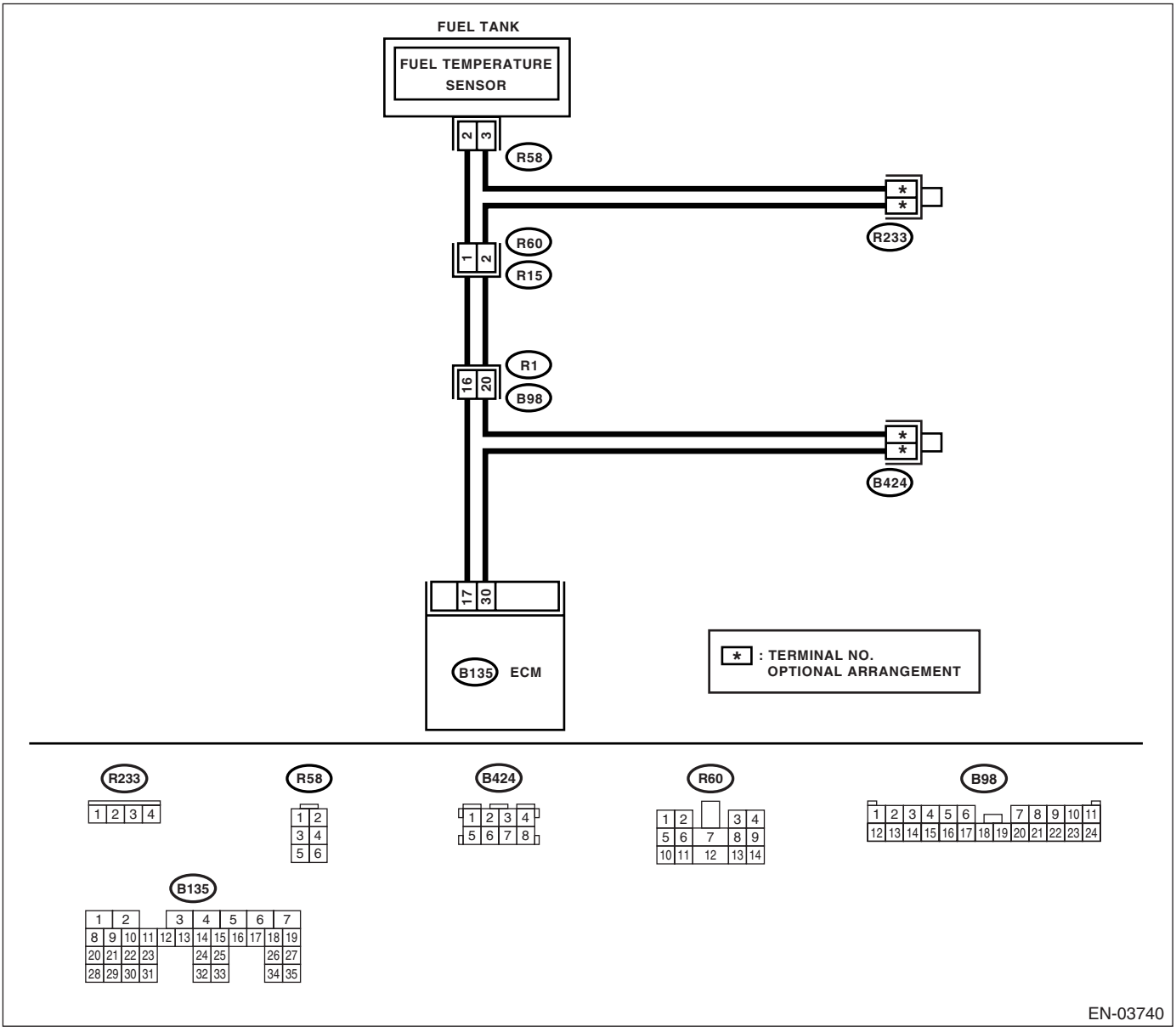
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-87, DTC P0181 FUEL TEMPERATURE SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0181.	Replace the fuel temperature sensor. <Ref. to EC(H6DO)-8, Fuel Temperature Sensor.>

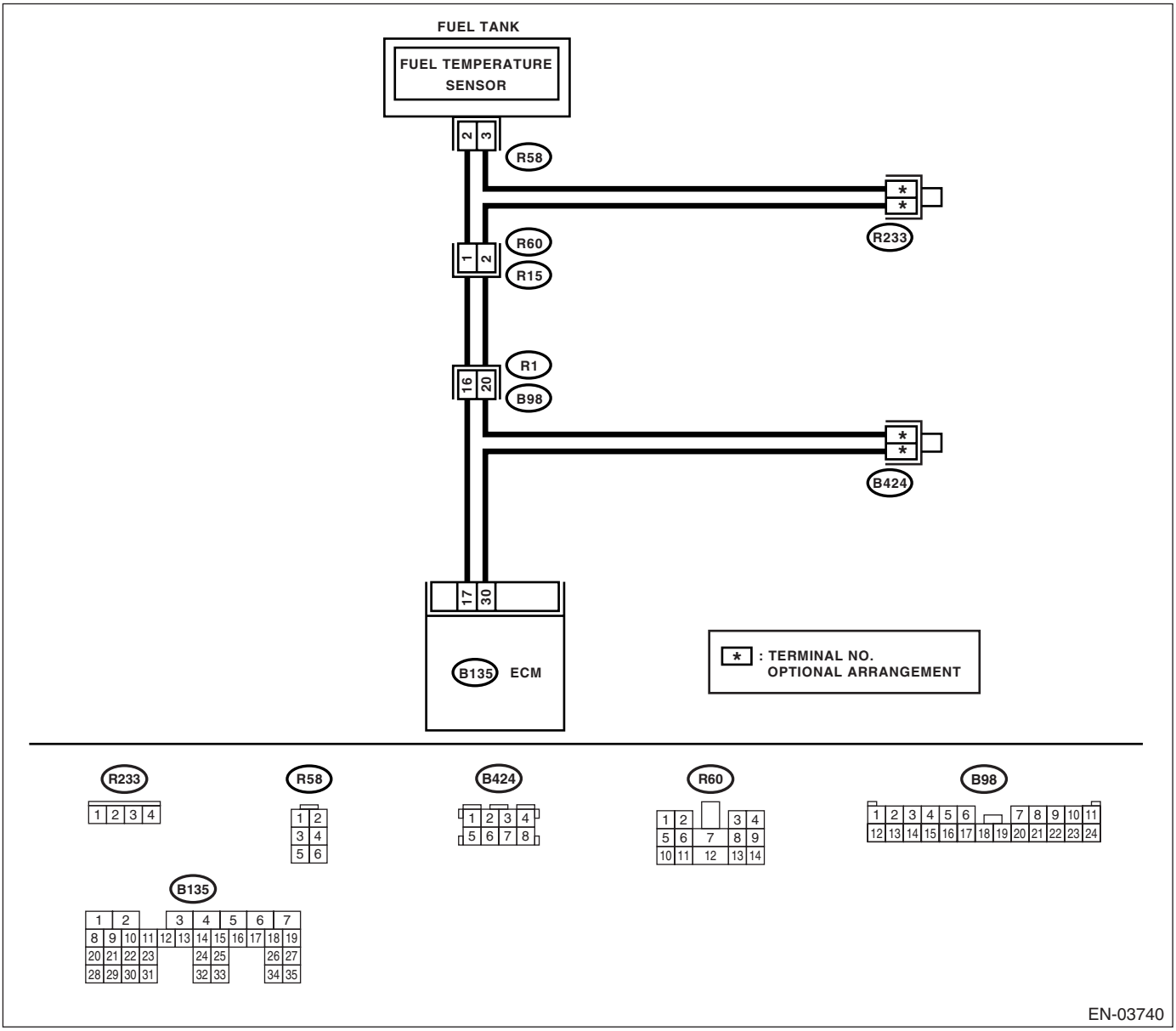
BF:DTC P0182 FUEL TEMPERATURE SENSOR “A” CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-90, DTC P0182 FUEL TEMPERATURE SENSOR “A” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of fuel temperature sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the temperature above 120°C (248°F)?	Go to step **2**.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.
2	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Remove the access hole lid. 3) Disconnect the connector from fuel pump. 4) Turn the ignition switch to ON. 5) Read the data of fuel temperature sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the temperature less than -40°C (-40°F)?	Replace the fuel temperature sensor. <Ref. to EC(H6DO)-8, Fuel Temperature Sensor.>	Repair the ground short circuit of harness between the fuel pump and ECM connector.

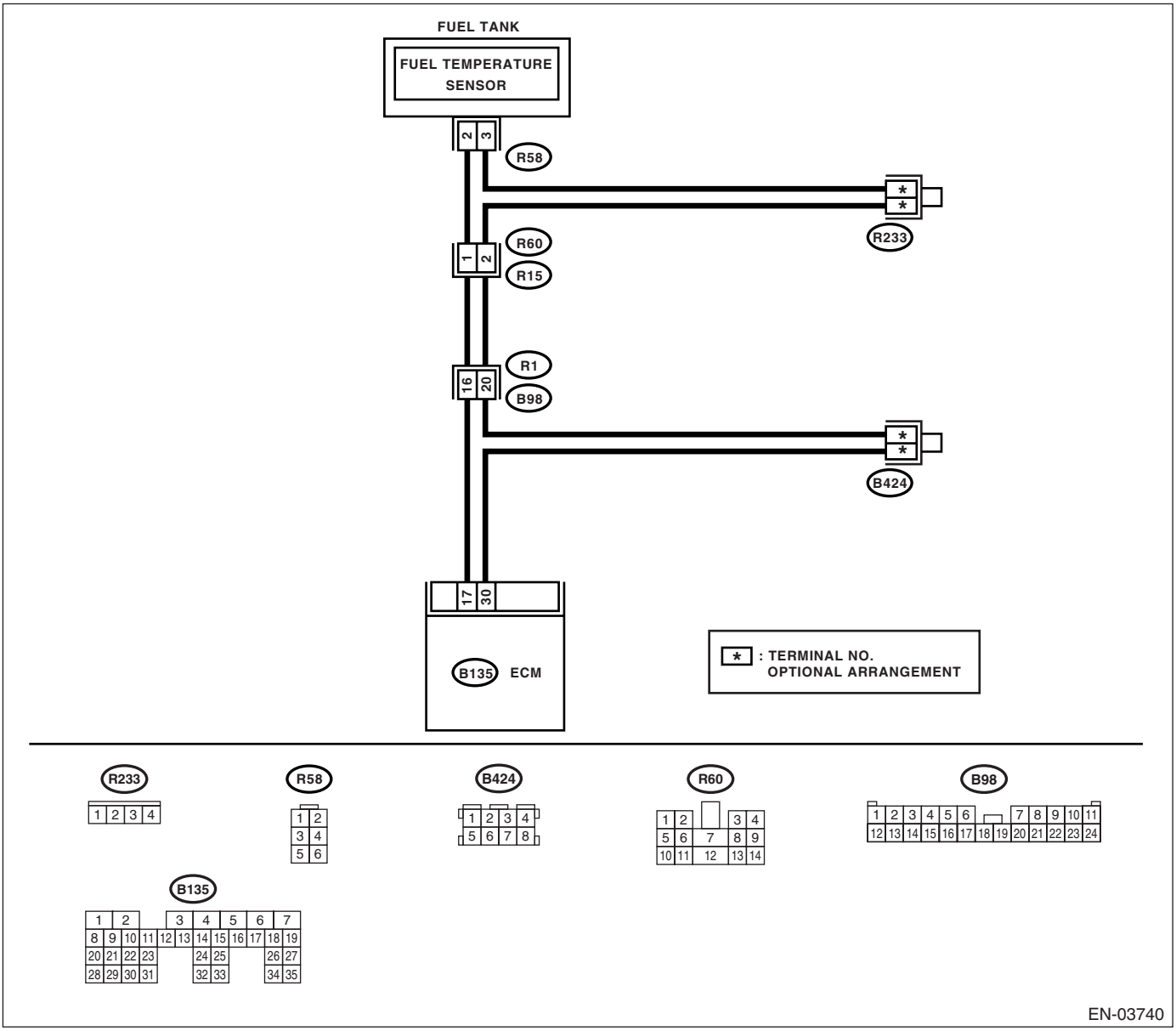
BG:DTC P0183 FUEL TEMPERATURE SENSOR “A” CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-92, DTC P0183 FUEL TEMPERATURE SENSOR “A” CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of fuel temperature sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the temperature less than -40°C (-40°F)?	Go to step **2**.	Repair the poor contact. NOTE: In this case, repair the following item: • Poor contact in fuel pump connector • Poor contact in ECM connector • Poor contact of coupling connector • Poor contact of joint connector
2	**CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the access hole lid. 3) Disconnect the connector from fuel pump. 4) Measure the voltage between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and fuel pump connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and fuel pump connector.	Go to step **4**.
4	**CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 4 V?	Go to step **5**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and fuel pump connector • Poor contact in fuel pump connector • Poor contact in ECM connector • Poor contact of coupling connector

Step		Check	Yes	No
5	**CHECK HARNESS BETWEEN FUEL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between fuel pump connector and ECM. ***Connector & terminal*** ***(R58) No. 3 — (B135) No. 30:***	Is the resistance less than 1 Ω?	Replace the fuel temperature sensor. <Ref. to EC(H6DO)-8, Fuel Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and fuel pump connector • Poor contact in fuel pump connector • Poor contact in ECM connector • Poor contact of coupling connector • Poor contact of joint connector

BH: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)-94, DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

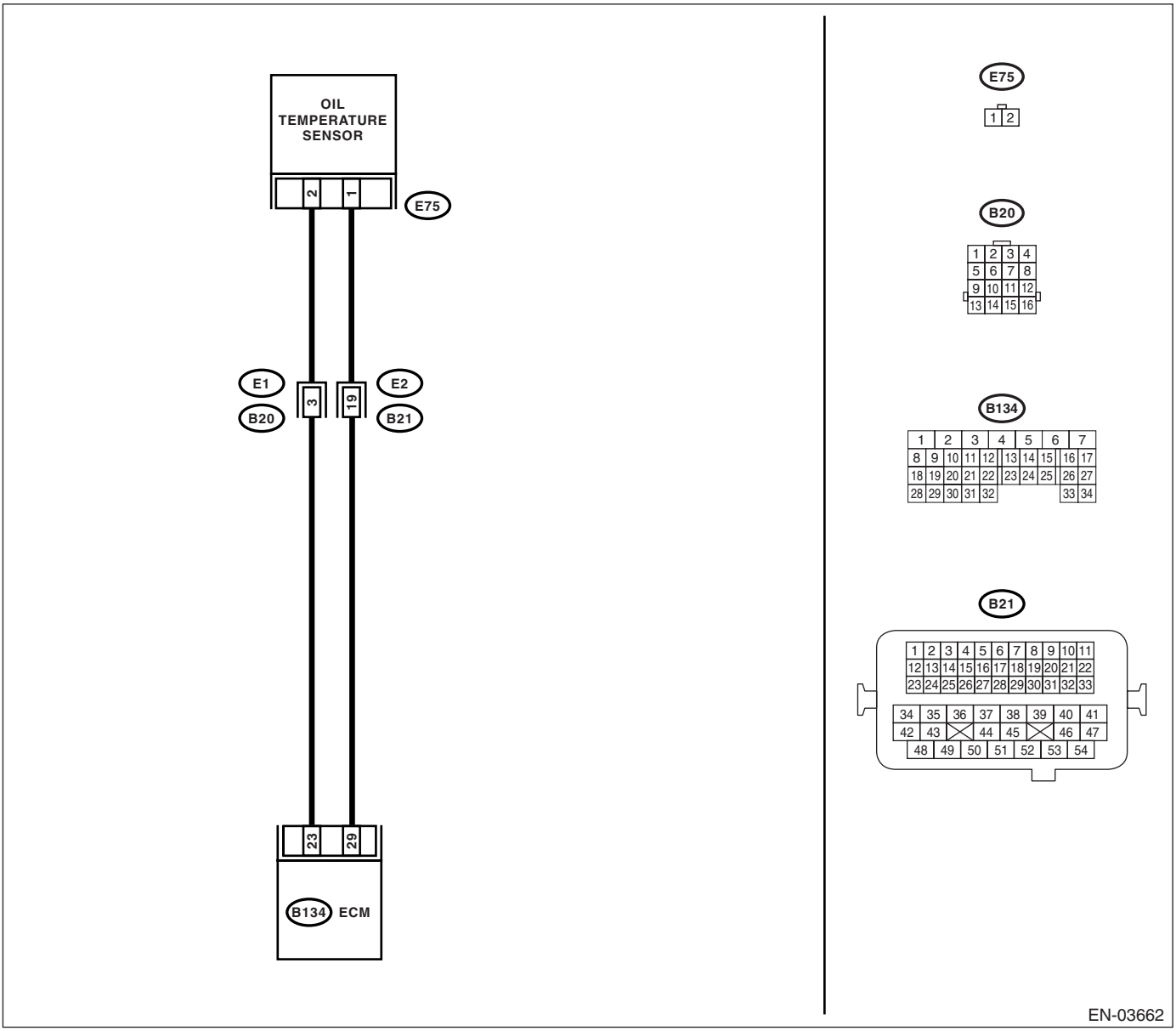
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step	Check	Yes	No
1 **CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0196.	Replace the oil temperature sensor. <Ref. to FU(H6DO)-27, Oil Temperature Sensor.>

BI: DTC P0197 ENGINE OIL TEMPERATURE SENSOR CIRCUIT LOW

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-96, DTC P0197 ENGINE OIL TEMPERATURE SENSOR CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

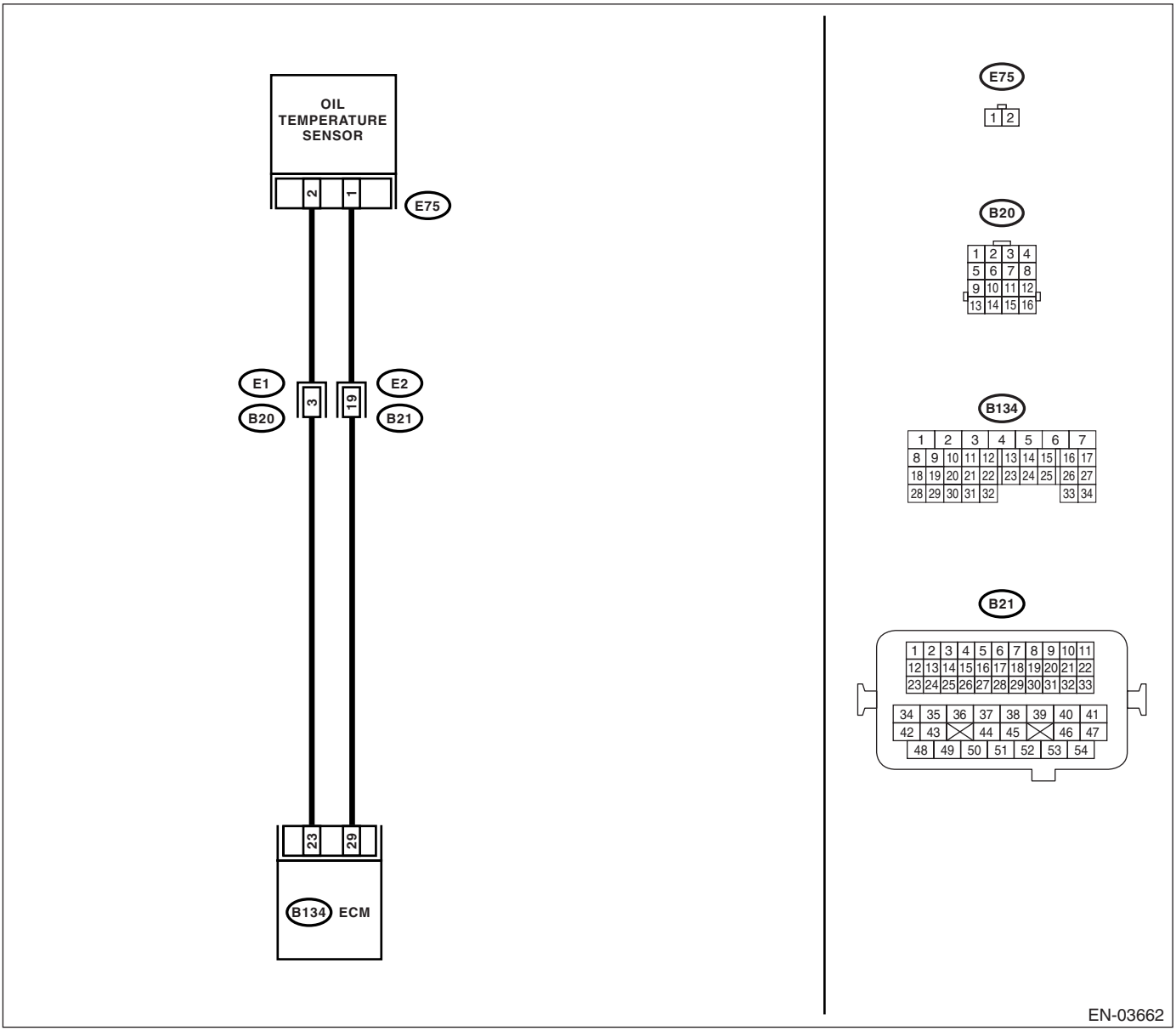
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN OIL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Disconnect the ECM connector and oil temperature sensor connector. 2) Measure the resistance of harness between oil temperature sensor connector and engine ground. ***Connector & terminal*** ***(B134) No. 23 — Engine ground:*** ***(B134) No. 29 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2**.	Repair the ground short circuit between ECM and oil temperature sensor connector.
2	**CHECK POOR CONTACT.** Check poor contact of oil temperature sensor connector.	Is there poor contact in oil temperature sensor connector?	Repair the poor contact.	Replace the oil temperature sensor. <Ref. to FU(H6DO)-27, Oil Temperature Sensor.>

BJ:DTC P0198 ENGINE OIL TEMPERATURE SENSOR CIRCUIT HIGH

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-97, DTC P0198 ENGINE OIL TEMPERATURE SENSOR CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

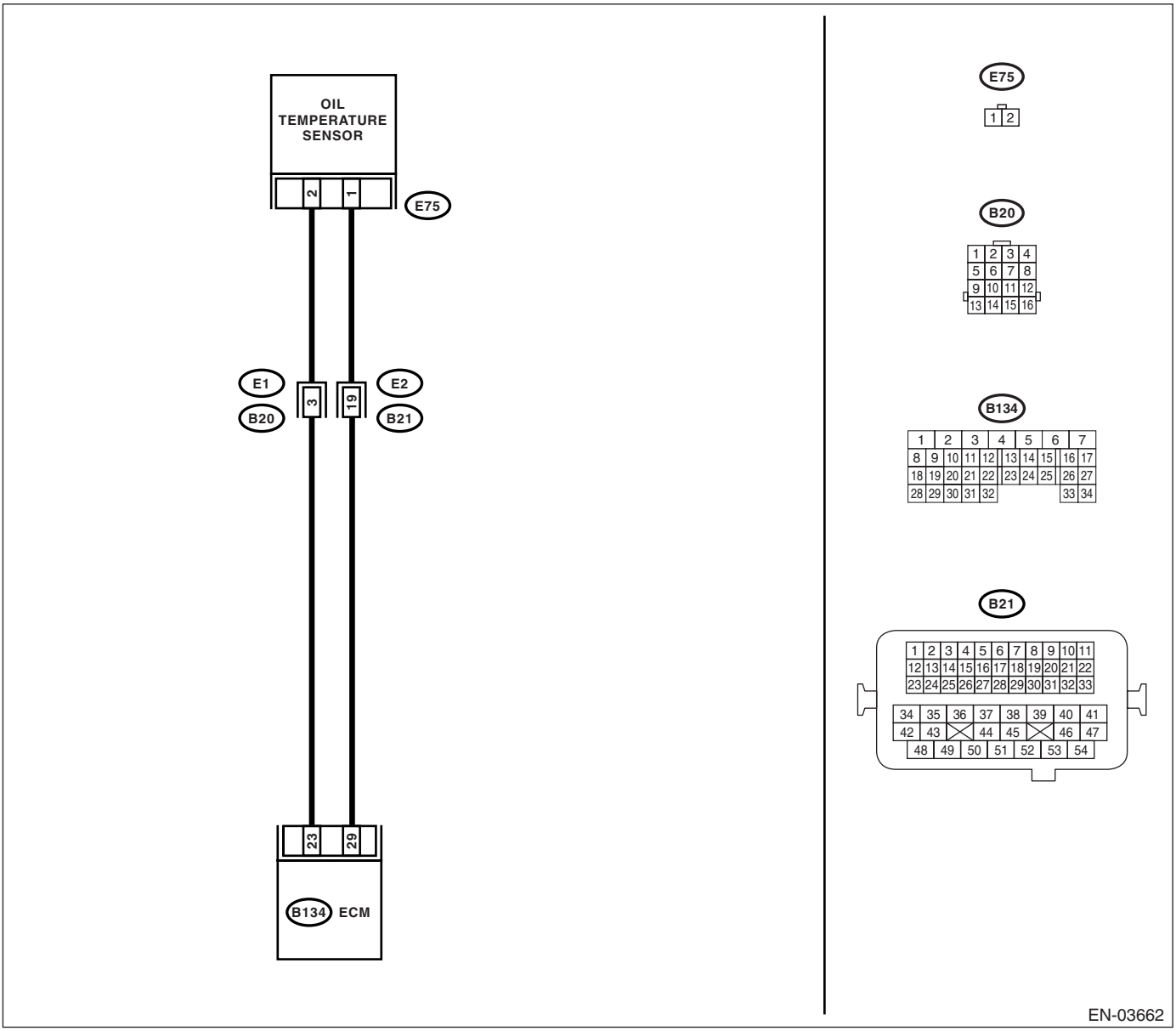
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN OIL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from oil temperature sensor. 3) Measure the voltage between oil temperature sensor connector and engine ground. ***Connector & terminal*** ***(E75) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and oil temperature sensor connector.	Go to step **2**.
2	**CHECK HARNESS BETWEEN OIL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between oil temperature sensor connector and engine ground. ***Connector & terminal*** ***(E75) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and oil temperature sensor connector.	Go to step **3**.
3	**CHECK HARNESS BETWEEN OIL TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between oil temperature sensor connector and engine ground. ***Connector & terminal*** ***(E75) No. 2 (+) — Engine ground (–):***	Is the voltage more than 4 V?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and oil temperature sensor connector • Poor contact of oil temperature sensor connector • Poor contact in ECM connector • Poor contact of coupling connector

	Step	Check	Yes	No
4	**CHECK HARNESS BETWEEN OIL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between oil temperature sensor connector and engine ground. ***Connector & terminal*** ***(E75) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the oil temperature sensor. <Ref. to FU(H6DO)-27, Oil Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and oil temperature sensor connector • Poor contact of oil temperature sensor connector • Poor contact in ECM connector • Poor contact of coupling connector • Poor contact of joint connector

BK:DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT

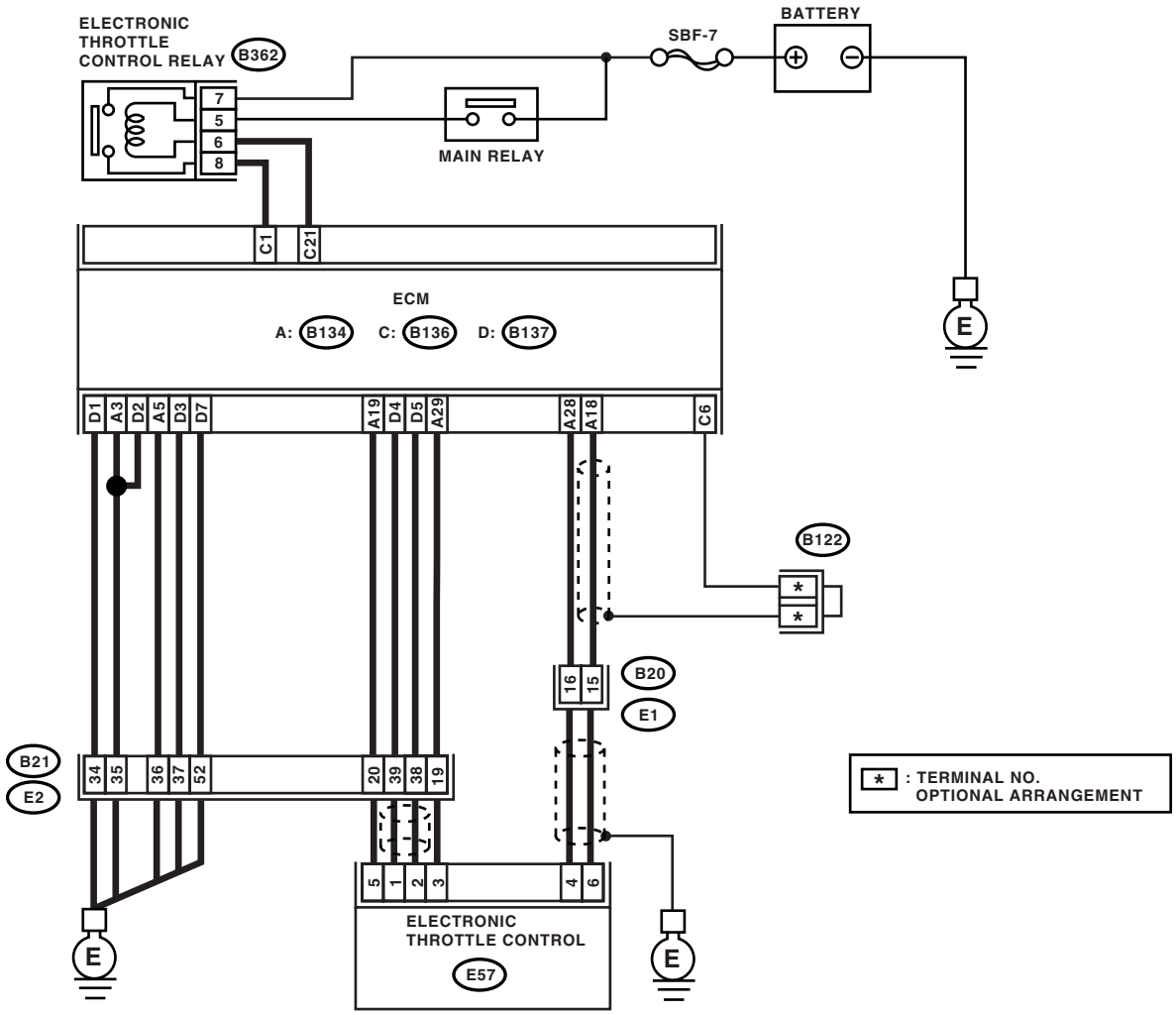
DTC DETECTING CONDITION:

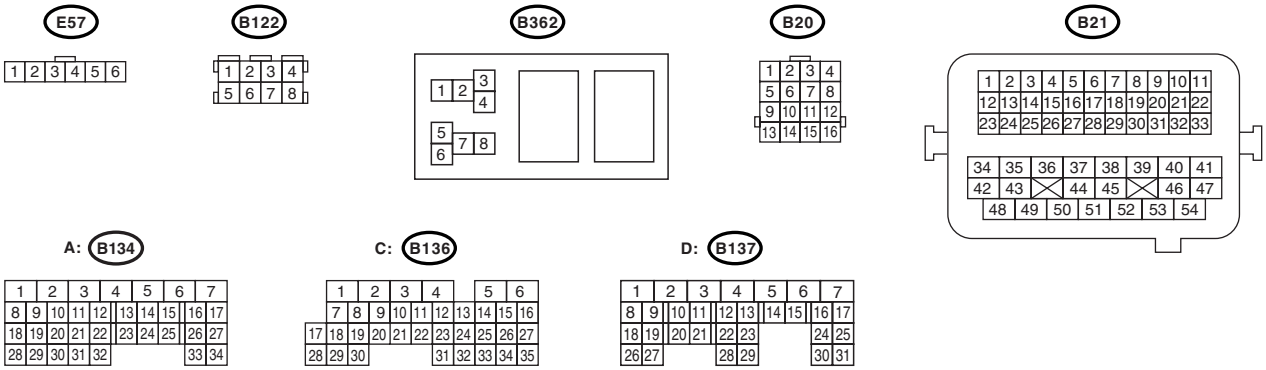
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-98, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:





EN-03739

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage more than 0.8 V?	Go to step **2**.	Go to step **3**.
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 28 — (E57) No. 4:*** ***(B134) No. 19 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 28 — Chassis ground:*** ***(B134) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the chassis short circuit of harness.
5	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (–):***	Is the voltage 4.5 — 5.5 V?	Go to step **6**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
6	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10Ω?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

BL:DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT

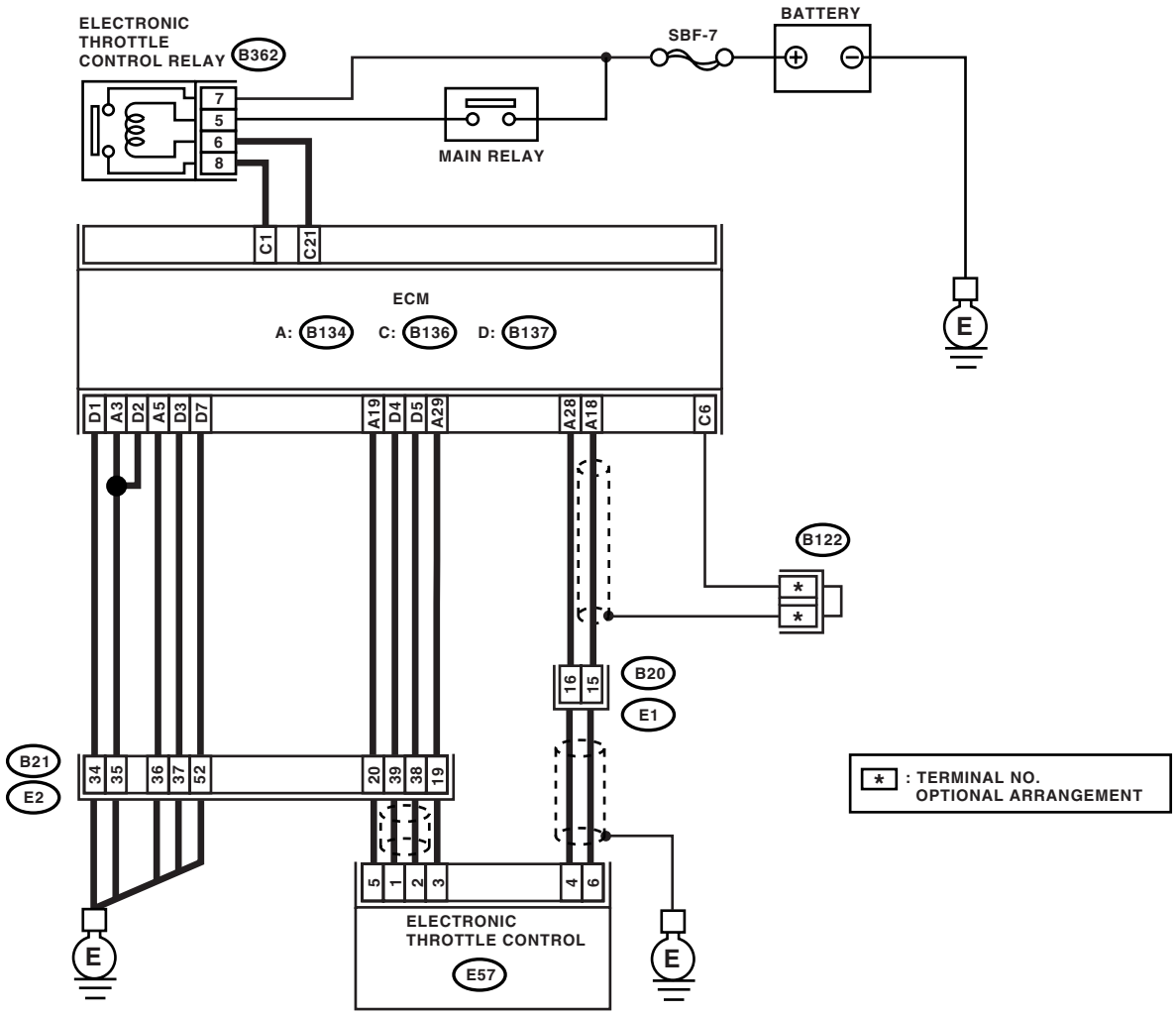
DTC DETECTING CONDITION:

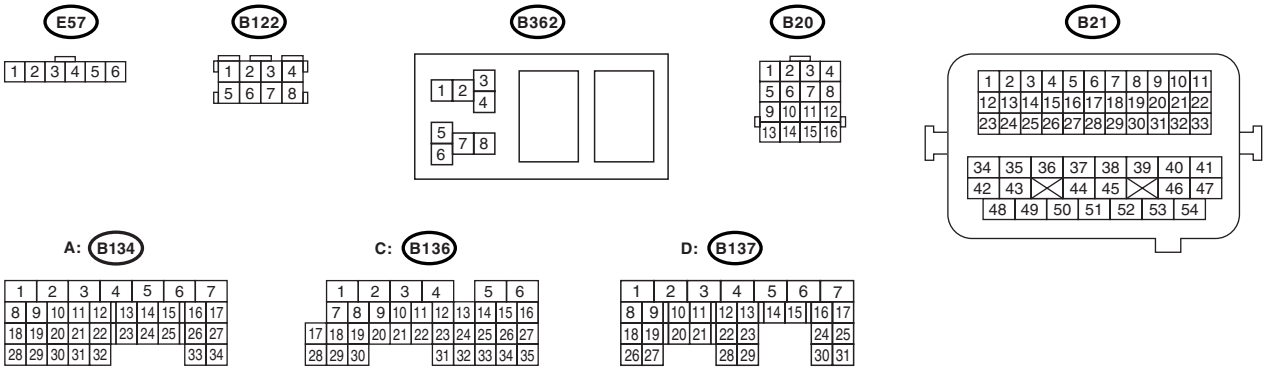
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-100, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:





EN-03739

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage less than 4.73 V?	Go to step **2**.	Go to step **3**.
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 29 — (E57) No. 3:*** ***(B134) No. 28 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **6**.	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between connector terminals. ***Connector & terminal*** ***(B134) No. 19 — (B134) No. 28:***	Is the resistance more than 1 MΩ?	Repair the poor contact. Replace the electronic throttle control.	Sensor power supply circuit may be shorted.

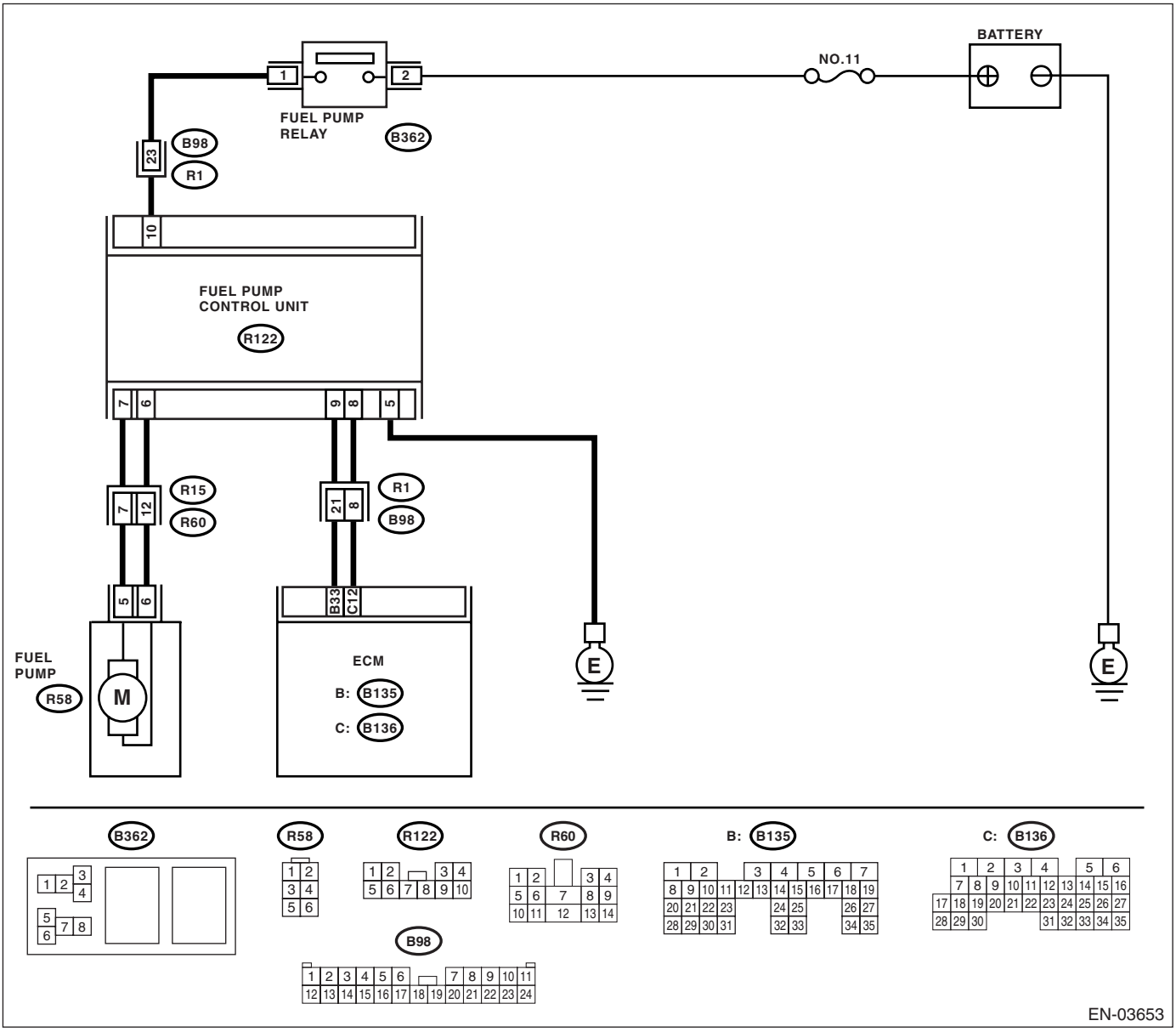
BM:DTC P0230 FUEL PUMP PRIMARY CIRCUIT

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-102, DTC P0230 FUEL PUMP PRIMARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT TO FUEL PUMP CONTROL UNIT.** 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. ***Connector & terminal*** ***(R122) No. 10 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Repair the power supply circuit. NOTE: In this case, repair the following item: • Open or ground short circuit of harness between fuel pump relay and fuel pump control unit • Poor contact of fuel pump control unit connector • Poor contact of fuel pump relay connector
2	**CHECK GROUND CIRCUIT OF FUEL PUMP CONTROL UNIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 5 — Chassis ground:***	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 between fuel pump control unit and chassis ground • Poor contact of fuel pump control unit connector
3	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.** 1) Disconnect the connector from fuel pump. 2) Measure the resistance of harness between fuel pump control unit and fuel pump connector. ***Connector & terminal*** ***(R122) No. 7 — (R58) No. 5:*** ***(R122) No. 6 — (R58) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit between fuel pump control unit and fuel pump.
4	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.** Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 7 — Chassis ground:*** ***(R122) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the ground short circuit between fuel pump control unit and fuel pump.

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between fuel pump control unit and ECM connector. ***Connector & terminal*** ***(R122) No. 9 — (B135) No. 33:*** ***(R122) No. 8 — (B136) No. 12:***	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 between fuel pump control unit and ECM • Poor contact of fuel pump control unit and ECM connector
6	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND ECM CONNECTOR.** Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 9 — Chassis ground:*** ***(R122) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair the ground short circuit between fuel pump control unit and ECM.
7	**CHECK POOR CONTACT.** Check poor contact of ECM and fuel pump control unit connector.	Is there poor contact of ECM and fuel pump control unit connector?	Repair the poor contact of ECM and fuel pump control unit connector.	Go to step **8**.
8	**CHECK EXPERIENCE OF RUNNING OUT OF FUEL.**	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)-36, Fuel Pump Control Unit.>

BN:DTC P0301 CYLINDER 1 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-244, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BO:DTC P0302 CYLINDER 2 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-244, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BP:DTC P0303 CYLINDER 3 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-244, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BQ:DTC P0304 CYLINDER 4 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-244, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BR:DTC P0305 CYLINDER 5 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-244, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BS: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)-109, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

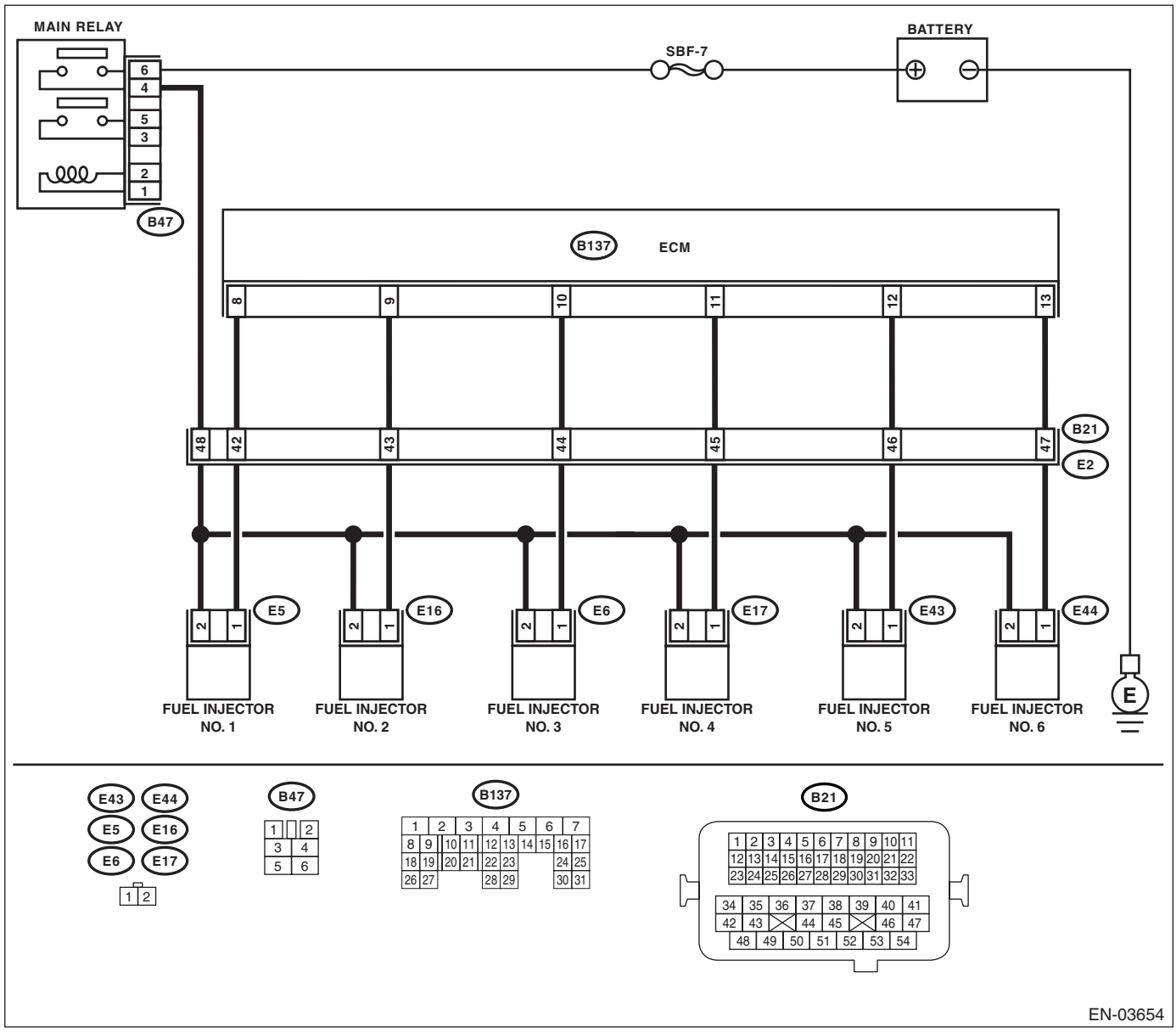
TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling
- Rough driving

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0301, P0302, P303, P0304, P0305 and P0306.	Go to step **2**.
2	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B137) No. 8 (+) — Chassis ground (–):*** ***#2 (B137) No. 9 (+) — Chassis ground (–):*** ***#3 (B137) No. 10 (+) — Chassis ground (–):*** ***#4 (B137) No. 11 (+) — Chassis ground (–):*** ***#5 (B137) No. 12 (+) — Chassis ground (–):*** ***#6 (B137) No. 13 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Go to step **3**.
3	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Measure the resistance between ECM connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:*** ***#5 (E43) No. 1 — Engine ground:*** ***#6 (E44) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair the ground short circuit of harness between fuel injector and ECM connector.
4	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** Measure the resistance of harness connector between ECM connector and fuel injector on faulty cylinders. ***Connector & terminal*** ***#1 (B137) No. 8 — (E5) No. 1:*** ***#2 (B137) No. 9 — (E16) No. 1:*** ***#3 (B137) No. 10 — (E6) No. 1:*** ***#4 (B137) No. 11 — (E17) No. 1:*** ***#5 (B137) No. 12 — (E43) No. 1:*** ***#6 (B137) No. 13 — (E44) No. 1:***	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 and fuel injector connector • Poor contact of coupling connector
5	**CHECK FUEL INJECTOR.** Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 5 — 20 Ω?	Go to step **6**.	Replace the faulty fuel injector. <Ref. to FU(H6DO)-24, Fuel Injector.>

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):*** ***#5 (E43) No. 2 (+) — Engine ground (–):*** ***#6 (E44) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	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 of harness between main relay and fuel injector on faulty cylinders • Poor contact of coupling connector • Poor contact of main relay connector • Poor contact of fuel injector connector on faulty cylinders
7	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B137) No. 8 (+) — Chassis ground (–):*** ***#2 (B137) No. 9 (+) — Chassis ground (–):*** ***#3 (B137) No. 10 (+) — Chassis ground (–):*** ***#4 (B137) No. 11 (+) — Chassis ground (–):*** ***#5 (B137) No. 12 (+) — Chassis ground (–):*** ***#6 (B137) No. 13 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and fuel injector. After repair, replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Go to step **8**.
8	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the faulty fuel injector <Ref. to FU(H6DO)-24, Fuel Injector.> and ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Go to step **9**.
9	**CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor.	Go to step **10**.
10	**CHECK CRANK PLATE.**	Is the crank sprocket rusted or the teeth of crank plate broken?	Replace the crank plate. <Ref. to ME(H6DO)-62, Cylinder Block.>	Go to step **11**.
11	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Turn the crankshaft using ST, 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)-44, Timing Chain Assembly.>	Go to step **12**.

	Step	Check	Yes	No
12	**CHECK FUEL LEVEL.**	Is the fuel meter indication lower than the “Lower” level?	Replenish fuel so that fuel meter indication is higher than the “Lower” level. After replenishing fuel, Go to step **13**.	Go to step **13**.
13	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Clear the memory using the Subaru Select Monitor or the general scan tool. NOTE: • Subaru Select Monitor <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool Refer to operating manuals for the general scan tool. 2) Start the engine, and drive the vehicle more than 10 minutes.	Does the malfunction indicator light illuminate or blink?	Go to step **15**.	Go to step **14**.
14	**CHECK CAUSE OF MISFIRE.**	Has the cause of misfire been detected while running the engine?	Finish diagnostics operation, if the engine has no abnormality.	Repair the poor contact. NOTE: In this case, repair the following item: • Poor contact of ignition coil connector • Poor contact of fuel injector connector on faulty cylinders • Poor contact in ECM connector • Poor contact of coupling connector
15	**CHECK AIR INTAKE SYSTEM.**	Is there any fault in air intake system?	Repair the air intake system. NOTE: Check the following item. • Are there air leaks or air suction caused by loose or dislocated nuts and bolts? • Are there cracks or any disconnection of hoses?	Go to step **16**.
16	**CHECK MISFIRE SYMPTOM.** 1) Turn the ignition switch to ON. 2) Read DTC. <Ref. to EN(H6DO)(diag)-34, Read Diagnostic Trouble Code (DTC).>	Does the Subaru Select Monitor or general scan tool indicate only one DTC?	Go to step **22**.	Go to step **17**.
17	**CHECK ANY OTHER DTC ON DISPLAY.**	Are DTC P0301 and P0302 displayed?	Go to step **23**.	Go to step **18**.

	Step	Check	Yes	No
18	**CHECK DTC ON DISPLAY.**	Are DTC P0303 and P0304 displayed?	Go to step **24**.	Go to step **19**.
19	**CHECK DTC ON DISPLAY.**	Are DTC P0305 and P0306 displayed?	Go to step **25**.	Go to step **20**.
20	**CHECK DTC ON DISPLAY.**	Are DTC P0301, P0303 and P0305 displayed?	Go to step **26**.	Go to step **21**.
21	**CHECK DTC ON DISPLAY.**	Are DTC P0302, P0304 and P0306 displayed?	Go to step **27**.	Go to step **28**.
22	**ONLY ONE CYLINDER**	Is there any fault in the cylinder?	Repair or replace faulty parts. NOTE: Check the following item. • Spark plug • Fuel injector • Compression ratio	Check DTC P0171, P0172, P0174 or P0175 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>
23	**GROUP OF #1 AND #2 CYLINDERS**	Are there any faults in #1 and #2 cylinders?	Repair or replace faulty parts. NOTE: • Check the following item. • Spark plug • Fuel injector • Ignition coil • Compression ratio • If any fault are not found, check the “IGNITION CONTROL SYSTEM” of #1 and #2 cylinders side. <Ref. to EN(H6DO)(diag)-63, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Check DTC P0171, P0172, P0174 or P0175 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>

Step	Check	Yes	No
24 GROUP OF #3 AND #4 CYLINDERS	Are there any faults in #3 and #4 cylinders?	Repair or replace faulty parts. NOTE: • Check the following item. • Spark plug • Fuel injector • Ignition coil • If any fault are not found, check the "IGNITION CONTROL SYSTEM" of #3 and #4 cylinders side. <Ref. to EN(H6DO)(diag)-63, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>
25 GROUP OF #5 AND #6 CYLINDERS	Are there any faults in #5 and #6 cylinders?	Repair or replace faulty parts. NOTE: • Check the following item. • Spark plug • Fuel injector • Ignition coil • Compression ratio • If any fault are not found, check the "IGNITION CONTROL SYSTEM" of #5 and #6 cylinders side. <Ref. to EN(H6DO)(diag)-63, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>

Step		Check	Yes	No
26	**GROUP OF #1, #3 AND #5 CYLINDERS.**	Is there any fault in #1, #3 and #5 cylinders?	Repair or replace faulty parts. NOTE: Check the following item. • Spark plug • Fuel injector • Skipping timing chain teeth	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>
27	**GROUP OF #2, #4 AND #6 CYLINDERS.**	Is there any fault in #2, #4 and #6 cylinders?	Repair or replace faulty parts. NOTE: Check the following item. • Spark plug • 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)-69, List of Diagnostic Trouble Code (DTC).>
28	**CYLINDER AT RANDOM**	Is the engine idle rough?	Check DTC P0171, P0172, P0174 or P0175 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Repair or replace faulty parts. NOTE: Check the following item. • Spark plug • Fuel injector • Compression ratio

BT:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

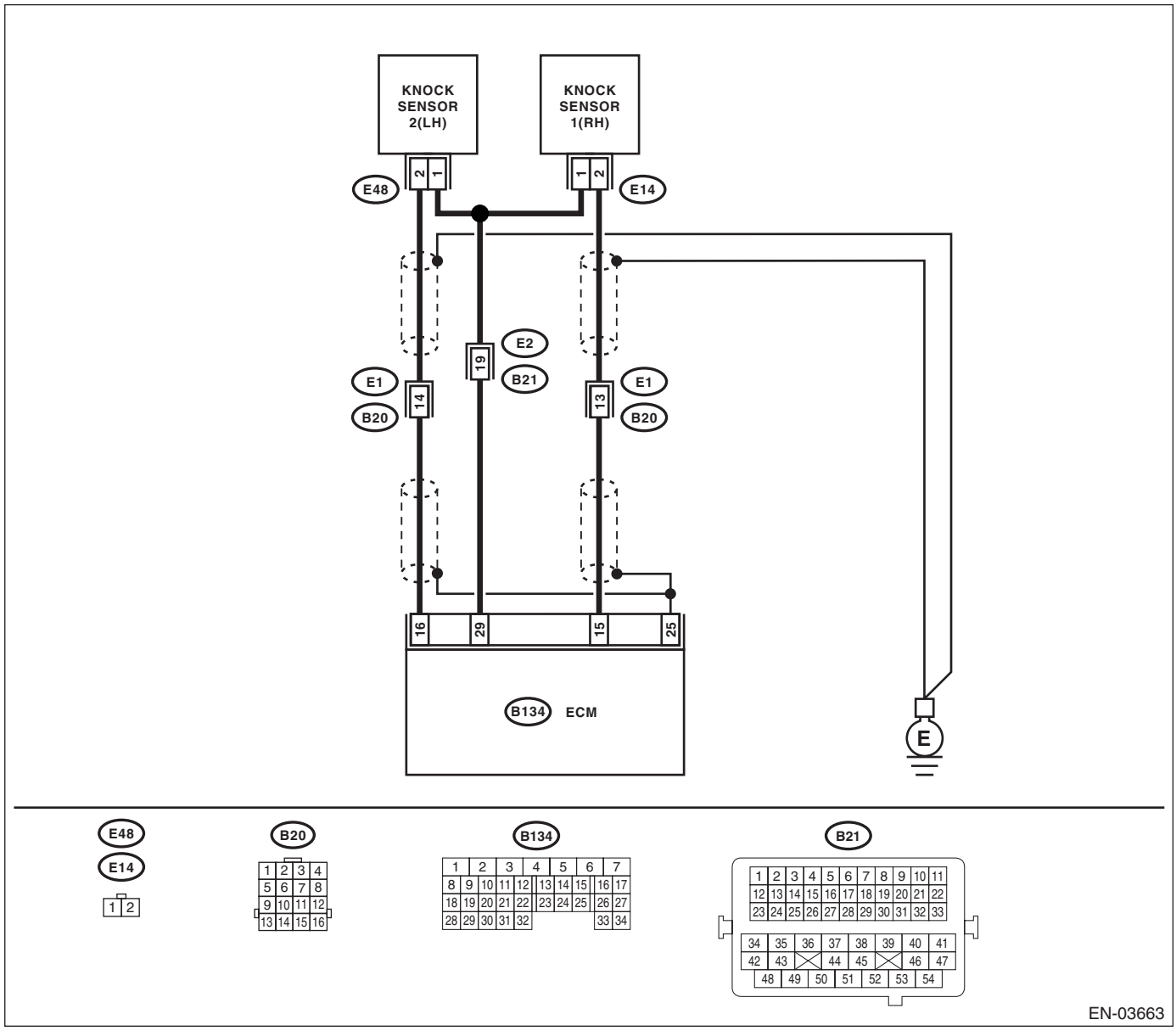
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-110, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B134) No. 15 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between knock sensor and ECM connector • Poor contact of knock sensor connector • Poor contact of coupling connector
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Poor contact of knock sensor connector
3	**CHECK INSTALLATION CONDITION OF KNOCK SENSOR**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU(H6DO)-20, Knock Sensor.>	Tighten the knock sensor installation bolt securely.

BU:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

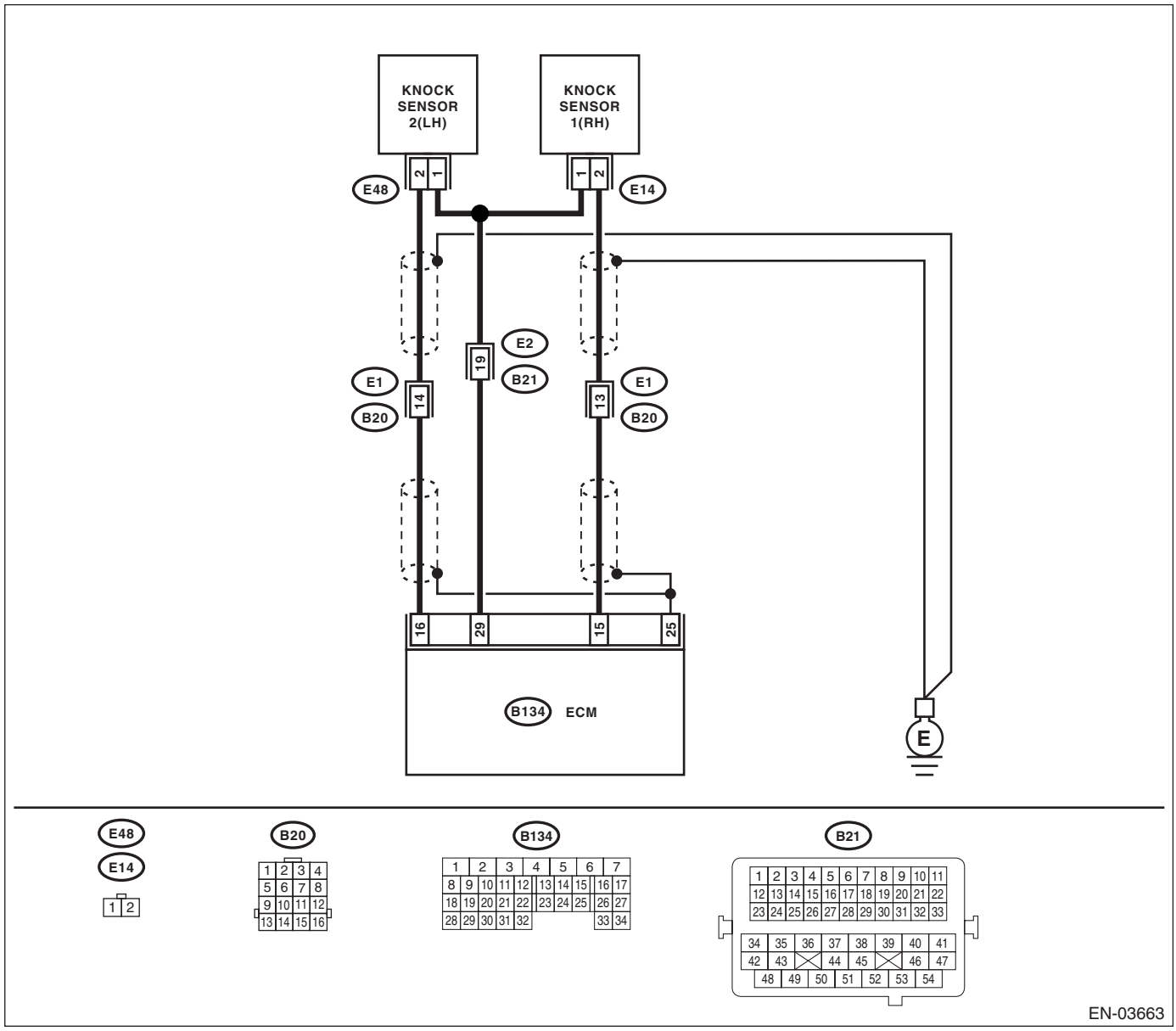
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-112, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 15 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2**.	Go to step **3**.
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU(H6DO)-20, Knock Sensor.>	Repair the ground short circuit of harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors are shielded. Repair the short circuit of harness covered with shield.
3	**CHECK INPUT SIGNAL OF ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 15 (+) — Chassis ground (–):***	Is the voltage more than 2 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.(However, the possibility of poor contact still remains.) NOTE: In this case, repair the following item: • Poor contact of knock sensor connector • Poor contact in ECM connector • Poor contact of coupling connector	Repair poor contact in ECM connector.

BV:DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW INPUT (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-113, DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW INPUT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

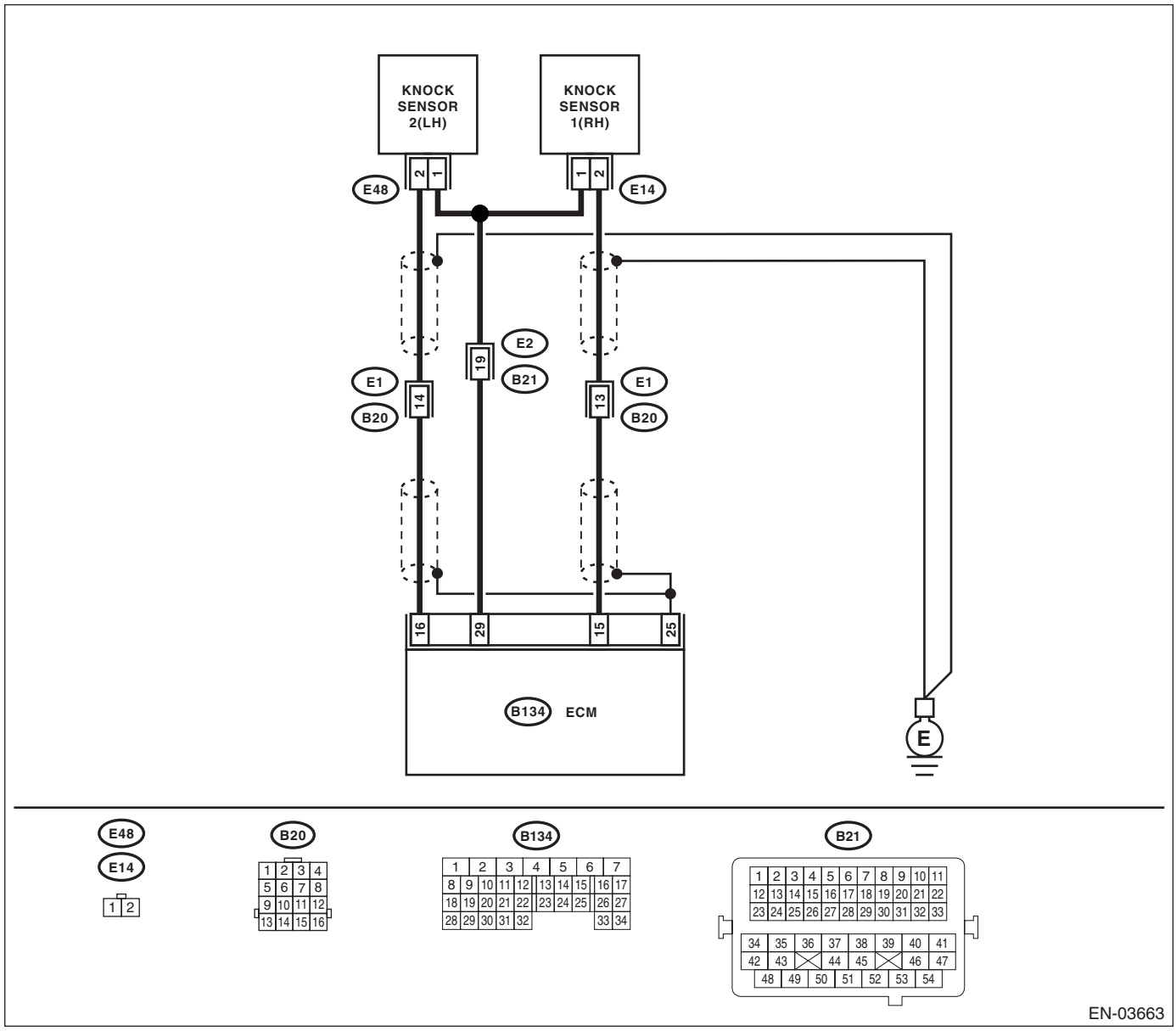
TROUBLE SYMPTOM:

- Driving performance problem
- Knocking is occurred.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B134) No. 16 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **2**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between knock sensor and ECM connector • Poor contact of knock sensor connector • Poor contact of coupling connector
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **3**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Poor contact of knock sensor connector
3	**CHECK INSTALLATION CONDITION OF KNOCK SENSOR**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU(H6DO)-20, Knock Sensor.>	Tighten the knock sensor installation bolt securely.

BW:DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH INPUT (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-113, DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH INPUT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

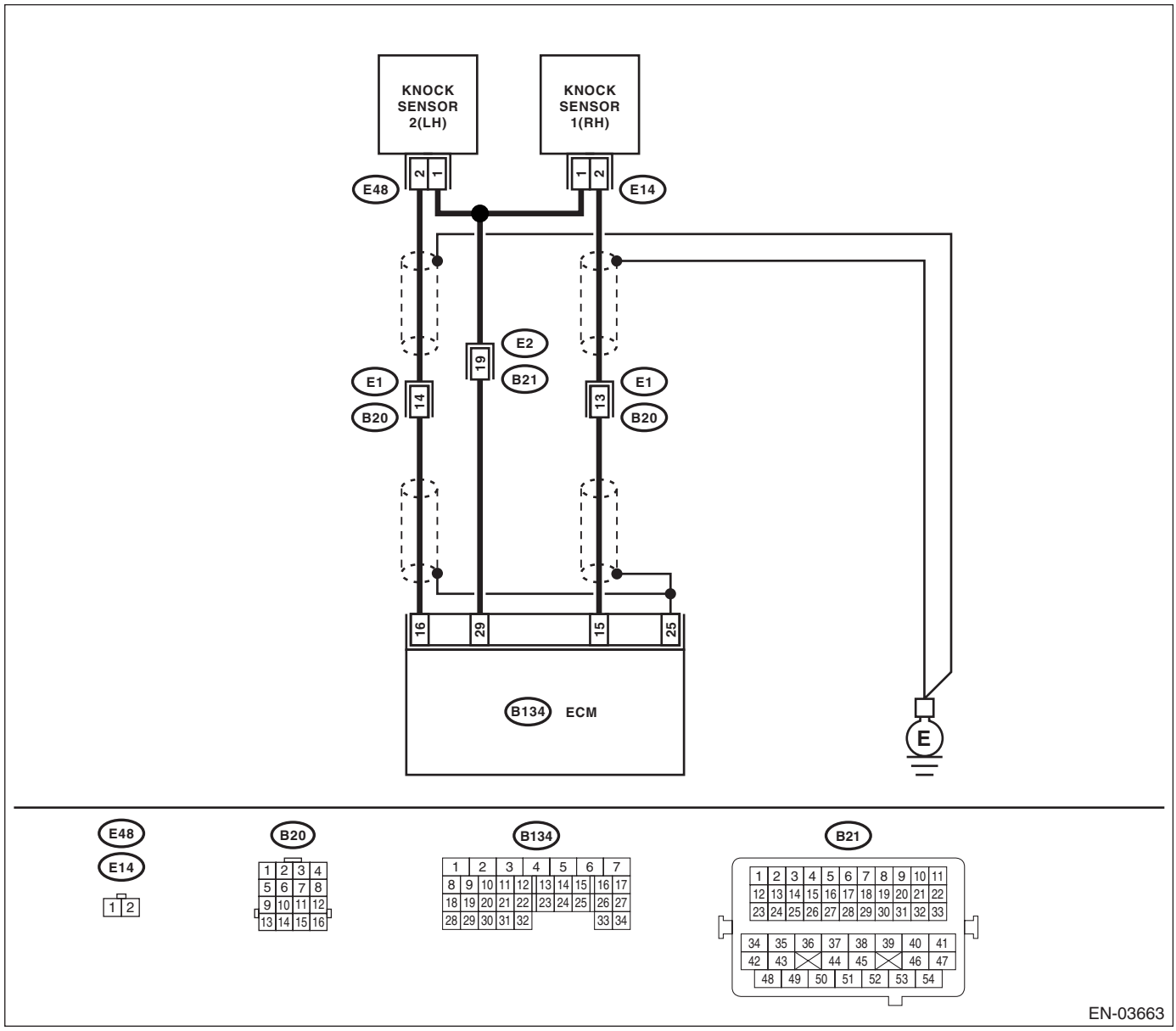
TROUBLE SYMPTOM:

- Driving performance problem
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 16 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2**.	Go to step **3**.
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU(H6DO)-20, Knock Sensor.>	Repair the ground short circuit of harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors are shielded. Repair the short circuit of harness covered with shield.
3	**CHECK INPUT SIGNAL OF ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 2 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following item: • Poor contact of knock sensor connector • Poor contact in ECM connector • Poor contact of coupling connector	Repair poor contact in ECM connector.

BX:DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-114, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

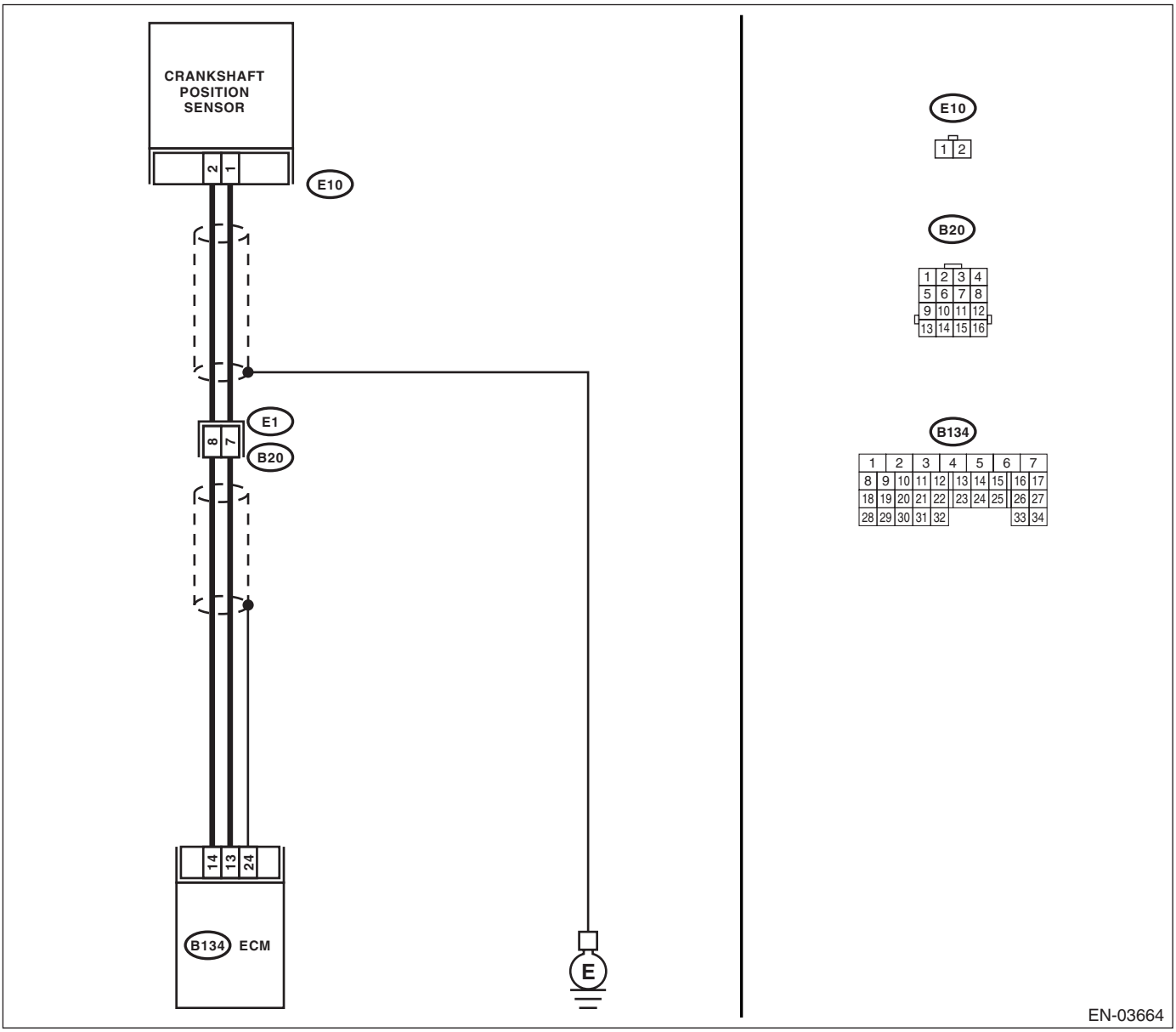
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from crankshaft position sensor. 3) Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact of coupling connector	Go to step **2**.
2	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit of harness between crankshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit of harness with shield.	Go to step **3**.
3	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact of coupling connector
4	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **5**.	Tighten the crankshaft position sensor installation bolt securely.
5	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove the crankshaft position sensor. 2) Measure the resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 1 and 4 kΩ?	Repair the poor contact of crankshaft position sensor connector.	Replace the crankshaft position sensor. <Ref. to FU(H6DO)-18, Crankshaft Position Sensor.>

BY: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)-116, DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

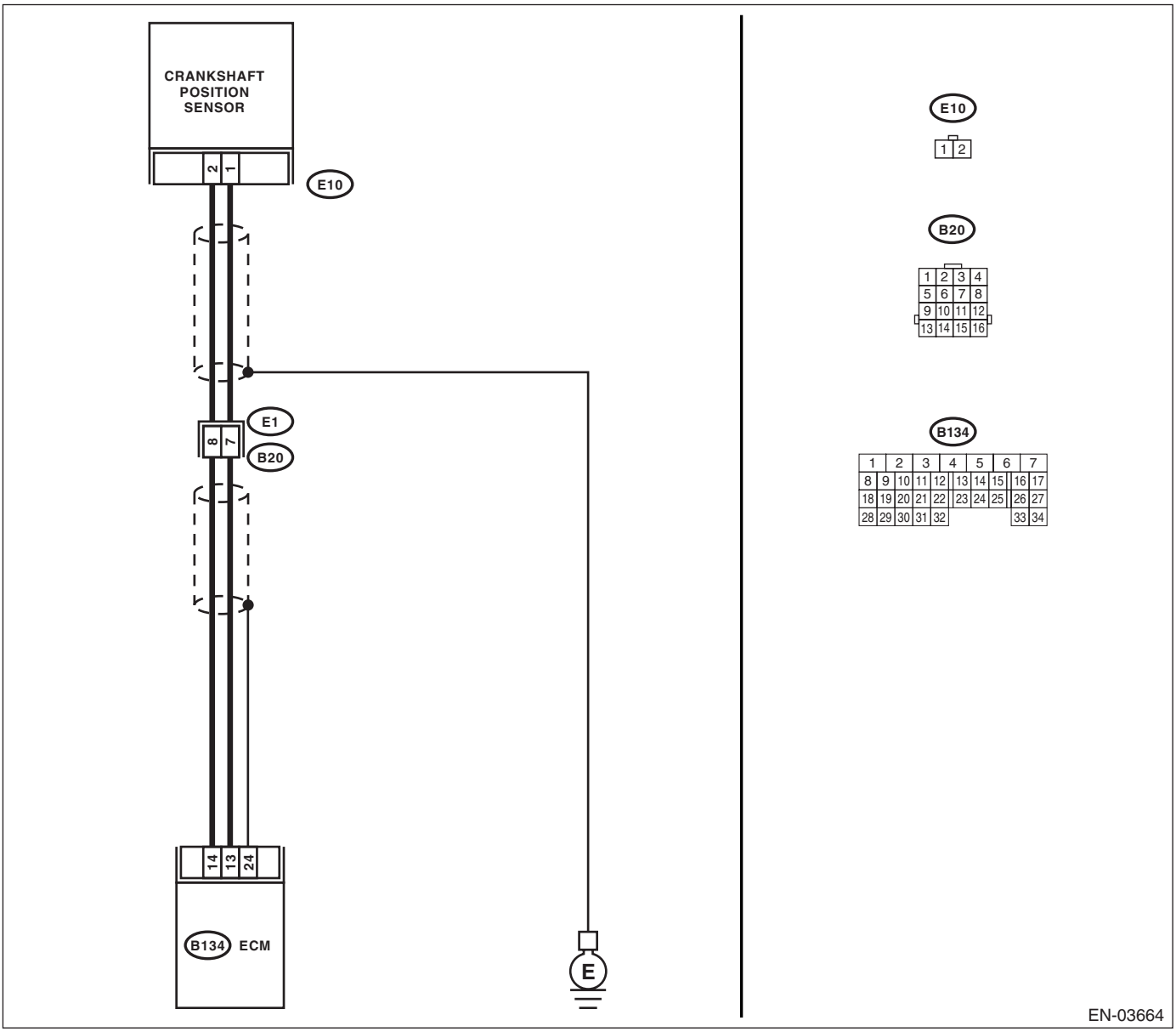
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.** Turn the ignition switch to OFF.	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **3**.	Tighten the crankshaft position sensor installation bolt securely.
3	**CHECK CRANKSHAFT PLATE.**	Are the crankshaft plate teeth cracked or damaged?	Replace the crankshaft plate.	Go to step **4**.
4	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Turn the crankshaft, and align alignment mark on crank sprocket with alignment mark on cylinder block.	Is the timing chain dislocated from its proper position?	Correct the installation condition of timing chain. <Ref. to ME(H6DO)-44, Timing Chain Assembly.>	Replace the crankshaft position sensor. <Ref. to FU(H6DO)-18, Crankshaft Position Sensor.>

BZ:DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

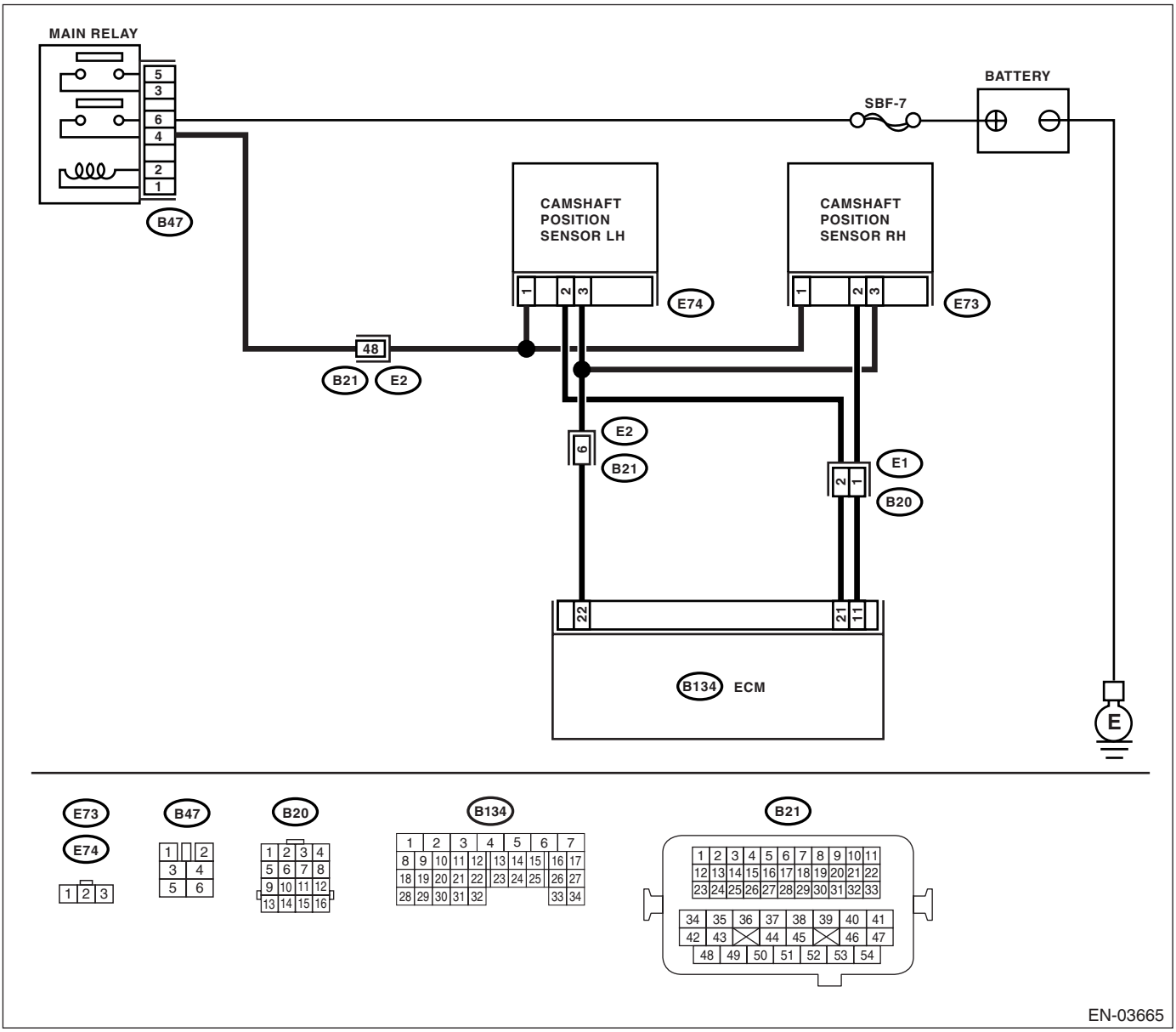
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-118, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E73) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit between main relay connector and camshaft position sensor connector.	Go to step **3**.
3	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E73) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Repair the open or ground short circuit between main relay connector and camshaft position sensor connector.
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between camshaft position sensor connector and ECM. ***Connector & terminal*** ***(E73) No. 2 — (B134) No. 11:*** ***(E73) No. 3 — (B134) No. 22:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit between camshaft position sensor and ECM.
5	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** Measure the resistance between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E73) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair the ground short circuit between camshaft position sensor and ECM.
6	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **7**.	Tighten the camshaft position sensor installation bolt securely.
7	**CHECK CAMSHAFT POSITION SENSOR.** Check waveform of camshaft position sensor. <Ref. to EN(H6DO)(diag)-16, Engine Control Module (ECM) I/O Signal.>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H6DO)-18, Crankshaft Position Sensor.>	Go to step **8**.
8	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

CA:DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-120, DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

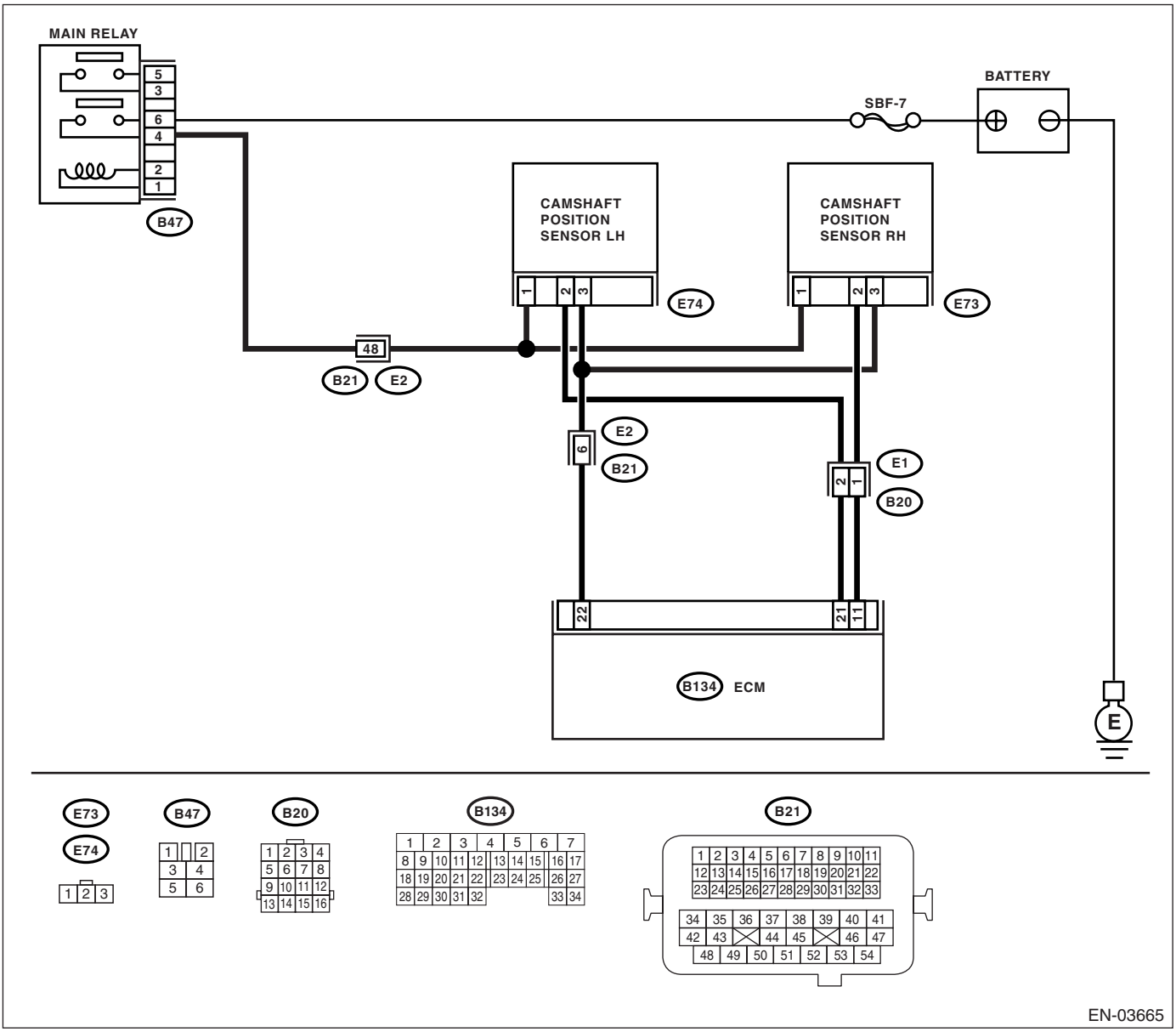
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E74) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit between main relay connector and camshaft position sensor connector.	Go to step **3**.
3	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E74) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Repair the open or ground short circuit between main relay connector and camshaft position sensor connector.
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between camshaft position sensor connector and ECM. ***Connector & terminal*** ***(E74) No. 2 — (B134) No. 21:*** ***(E74) No. 3 — (B134) No. 22:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit between camshaft position sensor and ECM.
5	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** Measure the resistance between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E74) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair the ground short circuit between camshaft position sensor and ECM.
6	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **7**.	Tighten the camshaft position sensor installation bolt securely.
7	**CHECK CAMSHAFT POSITION SENSOR.** Check waveform of camshaft position sensor. <Ref. to EN(H6DO)(diag)-16, Engine Control Module (ECM) I/O Signal.>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H6DO)-19, Camshaft Position Sensor.>	Go to step **8**.
8	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

CB:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

DTC DETECTING CONDITION:

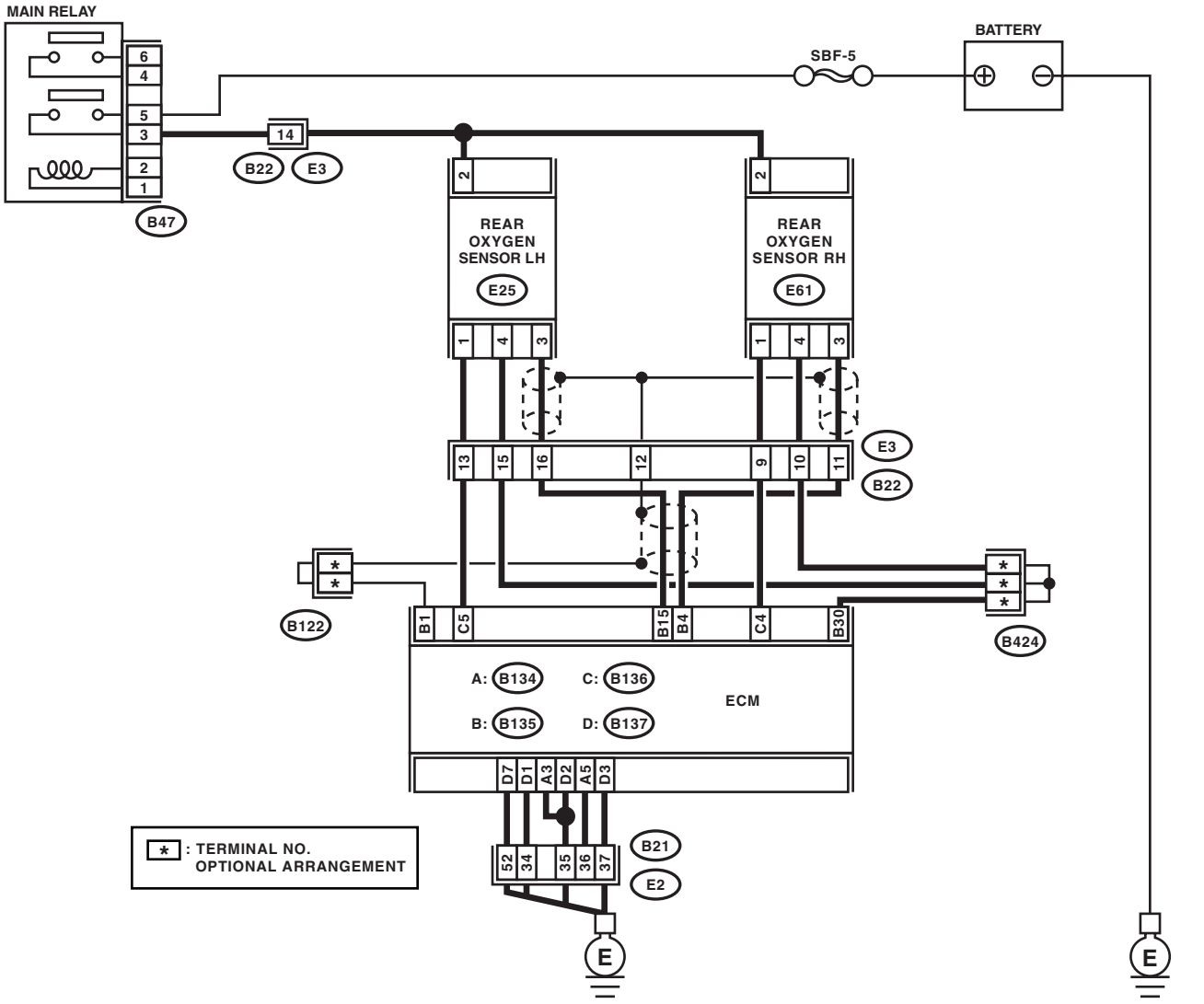
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-121, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

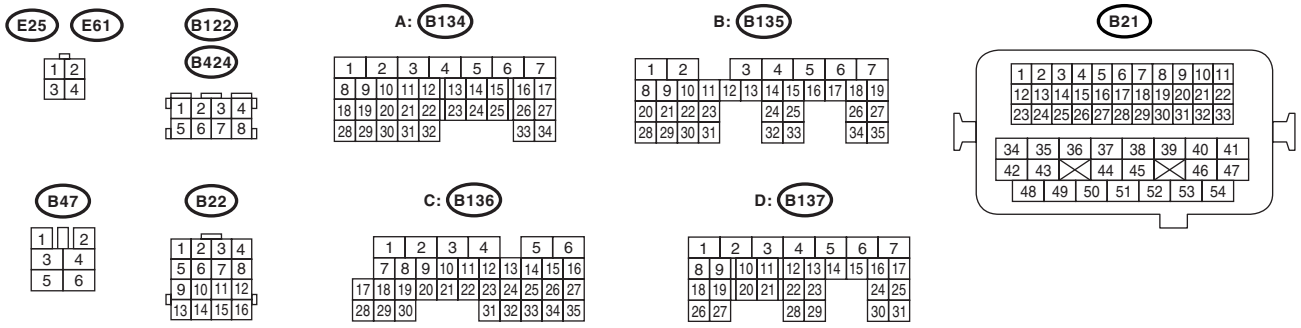
TROUBLE SYMPTOM:

- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03738

	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step **2**.
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B134) No. 4 — (E61) No. 3:*** ***(B134) No. 30 — (E61) No. 4:*** ***(B134) No. 15 — (E25) No. 3:*** ***(B134) No. 30 — (E25) No. 4:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between ECM and rear oxygen sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** Measure the resistance between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B135) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit between ECM and rear oxygen sensor connector.
4	**CHECK EXHAUST SYSTEM.** Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes. NOTE: Check the following positions. • Between cylinder head and front exhaust pipe • Between front exhaust pipe and front catalytic converter • Between front catalytic converter and rear catalytic converter	Is there any fault in exhaust system?	Repair or replace the exhaust system. <Ref. to EX(H6DO)-2, General Description.>	Go to step **5**.
5	**CHECK CATALYTIC CONVERTER.**	Is there damage on rear face or front face of catalytic converter?	Replace the catalytic converter. <Ref. to EC(H6DO)-3, Front Catalytic Converter.>	Contact the SOA service center.

CC: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)-124, 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 repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FUEL FILLER CAP.** 1) Turn the ignition switch to OFF. 2) Check the fuel filler cap. NOTE: The DTC 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 **3**.	Tighten fuel filler cap securely.
3	**CHECK FUEL FILLER CAP.**	Is the fuel filler cap SUBARU genuine?	Go to step **4**.	Replace with a SUBARU genuine fuel filler cap.
4	**CHECK FUEL FILLER PIPE PACKING.**	Is there any damage to the seal between fuel filler cap and fuel filler pipe?	Repair or replace the fuel filler cap and fuel filler pipe. <Ref. to FU(H6DO)-41, Fuel Filler Pipe.>	Go to step **5**.
5	**CHECK DRAIN VALVE.** 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Operate the drain valve. NOTE: Drain valve operation can also be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H6DO)(diag)-46, Compulsory Valve Operation Check Mode.>	Does the drain valve operate?	Go to step **6**.	Replace the drain valve. <Ref. to EC(H6DO)-12, Drain Valve.>

	Step	Check	Yes	No
6	**CHECK PURGE CONTROL SOLENOID VALVE.** Operate the purge control solenoid valve. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H6DO)(diag)-46, Compulsory Valve Operation Check Mode.>	Does the purge control solenoid valve operate?	Go to step **7**.	Replace the purge control solenoid valve. <Ref. to EC(H6DO)-6, Purge Control Solenoid Valve.>
7	**CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.** Turn the ignition switch to OFF.	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)-48, Fuel Delivery, Return and Evaporation Lines.>	Go to step **8**.
8	**CHECK CANISTER.**	Is the canister damaged or is there a hole of more than 1.0 mm (0.04 in) dia. in it?	Repair or replace the canister. <Ref. to EC(H6DO)-5, Canister.>	Go to step **9**.
9	**CHECK FUEL TANK.** Remove the fuel tank. <Ref. to FU(H6DO)-38, 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)-38, Fuel Tank.>	Go to step **10**.
10	**CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.**	Is there any hole of more than 1.0 mm (0.04 in) dia., crack, clogging, or disconnections, bend, misconnection of hoses or pipes in evaporative emission control system?	Repair or replace the hoses or pipes.	Contact with SOA Service Center.

CD:DTC P0447 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT OPEN

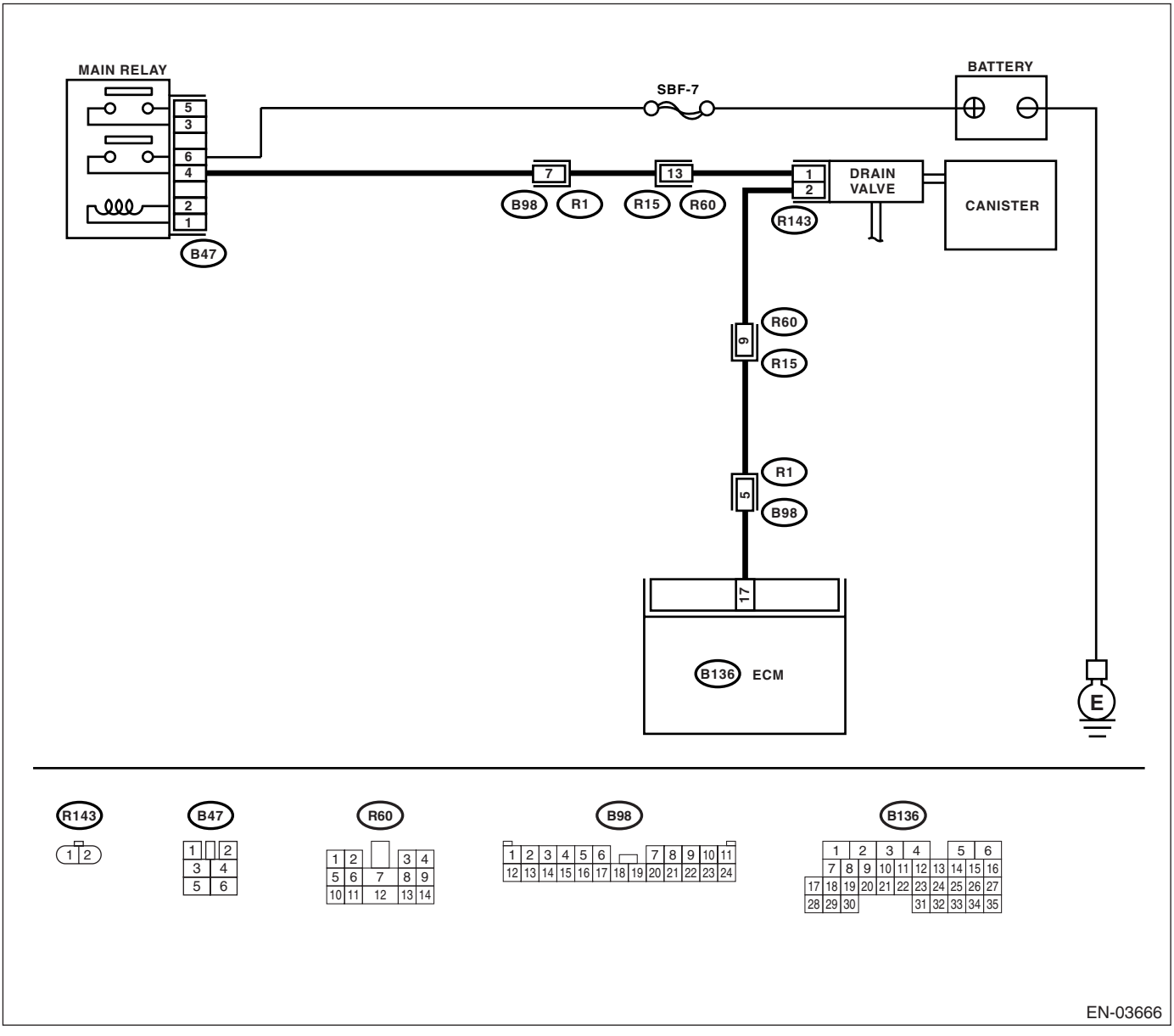
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-136, DTC P0447 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT OPEN, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Go to step **3**.
2	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following item: • Poor contact in drain valve connector • Poor contact in ECM connector • Poor contact of coupling connector
3	**CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from drain valve and ECM. 3) Measure the resistance of harness between drain valve connector and chassis ground. ***Connector & terminal*** ***(R143) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair ground short circuit of harness between ECM and drain valve connector.
4	**CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and drain valve connector. ***Connector & terminal*** ***(B136) No. 17 — (R143) No. 2:***	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 and drain valve connector • Poor contact of coupling connector
5	**CHECK DRAIN VALVE.** Measure the resistance between drain valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 10 — 100 Ω?	Go to step **6**.	Replace the drain valve. <Ref. to EC(H6DO)-12, Drain Valve.>

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO DRAIN VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between drain valve and chassis ground. ***Connector & terminal*** ***(R143) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between main relay and drain valve • Poor contact of coupling connector • Poor contact of main relay connector
7	**CHECK POOR CONTACT.** Check poor contact in drain valve connector.	Is there poor contact in drain valve connector?	Repair poor contact in drain valve connector.	Contact with SOA Service Center.

CE:DTC P0448 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT SHORTED

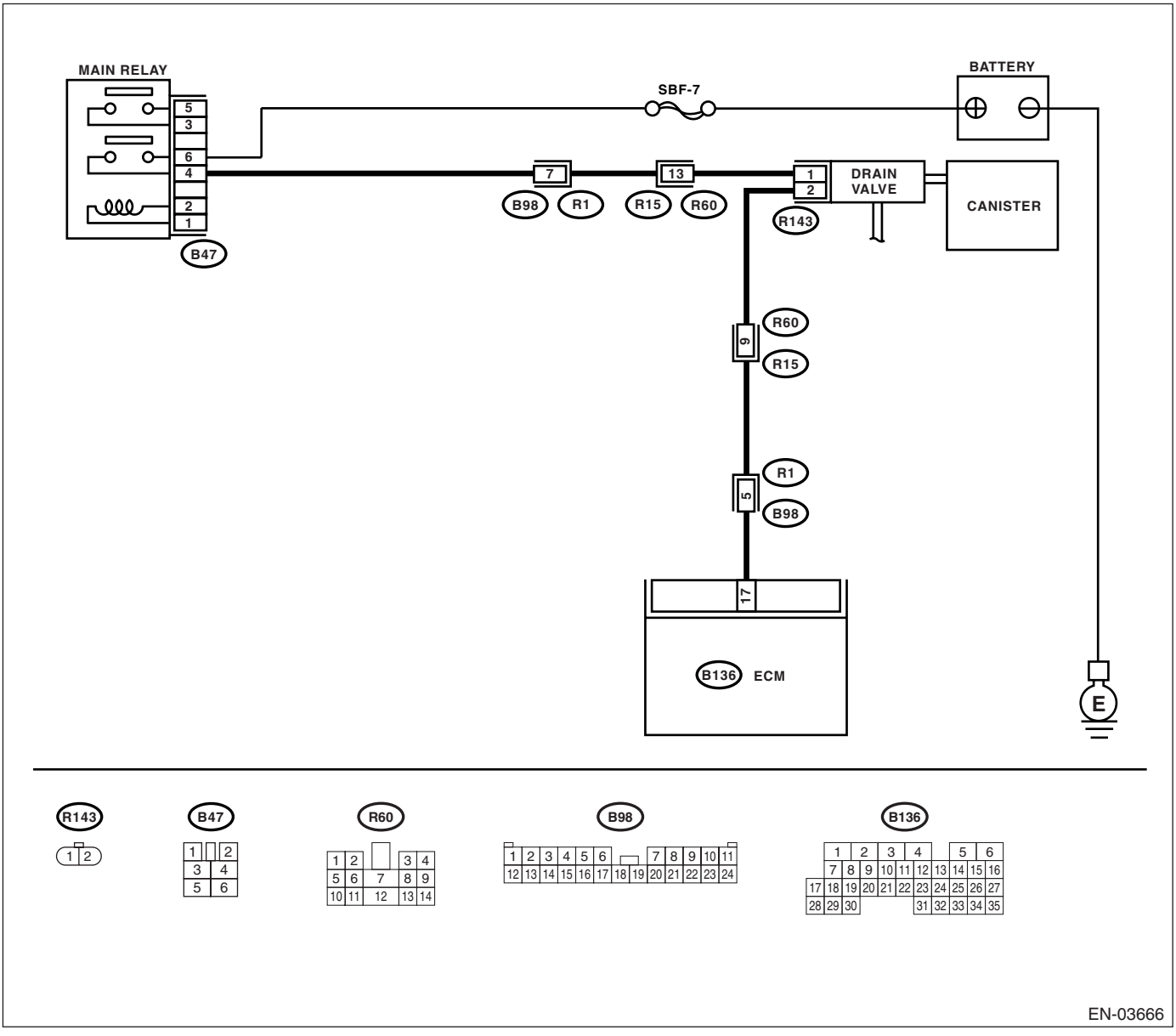
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-138, DTC P0448 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT SHORTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) While operating the drain valve, measure voltage between ECM and chassis ground. NOTE: Drain valve operation can also be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H6DO)(diag)-46, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (–):***	Is the voltage 0 — 10 V?	Go to step **2**.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. In this case, repair the poor contact in ECM connector.
2	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Go to step **3**.
3	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN DRAIN VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the drain valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit of harness between ECM and drain valve connector. After repair, replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Go to step **5**.
5	**CHECK DRAIN VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between drain valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the drain valve <Ref. to EC(H6DO)-12, Drain Valve.> and ECM <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>.	Go to step **6**.
6	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

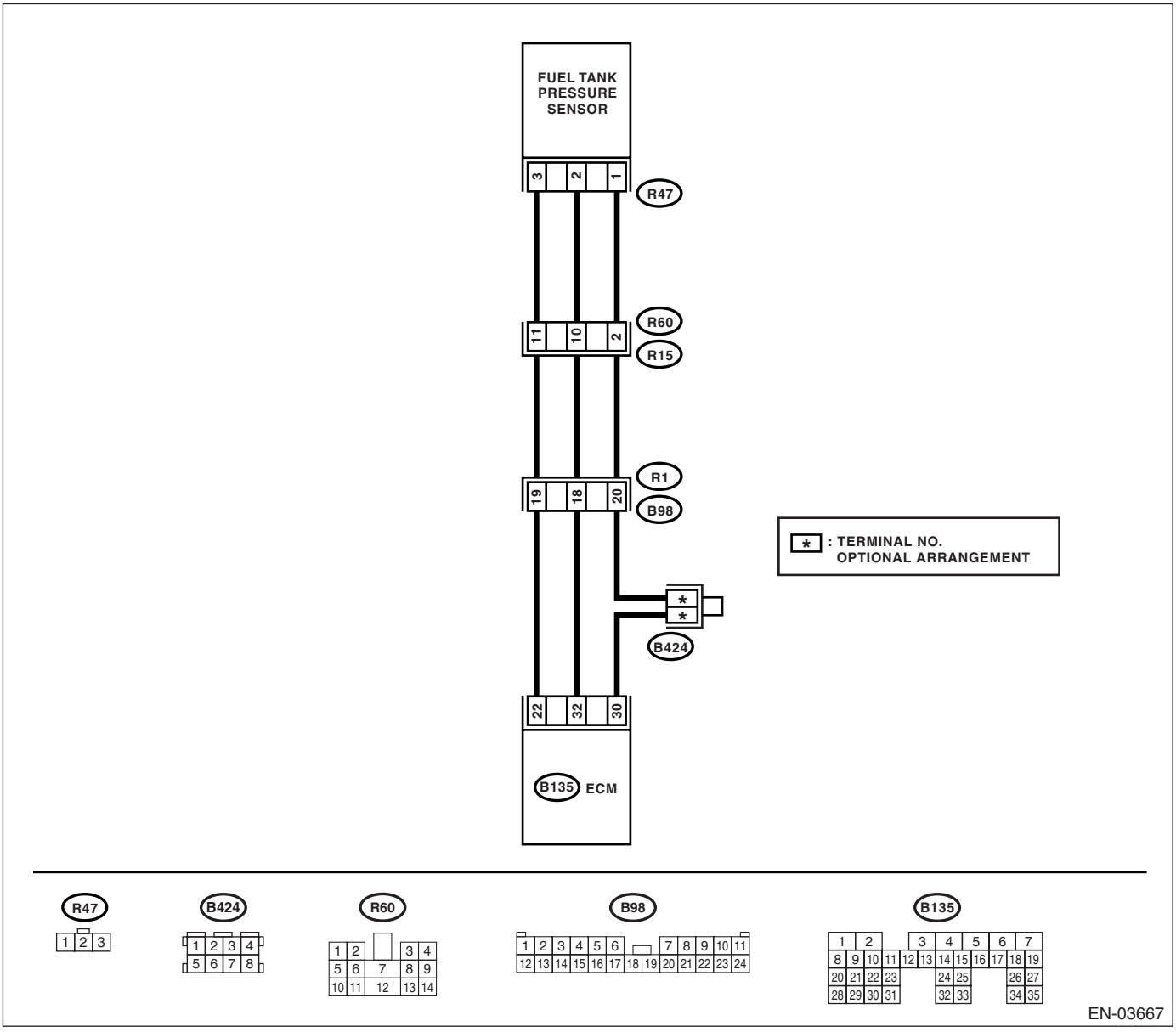
CF:DTC P0451 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-140, DTC P0451 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FUEL FILLER CAP.** 1) Turn the ignition switch to OFF. 2) Open the fuel flap.	Is the fuel filler cap tightened securely?	Go to step **3**.	Tighten fuel filler cap securely.
3	**CHECK PRESSURE VACUUM LINE.** NOTE: Check the following item. • Disconnection, leakage and clogging of the vacuum hoses and pipes between fuel tank pressure sensor and fuel tank • Disconnection, leakage and clogging of the air ventilation hoses and pipes between fuel filler pipe and fuel tank	Is there a fault in pressure/vacuum line?	Repair or replace the hoses and pipes.	Replace the fuel tank pressure sensor. <Ref. to EC(H6DO)-10, Fuel Tank Pressure Sensor.>

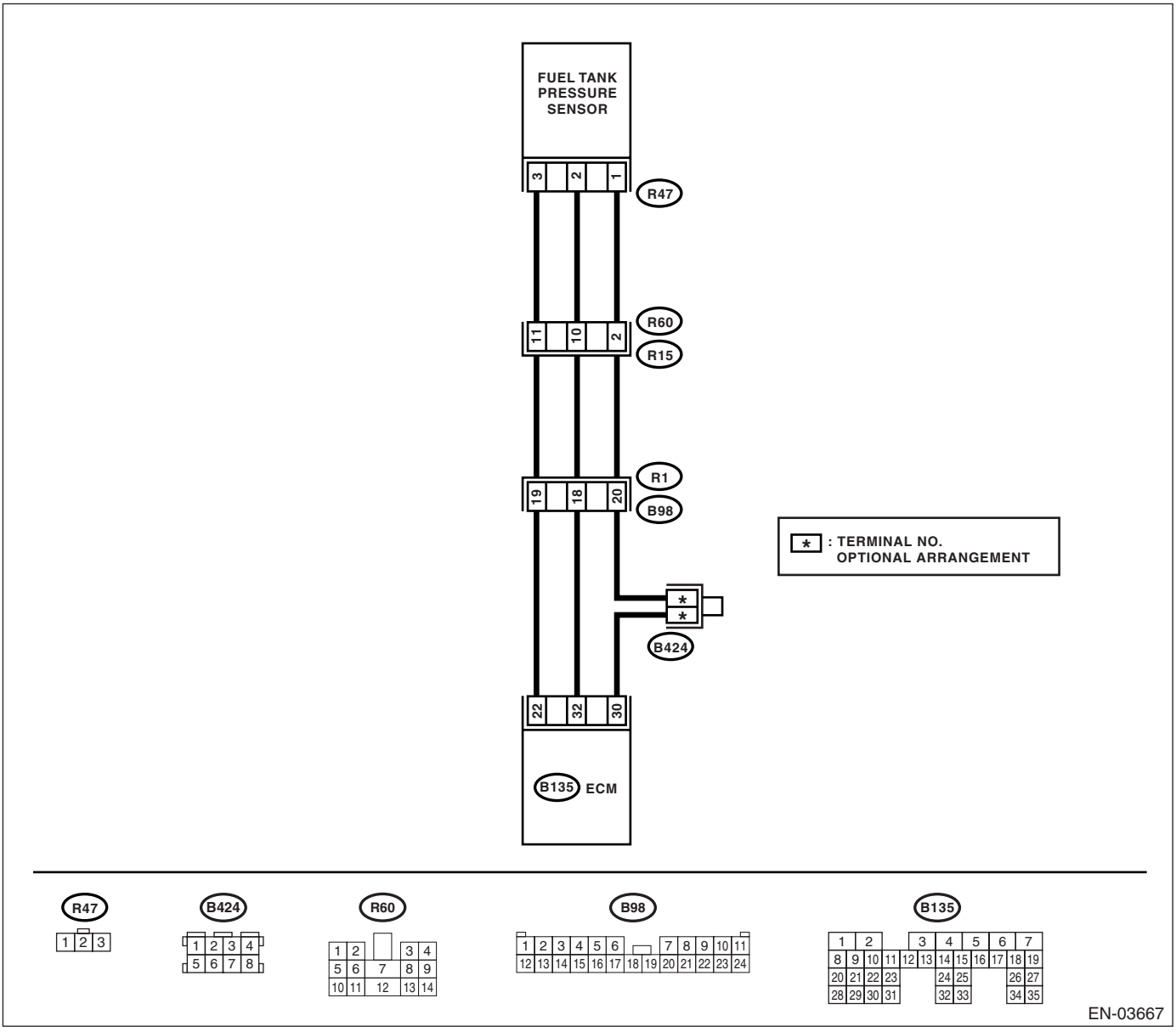
CG:DTC P0452 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-142, DTC P0452 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Remove the fuel filler cap. 3) Install the fuel filler cap. 4) Turn the ignition switch to ON. 5) Read the data of fuel tank pressure sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the measured value less than –2.8 kPa (–21.0 mmHg, –0.827 inHg)?	Go to step **2**.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.
2	**CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 22 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **4**.	Go to step **3**.
3	**CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 22 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair poor contact in ECM connector.	Contact with SOA Service Center.
4	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 32 (+) — Chassis ground (–):***	Is the voltage less than 0.2 V?	Go to step **6**.	Go to step **5**.
5	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Read the data of fuel tank pressure sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Does the measured value change by shaking ECM harness and connector?	Repair poor contact in ECM connector.	Go to step **6**.
6	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** 1) Turn the ignition switch to OFF. 2) Remove the rear seat cushion. 3) Separate rear wiring harness and fuel tank cord. 4) Turn the ignition switch to ON. 5) Measure the voltage between rear wiring harness connector and chassis ground. ***Connector & terminal*** ***(R15) No. 11 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **7**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and rear wiring harness connector • Poor contact of coupling connector

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM and rear wiring harness connector. ***Connector & terminal*** ***(B135) No. 30 — (R15) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and rear wiring harness connector • Poor contact of coupling connector • Poor contact of joint connector
8	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** Measure the resistance of harness between rear wiring harness connector and chassis ground. ***Connector & terminal*** ***(R15) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Repair short circuit to ground in harness between ECM and rear wiring harness connector.
9	**CHECK FUEL TANK CORD.** 1) Disconnect the connector from fuel tank pressure sensor. 2) Measure the resistance of fuel tank cord. ***Connector & terminal*** ***(R60) No. 11 — (R47) No. 3:***	Is the resistance less than 1 Ω?	Go to step **10**.	Repair open circuit in fuel tank cord.
10	**CHECK FUEL TANK CORD.** Measure the resistance of fuel tank cord. ***Connector & terminal*** ***(R60) No. 2 — (R47) No. 1:***	Is the resistance less than 1 Ω?	Go to step **11**.	Repair open circuit in fuel tank cord.
11	**CHECK FUEL TANK CORD.** Measure the resistance of harness between fuel tank pressure sensor connector and engine ground. ***Connector & terminal*** ***(R47) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12**.	Repair ground short circuit in fuel tank cord.
12	**CHECK POOR CONTACT.** Check poor contact in fuel tank pressure sensor connector.	Is there poor contact in fuel tank pressure sensor connector?	Repair poor contact in fuel tank pressure sensor connector.	Replace the fuel tank pressure sensor. <Ref. to EC(H6DO)-10, Fuel Tank Pressure Sensor.>

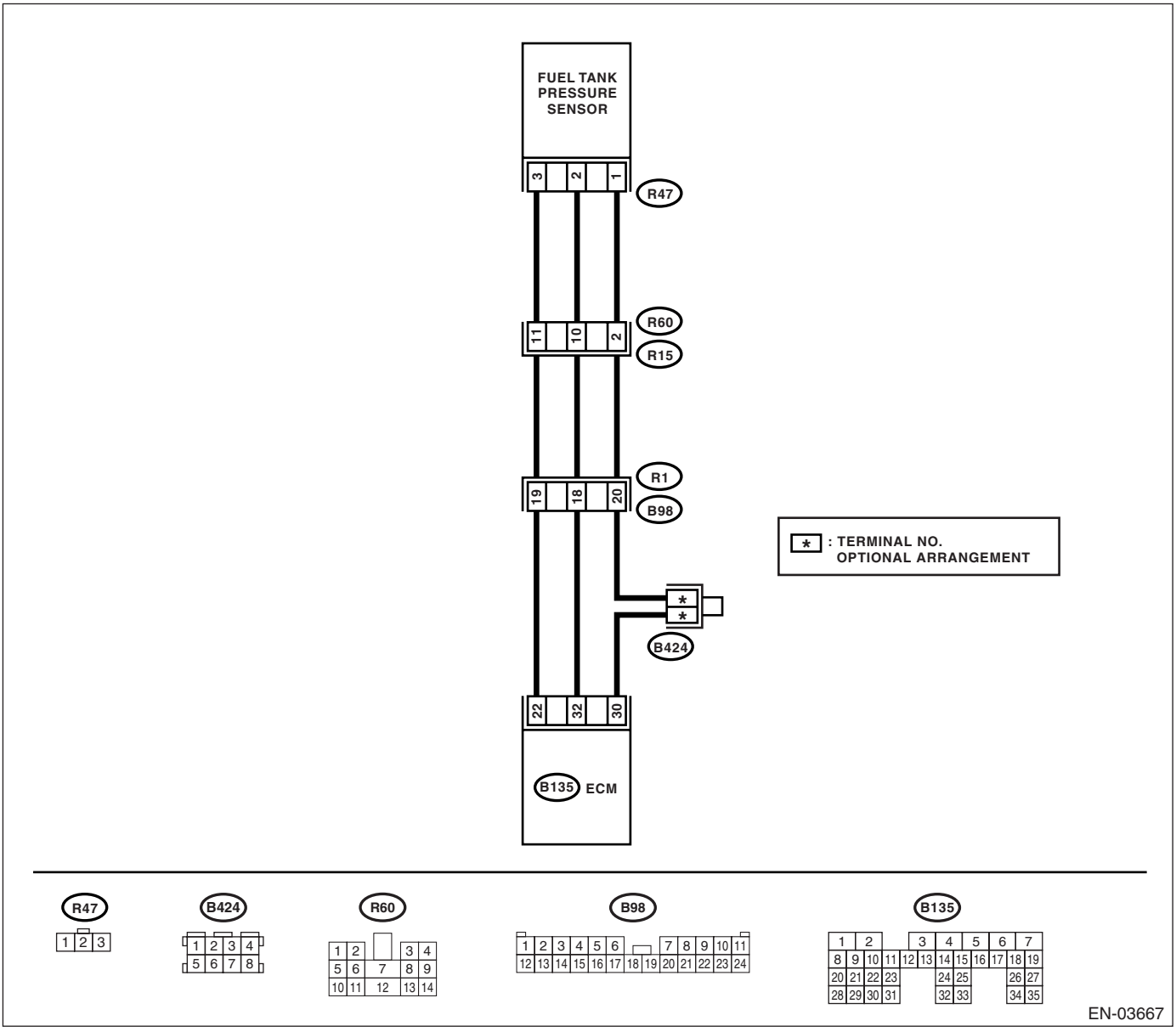
CH:DTC P0453 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-144, DTC P0453 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Remove the fuel filler cap. 3) Install the fuel filler cap. 4) Turn the ignition switch to ON. 5) Read the data of fuel tank pressure sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the measured value 2.8 kPa (21.0 mmHg, 0.827 inHg) or more?	Go to step **11**.	Go to step **2**.
2	**CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 22 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **4**.	Go to step **3**.
3	**CHECK POWER SUPPLY TO FUEL TANK PRESSURE SENSOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 22 (+) — Chassis ground (–):***	Does the measured value change by shaking ECM harness and connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
4	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 32 (+) — Chassis ground (–):***	Is the voltage less than 0.2 V?	Go to step **6**.	Go to step **5**.
5	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Read the data of fuel tank pressure sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Does the measured value change by shaking ECM harness and connector?	Repair poor contact in ECM connector.	Go to step **6**.
6	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** 1) Turn the ignition switch to OFF. 2) Remove the rear seat cushion. 3) Separate rear wiring harness and fuel tank cord. 4) Turn the ignition switch to ON. 5) Measure the voltage between rear wiring harness connector and chassis ground. ***Connector & terminal*** ***(R15) No. 11 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **7**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and rear wiring harness connector • Poor contact of coupling connector

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND COUPLING CONNECTOR IN REAR WIRING HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM and rear wiring harness connector. ***Connector & terminal*** ***(B135) No. 32 — (R15) No. 10:*** ***(B135) No. 30 — (R15) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and rear wiring harness connector • Poor contact of coupling connector
8	**CHECK FUEL TANK CORD.** 1) Disconnect the connector from fuel tank pressure sensor. 2) Measure the resistance of fuel tank cord. ***Connector & terminal*** ***(R60) No. 10 — (R47) No. 2:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair open circuit in fuel tank cord.
9	**CHECK FUEL TANK CORD.** Measure the resistance of fuel tank cord. ***Connector & terminal*** ***(R60) No. 2 — (R47) No. 1:***	Is the resistance less than 1 Ω?	Go to step **10**.	Repair open circuit in fuel tank cord.
10	**CHECK POOR CONTACT.** Check poor contact in fuel tank pressure sensor connector.	Is there poor contact in fuel tank pressure sensor connector?	Repair poor contact in fuel tank pressure sensor connector.	Replace the fuel tank pressure sensor. <Ref. to EC(H6DO)-10, Fuel Tank Pressure Sensor.>
11	**CHECK HARNESS BETWEEN ECM AND FUEL TANK PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel tank pressure sensor. 3) Turn the ignition switch to ON. 4) Read the data of fuel tank pressure sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the measured value 2.8 kPa (21.0 mmHg, 0.827 inHg) or more?	Repair short circuit to battery in harness between ECM and fuel tank pressure sensor connector.	Replace the fuel tank pressure sensor. <Ref. to EC(H6DO)-10, Fuel Tank Pressure Sensor.>

CI: 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)-146, 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 repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FUEL FILLER CAP.** 1) Turn the ignition switch to OFF. 2) Check the fuel filler cap. NOTE: The DTC is stored in memory if fuel filler cap is or was loose or if the cap chain was caught while tightening.	Is the fuel filler cap tightened securely?	Go to step **3**.	Tighten fuel filler cap securely.
3	**CHECK FUEL FILLER CAP.**	Is the fuel filler cap SUBARU genuine?	Go to step **4**.	Replace with a SUBARU genuine fuel filler cap.
4	**CHECK FUEL FILLER PIPE PACKING.**	Is there any damage to the seal between fuel filler cap and fuel filler pipe?	Repair or replace the fuel filler cap and fuel filler pipe. <Ref. to FU(H6DO)-41, Fuel Filler Pipe.>	Go to step **5**.
5	**CHECK DRAIN VALVE.** 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Operate the drain valve. NOTE: Drain valve operation can also be executed using Subaru Select Monitor. Refer to “Compulsory Valve Operation Check Mode” for procedures. <Ref. to EN(H6DO)(diag)-46, Compulsory Valve Operation Check Mode.>	Does the drain valve operate?	Go to step **6**.	Replace the drain valve. <Ref. to EC(H6DO)-12, Drain Valve.>

	Step	Check	Yes	No
6	**CHECK PURGE CONTROL SOLENOID VALVE.** Operate the purge control solenoid valve. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H6DO)(diag)-46, Compulsory Valve Operation Check Mode.>	Does the purge control solenoid valve operate?	Go to step **7**.	Replace the purge control solenoid valve. <Ref. to EC(H6DO)-6, Purge Control Solenoid Valve.>
7	**CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.** Turn the ignition switch to OFF.	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)-48, Fuel Delivery, Return and Evaporation Lines.>	Go to step **8**.
8	**CHECK CANISTER.**	Is the canister damaged or is there a hole of more than 0.5 mm (0.020 in) dia. in it?	Repair or replace the canister. <Ref. to EC(H6DO)-5, Canister.>	Go to step **9**.
9	**CHECK FUEL TANK.** Remove the fuel tank. <Ref. to FU(H6DO)-38, 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)-38, Fuel Tank.>	Go to step **10**.
10	**CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.**	Is there any hole of more than 0.5 mm (0.020 in) dia., crack, clogging, or disconnections, bend, misconnection of hoses or pipes in evaporative emission control system?	Repair or replace the hoses or pipes.	Contact with SOA Service Center.

CJ: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)-146, 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 repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FUEL FILLER CAP.** 1) Turn the ignition switch to OFF. 2) Check the fuel filler cap. NOTE: The DTC 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 **3**.	Tighten fuel filler cap securely.
3	**CHECK FUEL FILLER CAP.**	Is the fuel filler cap SUBARU genuine?	Go to step **4**.	Replace with a SUBARU genuine fuel filler cap.
4	**CHECK FUEL FILLER PIPE PACKING.**	Is there any damage to the seal between fuel filler cap and fuel filler pipe?	Repair or replace the fuel filler cap and fuel filler pipe. <Ref. to FU(H6DO)-41, Fuel Filler Pipe.>	Go to step **5**.
5	**CHECK DRAIN VALVE.** 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Operate the drain valve. NOTE: Drain valve operation can also be executed using Subaru Select Monitor. Refer to “Compulsory Valve Operation Check Mode” for procedures. <Ref. to EN(H6DO)(diag)-46, Compulsory Valve Operation Check Mode.>	Does the drain valve operate?	Go to step **6**.	Replace the drain valve. <Ref. to EC(H6DO)-12, Drain Valve.>

	Step	Check	Yes	No
6	**CHECK PURGE CONTROL SOLENOID VALVE.** Operate the purge control solenoid valve. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H6DO)(diag)-46, Compulsory Valve Operation Check Mode.>	Does the purge control solenoid valve operate?	Go to step **7**.	Replace the purge control solenoid valve. <Ref. to EC(H6DO)-6, Purge Control Solenoid Valve.>
7	**CHECK CANISTER.**	Is the canister damaged?	Repair or replace the canister. <Ref. to EC(H6DO)-5, Canister.>	Go to step **8**.
8	**CHECK FUEL TANK.** Remove the fuel tank. <Ref. to FU(H6DO)-38, Fuel Tank.>	Is the fuel tank damaged?	Repair or replace the fuel tank. <Ref. to FU(H6DO)-38, Fuel Tank.>	Go to step **9**.
9	**CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.**	Are there holes of more than 0.5 mm (0.020 in) dia., cracks, clogging, or disconnections, misconnection of hoses or pipes in evaporative emission control system?	Repair or replace the hoses or pipes.	Contact with SOA Service Center.

CK:DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-147, DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

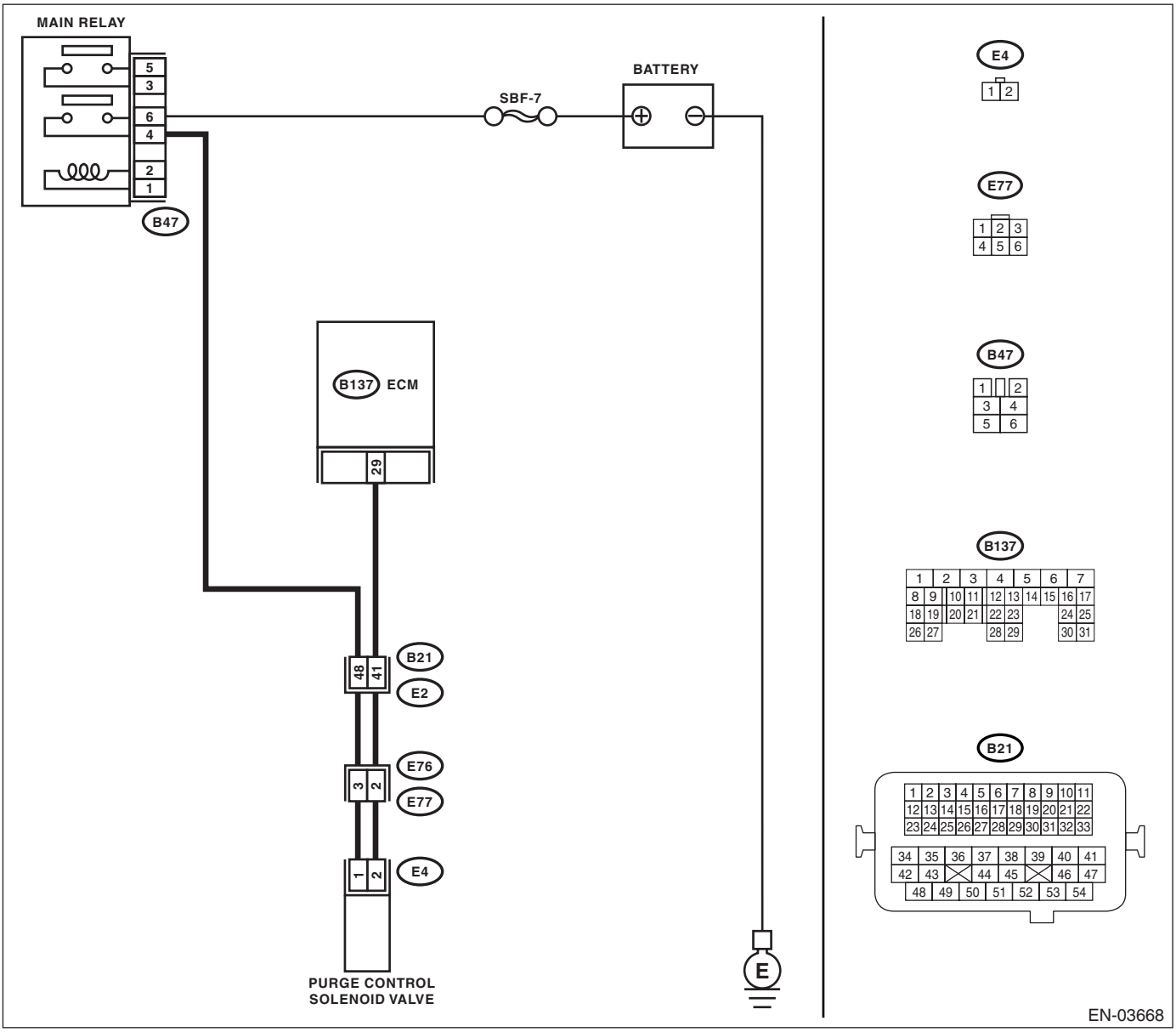
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 29 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **2**.
2	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from purge control solenoid valve and ECM. 3) Measure the resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the ground short circuit of harness between ECM and purge control solenoid valve connector.
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and purge control solenoid valve. ***Connector & terminal*** ***(B137) No. 29 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between ECM and purge control solenoid valve connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and purge control solenoid valve connector • Poor contact of coupling connector
4	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove the purge control solenoid valve. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 10 — 100 Ω?	Go to step **5**.	Replace the purge control solenoid valve. <Ref. to EC(H6DO)-6, Purge Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **6**.	Repair the open circuit of harness between main relay and purge control solenoid valve connector.
6	**CHECK POOR CONTACT.** Check poor contact of purge control solenoid valve connector.	Is there poor contact of purge control solenoid valve connector?	Repair the poor contact of purge control solenoid valve connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

CL:DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-149, DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

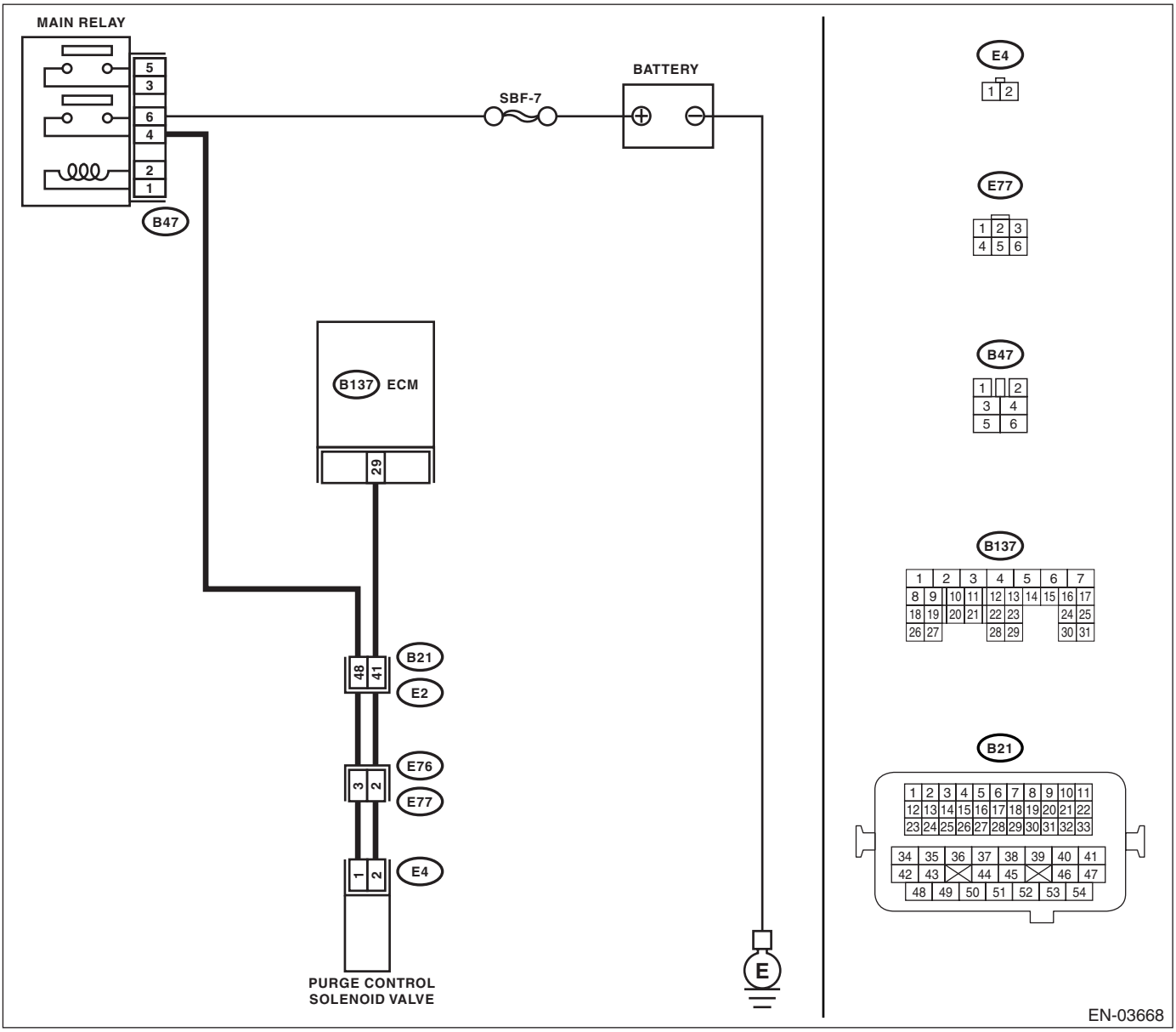
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground while operating the purge control solenoid valve. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H6DO)(diag)-46, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B137) No. 29 (+) — Chassis ground (–):***	Is the voltage 0 — 10 V?	Go to step **2**.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. In this case, repair the poor contact in ECM connector.
2	**CHECK OUTPUT SIGNAL OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 29 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4**.	Go to step **3**.
3	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 29 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit of harness between ECM and purge control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Go to step **5**.
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the purge control solenoid valve <Ref. to EC(H6DO)-6, Purge Control Solenoid Valve.> and ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Go to step **6**.
6	**CHECK POOR CONTACT.** Check poor contact of ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

CM:DTC P0461 FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-151, DTC P0461 FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	CHECK 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)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0461.	Replace the fuel level sensor and fuel sub level sensor. <Ref. to FU(H6DO)-45, Fuel Level Sensor.> <Ref. to FU(H6DO)-46, Fuel Sub Level Sensor.>

CN:DTC P0462 FUEL LEVEL SENSOR CIRCUIT LOW INPUT

NOTE:
For the diagnostic procedure, refer to DTC P0463. <Ref. to EN(H6DO)(diag)-293, DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CO:DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-155, DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is DTC P0462 or P0463 displayed on the Subaru Select Monitor?	Check the combination meter. <Ref. to IDI-11, Combination Meter.>	Temporary poor contact occurs.

CP: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)-157, DTC P0464 FUEL LEVEL SENSOR CIRCUIT INTERMITTENT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0464 displayed on the display?	Check the combination meter. <Ref. to IDI-11, Combination Meter.>	Temporary poor contact occurs.

CQ:DTC P0483 COOLING FAN RATIONALITY CHECK

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-160, DTC P0483 COOLING FAN RATIONALITY CHECK, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Occurrence of noise
- Overheating

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

NOTE:
If the vehicle, with the engine idling, is placed very close to a wall or another vehicle, preventing normal cooling function, the OBD system may detect malfunction.

Step		Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Check radiator fan, fan motor and thermostat and if thermostat is stuck, replace thermostat. <Ref. to CO(H6DO)-21, Radiator Main Fan and Fan Motor.> <Ref. to CO(H6DO)-25, Radiator Sub Fan and Fan Motor.>

CR:DTC P0500 VEHICLE SPEED SENSOR

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-161, DTC P0500 VEHICLE SPEED SENSOR, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK DTC OF VDC.** Check DTC of VDC.	Is DTC of VDC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-34, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact of ECM.

CS:DTC P0506 IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-163, DTC P0506 IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Hard to start the engine.
- Engine does not start.
- Erroneous idling
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0506.	Go to step **2**.
2	**CHECK AIR CLEANER ELEMENT.** 1) Turn the ignition switch to OFF. 2) Check the air cleaner element.	Is the air cleaner element excessively clogged?	Replace the air cleaner element. <Ref. to IN(H6DO)-4, Air Cleaner Element.>	Go to step **3**.
3	**CHECK ELECTRONIC THROTTLE CONTROL.** 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.

CT:DTC P0507 IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-165, DTC P0507 IDLE 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 repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0507.	Go to step **2**.
2	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start and idle the engine. 3) Check the following item. • Loose installation of intake manifold and throttle body • Cracks of intake manifold gasket and throttle body gasket • Disconnection of vacuum hoses	Is there any fault in air intake system?	Repair air suction and leaks.	Go to step **3**.
3	**CHECK ELECTRONIC THROTTLE CONTROL.** 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.

CU:DTC P0512 STARTER REQUEST CIRCUIT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-167, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

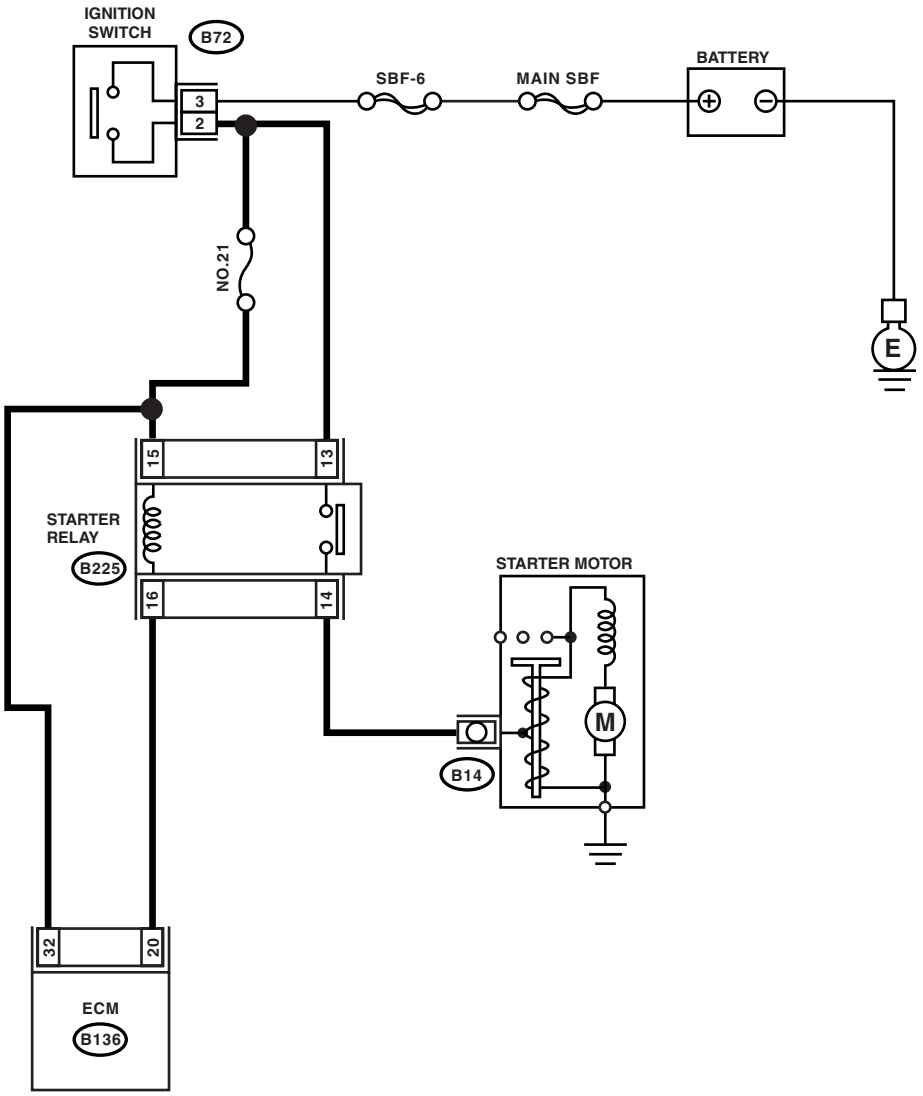
TROUBLE SYMPTOM:

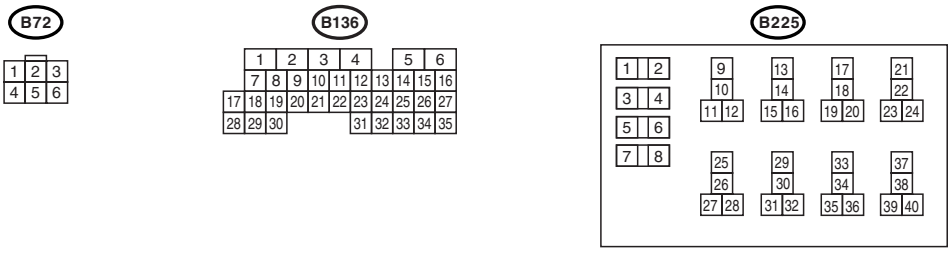
Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03735

	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Turn the ignition switch to ON. NOTE: Place the inhibitor switch in each position.	Does the starter motor operate?	Repair the battery short circuit in starter motor circuit.	Check the starter motor circuit. <Ref. to EN(H6DO)(diag)-58, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

CV:DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-169, DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE), Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

Engine keeps running at higher speed than specified idle speed.

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0519.	Go to step **2**.
2	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start and idle the engine. 3) Check the following item. • Loose installation of intake manifold and throttle body • Cracks of intake manifold gasket and throttle body gasket • Disconnection of vacuum hoses	Is there any fault in air intake system?	Repair air suction and leaks.	Go to step **3**.
3	**CHECK ELECTRONIC THROTTLE CONTROL.** 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.

CW:DTC P0600 SERIAL COMMUNICATION LINK

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

CX:DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-171, 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 repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

CY:DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

NOTE:
For the diagnostic procedure, refer to DTC P0607. <Ref. to EN(H6DO)(diag)-302, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CZ:DTC P0607 CONTROL MODULE PERFORMANCE

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-173, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

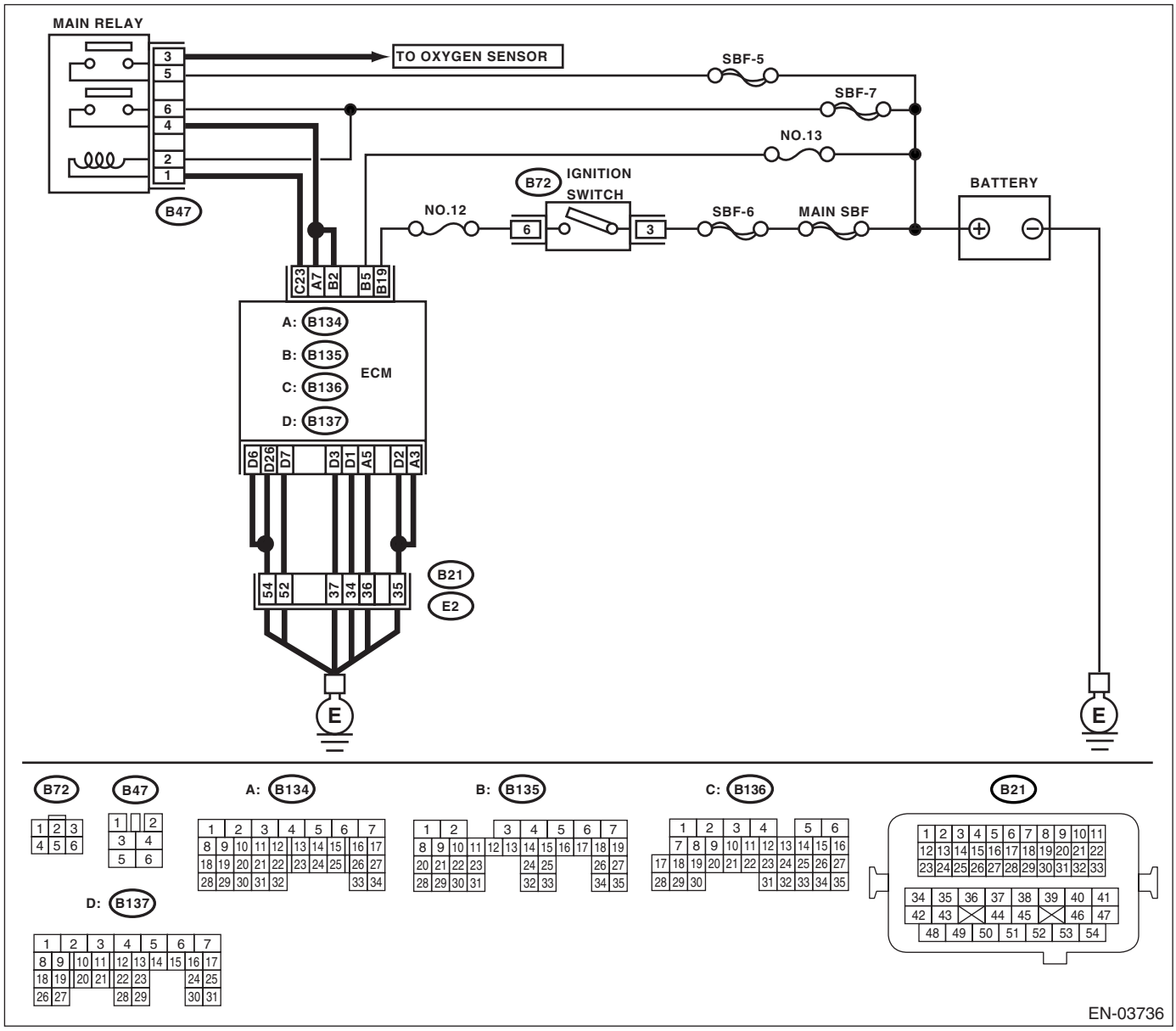
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 7 (+) — Chassis ground (–):*** ***(B135) No. 2 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **2**.	Repair the open or ground short circuit of power supply circuit.
2	**CHECK INPUT VOLTAGE FROM ECM.** 1) Start the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 7 (+) — Chassis ground (–):*** ***(B135) No. 2 (+) — Chassis ground (–):***	Is the voltage 13 — 15 V?	Go to step **3**.	Repair the open or ground short circuit of power supply circuit.
3	**CHECK ECM GROUND HARNESS.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 (+) — Chassis ground (–):*** ***(B134) No. 5 (+) — Chassis ground (–):*** ***(B137) No. 1 (+) — Chassis ground (–):*** ***(B137) No. 2 (+) — Chassis ground (–):*** ***(B137) No. 3 (+) — Chassis ground (–):*** ***(B137) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Further tighten the engine ground terminal.

DA:DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1)

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H6DO)(diag)-360, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DB:DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-179, DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0691 displayed?	Check the radiator fan system. <Ref. to CO(H6DO)-7, Radiator Fan System.>	Temporary poor contact occurs.

DC:DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH

DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-180, DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0692 displayed?	Check the radiator fan system. <Ref. to CO(H6DO)-7, Radiator Fan System.>	Temporary poor contact occurs.

DD:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

NOTE:
For the diagnostic procedure, refer to AT section. <Ref. to 5AT(diag)-2, Basic Diagnostic Procedure.>

DE:DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 1 SENSOR 1)

NOTE:
For diagnostic procedure, refer to DTC P1153. <Ref. to EN(H6DO)(diag)-305, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

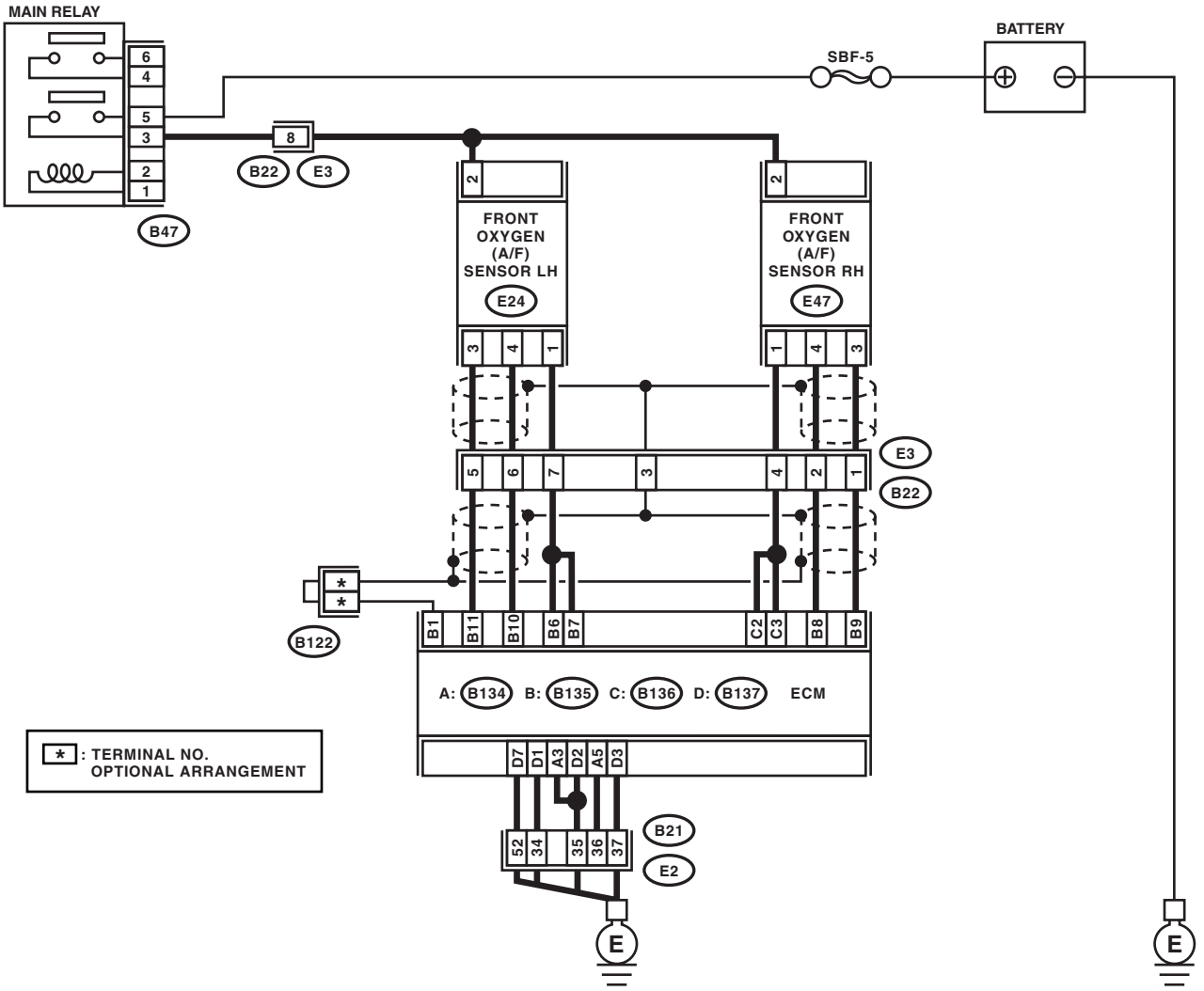
DF:DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 1 SENSOR 1)

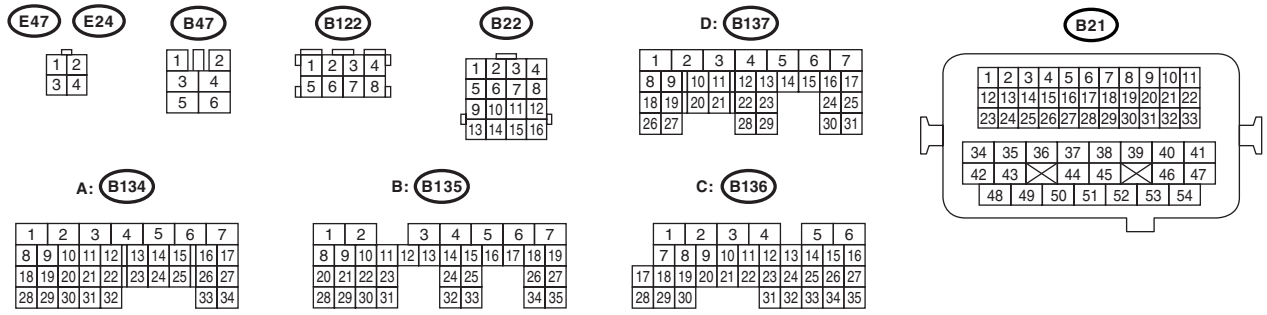
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-184, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or general scan tool screen, warm-up the engine until engine coolant temperature is above 75°C (167°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read data of front oxygen (A/F) sensor signal using the Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value within 0.86 — 1.15 at idle?	Go to step **3**.	Go to step **4**.
3	**CHECK REAR OXYGEN SENSOR SIGNAL.** 1) Race engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed. 2) Operate the LED operation mode for engine. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Does the LED of {Rear O2 Rich Signal} blink?	Check front oxygen (A/F) sensor circuit.	Check rear oxygen sensor circuit. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>
4	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Looseness of part installation • Damage (crack, hole etc.) of parts • Looseness of the front oxygen (A/F) sensor • Looseness or ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>

DG:DTC P1154 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 2 SENSOR 1)

NOTE:
For diagnostic procedure, refer to DTC P1155. <Ref. to EN(H6DO)(diag)-309, DTC P1155 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DH:DTC P1155 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 2 SENSOR 1)

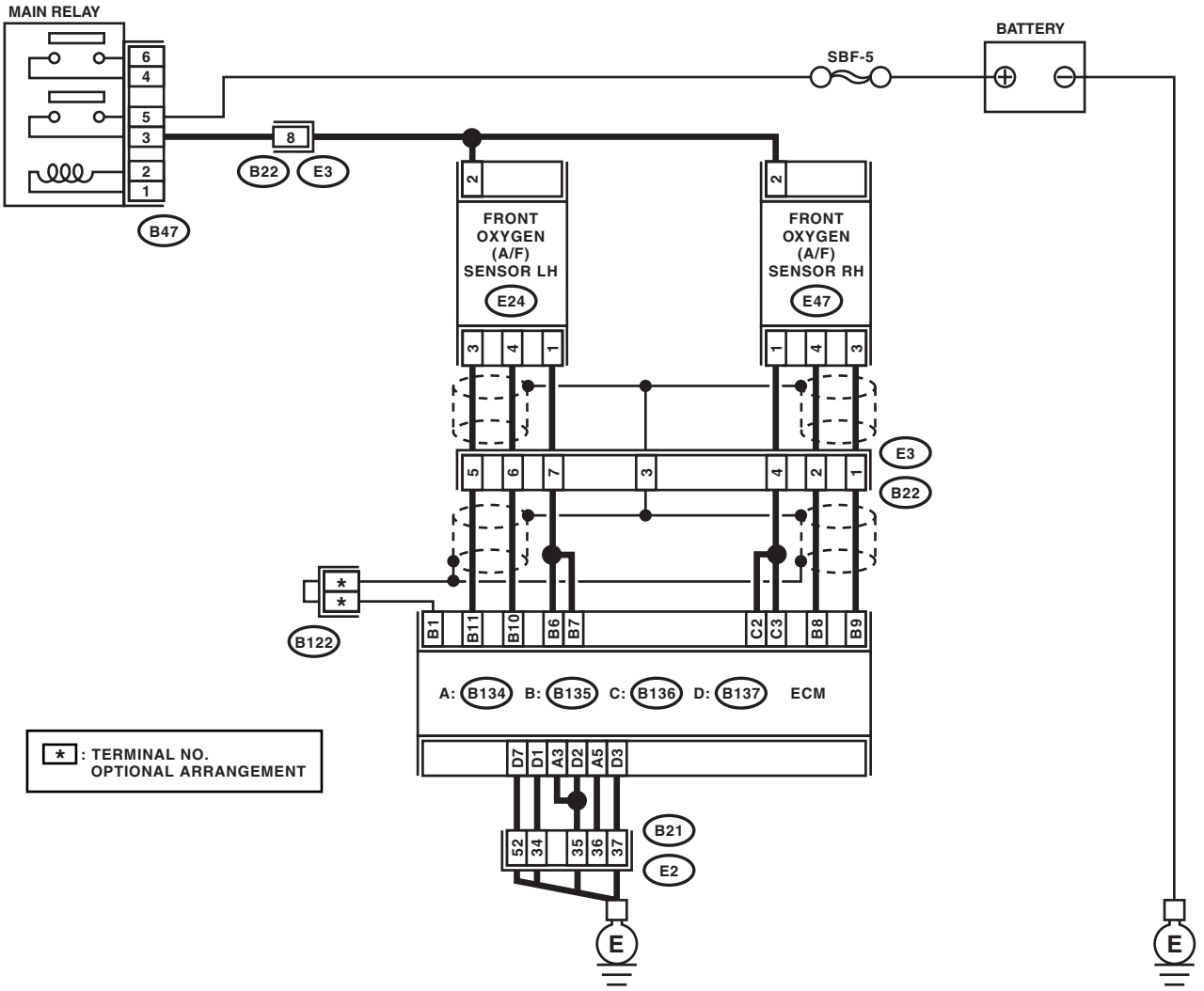
DTC DETECTING CONDITION:

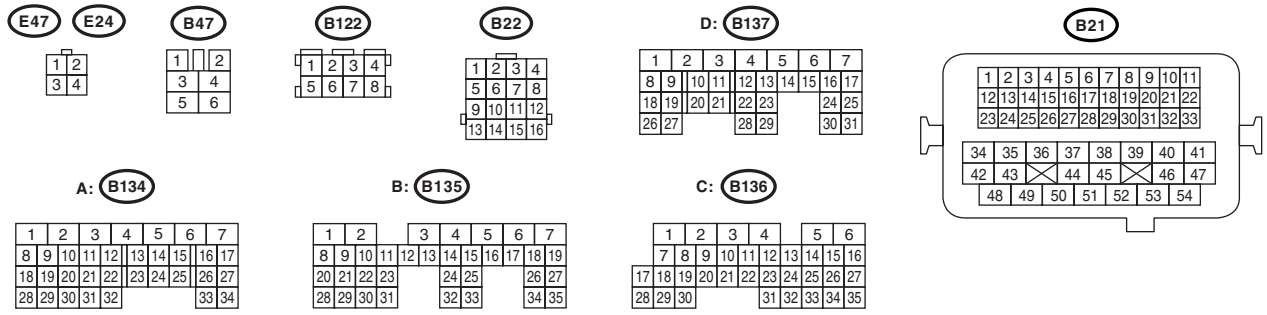
- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-186, DTC P1155 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03737

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or general scan tool screen, warm-up the engine until engine coolant temperature is above 75°C (167°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read data of front oxygen (A/F) sensor signal using the Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value within 0.86 — 1.15 at idle?	Go to step **3**.	Go to step **4**.
3	**CHECK REAR OXYGEN SENSOR SIGNAL.** 1) Race engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed. 2) Operate the LED operation mode for engine. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Does the LED of {Rear O2 Rich Signal} blink?	Check front oxygen (A/F) sensor circuit.	Check rear oxygen sensor circuit. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>
4	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Looseness of part installation • Damage (crack, hole etc.) of parts • Looseness of the front oxygen (A/F) sensor • Looseness or ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-28, Front Oxygen (A/F) Sensor.>

DI: DTC P1160 RETURN SPRING FAILURE

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H6DO)(diag)-360, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DJ:DTC P1443 VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-189, DTC P1443 VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM, Diagnostic Trouble Code (DTC) Detecting Criteria.>

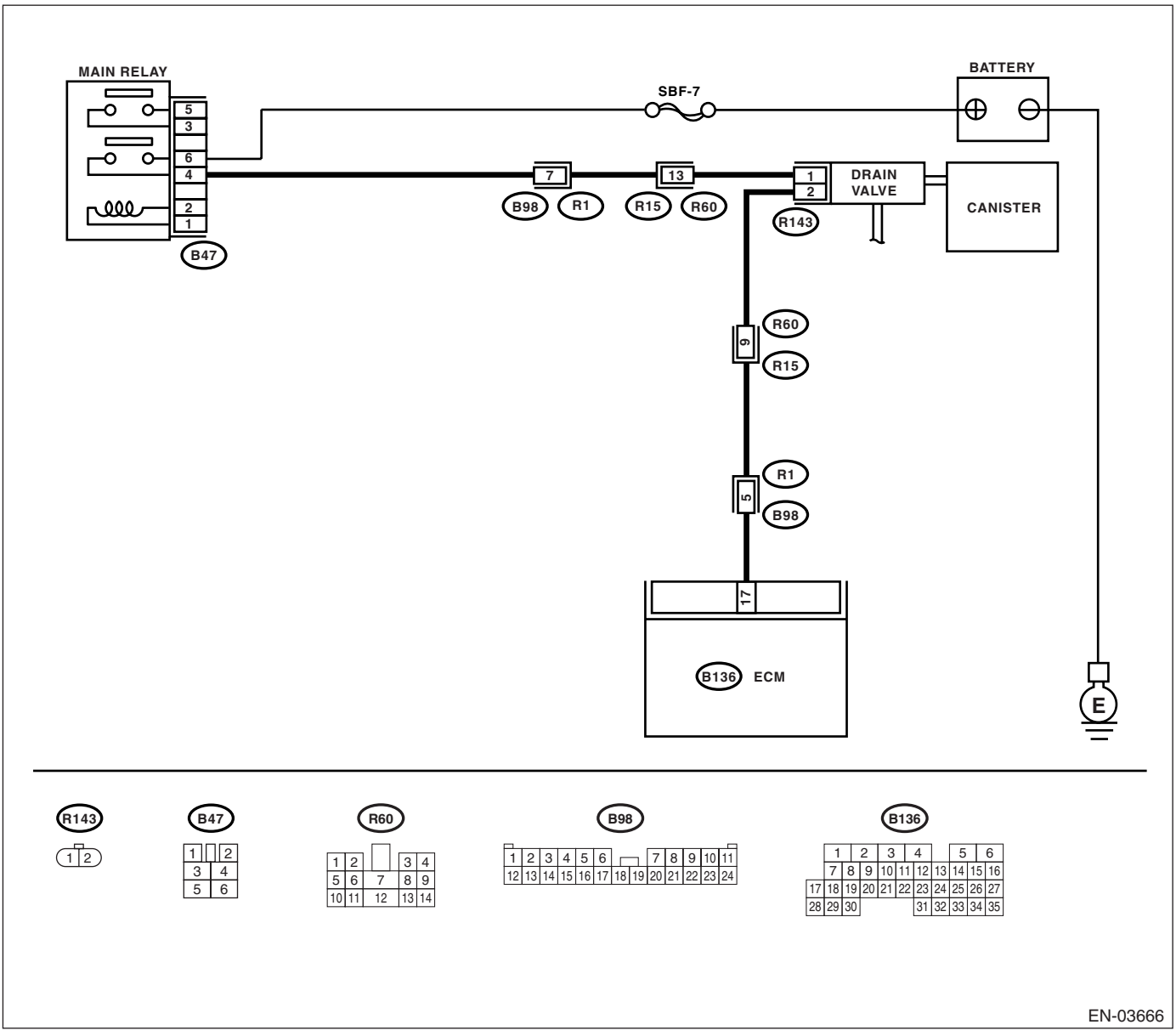
TROUBLE SYMPTOM:

Improper fuel supply

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK 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)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK VENT LINE HOSES.** Check the following item. • Clogging of vent hoses between canister and drain valve • Clogging of vent hose between drain valve and air filter • Clogging of drain filter	Is there a fault in vent line?	Repair or replace faulty parts.	Go to step **3**.
3	**CHECK DRAIN VALVE OPERATION.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) Operate the drain valve. NOTE: Drain valve operation can also be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H6DO)(diag)-46, Compulsory Valve Operation Check Mode.>	Does the drain valve operate?	Contact with SOA Service Center.	Replace the drain valve. <Ref. to EC(H6DO)-12, Drain Valve.>

DK:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-191, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

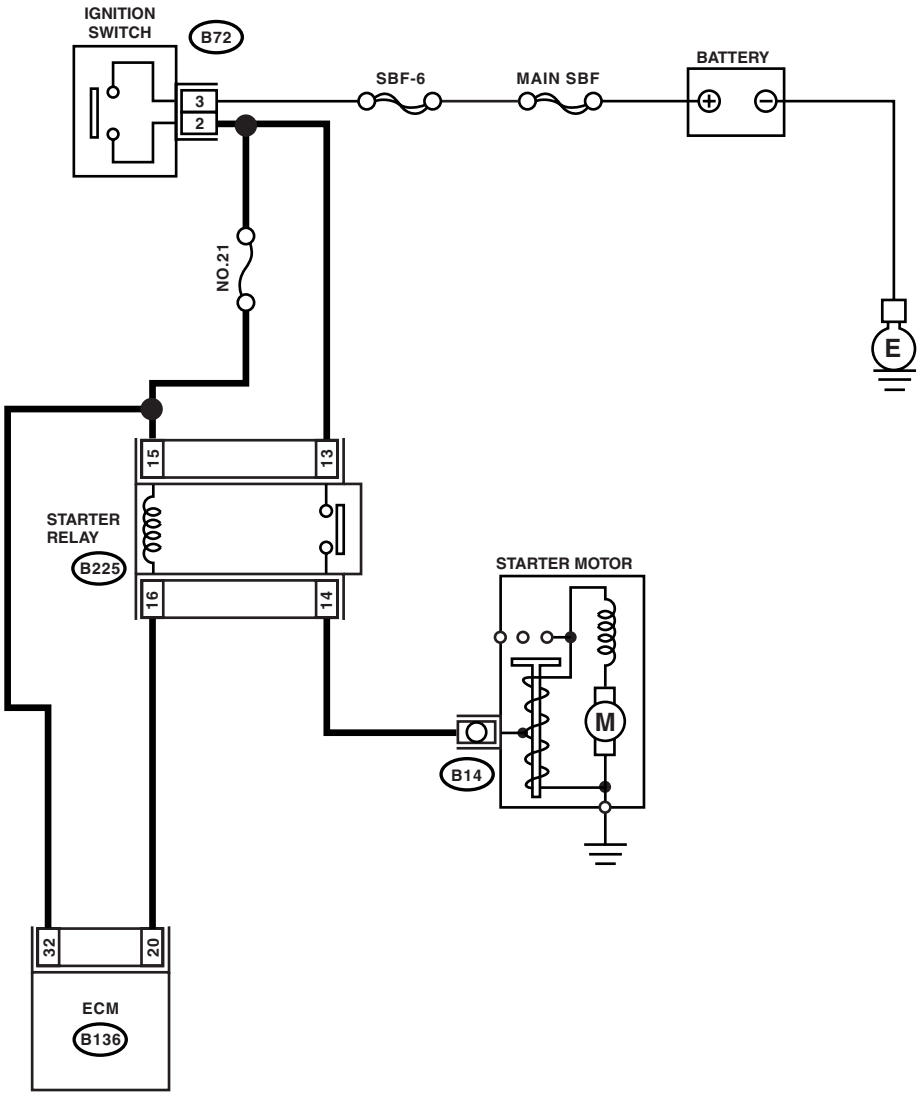
TROUBLE SYMPTOM:

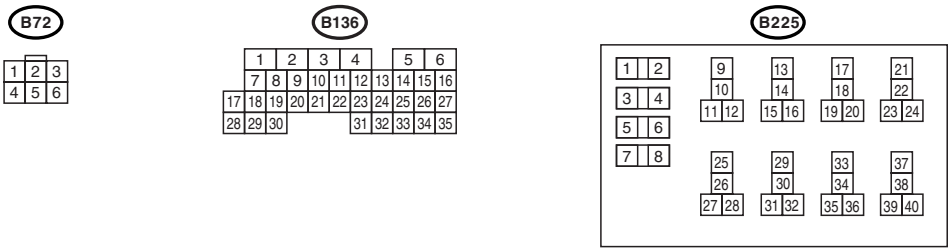
Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03735

	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Place the inhibitor switch in “P” or “N” range.	Does the starter motor operate when ignition switch is turned to START?	Repair the harness and connector. NOTE: In this case, repair the following item: • Open or ground short circuit of harness between ECM and starter motor connector • Poor contact in ECM connector	Check the starter motor circuit. <Ref. to EN(H6DO)(diag)-58, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

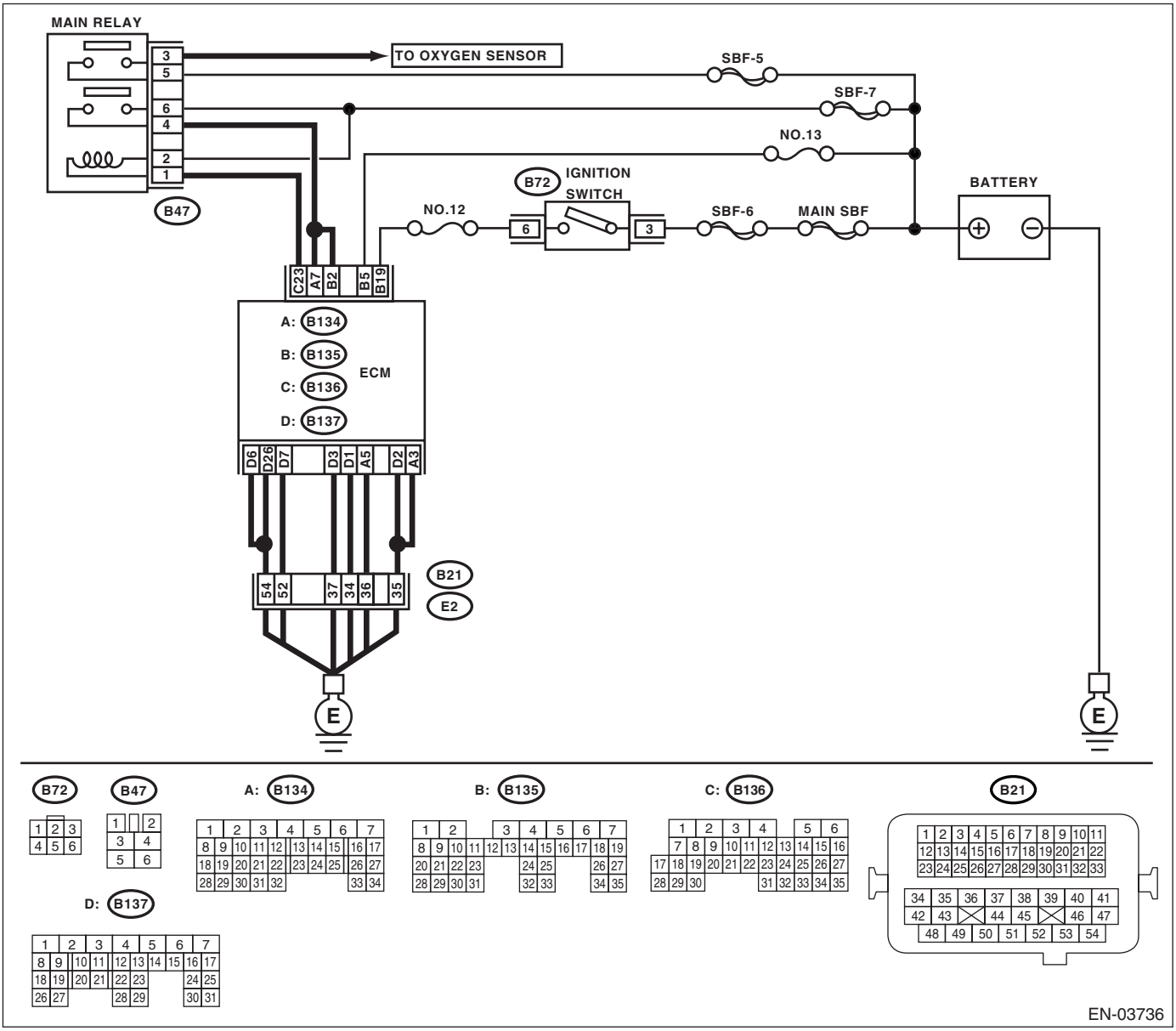
DL:DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-192, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK INPUT SIGNAL OF ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair poor contact in ECM connector.	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 5 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit of harness between ECM connector and battery terminal.	Go to step **3**.
3	**CHECK FUSE No. 13.**	Is the fuse blown out?	Replace the fuse.	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and battery • Poor contact in ECM connector • Poor contact of battery terminal

DM:DTC P2088 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 1)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-194, DTC P2088 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

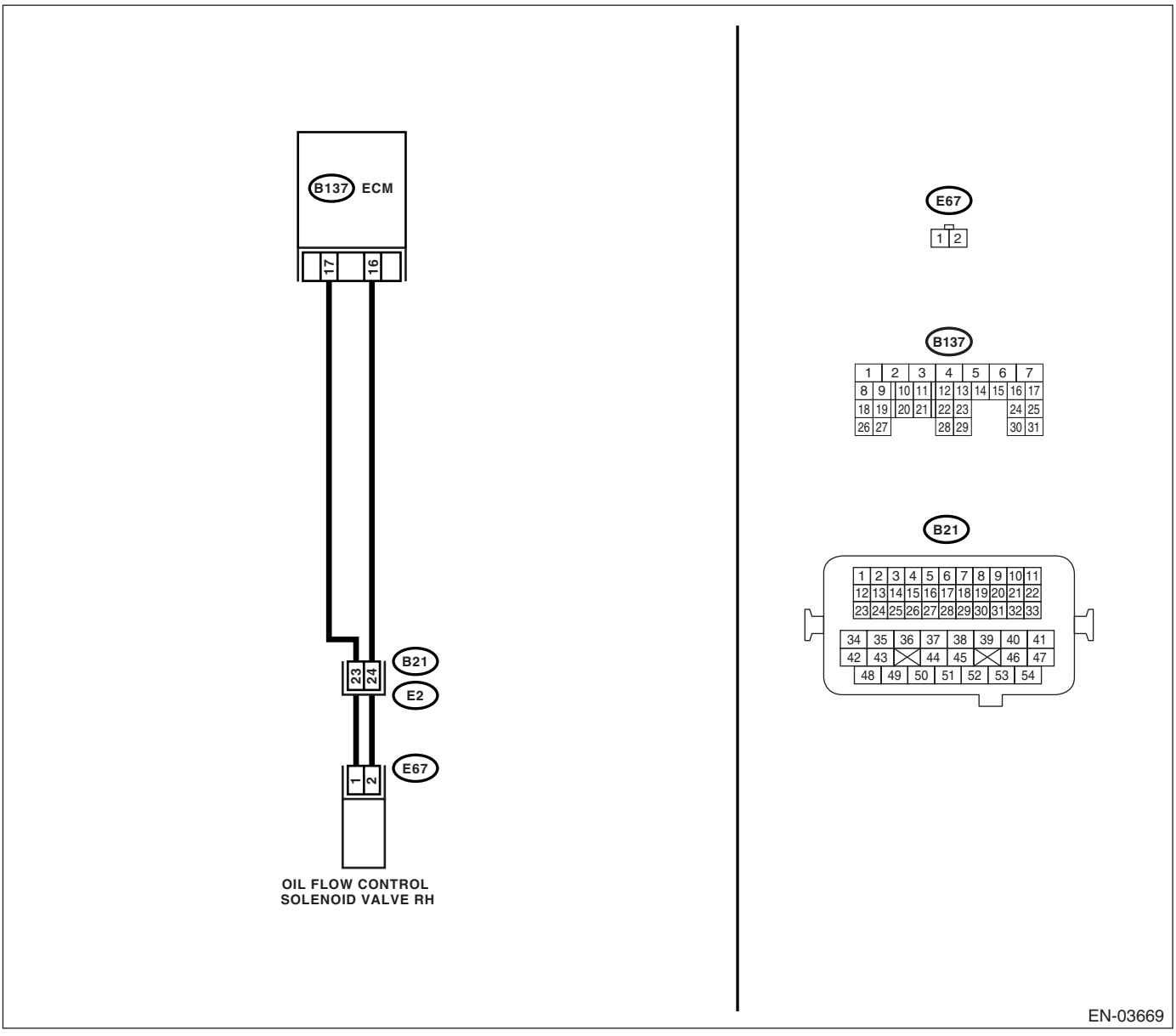
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B137) No. 17 — (E67) No. 1:*** ***(B137) No. 16 — (E67) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between ECM and oil flow control solenoid valve connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and oil flow control solenoid valve connector • Poor contact of coupling connector
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 6 — 12 Ω?	Repair the poor contact of ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H6DO)-77, Oil Flow Control Solenoid Valve.>

DN:DTC P2089 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 1)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-195, DTC P2089 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

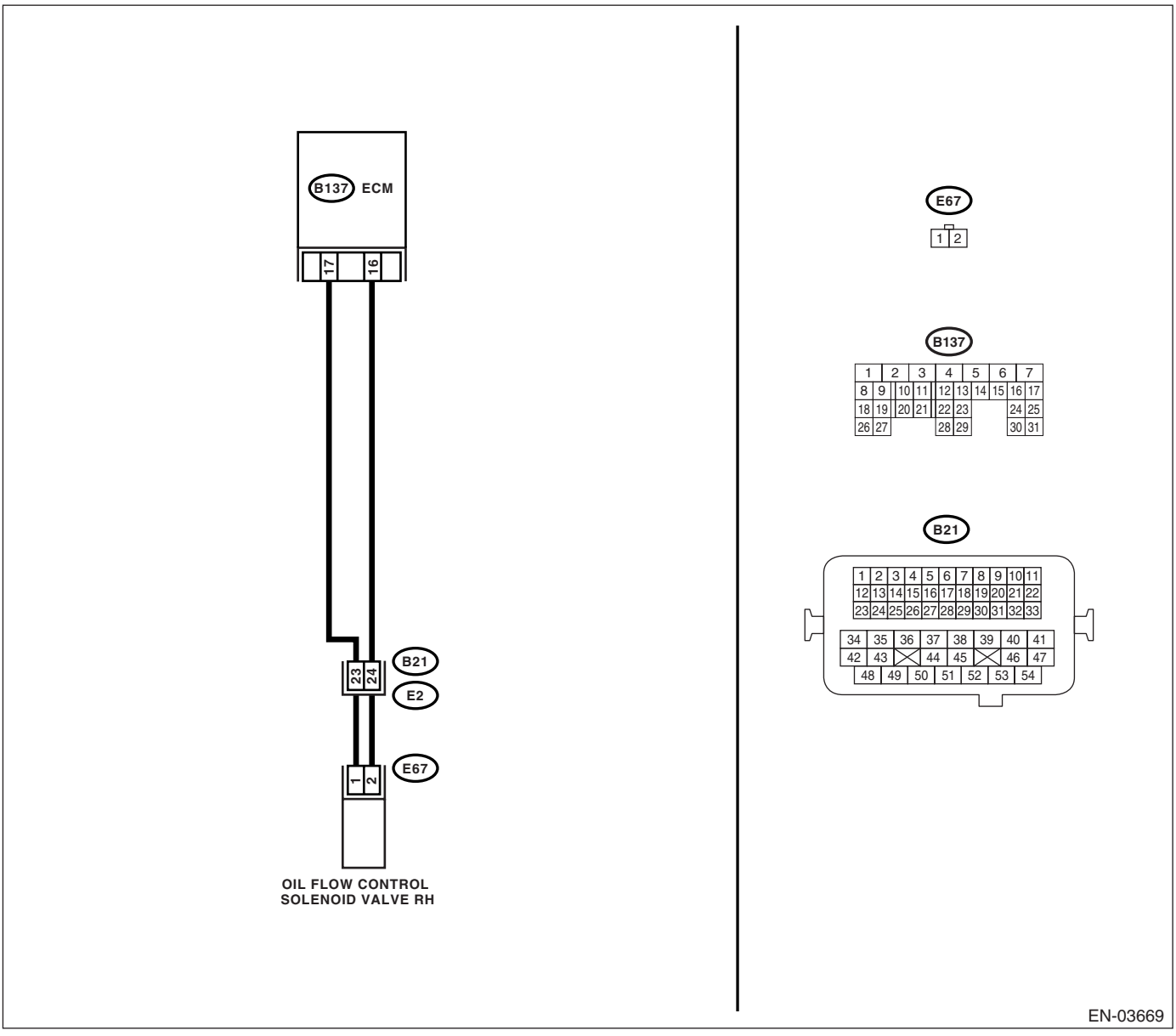
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and oil flow control solenoid valve. 3) Measure the resistance between oil flow control solenoid valve and engine ground. ***Connector & terminal*** ***(E67) No. 1 — Engine ground:*** ***(E67) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2**.	Repair the short circuit between ECM and oil flow control solenoid valve connector.
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 6 — 12 Ω?	Repair the poor contact of ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H6DO)-77, Oil Flow Control Solenoid Valve.>

DO:DTC P2092 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-196, DTC P2092 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

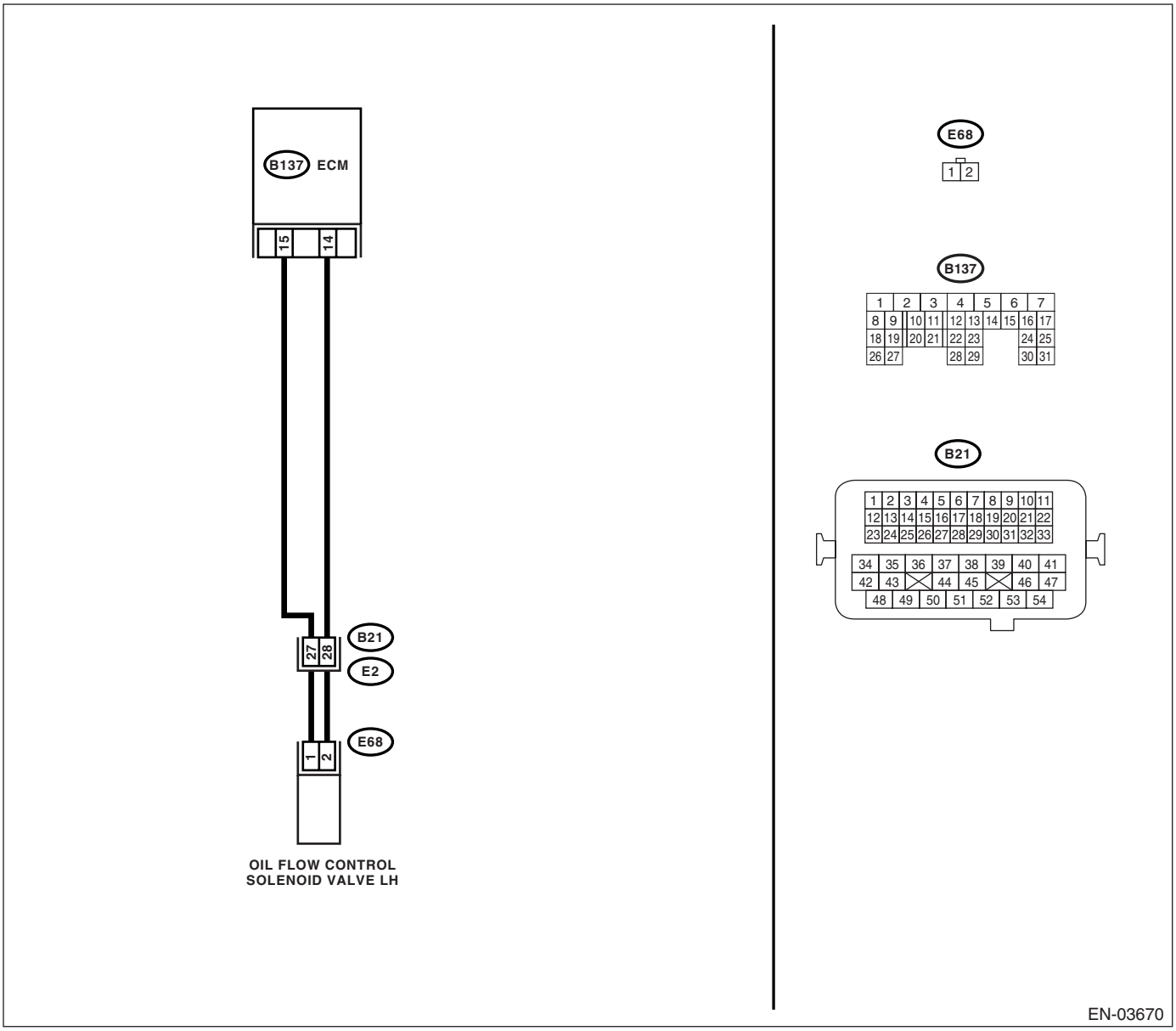
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B137) No. 15 — (E68) No. 1:*** ***(B137) No. 14 — (E68) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between ECM and oil flow control solenoid valve connector. NOTE: In this case, repair the following item: • Open circuit of harness between ECM and oil flow control solenoid valve connector • Poor contact of coupling connector
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 6 — 12 Ω?	Repair the poor contact of ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H6DO)-77, Oil Flow Control Solenoid Valve.>

DP:DTC P2093 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 2)

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-196, DTC P2093 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

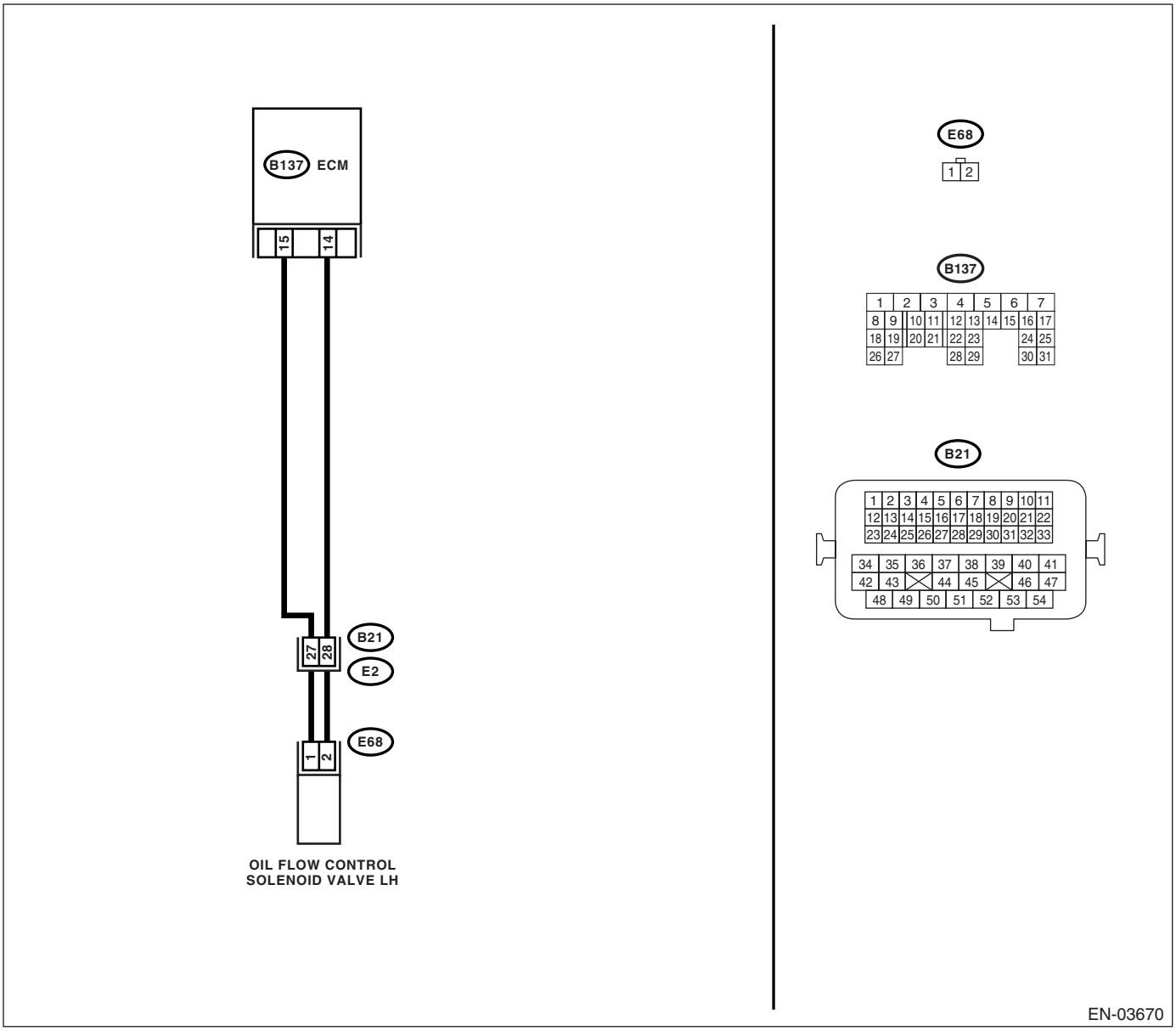
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and oil flow control solenoid valve. 3) Measure the resistance between oil flow control solenoid valve and engine ground. ***Connector & terminal*** ***(E68) No. 1 — Engine ground:*** ***(E68) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2**.	Repair the short circuit between ECM and oil flow control solenoid valve connector.
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 6 — 12 Ω?	Repair the poor contact of ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H6DO)-77, Oil Flow Control Solenoid Valve.>

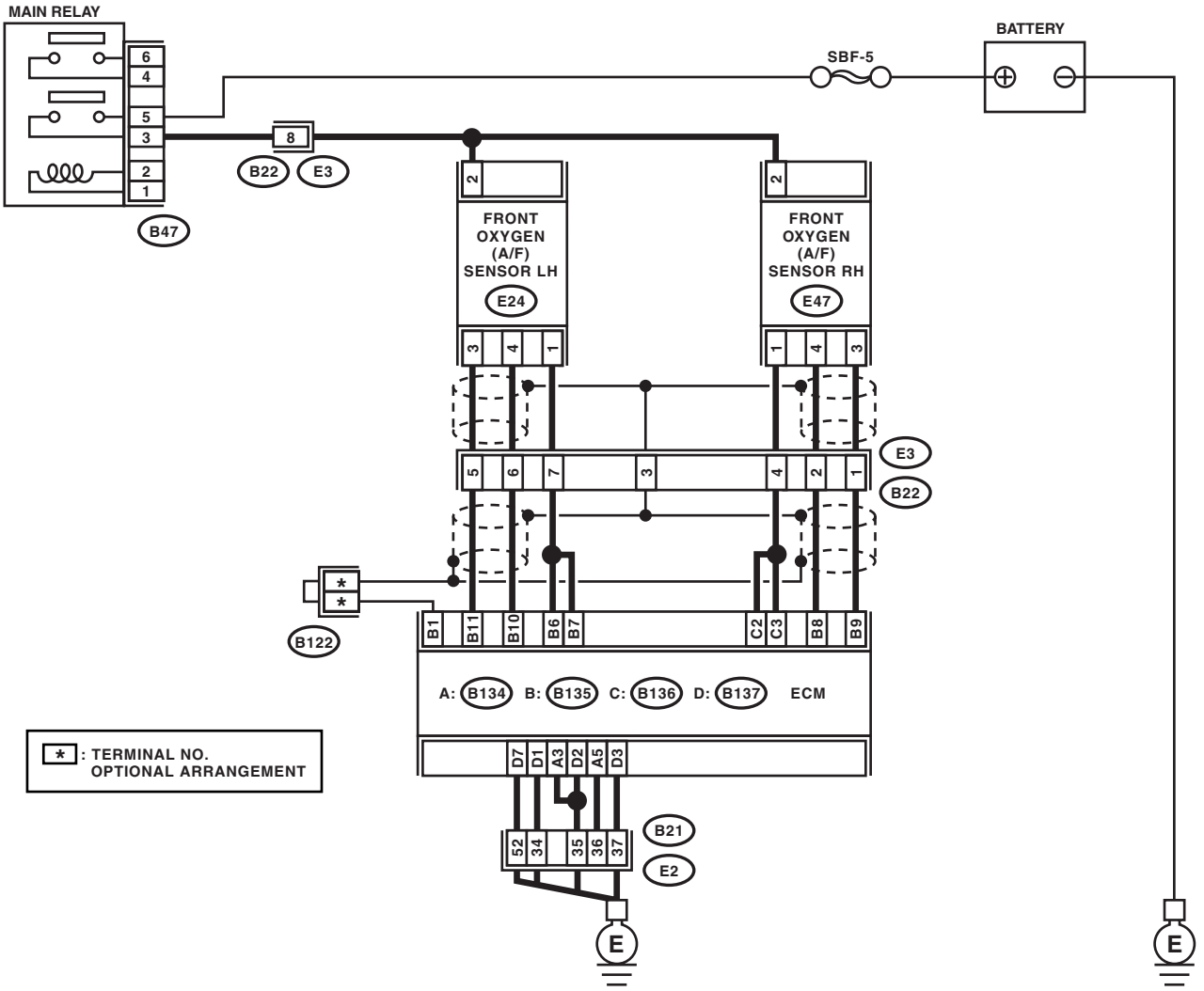
DQ:DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1)

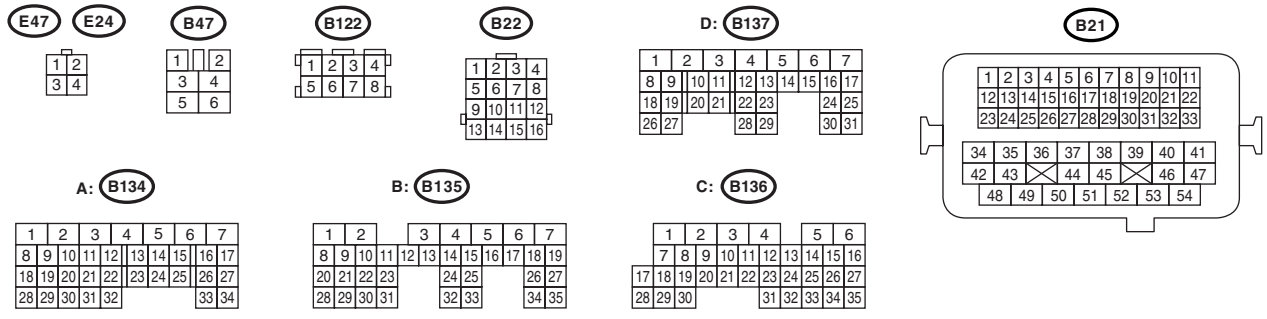
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-197, DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

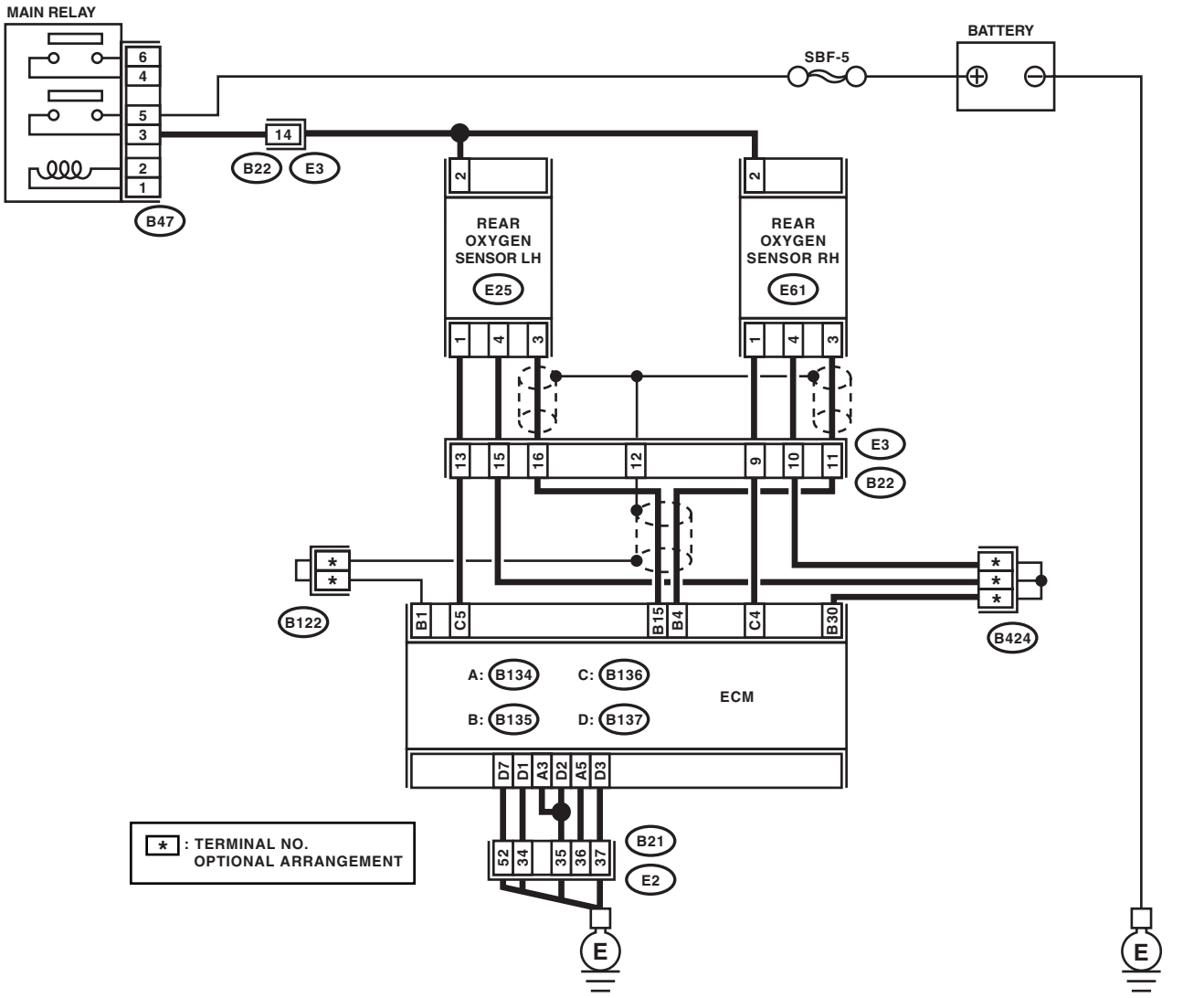
CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

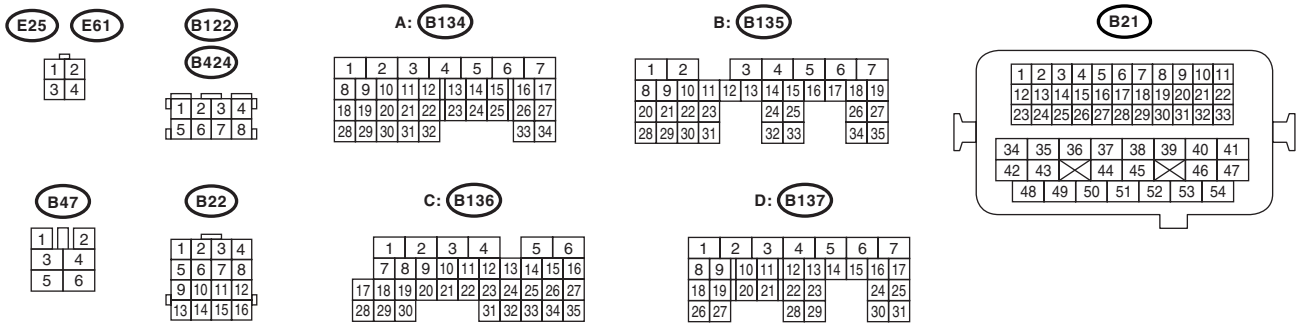
WIRING DIAGRAM:





EN-03737


MAIN RELAY
BATTERY
SBF-5
B47
B22
E3
REAR OXYGEN SENSOR LH
E25
REAR OXYGEN SENSOR RH
E61
B122
B424
A: B134
C: B136
B: B135
D: B137
ECM
B21
E2
* : TERMINAL NO. OPTIONAL ARRANGEMENT


E25
E61
B122
B424
A: B134
B: B135
B21
B47
B22
C: B136
D: B137

EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or general scan tool screen, warm-up the engine until engine coolant temperature is above 75°C (167°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read data of front oxygen (A/F) sensor signal using the Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value within 0.86 — 1.15 at idle?	Go to step **3**.	Go to step **4**.
3	**CHECK REAR OXYGEN SENSOR SIGNAL.** 1) Race engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed. 2) Operate the LED operation mode for engine. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Does the LED of {Rear O2 Rich Signal} blink?	Check front oxygen (A/F) sensor circuit.	Check rear oxygen sensor circuit. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>
4	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Looseness of part installation • Damage (crack, hole etc.) of parts • Looseness of the front oxygen (A/F) sensor • Looseness or ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Go to step **5**.
5	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **6**.

	Step	Check	Yes	No
6	**CHECK FUEL PRESSURE** **WARNING:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel.** Measure the fuel pressure. <Ref. to ME(H6DO)-26, INSPECTION, Fuel Pressure.> **WARNING:** **Release fuel pressure before removing the fuel pressure gauge.**	Is the measured value 338 — 348 kPa (3.4 — 3.5 kg/cm^2, 49 — 50.5 psi)?	Go to step **7**.	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 supply line
7	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the temperature above 60°C (140°F)?	Go to step **8**.	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-17, Engine Coolant Temperature Sensor.>
8	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value 3.1 — 4.3 g/s (0.4 — 0.6 lb/m)?	Go to step **9**.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>

	Step	Check	Yes	No
9	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Open the front hood. 6) Measure the ambient temperature. 7) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Subtract ambient temperature from intake air temperature. Is the obtained value –10 — 50°C (14 — 122°F)?	Go to step **10**.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>
10	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — Chassis ground:*** ***(B134) No. 33 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11**.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
11	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 (+) — Chassis ground (–):*** ***(B134) No. 33 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **12**.	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector.
12	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — (E47) No. 4:*** ***(B134) No. 33 — (E47) No. 3:***	Is the resistance less than 1 Ω?	Go to step **13**.	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.

	Step	Check	Yes	No
13	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 490 mV?	Go to step **16**.	Go to step **14**.
14	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B137) No. 24 — (E61) No. 3:*** ***(B136) No. 35 — (E61) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **15**.
15	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E61) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
16	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and rapidly reduce the engine speed from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 250 mV or less?	Contact with SOA Service Center.	Go to step **17**.
17	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B137) No. 24 — (E61) No. 3:*** ***(B136) No. 35 — (E61) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **18**.
18	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E61) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

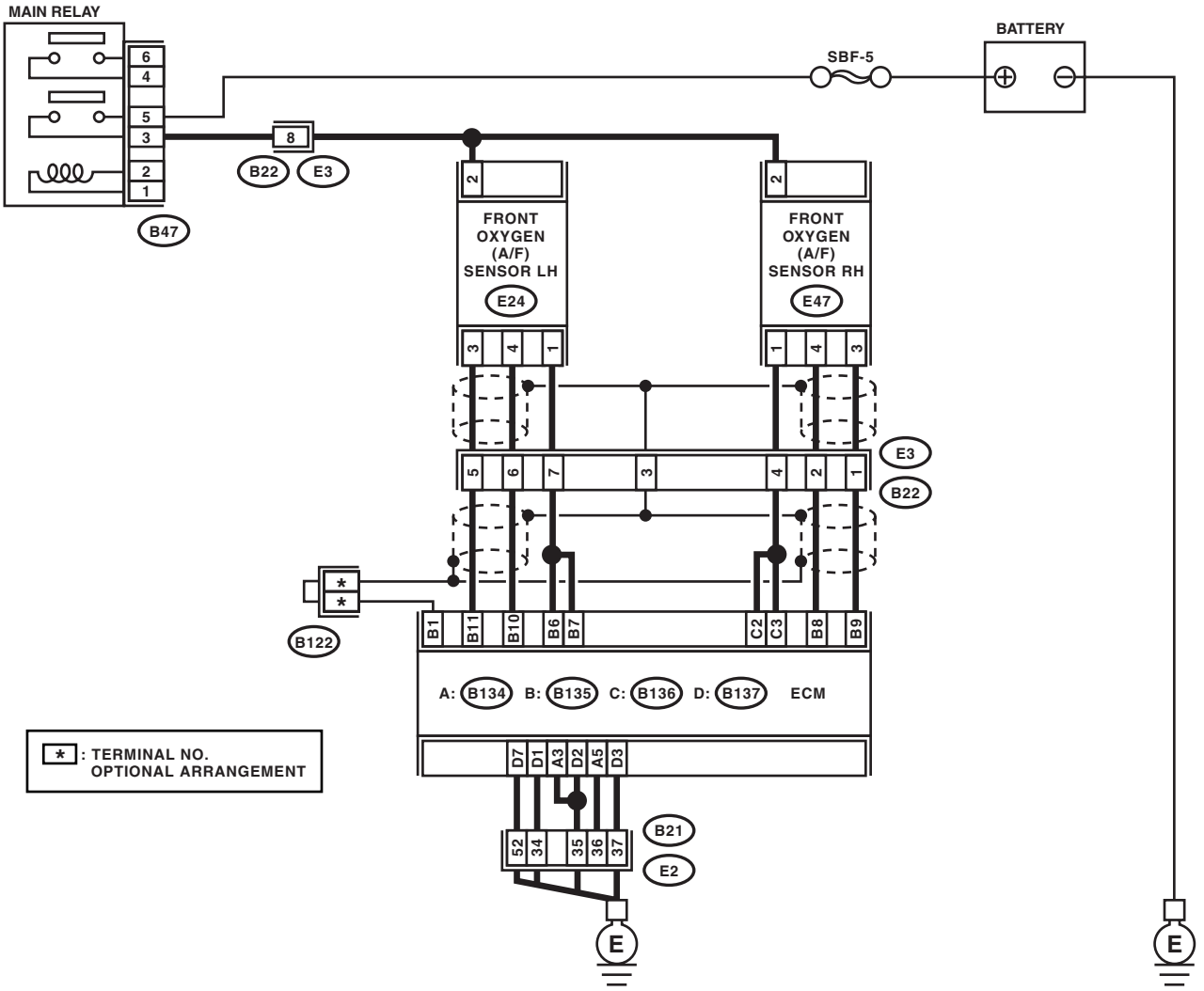
DR:DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1)

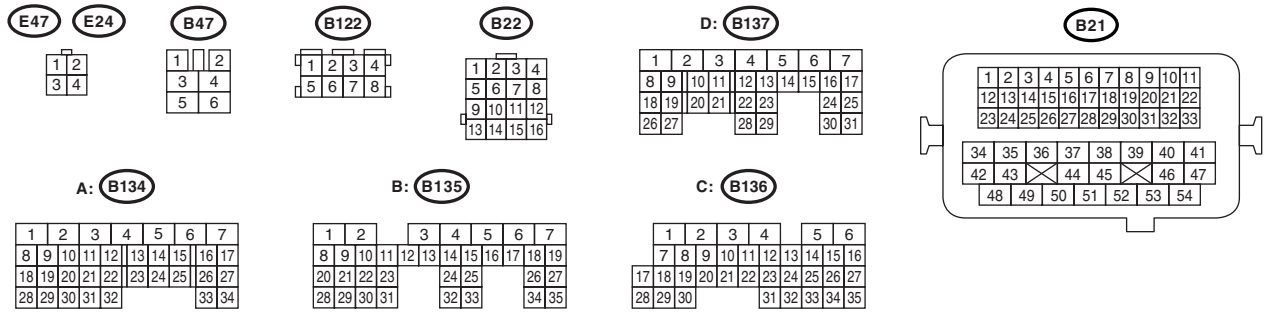
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-199, DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

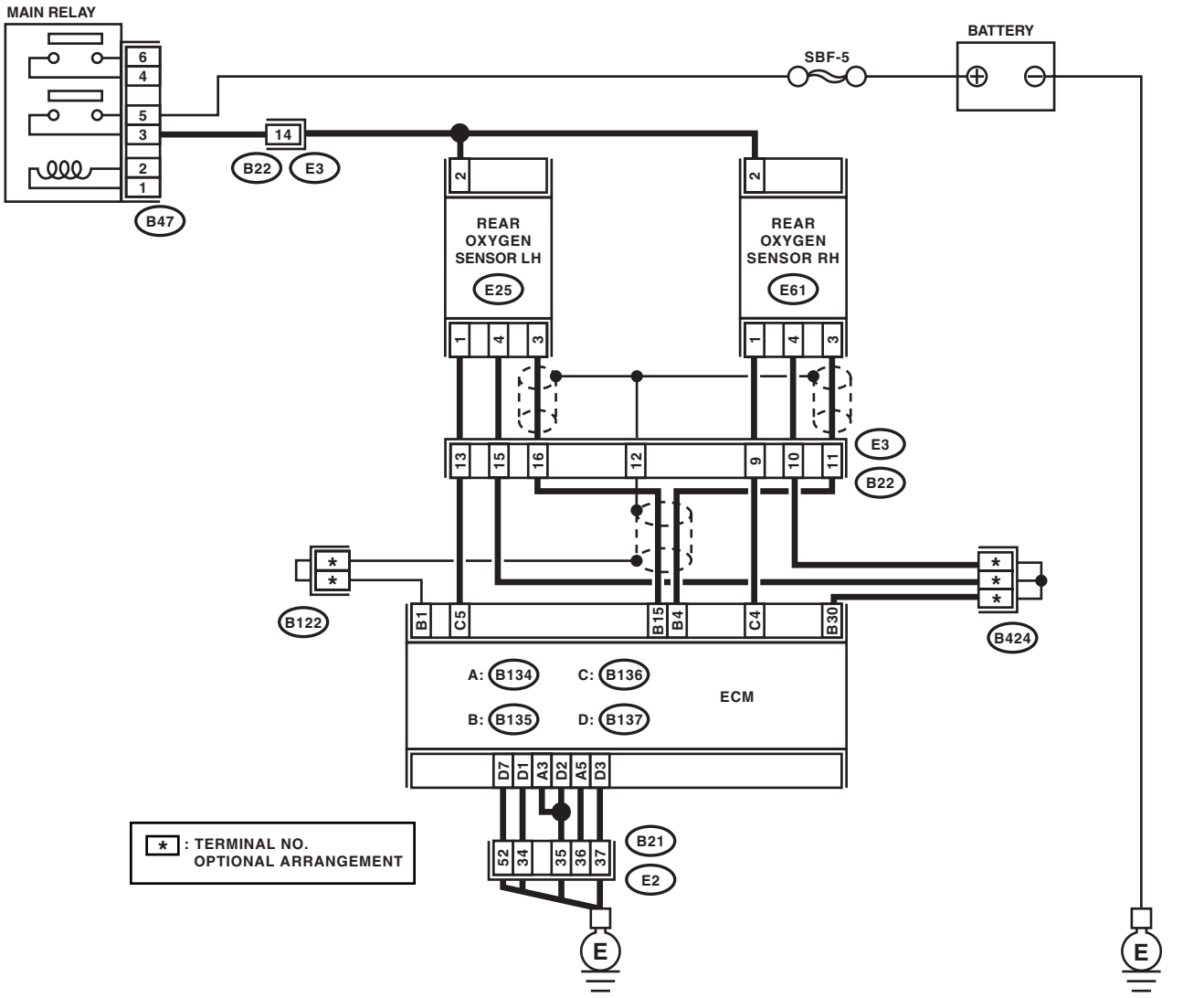
CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

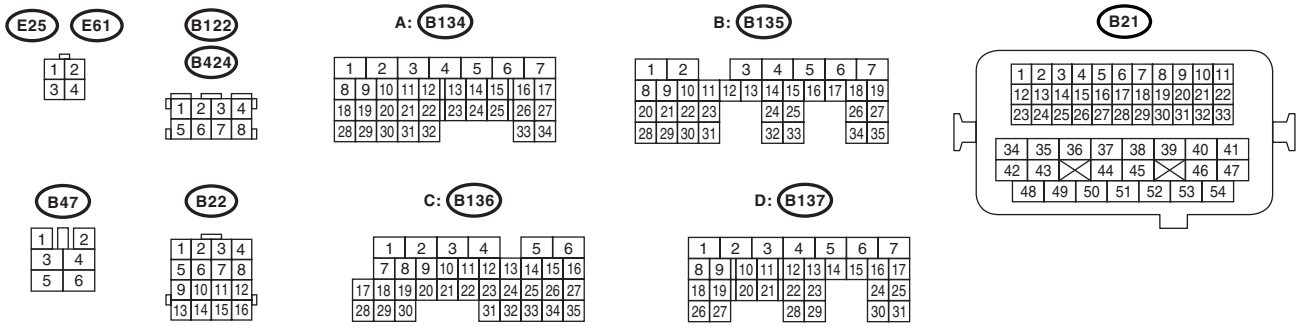
WIRING DIAGRAM:





EN-03737


MAIN RELAY
BATTERY
SBF-5
B47
B22
E3
REAR OXYGEN SENSOR LH
E25
REAR OXYGEN SENSOR RH
E61
B122
B424
A: B134
C: B136
B: B135
D: B137
ECM
B21
E2
* : TERMINAL NO. OPTIONAL ARRANGEMENT


E25
E61
B122
B424
A: B134
B: B135
B21
B47
B22
C: B136
D: B137

EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or general scan tool screen, warm-up the engine until engine coolant temperature is above 75°C (167°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read data of front oxygen (A/F) sensor signal using the Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value within 0.86 — 1.15 at idle?	Go to step **3**.	Go to step **4**.
3	**CHECK REAR OXYGEN SENSOR SIGNAL.** 1) Race engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed. 2) Operate the LED operation mode for engine. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Does the LED of {Rear O2 Rich Signal} blink?	Check front oxygen (A/F) sensor circuit.	Check rear oxygen sensor circuit. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>
4	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Looseness of part installation • Damage (crack, hole etc.) of parts • Looseness of the front oxygen (A/F) sensor • Looseness or ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Go to step **5**.
5	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **6**.

	Step	Check	Yes	No
6	**CHECK FUEL PRESSURE** **WARNING:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel.** Measure the fuel pressure. <Ref. to ME(H6DO)-26, INSPECTION, Fuel Pressure.> **WARNING:** **Release fuel pressure before removing the fuel pressure gauge.**	Is the measured value 338 — 348 kPa (3.4 — 3.5 kg/cm^2, 49 — 50.5 psi)?	Go to step **7**.	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 supply line
7	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the temperature above 60°C (140°F)?	Go to step **8**.	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-17, Engine Coolant Temperature Sensor.>
8	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value 3.1 — 4.3 g/s (0.4 — 0.6 lb/m)?	Go to step **9**.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>

	Step	Check	Yes	No
9	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Open the front hood. 6) Measure the ambient temperature. 7) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Subtract ambient temperature from intake air temperature. Is the obtained value –10 — 50°C (14 — 122°F)?	Go to step **10**.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>
10	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — Chassis ground:*** ***(B134) No. 33 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11**.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
11	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 (+) — Chassis ground (–):*** ***(B134) No. 33 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **12**.	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector.
12	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — (E47) No. 4:*** ***(B134) No. 33 — (E47) No. 3:***	Is the resistance less than 1 Ω?	Go to step **13**.	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.

	Step	Check	Yes	No
13	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 490 mV?	Go to step **16**.	Go to step **14**.
14	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B135) No. 4 — (E61) No. 3:*** ***(B135) No. 30 — (E61) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **15**.
15	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E61) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
16	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and rapidly reduce the engine speed from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 250 mV or less?	Contact with SOA Service Center.	Go to step **17**.
17	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B135) No. 4 — (E61) No. 3:*** ***(B135) No. 30 — (E61) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **18**.
18	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E61) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

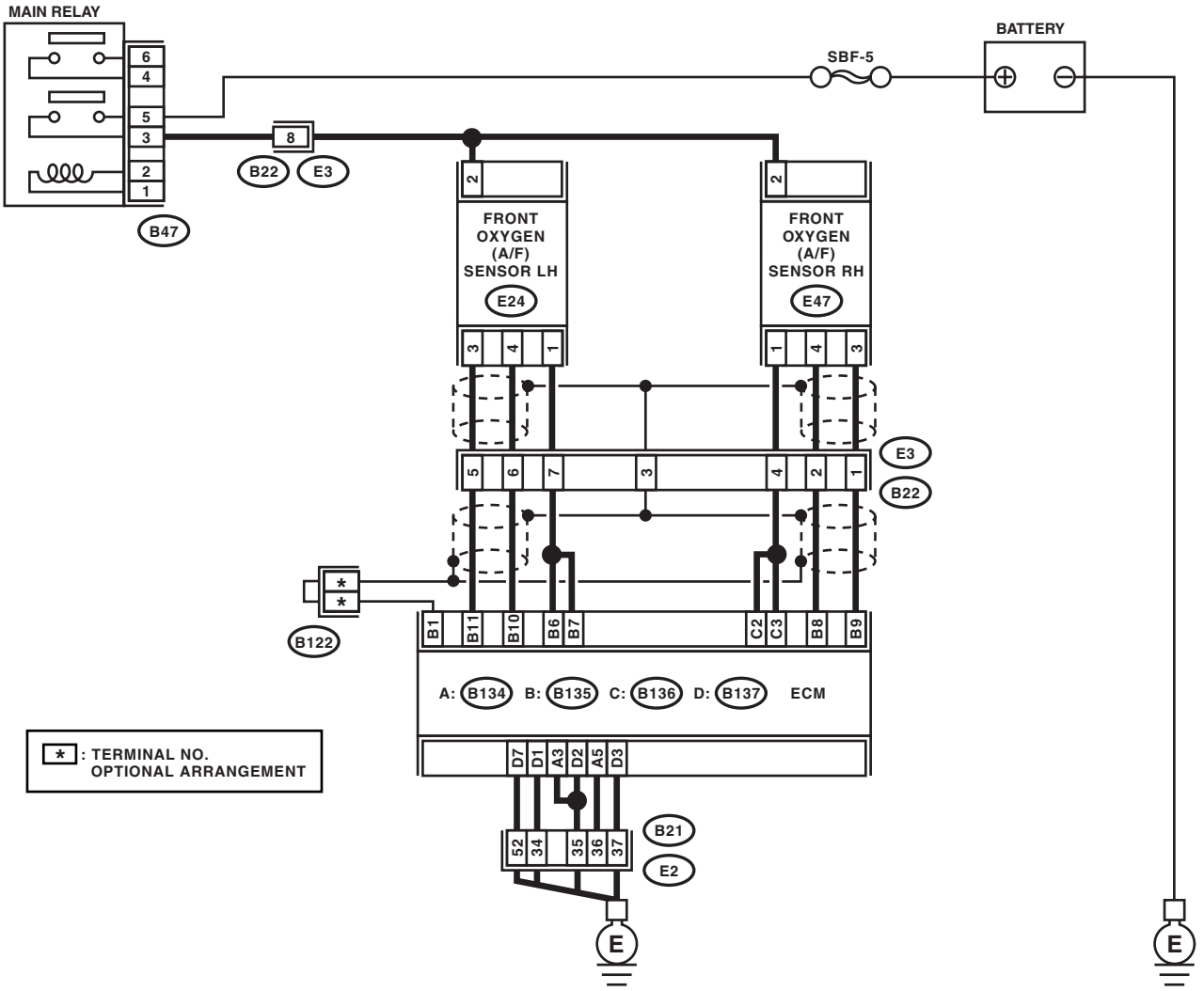
DS:DTC P2098 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 2)

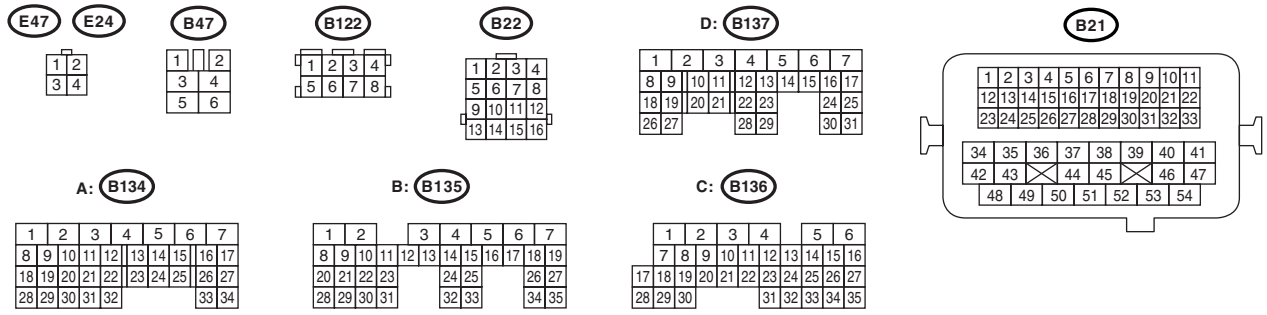
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-200, DTC P2098 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

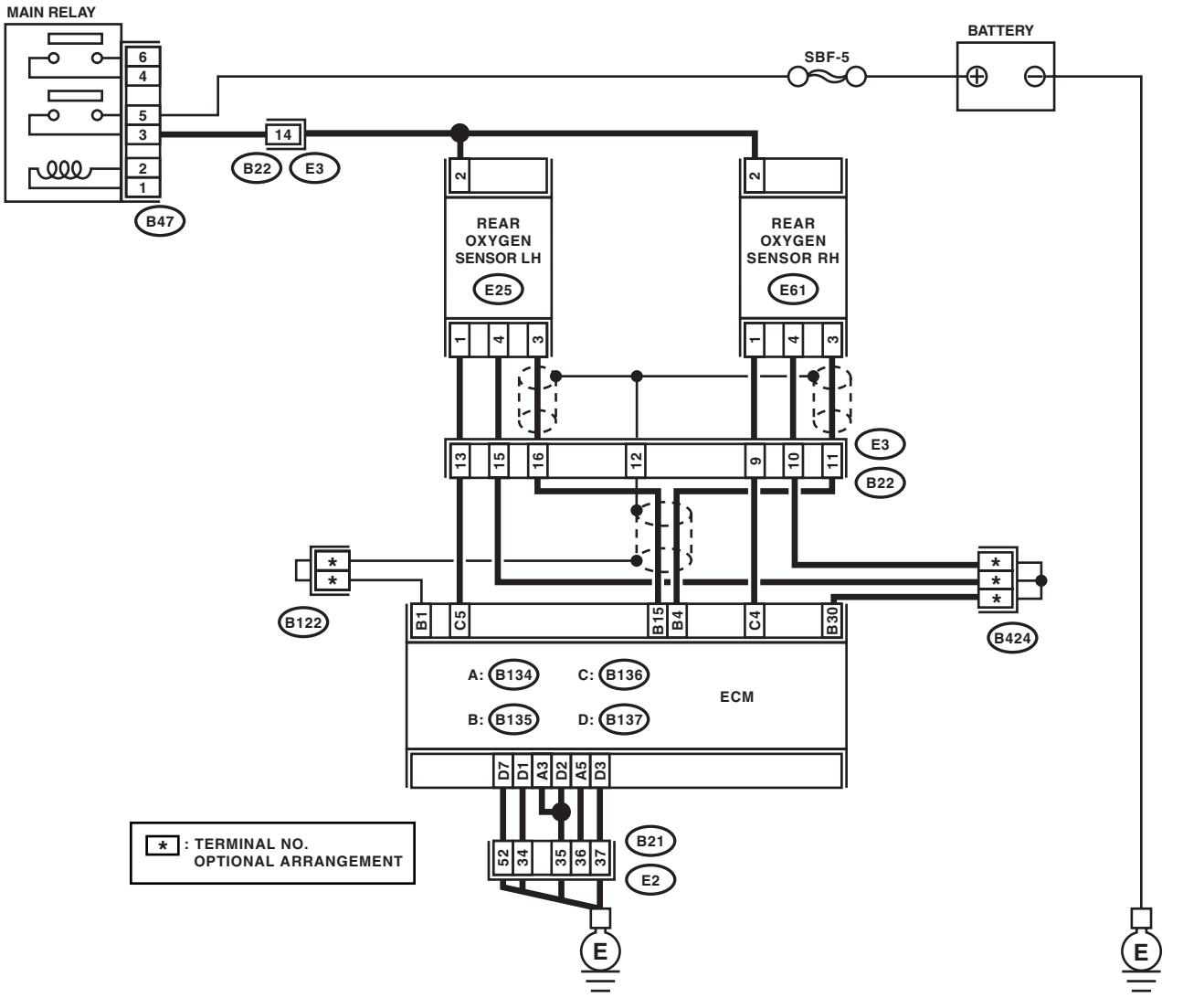
CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

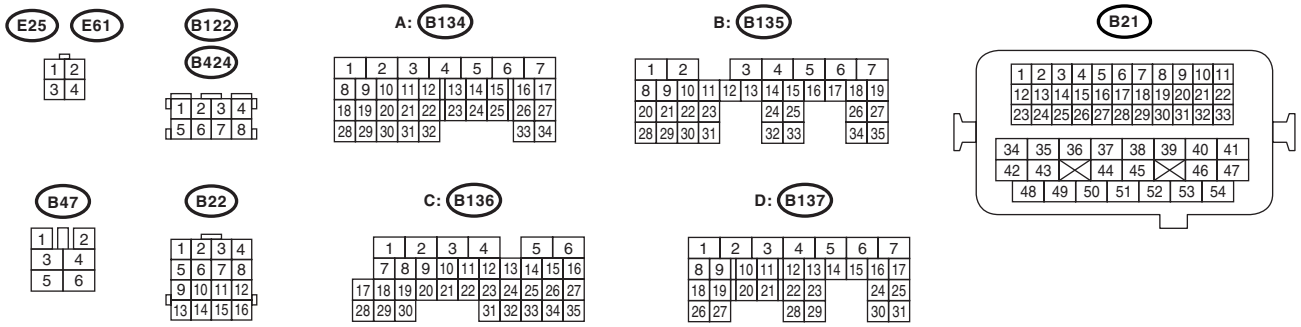
WIRING DIAGRAM:





EN-03737


MAIN RELAY
BATTERY
SBF-5
B47
B22
E3
REAR OXYGEN SENSOR LH
E25
REAR OXYGEN SENSOR RH
E61
B122
B424
A: B134
C: B136
B: B135
D: B137
ECM
B21
E2
* : TERMINAL NO. OPTIONAL ARRANGEMENT


E25
E61
B122
B424
A: B134
B: B135
B21
B47
B22
C: B136
D: B137

EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or general scan tool screen, warm-up the engine until engine coolant temperature is above 75°C (167°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read data of front oxygen (A/F) sensor signal using the Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value within 0.86 — 1.15 at idle?	Go to step **3**.	Go to step **4**.
3	**CHECK REAR OXYGEN SENSOR SIGNAL.** 1) Race engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed. 2) Operate the LED operation mode for engine. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE.". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Does the LED of {Rear O2 Rich Signal} blink?	Check front oxygen (A/F) sensor circuit.	Check rear oxygen sensor circuit. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>
4	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Looseness of part installation • Damage (crack, hole etc.) of parts • Looseness of the front oxygen (A/F) sensor • Looseness or ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Go to step **5**.
5	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **6**.

	Step	Check	Yes	No
6	**CHECK FUEL PRESSURE** **WARNING:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel.** Measure the fuel pressure. <Ref. to ME(H6DO)-26, INSPECTION, Fuel Pressure.> **WARNING:** **Release fuel pressure before removing the fuel pressure gauge.**	Is the measured value 338 — 348 kPa (3.4 — 3.5 kg/cm^2, 49 — 50.5 psi)?	Go to step **7**.	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 supply line
7	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the temperature above 60°C (140°F)?	Go to step **8**.	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-17, Engine Coolant Temperature Sensor.>
8	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value 3.1 — 4.3 g/s (0.4 — 0.6 lb/m)?	Go to step **9**.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>

	Step	Check	Yes	No
9	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Open the front hood. 6) Measure the ambient temperature. 7) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Subtract ambient temperature from intake air temperature. Is the obtained value –10 — 50°C (14 — 122°F)?	Go to step **10**.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>
10	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 27 — Chassis ground:*** ***(B134) No. 34 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11**.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
11	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 27 (+) — Chassis ground (–):*** ***(B134) No. 34 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **12**.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
12	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 27 — (E24) No. 4:*** ***(B134) No. 34 — (E24) No. 3:***	Is the resistance less than 1 Ω?	Go to step **13**.	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.

	Step	Check	Yes	No
13	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 490 mV?	Go to step **16**.	Go to step **14**.
14	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B137) No. 25 — (E61) No. 3:*** ***(B136) No. 35 — (E61) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **15**.
15	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
16	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and rapidly reduce the engine speed from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 250 mV or less?	Contact with SOA Service Center.	Go to step **17**.
17	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B137) No. 25 — (E61) No. 3:*** ***(B136) No. 35 — (E61) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **18**.
18	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

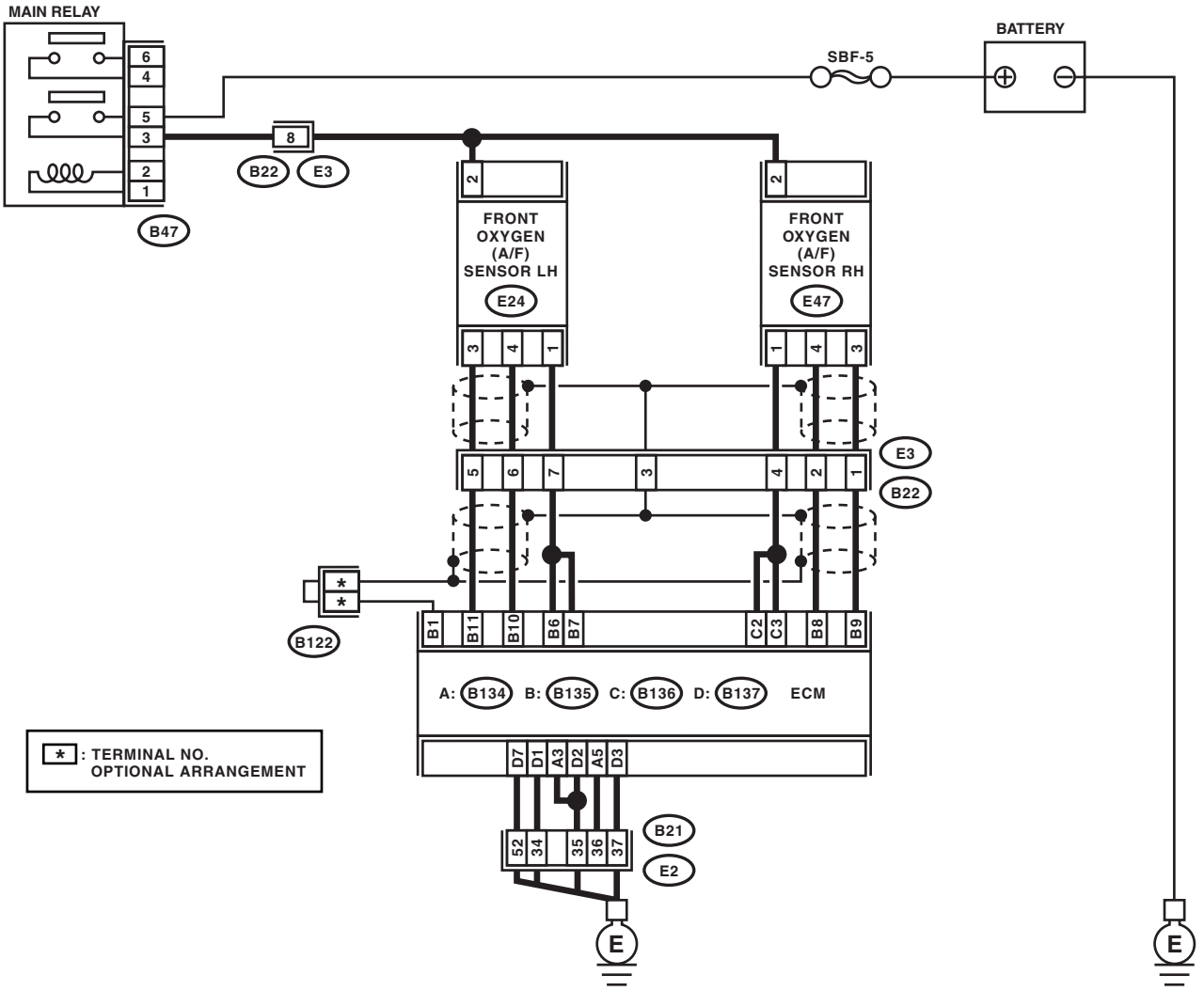
DT:DTC P2099 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 2)

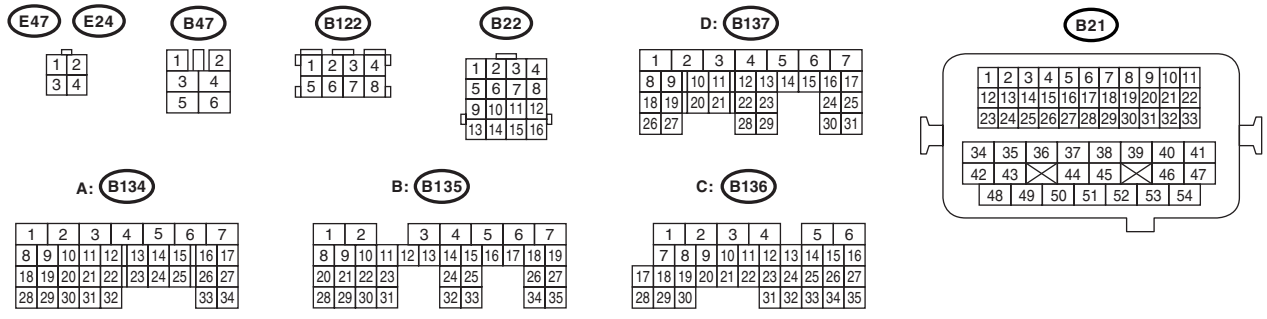
DTC DETECTING CONDITION:

- Detected when two consecutive driving cycles with fault occur.
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-200, DTC P2099 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

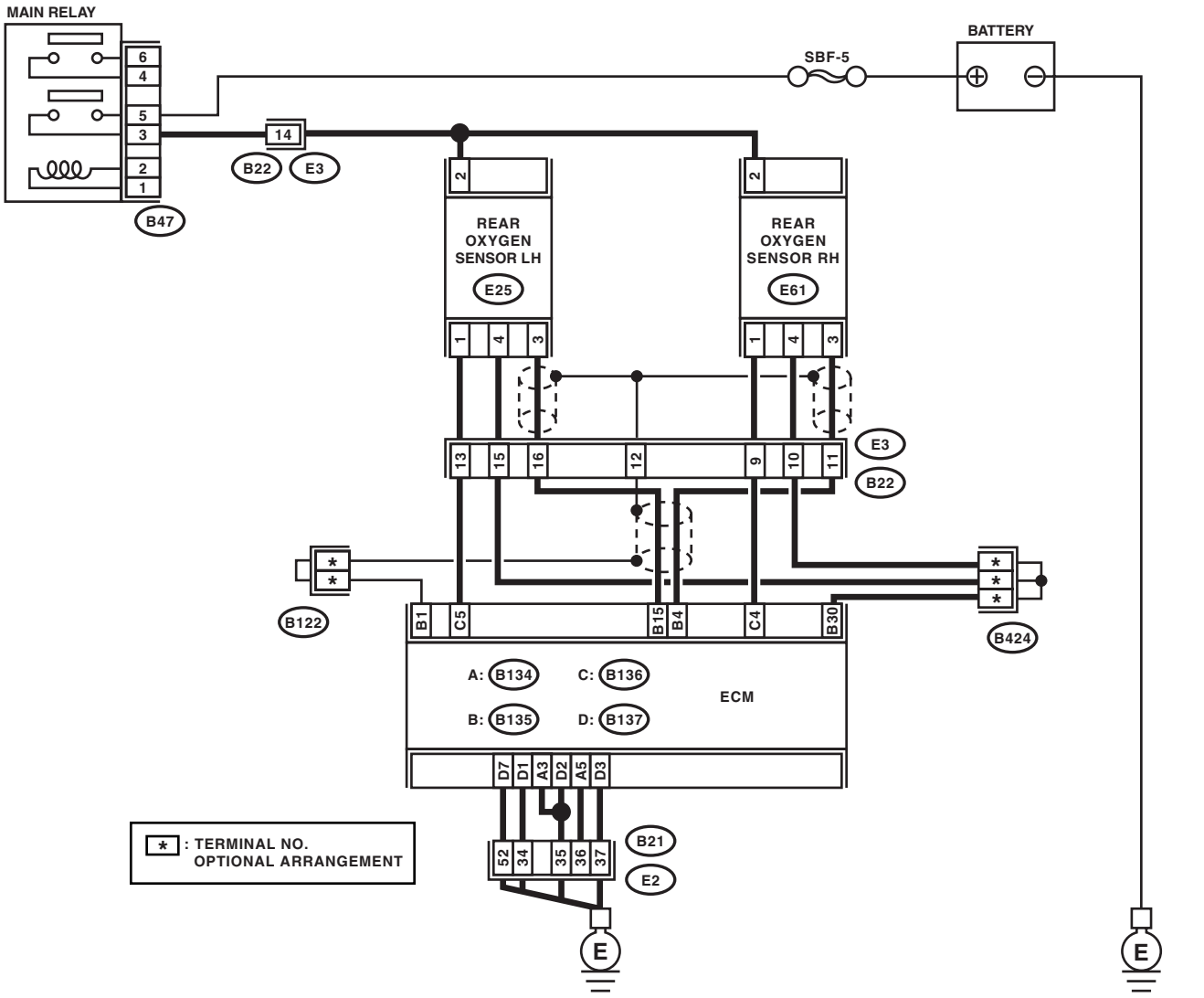
CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

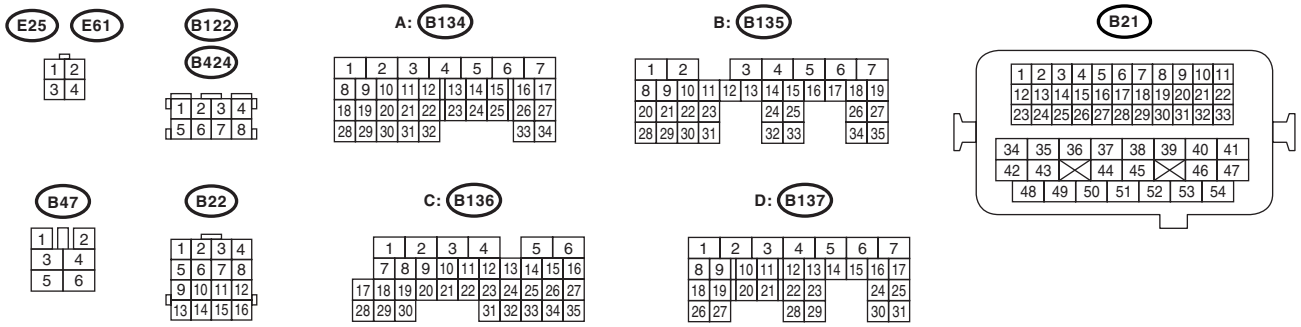
WIRING DIAGRAM:





EN-03737


MAIN RELAY
BATTERY
SBF-5
B47
B22
E3
REAR OXYGEN SENSOR LH
E25
REAR OXYGEN SENSOR RH
E61
B122
B424
A: B134
C: B136
B: B135
D: B137
ECM
B21
E2
* : TERMINAL NO. OPTIONAL ARRANGEMENT


E25
E61
B122
B424
A: B134
B: B135
B21
B47
B22
C: B136
D: B137

EN-03738

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-69, List of Diagnostic Trouble Code (DTC).>	Go to step **2**.
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or general scan tool screen, warm-up the engine until engine coolant temperature is above 75°C (167°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read data of front oxygen (A/F) sensor signal using the Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value within 0.86 — 1.15 at idle?	Go to step **3**.	Go to step **4**.
3	**CHECK REAR OXYGEN SENSOR SIGNAL.** 1) Race engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed. 2) Operate the LED operation mode for engine. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE.". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Does the LED of {Rear O2 Rich Signal} blink?	Check front oxygen (A/F) sensor circuit.	Check rear oxygen sensor circuit. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>
4	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Looseness of part installation • Damage (crack, hole etc.) of parts • Looseness of the front oxygen (A/F) sensor • Looseness or ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Go to step **5**.
5	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **6**.

	Step	Check	Yes	No
6	**CHECK FUEL PRESSURE** **WARNING:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel.** Measure the fuel pressure. <Ref. to ME(H6DO)-26, INSPECTION, Fuel Pressure.> **WARNING:** **Release fuel pressure before removing the fuel pressure gauge.**	Is the measured value 338 — 348 kPa (3.4 — 3.5 kg/cm^2, 49 — 50.5 psi)?	Go to step **7**.	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 supply line
7	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the temperature above 60°C (140°F)?	Go to step **8**.	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-17, Engine Coolant Temperature Sensor.>
8	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the measured value 3.1 — 4.3 g/s (0.4 — 0.6 lb/m)?	Go to step **9**.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>

	Step	Check	Yes	No
9	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all the accessory switches to OFF. 5) Open the front hood. 6) Measure the ambient temperature. 7) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Subtract ambient temperature from intake air temperature. Is the obtained value –10 — 50°C (14 — 122°F)?	Go to step **10**.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-23, Mass Air Flow and Intake Air Temperature Sensor.>
10	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 27 — Chassis ground:*** ***(B134) No. 34 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11**.	Repair the ground short circuit of harness between ECM and front oxygen (A/F) sensor connector.
11	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 27 (+) — Chassis ground (–):*** ***(B134) No. 34 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **12**.	Repair the battery short circuit of harness between ECM and front oxygen (A/F) sensor connector.
12	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 27 — (E24) No. 4:*** ***(B134) No. 34 — (E24) No. 3:***	Is the resistance less than 1 Ω?	Go to step **13**.	Repair the open circuit of harness between ECM and front oxygen (A/F) sensor connector.

	Step	Check	Yes	No
13	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage more than 490 mV?	Go to step **16**.	Go to step **14**.
14	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B137) No. 25 — (E61) No. 3:*** ***(B136) No. 35 — (E61) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **15**.
15	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
16	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and rapidly reduce the engine speed from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the general scan tool operation manual.	Is the voltage 250 mV or less?	Contact with SOA Service Center.	Go to step **17**.
17	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 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. ***Connector & terminal*** ***(B137) No. 25 — (E61) No. 3:*** ***(B136) No. 35 — (E61) No. 4:***	Is the resistance more than 3Ω?	Repair the open circuit of harness between ECM and rear oxygen sensor connector.	Go to step **18**.
18	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (–):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-30, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following item: • Open circuit of harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

DU:DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/ PERFORMANCE

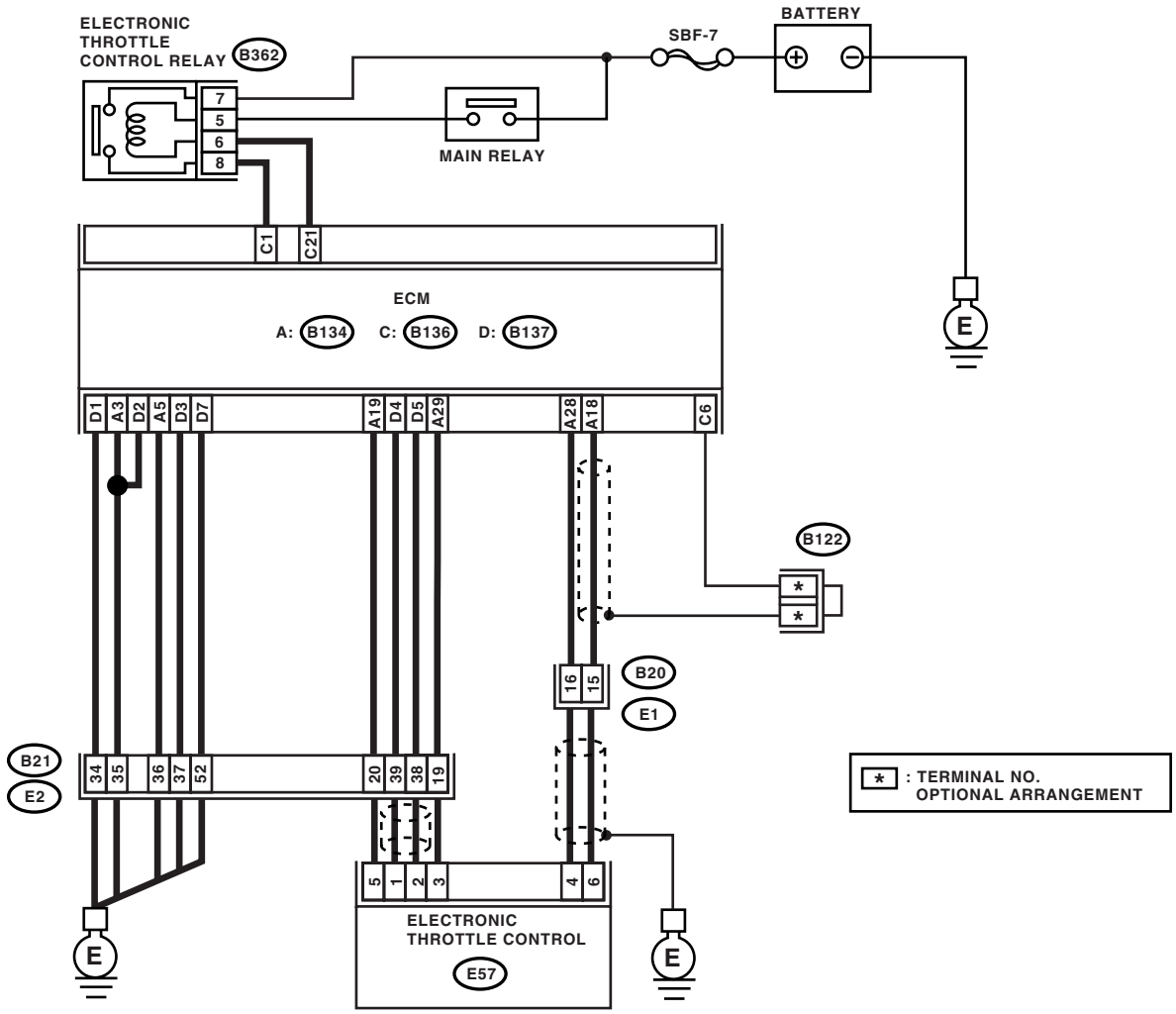
DTC DETECTING CONDITION:

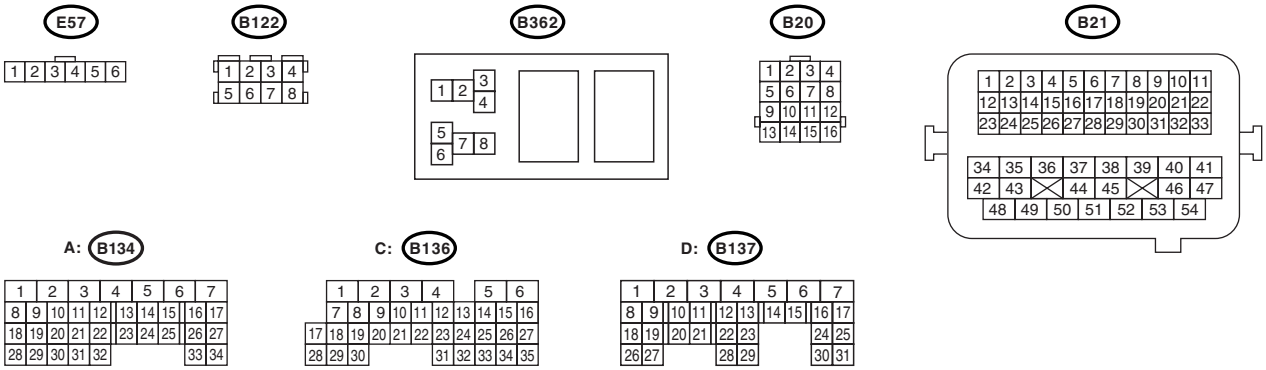
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-201, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:





EN-03739

	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 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. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **2**.	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 7 (+) — Chassis ground (–):*** ***(B362) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 5 V?	Go to step **3**.	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 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. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (–):***	Is the voltage less than 5 V?	Go to step **4**.	Repair the power supply short circuit of harness between ECM and electronic throttle control.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the ground short circuit of harness between ECM and electronic throttle control relay.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B136) No. 21 — (B362) No. 6:*** ***(B136) No. 1 — (B362) No. 8:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between ECM and electronic throttle control relay.
6	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **7**.	Go to step **9**.

	Step	Check	Yes	No
7	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage more than 0.8 V?	Go to step **8**.	Go to step **9**.
8	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **13**.
9	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 18 — (E57) No. 6:*** ***(B134) No. 28 — (E57) No. 4:*** ***(B134) No. 19 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **10**.	Repair the open circuit of harness connector.
10	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 28 — Chassis ground:*** ***(B136) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11**.	Repair the ground short circuit of harness.
11	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (–):***	Is the voltage 4.5 — 5.5 V?	Go to step **12**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
12	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10Ω?	Go to step **13**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
13	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage 4.63 V?	Go to step **14**.	Go to step **16**.

	Step	Check	Yes	No
14	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage 4.73 V?	Go to step **15**.	Go to step **16**.
15	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **21**.
16	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 29 — (E57) No. 3:*** ***(B134) No. 18 — (E57) No. 6:*** ***(B134) No. 28 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **17**.	Repair the open circuit of harness connector.
17	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **18**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
18	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **19**.	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.
19	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (–):*** ***(E57) No. 4 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **20**.	Repair the short circuit of harness between ECM connector and electronic throttle control connector.
20	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B134) No. 18 — (B134) No. 19:*** ***(B134) No. 28 — (B134) No. 19:***	Is the resistance more than 1 MΩ?	Go to step **21**.	Repair the short circuit to sensor power supply.

	Step	Check	Yes	No
21	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect the connectors except for electric throttle control relay. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage 0.81 — 0.87 V?	Go to step **22**.	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.
22	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage 1.64 — 1.70 V?	Go to step **23**.	Repair poor contact in ECM connector. Replace the electronic throttle control if defective.
23	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 5 — (E57) No. 2:*** ***(B137) No. 4 — (E57) No. 1:***	Is the resistance less than 1 Ω?	Go to step **24**.	Repair the open circuit of harness connector.
24	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 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. ***Connector & terminal*** ***(E57) No. 2 (+) — Engine ground (–):*** ***(E57) No. 1 (+) — Engine ground (–):***	Is the voltage less than 5 V?	Go to step **25**.	Repair the power supply short circuit of harness between ECM and electronic throttle control.
25	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 2 — Engine ground:*** ***(E57) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **26**.	Repair the short circuit of harness.
26	**CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS.** Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E57) No. 2 — (E57) No. 1:***	Is the resistance more than 1 MΩ?	Go to step **27**.	Repair the short circuit of harness.

	Step	Check	Yes	No
27	**CHECK GROUND CIRCUIT.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 5 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — Chassis ground:*** ***(B137) No. 3 — Chassis ground:*** ***(B137) No. 7 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **28**.	Repair the open circuit of harness.
28	**CHECK ELECTRONIC THROTTLE CONTROL.** Measure the resistance between electronic throttle control terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 5 Ω?	Go to step **29**.	Replace the electronic throttle control.
29	**CHECK ELECTRONIC THROTTLE CONTROL.** 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 poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Replace the electronic throttle control.

DV:DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

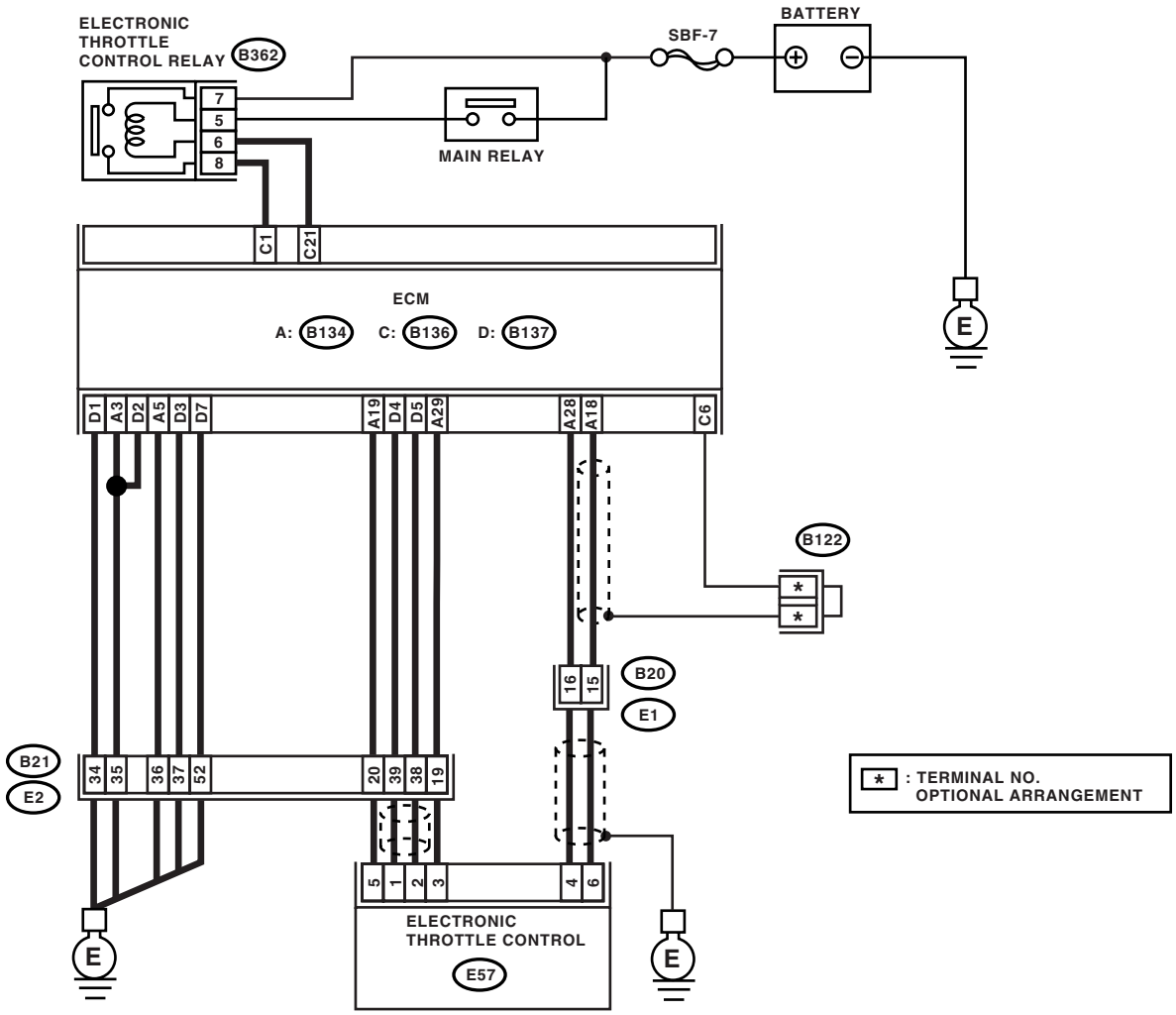
DTC DETECTING CONDITION:

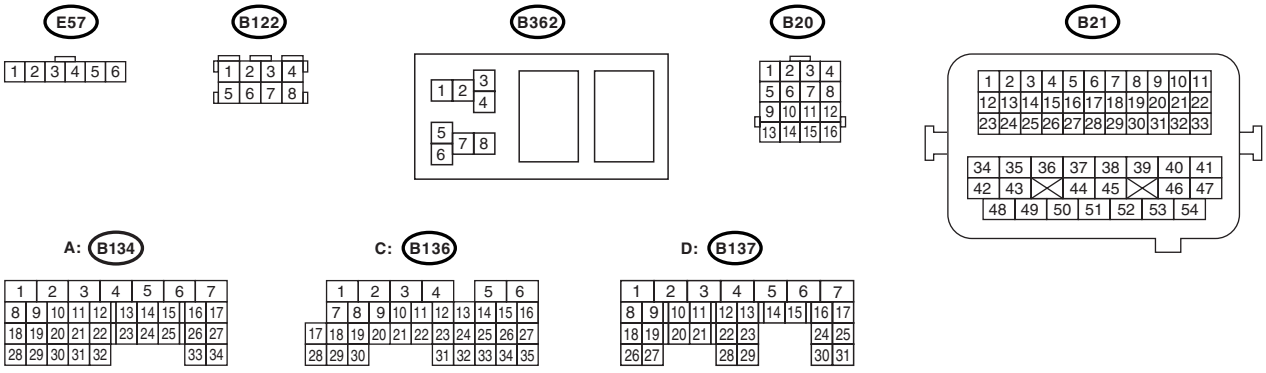
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-203, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:





EN-03739

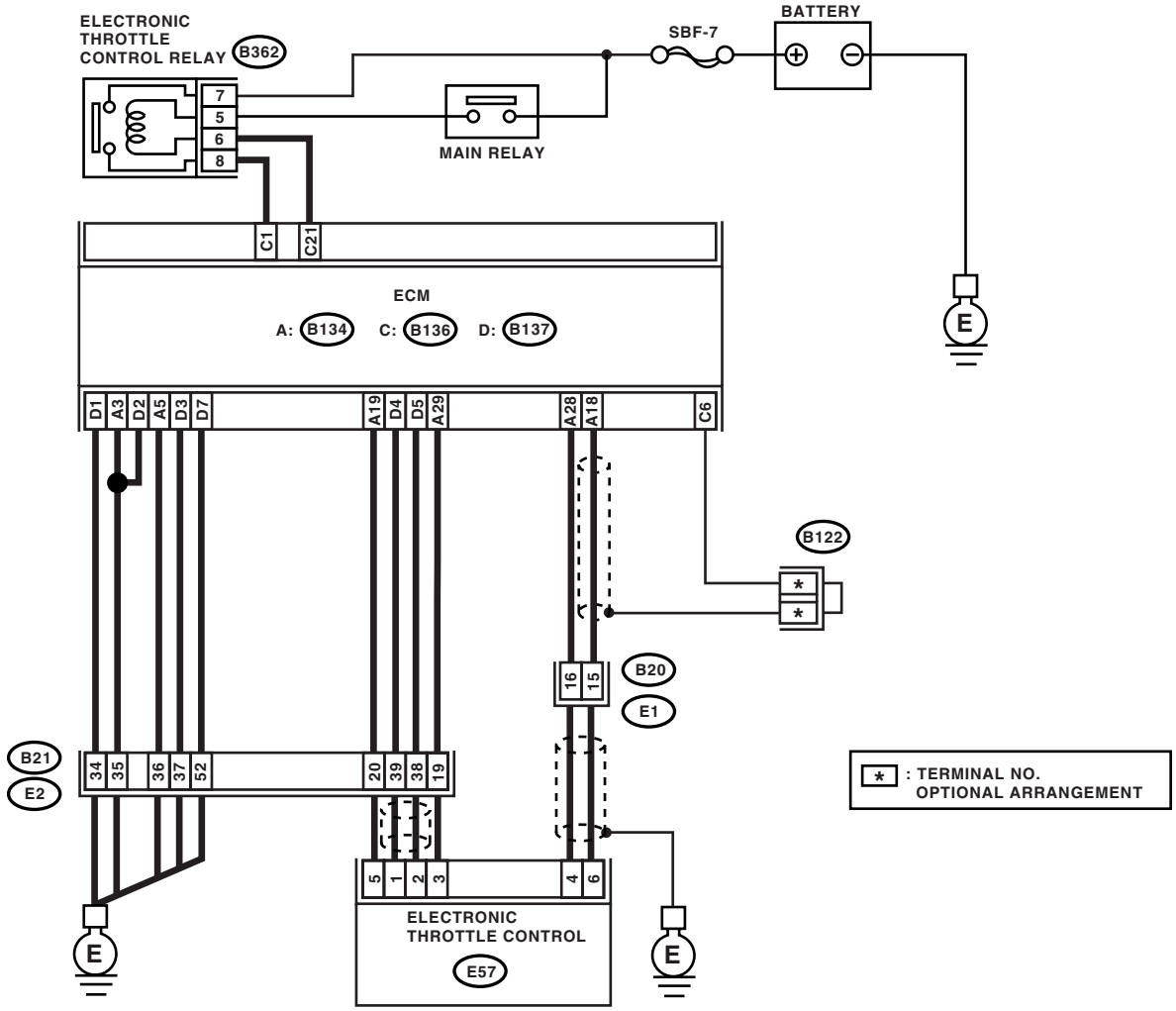
	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to terminals No. 5 and No. 6 of electronic throttle control relay. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **2**.	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 7 (+) — Chassis ground (–):*** ***(B362) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 5 V?	Go to step **3**.	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 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. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (–):***	Is the voltage less than 5 V?	Go to step **4**.	Repair the power supply short circuit of harness between ECM and electronic throttle control relay.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the ground short circuit of harness between ECM and electronic throttle control relay.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B136) No. 21 — (B362) No. 6:*** ***(B136) No. 1 — (B362) No. 8:***	Is the resistance less than 1 Ω?	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Repair the open circuit of harness between ECM and electronic throttle control relay.

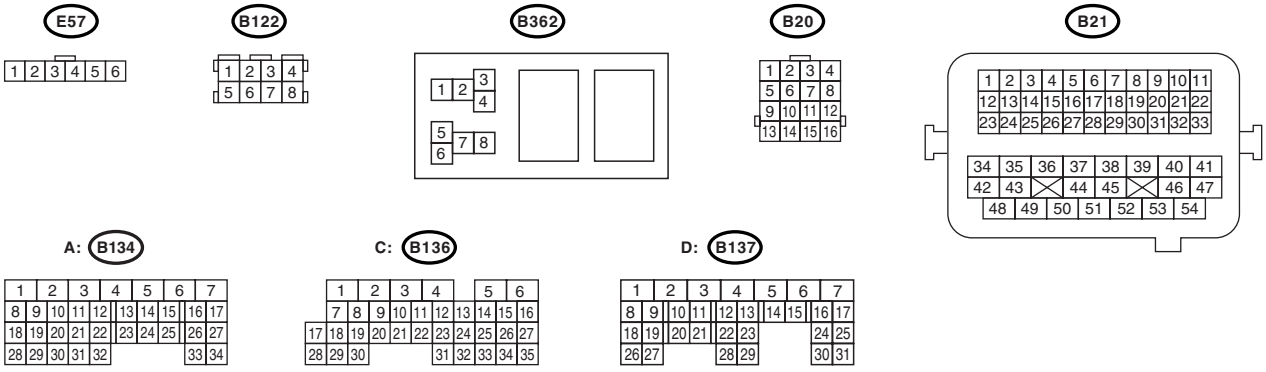
DW:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-205, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>

WIRING DIAGRAM:





EN-03739

	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance more than 1 MΩ?	Go to step **2**.	Replace the electronic throttle control relay.
2	**CHECK SHORT CIRCUIT OF ELECTRONIC THROTTLE CONTROL RELAY POWER SUPPLY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 5 V?	Go to step **3**.	Repair the power supply short circuit of harness between ECM and electronic throttle control relay.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Repair the ground short circuit of harness between ECM and electronic throttle control relay.

DX:DTC P2109 THROTTLE/PEDAL POSITION SENSOR A MINIMUM STOP PERFORMANCE

NOTE:
For the diagnostic procedure, refer to DTC P2101. <Ref. to EN(H6DO)(diag)-360, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DY:DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT LOW INPUT

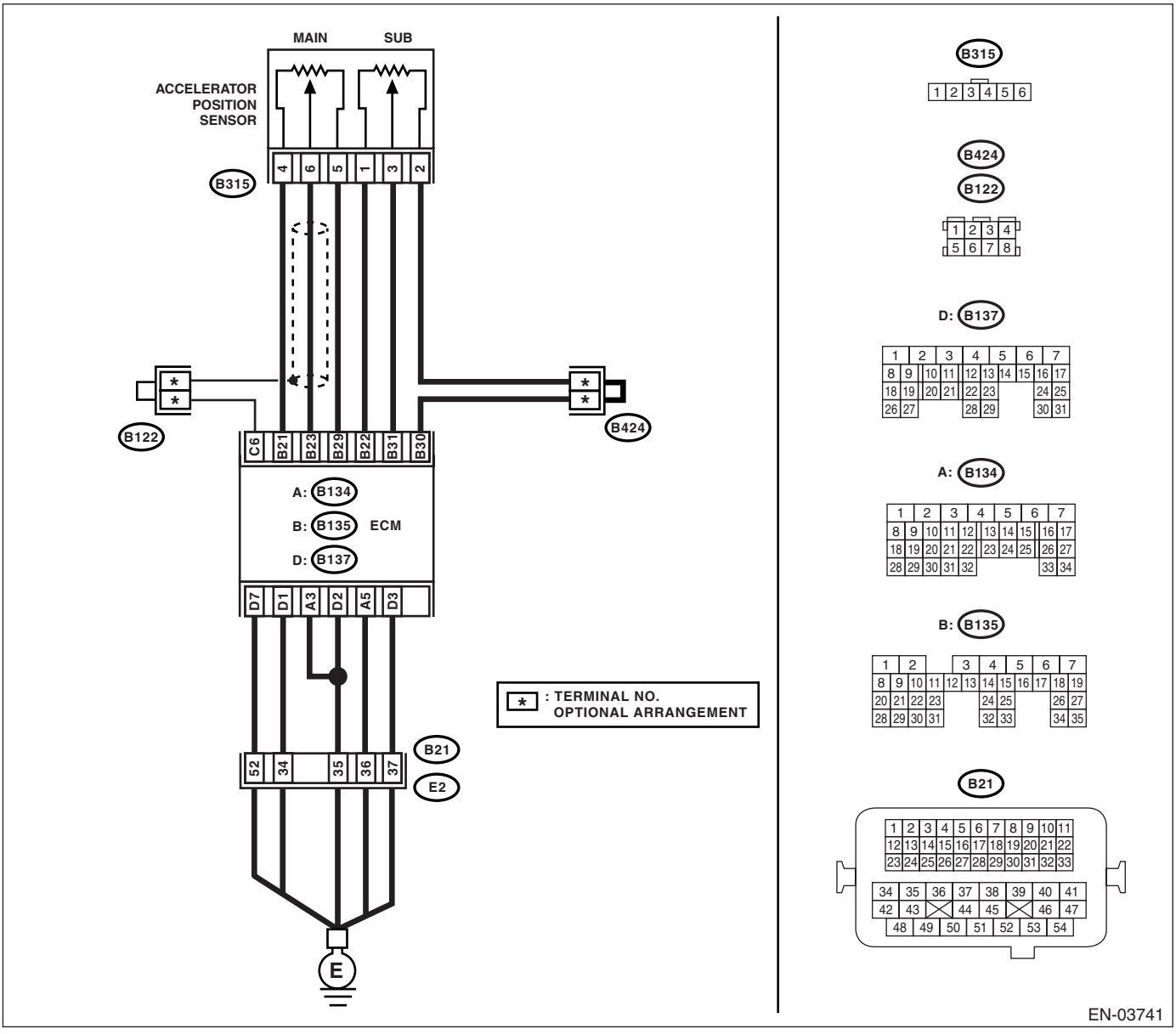
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-209, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/ SWITCH “D” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



EN-03741

	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **2**.	Go to step **3**.
2	**CHECK POOR CONTACT.** Check poor contact of connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B135) No. 23 — (B315) No. 6:*** ***(B135) No. 21 — (B315) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 23 — Chassis ground:*** ***(B135) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 (+) — Engine ground (–):***	Is the voltage 4.5 — 5.5 V?	Go to step **6**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance between 1.2 and 4.8 kΩ?	Go to step **7**.	Replace the accelerator pedal position sensor.
7	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 6 — No. 5:*** Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance between 0.2 and 1.0 kΩ?	Go to step **8**.	Replace the accelerator pedal position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 6 — No. 5:*** Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance between 0.5 and 2.5 kΩ?	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Replace the accelerator pedal position sensor.

DZ:DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT HIGH INPUT

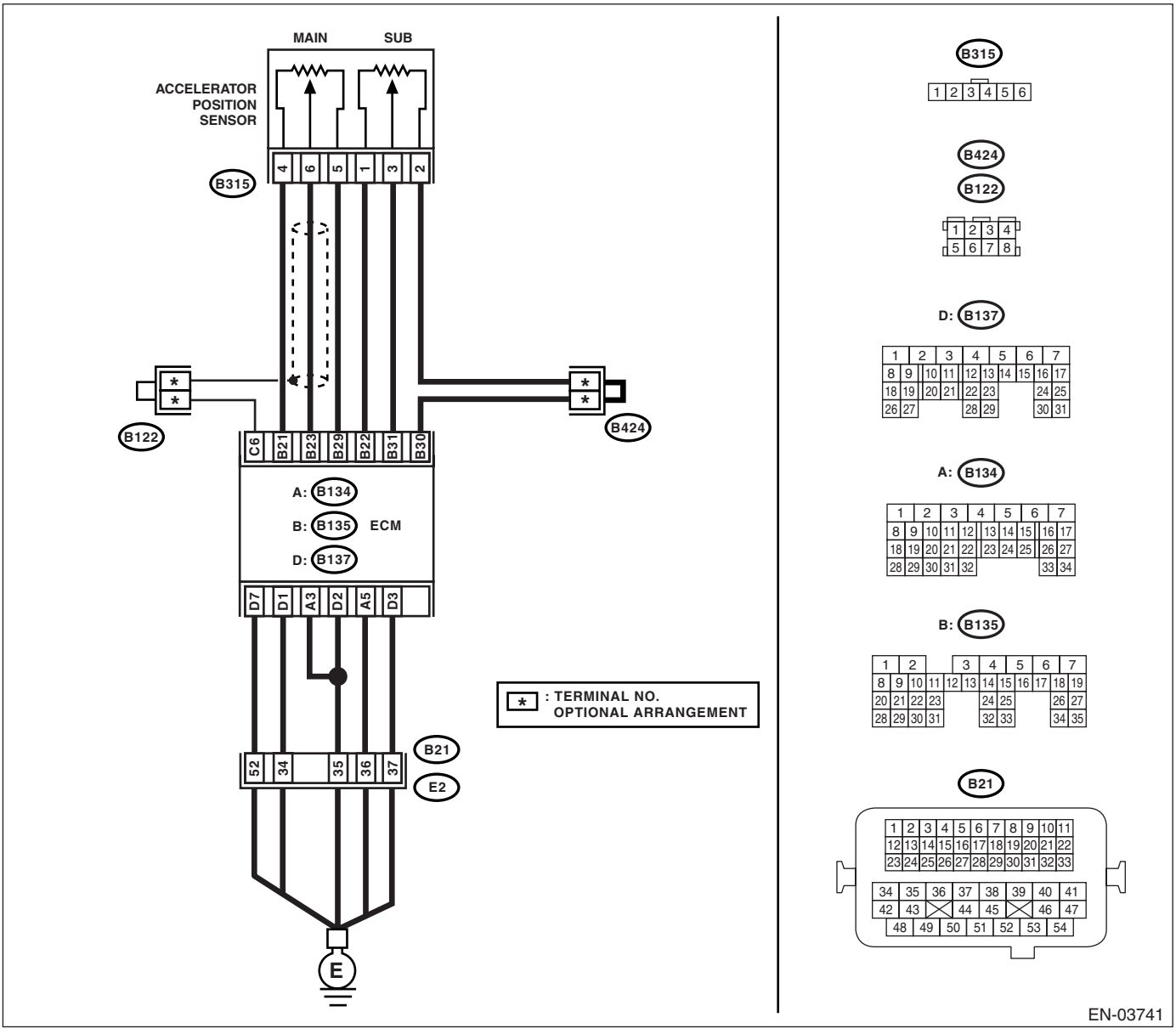
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-211, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/ SWITCH “D” CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



EN-03741

	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage less than 4.8 V?	Go to step **2**.	Go to step **3**.
2	**CHECK POOR CONTACT.** Check poor contact of connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B135) No. 29 — (B315) No. 5:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 6 (+) — Engine ground (–):***	Is the voltage less than 6 V?	Go to step **6**.	Repair the battery short circuit of harness between ECM connector and accelerator pedal position sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B135) No. 23 — (B135) No. 21:*** ***(B135) No. 23 — (B135) No. 22:***	Is the resistance more than 1 MΩ?	Repair the poor contact of accelerator pedal position sensor connector. Replace the accelerator pedal position sensor if defective.	Repair the short circuit to sensor power supply.

EA:DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT

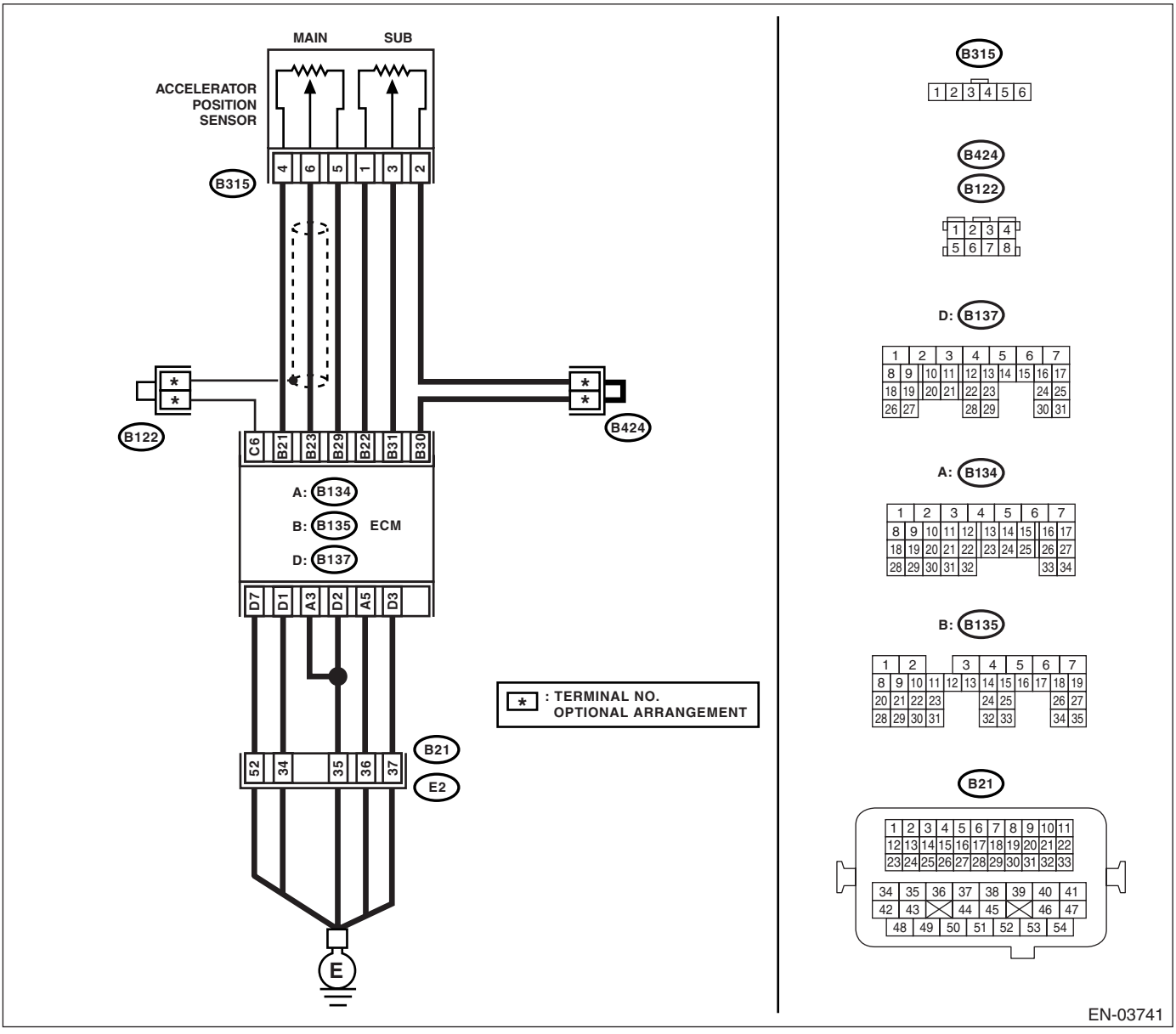
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-213, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/ SWITCH “E” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



EN-03741

	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **2**.	Go to step **3**.
2	**CHECK POOR CONTACT.** Check poor contact of connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B135) No. 31 — (B315) No. 3:*** ***(B135) No. 22 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 31 — Chassis ground:*** ***(B135) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 1 (+) — Engine ground (–):***	Is the voltage 4.5 — 5.5 V?	Go to step **6**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 0.75 and 3.15 kΩ?	Go to step **7**.	Replace the accelerator pedal position sensor.
7	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 3 — No. 2:*** 2) Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance between 0.15 and 0.63 kΩ?	Go to step **8**.	Replace the accelerator pedal position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 3 — No. 2:*** 2) Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance between 0.28 and 1.68 kΩ?	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Replace the accelerator pedal position sensor.

EB:DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT

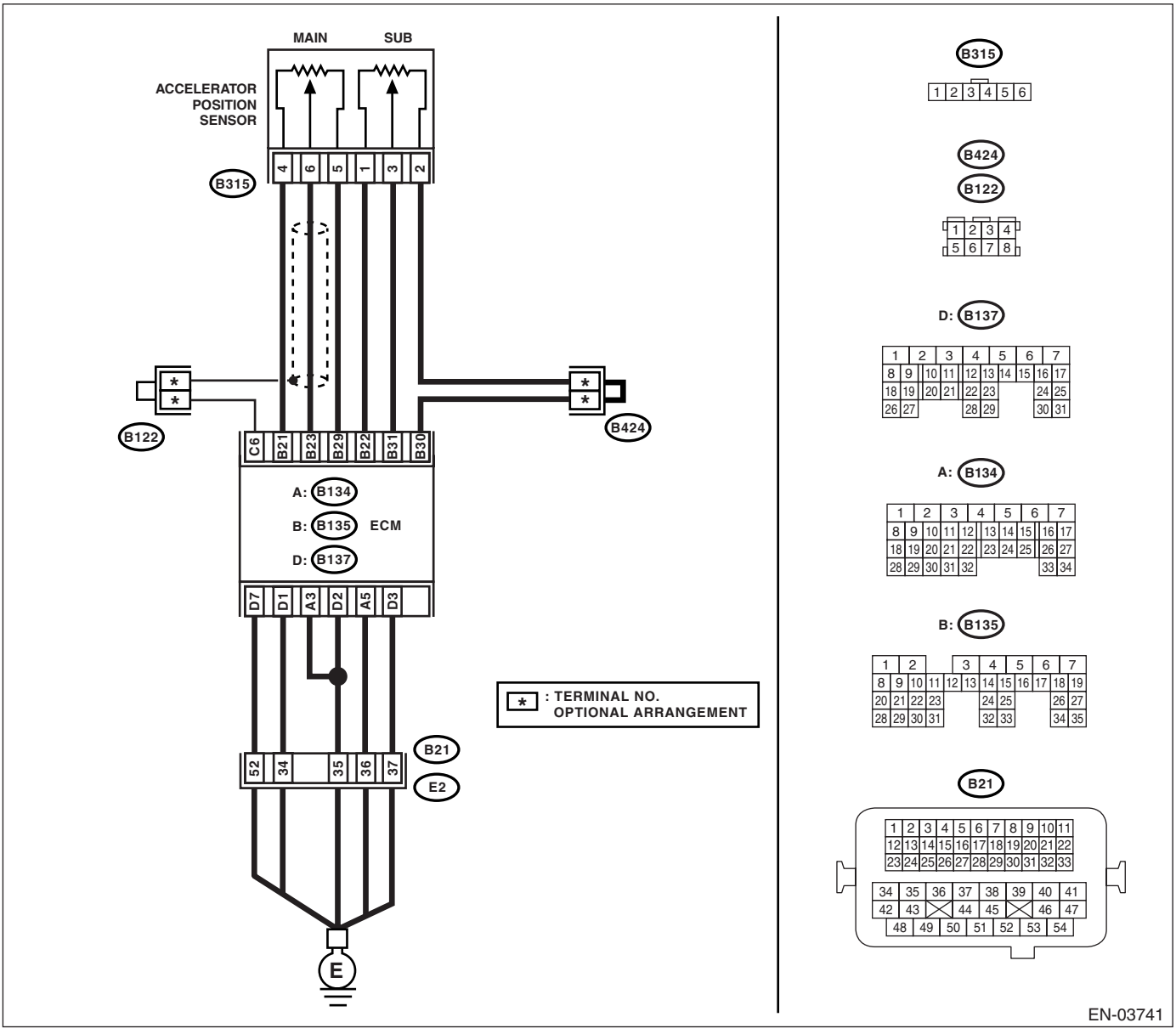
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-215, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/ SWITCH “E” CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage less than 4.8 V?	Go to step **2**.	Go to step **3**.
2	**CHECK POOR CONTACT.** Check poor contact of connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B135) No. 30 — (B315) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Engine ground (–):***	Is the voltage less than 6 V?	Go to step **6**.	Repair the battery short circuit of harness between ECM connector and accelerator pedal position sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B135) No. 31 — (B135) No. 21:*** ***(B135) No. 31 — (B135) No. 22:***	Is the resistance more than 1 MΩ?	Repair the poor contact of accelerator pedal position sensor connector. Replace the accelerator pedal position sensor if defective.	Repair the short circuit to sensor power supply.

EC:DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A”/“B” VOLTAGE RATIONALITY

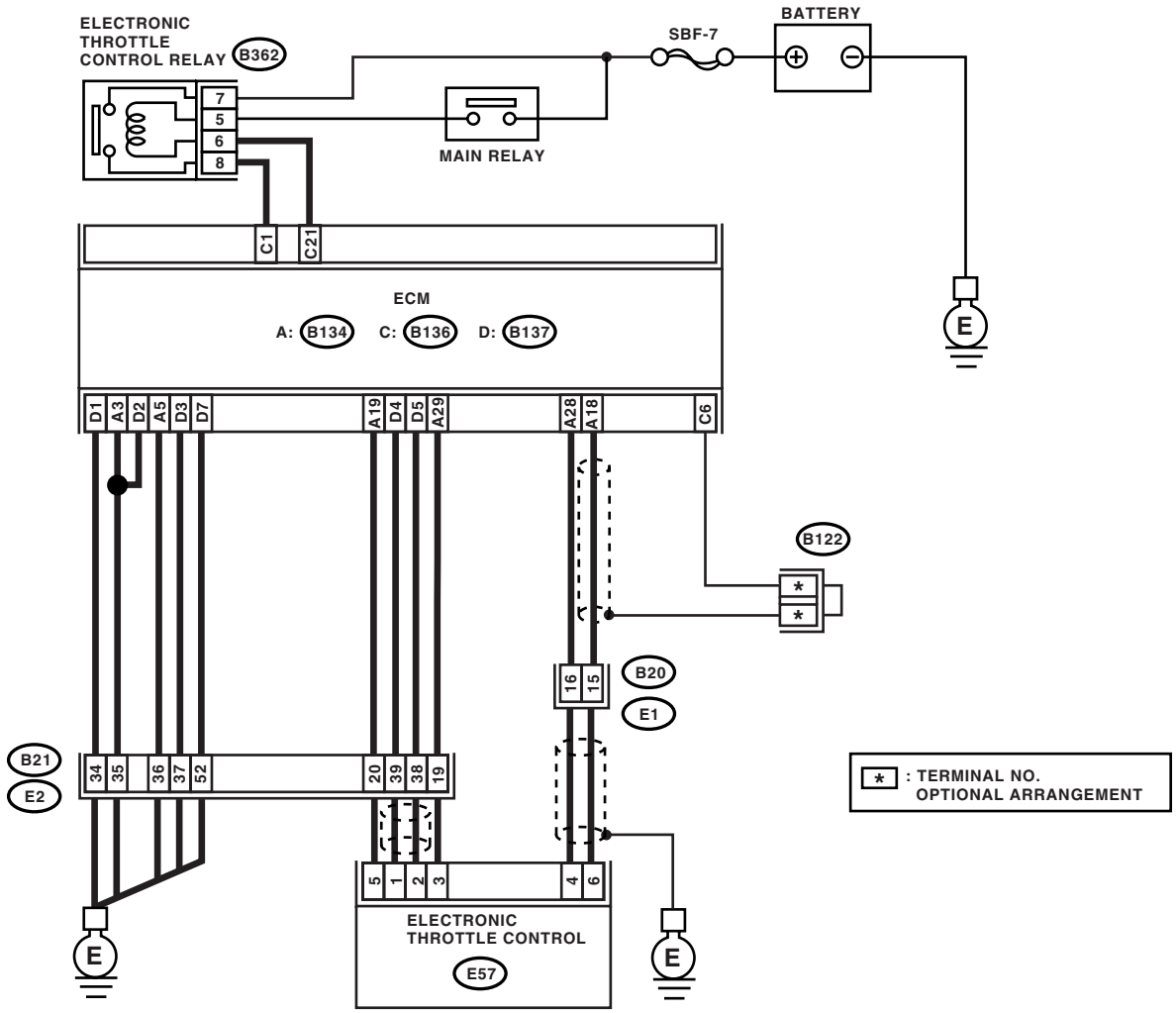
DTC DETECTING CONDITION:

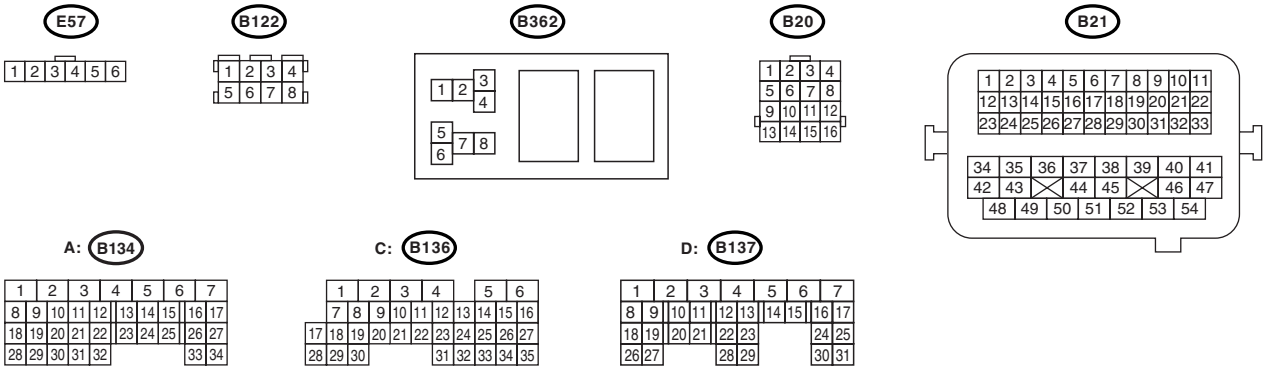
- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-217, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/ SWITCH “A”/“B” VOLTAGE RATIONALITY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:





EN-03739

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **2**.	Go to step **4**.
2	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage more than 0.8 V?	Go to step **3**.	Go to step **4**.
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **14**.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 18 — (E57) No. 6:*** ***(B134) No. 28 — (E57) No. 4:*** ***(B134) No. 19 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 18 — Chassis ground:*** ***(B134) No. 28 — Chassis ground:*** ***(B134) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair the ground short circuit of harness.
6	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (–):***	Is the voltage 4.5 — 5.5 V?	Go to step **7**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
7	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10Ω?	Go to step **8**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>

	Step	Check	Yes	No
8	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage less than 4.63 V?	Go to step **9**.	Go to step **11**.
9	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage less than 4.73 V?	Go to step **10**.	Go to step **11**.
10	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
11	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B134) No. 29 — (E57) No. 3:*** ***(B134) No. 18 — (E57) No. 6:*** ***(B134) No. 28 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **12**.	Repair the open circuit of harness connector.
12	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **13**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
13	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **14**.	Repair the battery short circuit of harness between ECM connector and electronic throttle control connector.
14	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (–):*** ***(E57) No. 4 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **15**.	Repair the short circuit of harness between ECM connector and electronic throttle control connector.

	Step	Check	Yes	No
15	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B134) No. 18 — (B134) No. 19:*** ***(B134) No. 28 — (B134) No. 19:***	Is the resistance more than 1 MΩ?	Go to step **16**.	Repair the short circuit to sensor power supply.
16	**CHECK ELECTRONIC THROTTLE CONTROL HARNESS.** 1) Disconnect the connectors from ECM. 2) Disconnect the connectors from electronic throttle control. 3) Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E57) No. 6 — (E57) No. 4:***	Is the resistance more than 1 MΩ?	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Repair the short circuit of harness.

ED:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D”/“E” VOLTAGE RATIONALITY

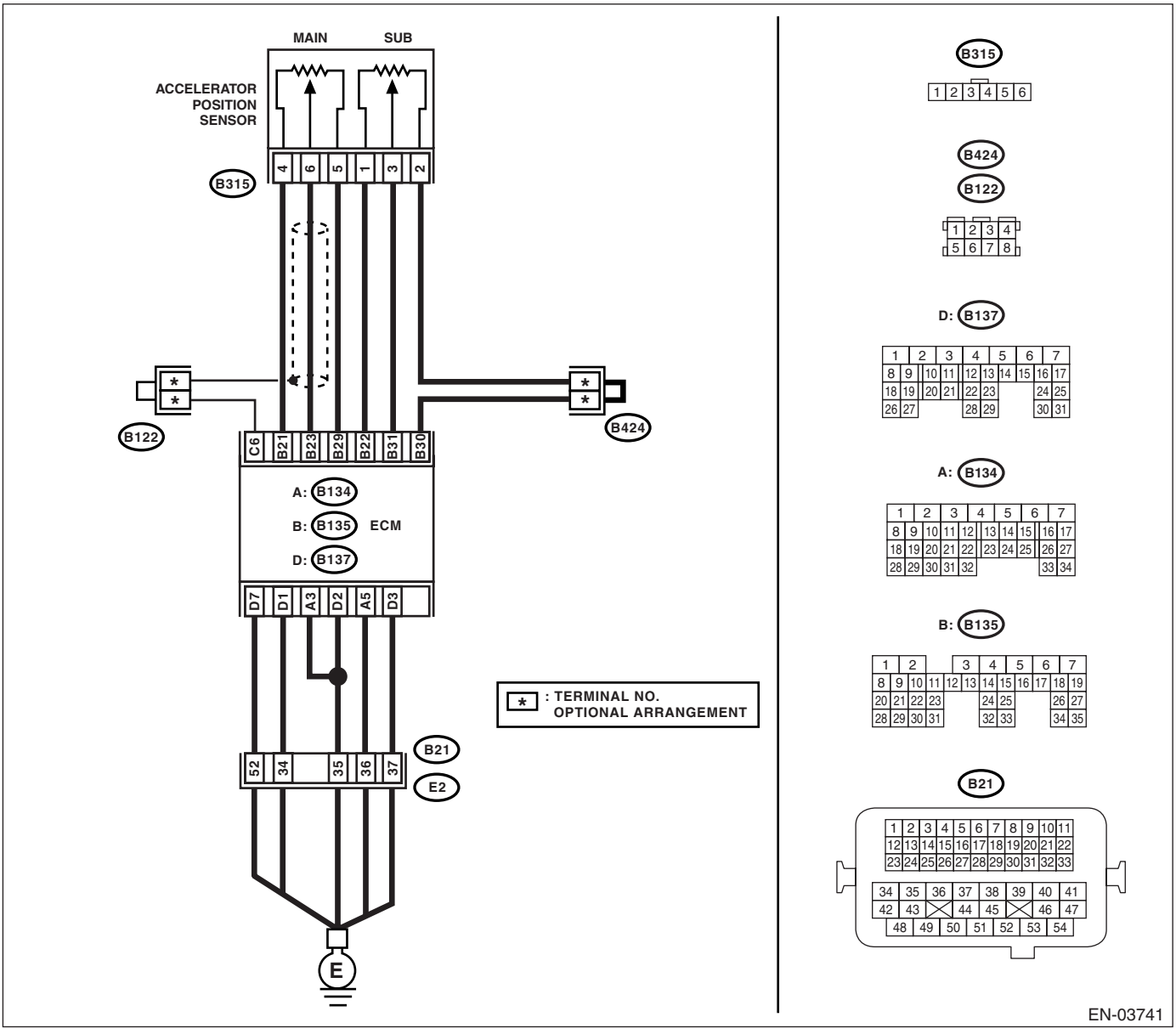
DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-219, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/ SWITCH “D”/“E” VOLTAGE RATIONALITY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator pedal position sensor signal and sub accelerator pedal position sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage more than 0.4 V?	Go to step **2**.	Go to step **3**.
2	**CHECK POOR CONTACT.** Check poor contact of connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **12**.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B135) No. 23 — (B315) No. 6:*** ***(B135) No. 21 — (B315) No. 4:*** ***(B135) No. 31 — (B315) No. 3:*** ***(B135) No. 22 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 23 — Chassis ground:*** ***(B135) No. 21 — Chassis ground:*** ***(B135) No. 31 — Chassis ground:*** ***(B135) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the ground short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 (+) — Engine ground (–):*** ***(B315) No. 1 (+) — Engine ground (–):***	Is the voltage 4.5 — 5.5 V?	Go to step **6**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance between 1.2 and 4.8 kΩ?	Go to step **7**.	Replace the accelerator pedal position sensor.

	Step	Check	Yes	No
7	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance between 0.75 and 3.15 kΩ?	Go to step **8**.	Replace the accelerator pedal position sensor.
8	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 6 — No. 5:***	Is the resistance between 0.2 and 0.8 kΩ?	Go to step **9**.	Replace the accelerator pedal position sensor.
9	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 3 — No. 2:***	Is the resistance between 0.15 and 0.63 kΩ?	Go to step **10**.	Replace the accelerator pedal position sensor.
10	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor with depressing the accelerator pedal. ***Terminals*** ***No. 6 — No. 5:***	Is the resistance between 0.5 and 2.5 kΩ?	Go to step **11**.	Replace the accelerator pedal position sensor.
11	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of accelerator pedal position sensor with depressing the accelerator pedal. ***Terminals*** ***No. 3 — No. 2:***	Is the resistance between 0.28 and 1.68 kΩ?	Go to step **12**.	Replace the accelerator pedal position sensor.
12	**CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Turn the ignition switch to ON. 4) Read the data of main accelerator pedal position sensor signal and the sub accelerator pedal position sensor signal using the Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H6DO)(diag)-26, Subaru Select Monitor.>	Is the voltage less than 4.8 V?	Go to step **13**.	Go to step **14**.
13	**CHECK POOR CONTACT.** Check poor contact of connector between ECM and accelerator pedal position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **18**.

	Step	Check	Yes	No
14	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B135) No. 29 — (B315) No. 5:*** ***(B135) No. 30 — (B315) No. 2:***	Is the resistance less than 1 Ω?	Go to step **15**.	Repair the open circuit of harness connector.
15	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 — Engine ground:*** ***(B315) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **16**.	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>
16	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator pedal position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 6 (+) — Engine ground (–):*** ***(B315) No. 3 (+) — Engine ground (–):***	Is the voltage less than 6 V?	Go to step **17**.	Repair the battery short circuit of harness between ECM connector and accelerator pedal position sensor connector.
17	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B135) No. 23 — (B135) No. 21:*** ***(B135) No. 23 — (B135) No. 22:*** ***(B135) No. 31 — (B135) No. 21:*** ***(B135) No. 31 — (B135) No. 22:***	Is the resistance more than 1 MΩ?	Go to step **18**.	Repair the short circuit to sensor power supply.
18	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Disconnect the connectors from accelerator pedal position sensor. 4) Measure the resistance between connector terminals of accelerator pedal position sensor. ***Connector & terminal*** ***(B315) No. 6 — (B315) No. 3:***	Is the resistance more than 1 MΩ?	Repair poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).>	Repair the short circuit of harness between ECM connector and accelerator pedal position sensor connector.

EE: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)-221, DTC P2227 BAROMETRIC PRESSURE CIRCUIT RANGE/ PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).> NOTE: The barometric pressure sensor is built into the ECM.	It is not necessary to inspect DTC P0129.

EF:DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-222, DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P1110 displayed on the Subaru Select Monitor or general scan tool?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).> NOTE: The barometric pressure sensor is built into the ECM.	Temporary poor contact occurs.

EG:DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

- Immediately at fault recognition
- GENERAL DESCRIPTION <Ref. to GD(H6DO)-223, DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

CAUTION:
After repair or replacement of faulty parts, perform Clear Memory Mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P1111 displayed on the Subaru Select Monitor or general scan tool?	Replace the ECM. <Ref. to FU(H6DO)-32, Engine Control Module (ECM).> NOTE: The barometric pressure sensor is built into the ECM.	Temporary poor contact occurs.

19.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H6DO)-83, Engine Trouble in General.>

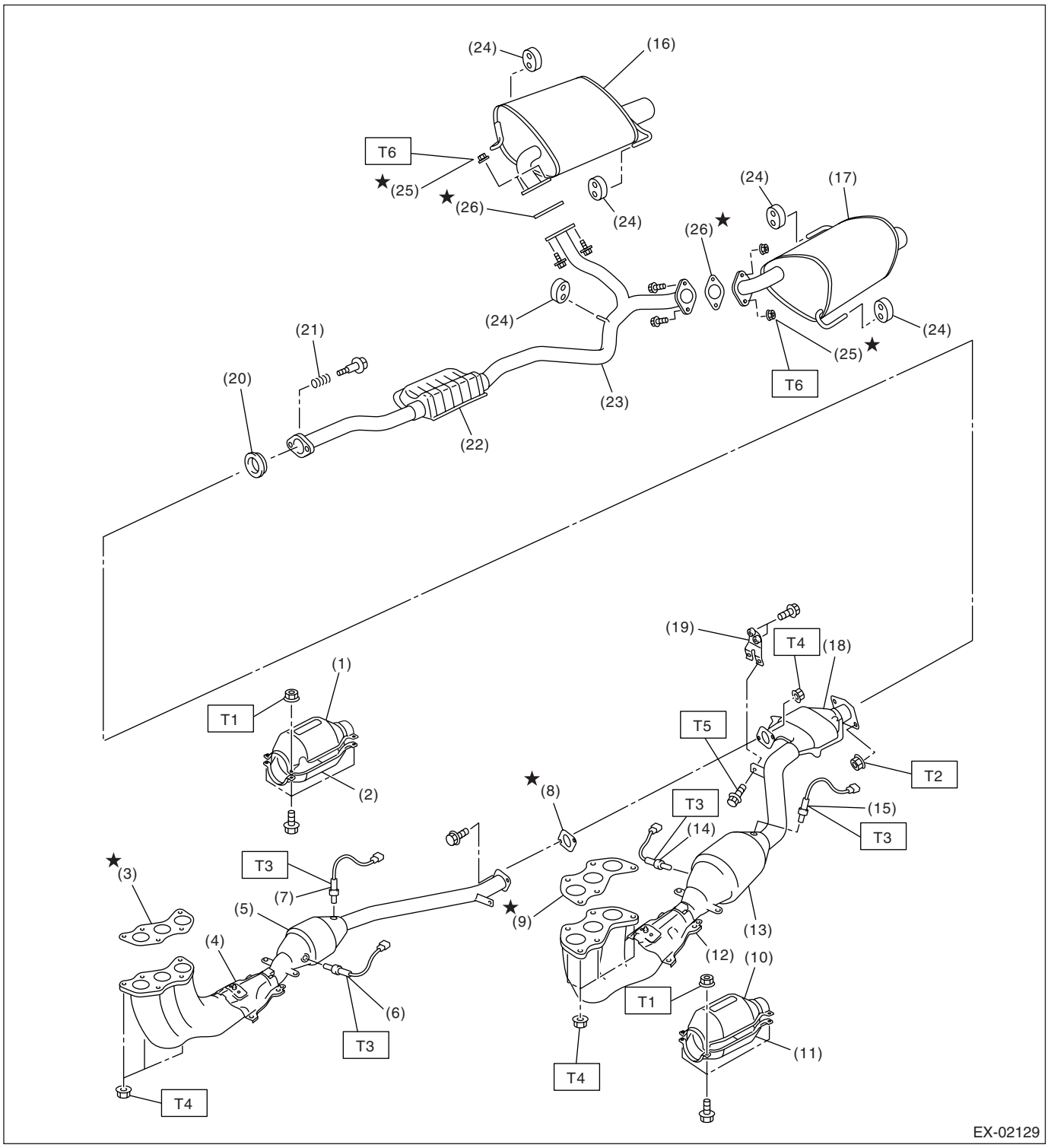
Symptom	Problem parts
1. Engine stalls during idling.	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Ignition parts (*1) 4) Engine coolant temperature sensor (*2) 5) Crankshaft position sensor (*3) 6) Camshaft position sensor (*3) 7) Fuel injection parts (*4)
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
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) Oil temperature sensor
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) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1) 12) Accelerator pedal position sensor 13) Oil temperature sensor
5. Engine stalls, engine sags or hesitates 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

Symptom	Problem parts
6. Surging	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Fuel injection parts (*4) 7) Electronic throttle control 8) Fuel pump and fuel pump relay
7. Spark knock	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay
8. After burning in exhaust system	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay

*1: Check ignition coil & ignitor assembly and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Make sure the secure installation.
*4: Check the fuel injector and fuel pressure regulator.
*5: Inspect air leak in air intake system.

1. General Description

A: COMPONENT



(1) Front catalytic converter upper cover (RH)
(2) Front catalytic converter lower cover (RH)
(3) Gasket
(4) Front exhaust pipe (RH)
(5) Front catalytic converter (RH)
(6) Front oxygen (A/F) sensor (RH)
(7) Rear oxygen sensor (RH)
(8) Gasket
(9) Gasket
(10) Front catalytic converter upper cover (LH)
(11) Front catalytic converter lower cover (LH)
(12) Front exhaust pipe (LH)
(13) Front catalytic converter (LH)
(14) Front oxygen (A/F) sensor (LH)
(15) Rear oxygen sensor (LH)
(16) Muffler (RH)
(17) Muffler (LH)
(18) Rear catalytic converter
(19) Bracket
(20) Gasket
(21) Spring
(22) Chamber
(23) Rear exhaust pipe
(24) Cushion rubber
(25) Self-locking nut
(26) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 18 (1.8, 13.0)
T3: 21 (2.1, 15.2)
T4: 30 (3.1, 22.4)
T5: 35 (3.6, 26.0)
T6: 48 (4.9, 35.4)

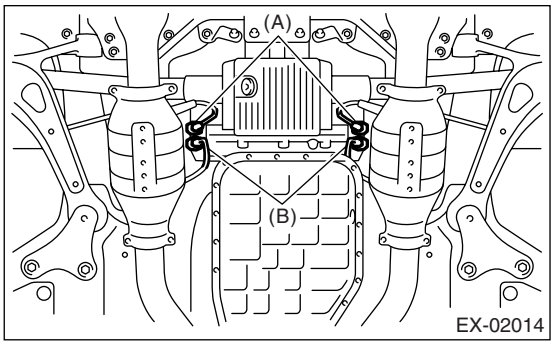
B: CAUTION

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

2. Front Exhaust Pipe

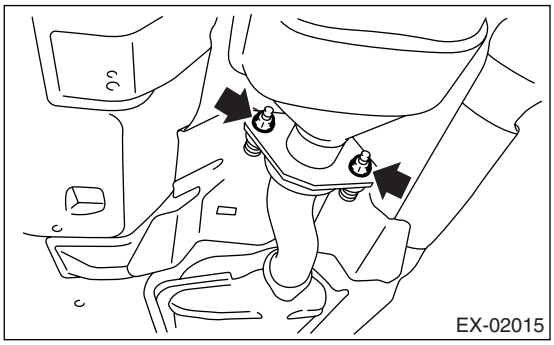
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Remove the front oxygen (A/F) sensor connector (A) and rear oxygen sensor connector (B).



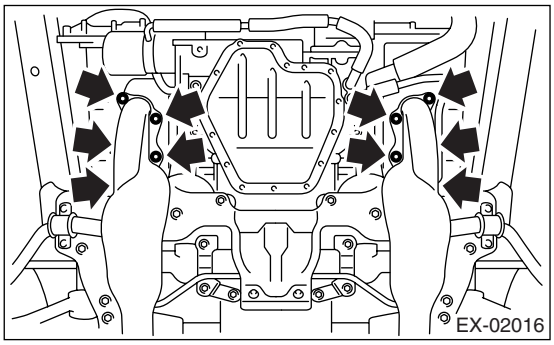
5) Separate the front exhaust pipe from rear exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.

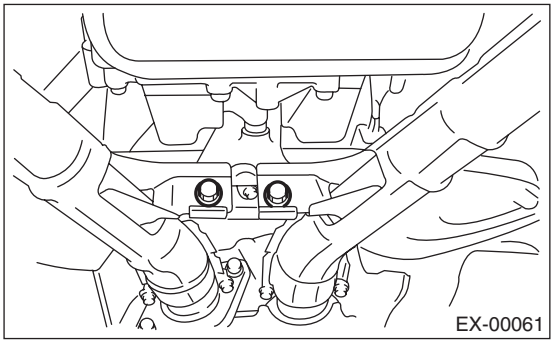


6) Remove the nuts which hold front exhaust pipe onto cylinder heads.

CAUTION:
Be careful not to pull down the front exhaust pipe assembly.



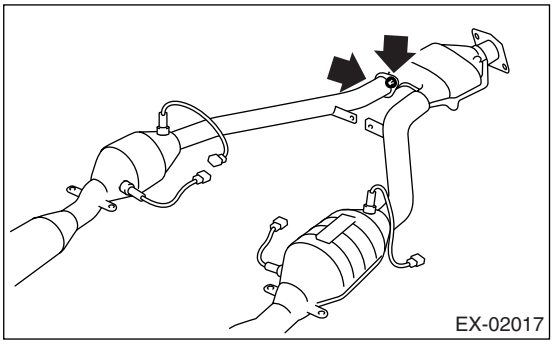
7) Remove the bolts which hold front exhaust pipe assembly to hanger bracket.



8) Remove the front exhaust pipe assembly from vehicle.

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 front exhaust pipe assembly.



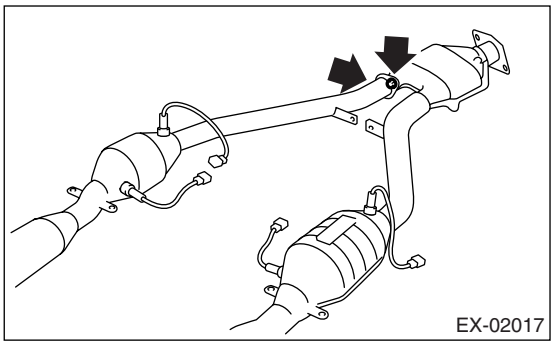
10) Remove the front oxygen (A/F) sensor and rear oxygen sensor. <Ref. to FU(H6DO)-28, REMOVAL, Front Oxygen (A/F) Sensor.> <Ref. to FU(H6DO)-30, REMOVAL, Rear Oxygen Sensor.>

B: INSTALLATION

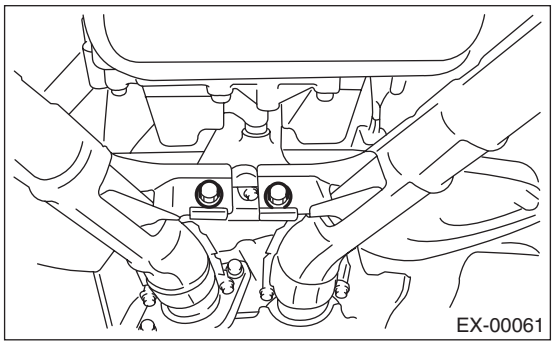
1) Install the front oxygen (A/F) sensor and rear oxygen sensor. <Ref. to FU(H6DO)-28, INSTALLATION, Front Oxygen (A/F) Sensor.> <Ref. to FU(H6DO)-30, INSTALLATION, Rear Oxygen Sensor.>
2) Install the front exhaust pipe (RH) to front exhaust pipe assembly.

NOTE:
Use a new gasket.

Tightening torque:
30 N·m (2.5 kgf-m, 22.4 ft-lb)

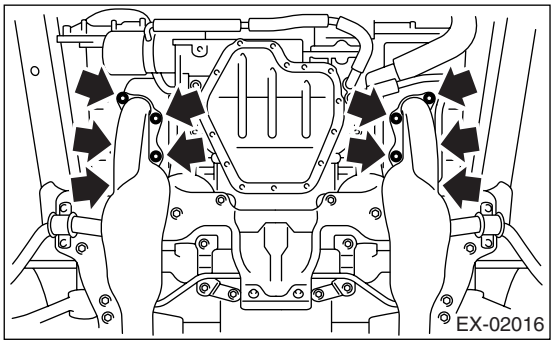

EX-02017

3) Install the front exhaust pipe assembly to vehicle.
4) Temporarily tighten the bolts which hold front exhaust pipe assembly to hanger bracket.


EX-00061

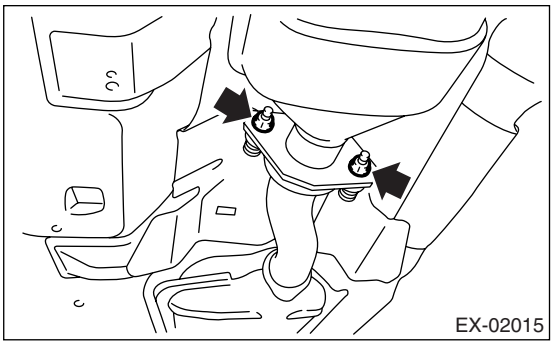
5) Install the nuts to cylinder head which hold front exhaust pipe.

Tightening torque:
30 N·m (2.5 kgf-m, 22.4 ft-lb)


EX-02016

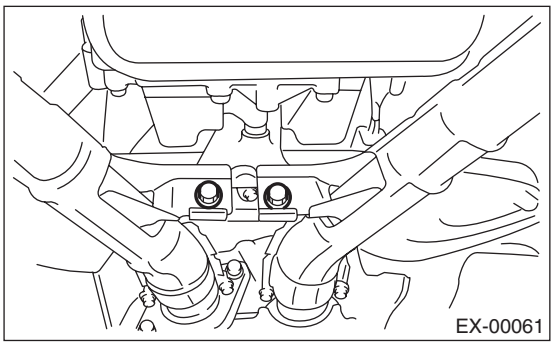
6) Install the under cover.
7) Tighten the bolts which install front exhaust pipe to rear exhaust pipe.

Tightening torque:
18 N·m (2.5 kgf-m, 13.0 ft-lb)

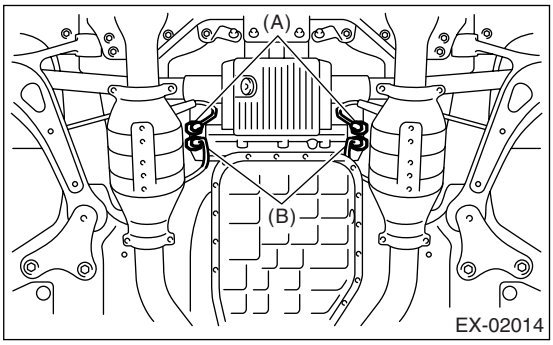

EX-02015

8) Tighten the bolts which hold front exhaust pipe assembly to hanger bracket.

Tightening torque:
35 N·m (2.5 kgf-m, 26.0 ft-lb)


EX-00061

9) Connect the front oxygen (A/F) sensor connector (A) and rear oxygen sensor connector (B).



EX-02014

10) Lower the vehicle.
11) Connect the ground cable to battery.

C: INSPECTION

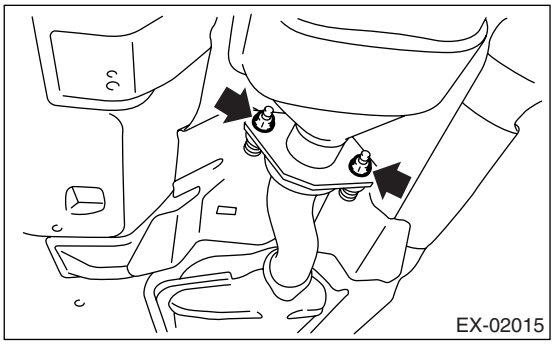
1) Check the connections and welds for exhaust leaks.
2) Make sure there are no holes or rusting.

3. Rear Exhaust Pipe

A: REMOVAL

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

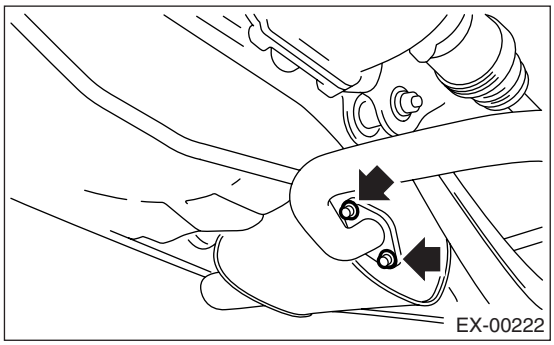
CAUTION:
Be careful, exhaust pipe is hot.



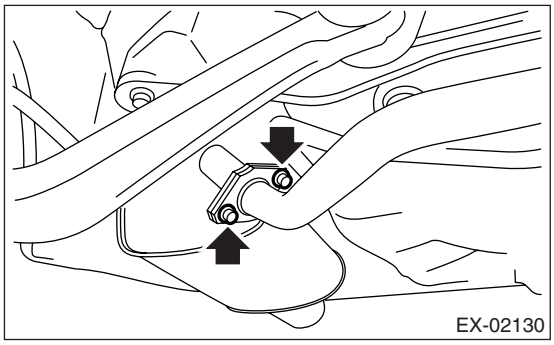
2) Separate the rear exhaust pipe from muffler.

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

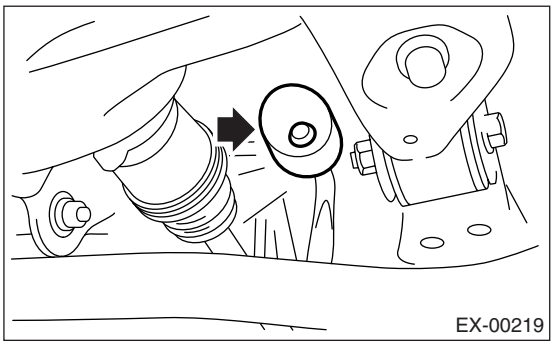
- LH side



- RH side

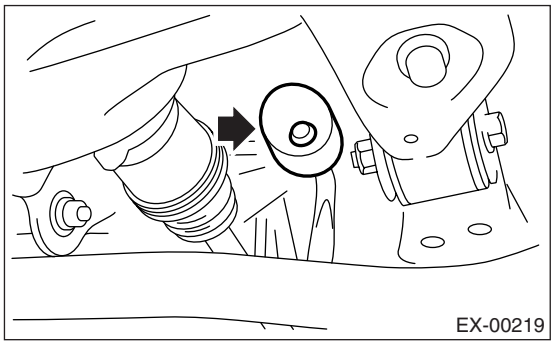


3) Apply a coat of spray type lubricant to the mating area of cushion rubber.
4) Remove the rear exhaust pipe bracket from cushion rubber.



B: INSTALLATION

1) Apply a coat of spray type lubricant to the mating area of cushion rubber.
2) Install the rear exhaust pipe bracket to cushion rubber.

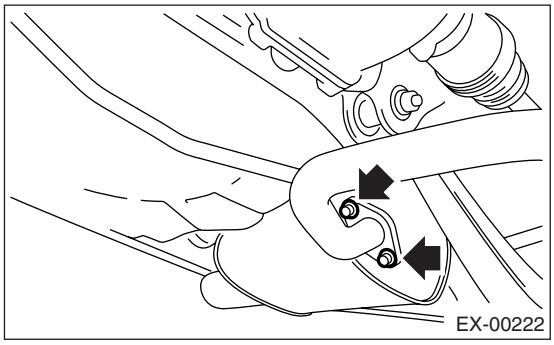


3) Install the rear exhaust pipe to muffler.

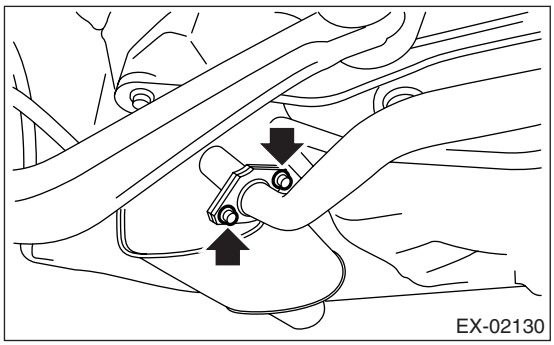
NOTE:
Use a new gasket and self-locking nut.

Tightening torque:
48 N·m (2.5 kgf-m, 35.4 ft-lb)

- LH side

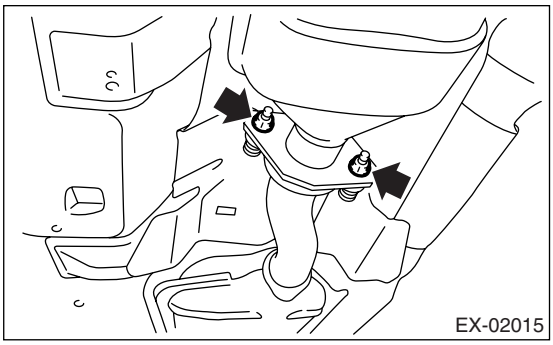


- RH side



4) Install the rear exhaust pipe to center exhaust pipe.

Tightening torque:
18 N·m (2.5 kgf-m, 13.0 ft-lb)



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.

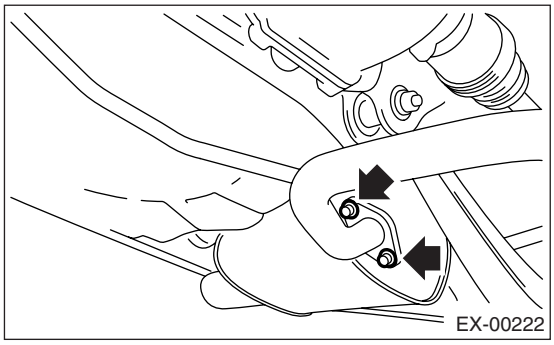
4. Muffler

A: REMOVAL

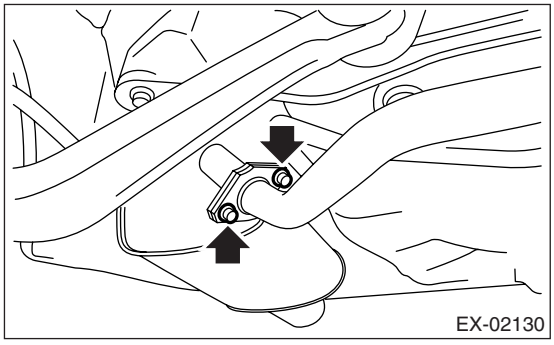
1) Separate the muffler from rear exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.

- LH side

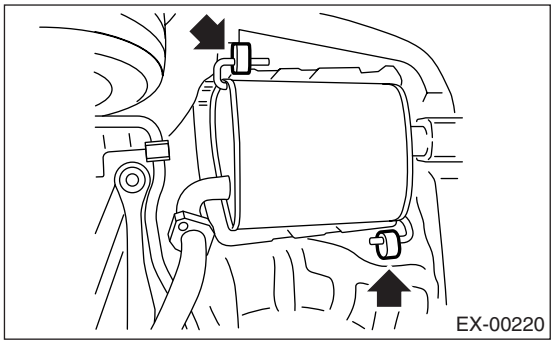


- RH side

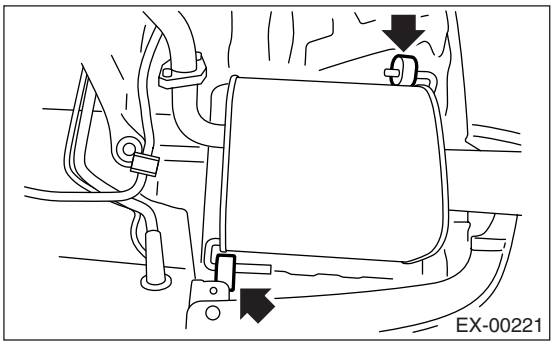


2) Apply a coat of spray type lubricant to the mating area of cushion rubber.

- LH side



- RH side



3) Remove the front and rear cushion rubber, and then remove the muffler.

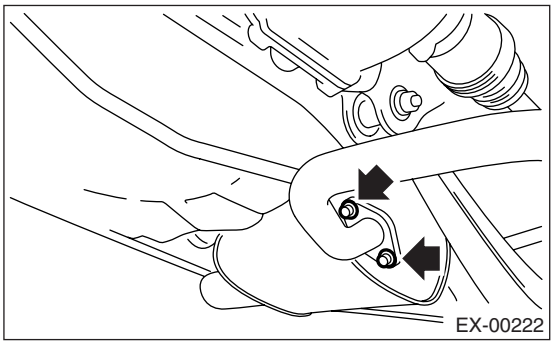
B: INSTALLATION

Install in the reverse order of removal.

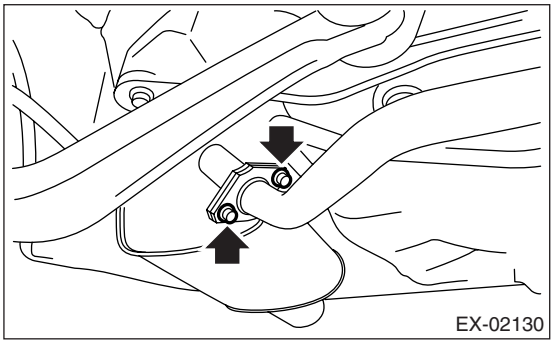
NOTE:
Use a new gasket and self-locking nut.

Tightening torque:
48 N·m (2.5 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.

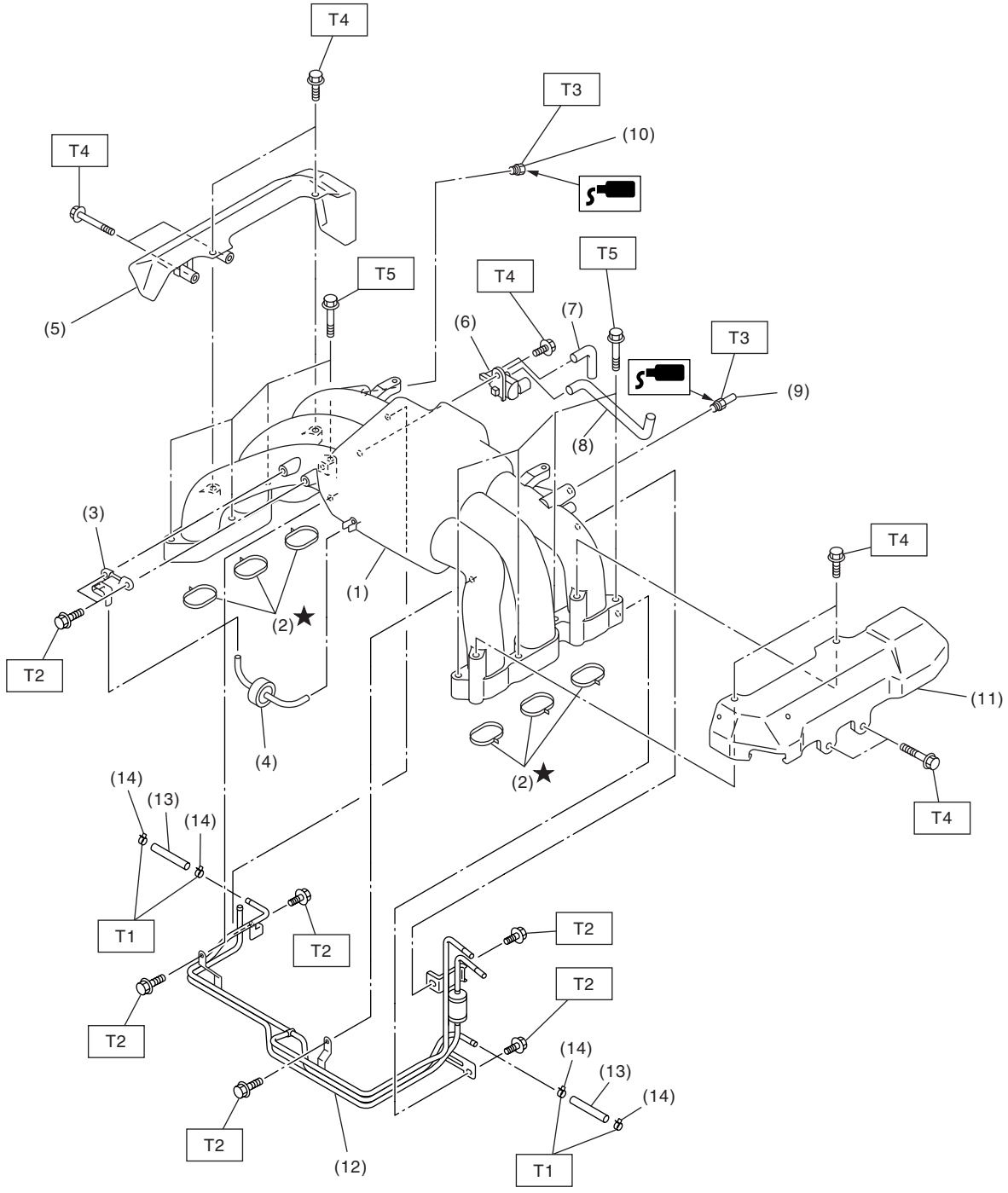
1. General Description

A: SPECIFICATION

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

B: COMPONENT

1. INTAKE MANIFOLD

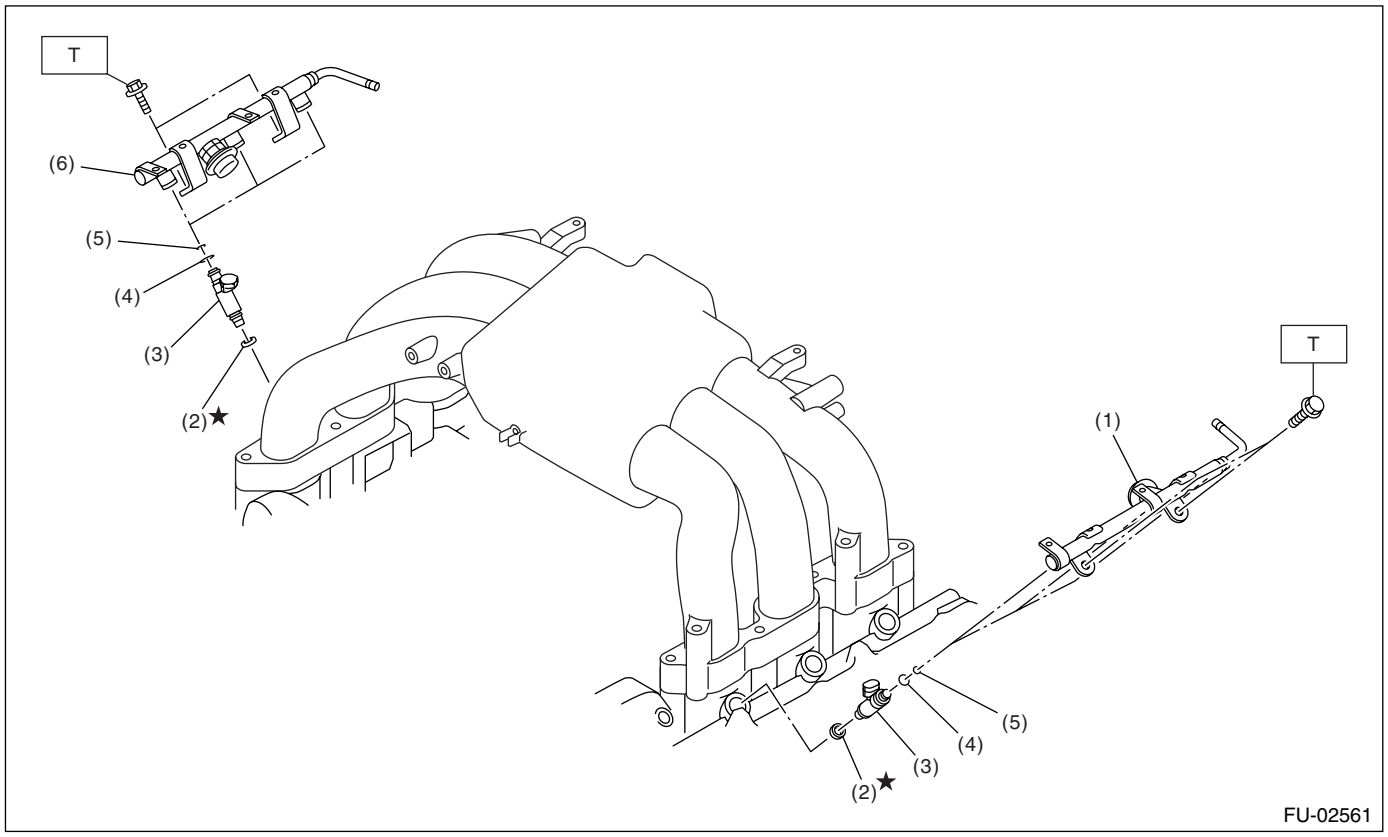


FU-02706

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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.5 (0.15, 1.1)
T2: 6.4 (0.65, 4.7)
T3: 17 (1.7, 12.5)
T4: 19 (1.9, 14)
T5: 25 (2.5, 18)

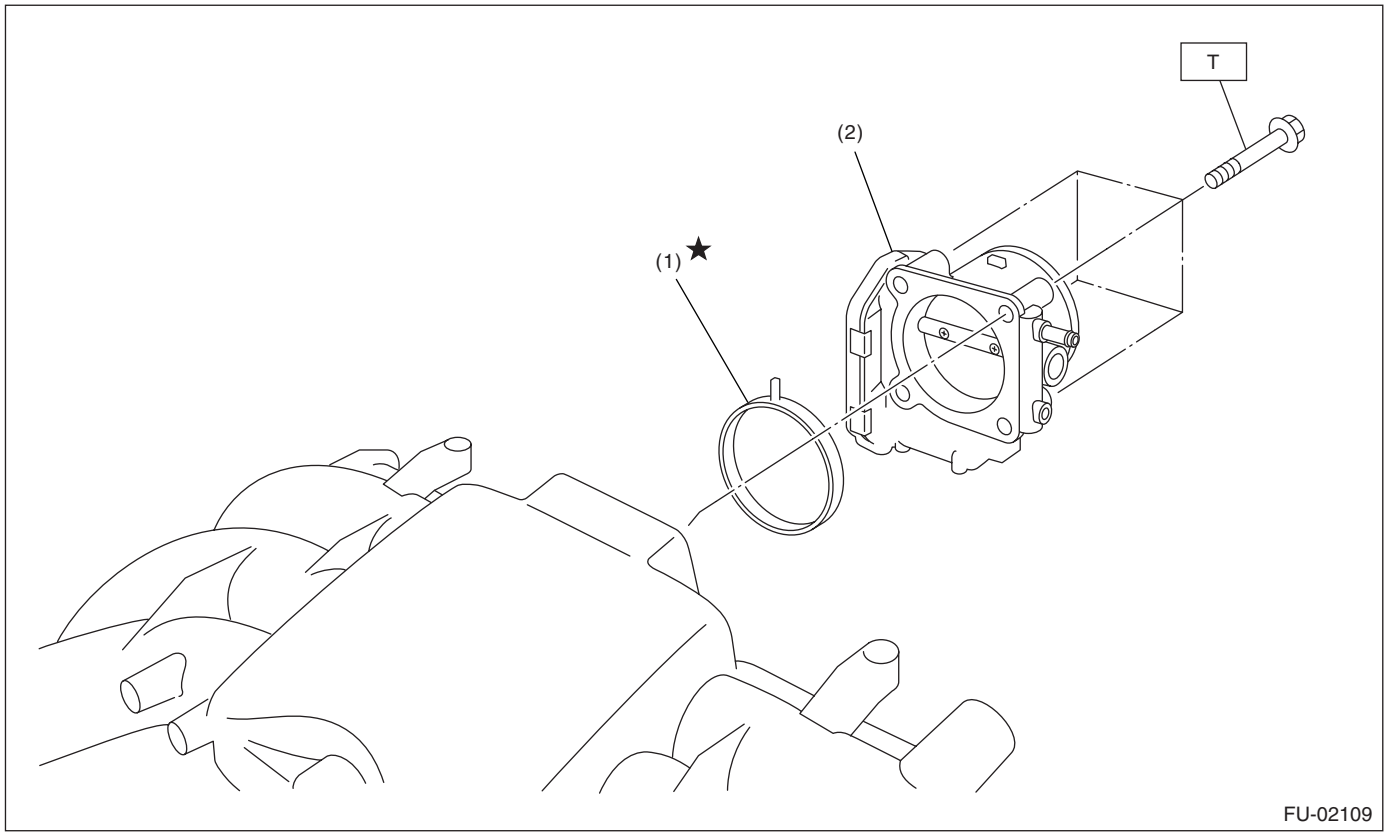
2. FUEL INJECTOR



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

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

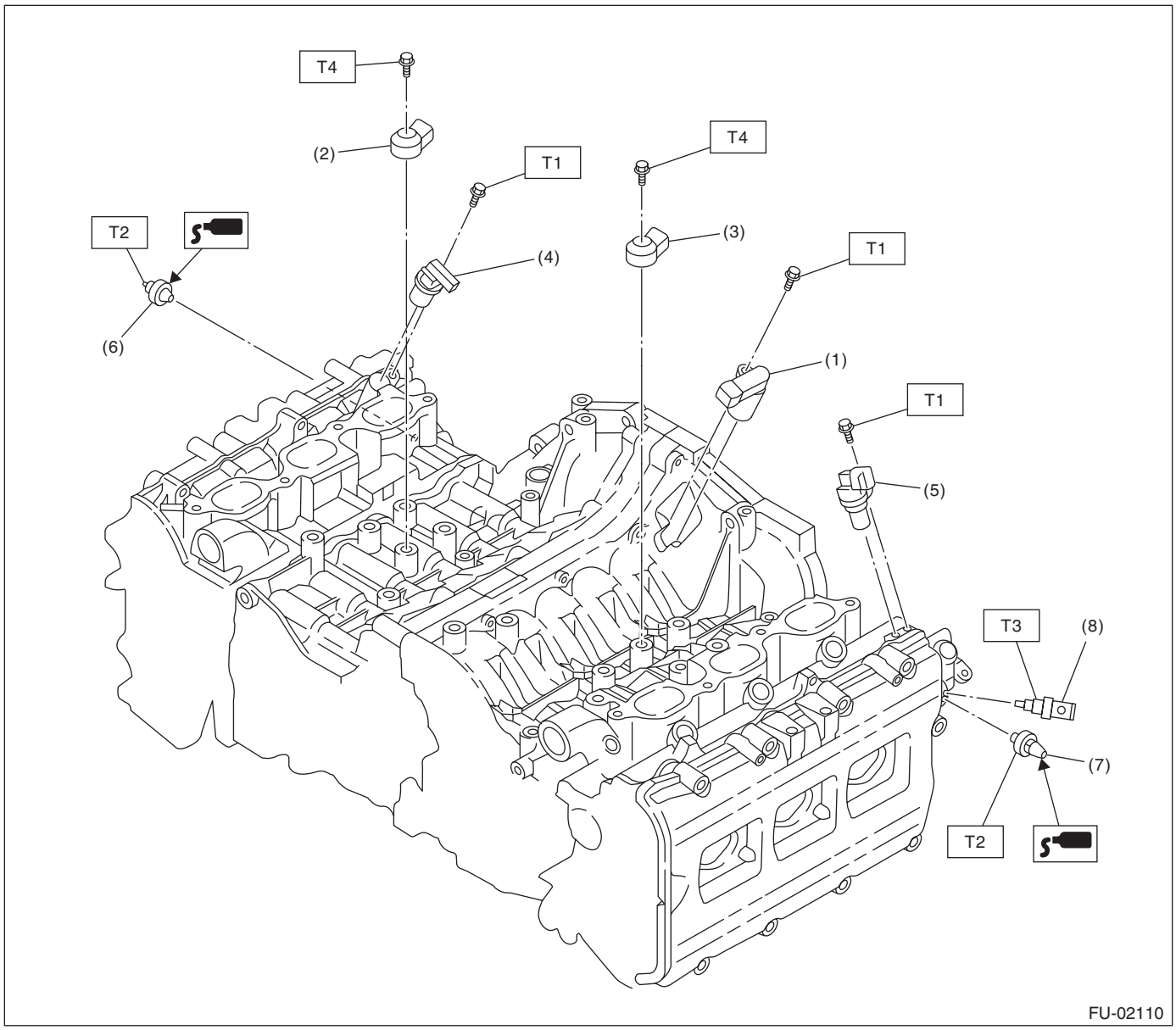
3. AIR INTAKE SYSTEM



(1) O-ring
(2) Throttle body

Tightening torque: N·m (kgf-m, ft-lb)
T: 8 (0.8, 5.9)

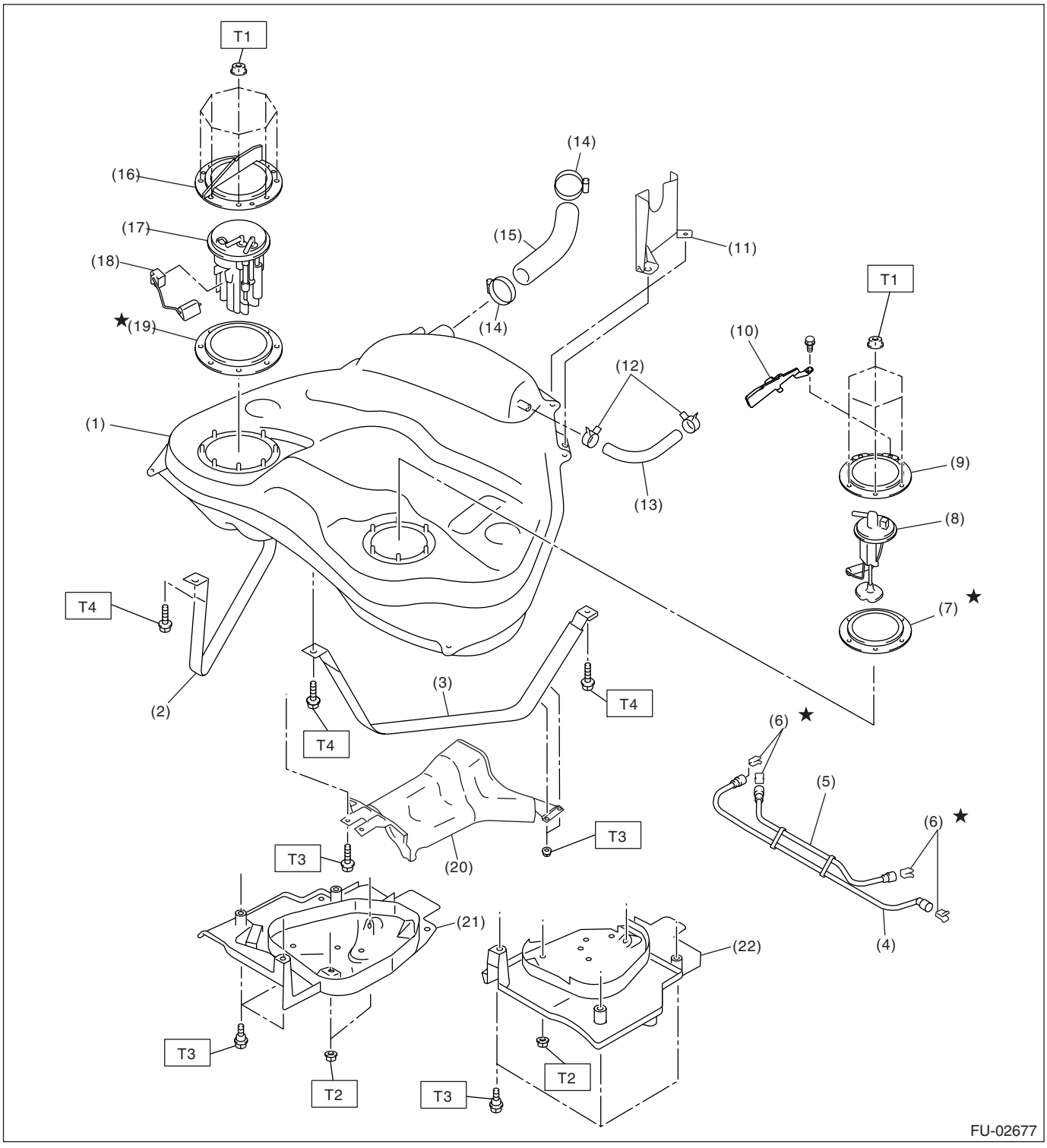
4. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS



(1) Crankshaft position sensor
(2) Knock sensor RH
(3) Knock sensor LH
(4) Camshaft position sensor RH
(5) Camshaft position sensor LH
(6) Variable valve lift diagnosis oil pressure switch RH
(7) Variable valve lift diagnosis oil pressure switch LH
(8) Oil temperature sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 17 (1.7, 12.5)
T3: 18 (1.8, 13.3)
T4: 25 (2.5, 18)

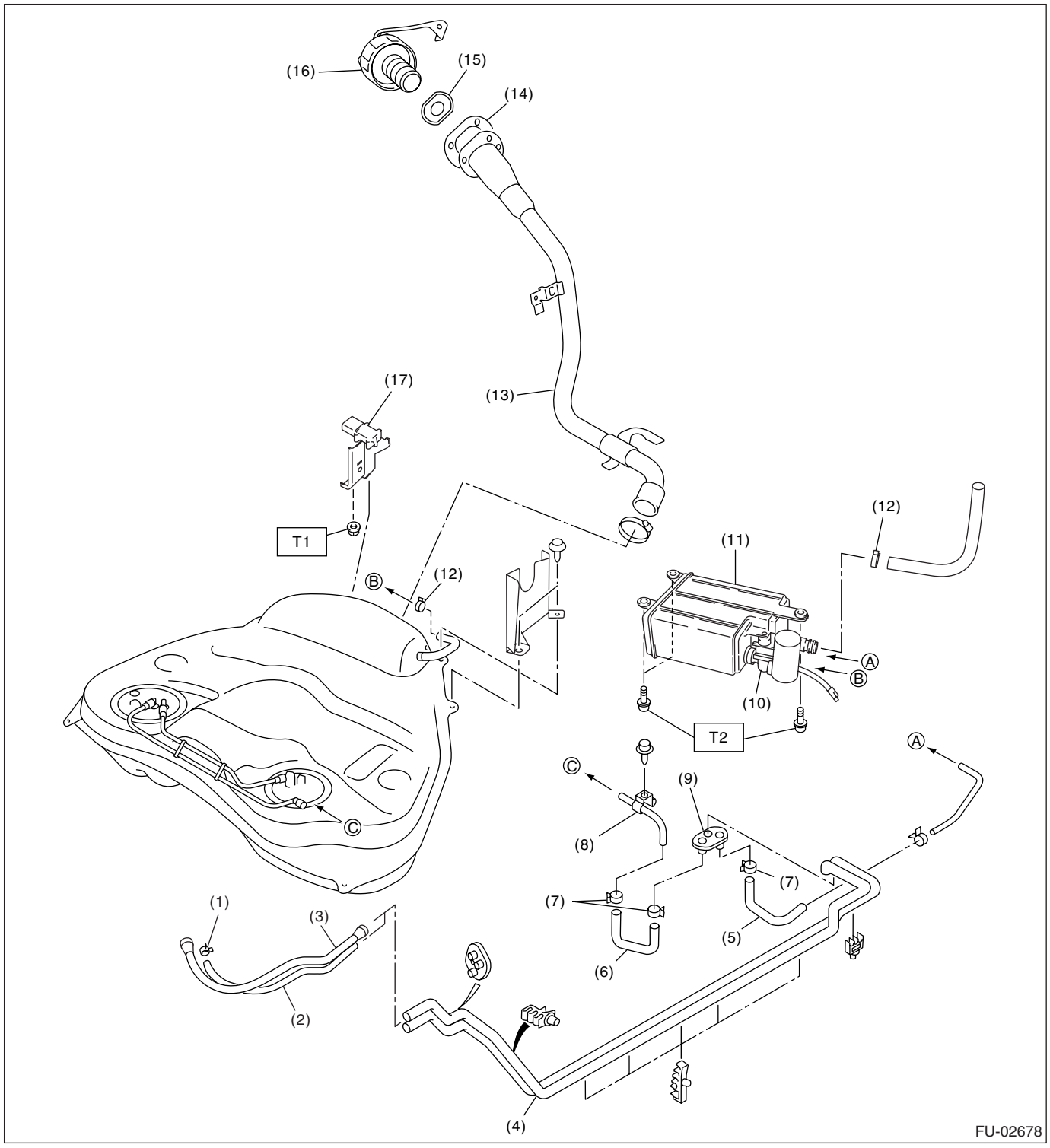
5. FUEL TANK


T1
(14)
(16)
(17)
(15)
(11)
(18)
(19)
(14)
T1
(10)
(12)
(1)
(9)
(13)
(8)
T4
(7)
(2)
(3)
T4
T4
(6)
(5)
(6)
T3
T3
(20)
(4)
(21)
(22)
T3
T2
T2
T3
FU-02677

(1) Fuel tank
(2) Fuel tank band RH
(3) Fuel tank band LH
(4) Delivery tube
(5) Jet pump tube
(6) Retainer
(7) Fuel sub level sensor gasket
(8) Fuel sub level sensor
(9) Fuel sub level sensor upper plate
(10) Bracket
(11) Fuel tank protector LH (Rear)
(12) Clip
(13) Evaporation hose
(14) Clamp
(15) Fuel filler hose
(16) Fuel pump upper plate
(17) Fuel pump ASSY
(18) Fuel level sensor
(19) Fuel pump gasket
(20) Heat shield cover
(21) Fuel tank protector RH (Front)
(22) Fuel tank protector LH (Front)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.2)
T2: 9 (0.9, 6.6)
T3: 17.5 (1.78, 12.9)
T4: 33 (3.4, 25)

6. FUEL LINE



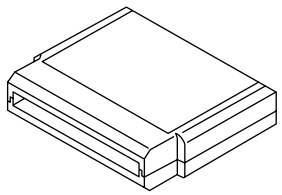
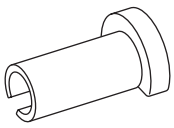
(1) Clamp
(2) Evaporation hose A
(3) Fuel delivery hose A
(4) Fuel pipe ASSY
(5) Evaporation hose B
(6) Fuel delivery hose B
(7) Clamp
(8) Fuel pipe ASSY
(9) Grommet
(10) Drain valve
(11) Canister
(12) Clamp
(13) Fuel filler pipe
(14) Packing
(15) Ring
(16) Fuel filler cap
(17) Fuel tank pressure sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)

C: CAUTION

- Wear work clothing, including a cap, protective goggles and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Be careful not to burn yourself, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or 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 FIRE” signs near the working area.
- Be careful not to spill fuel on the floor.

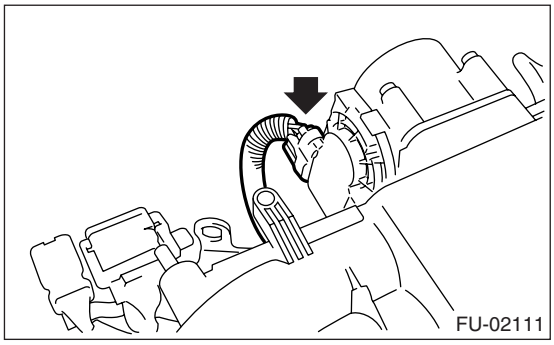
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting the electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting the electrical system.
 ST42099AE000	42099AE000	CONNECTOR REMOVER	Used for disconnecting quick connector of the engine compartment.

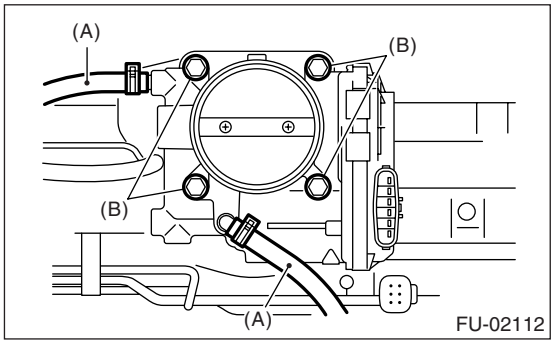
2. Throttle Body

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Remove the air intake chamber. <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
4) Disconnect the connectors from the throttle position sensor.



5) Disconnect the engine coolant hoses (A) from throttle body.
6) Remove the bolts (B) which secure throttle body to intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

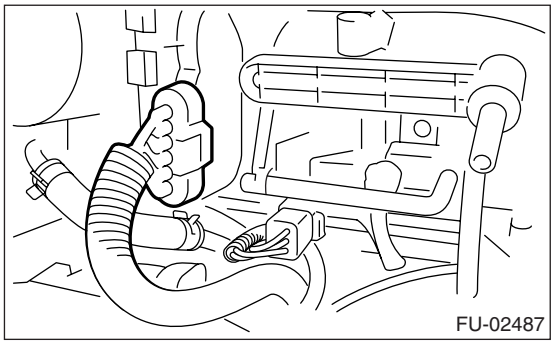
NOTE:
Use new O-rings.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

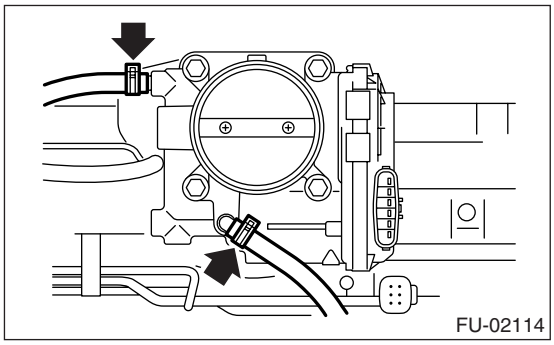
3. Intake Manifold

A: REMOVAL

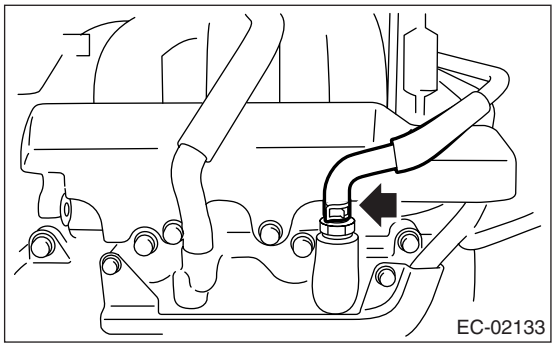
1) Remove the collector cover.
2) Release the fuel pressure. <Ref. to FU(H6DO)-37, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Disconnect the ground cable from battery.
4) Open the fuel filler flap lid, and remove the fuel filler cap.
5) Remove the air cleaner case and air intake chamber. <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
6) Remove the generator. <Ref. to SC(H6DO)-19, REMOVAL, Generator.>
7) Disconnect the connector from throttle body.


FU-02487

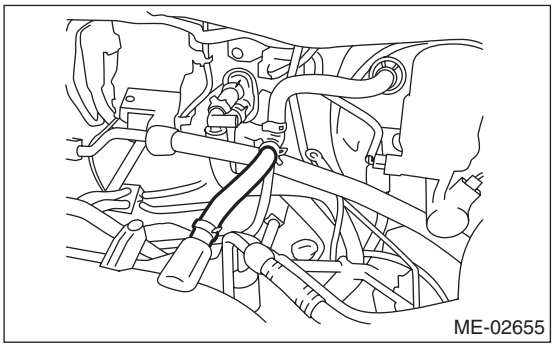
8) Disconnect the engine coolant hoses from throttle body.


FU-02114

9) Disconnect the PCV hose.

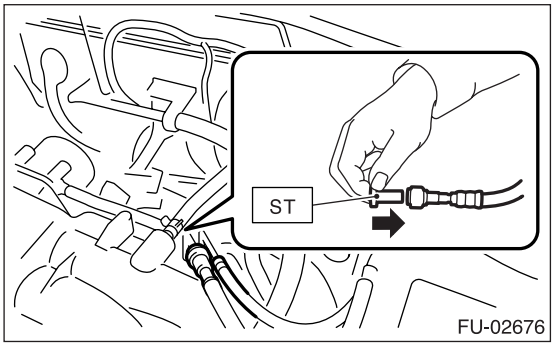

EC-02133

10) Disconnect the brake booster hose.


ME-02655

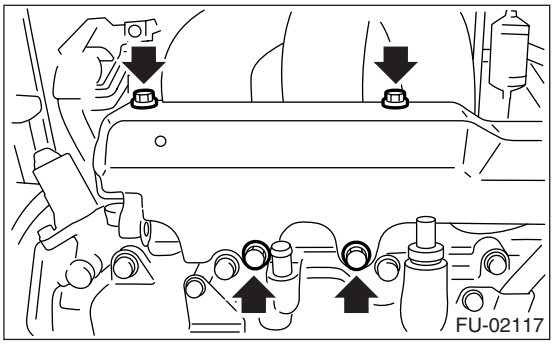
11) Disconnect the fuel hoses from fuel pipe.
(1) Disconnect the connector of fuel pipe by pushing the ST in the direction of arrow.
ST 42099AE000 CONNECTOR REMOVER
(2) Remove the clip, and disconnect the evaporation hose from the pipe.

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



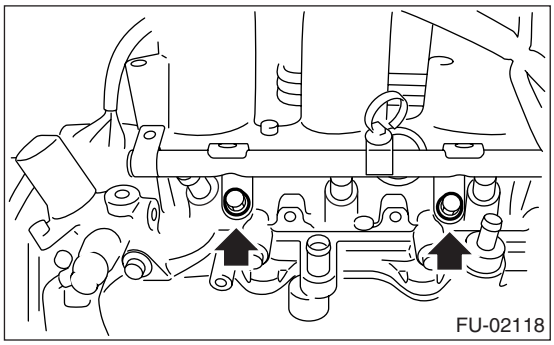
FU-02676

12) Remove the fuel pipe protector LH.

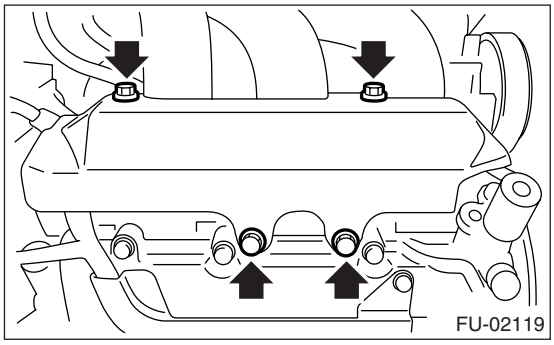

FU-02117

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

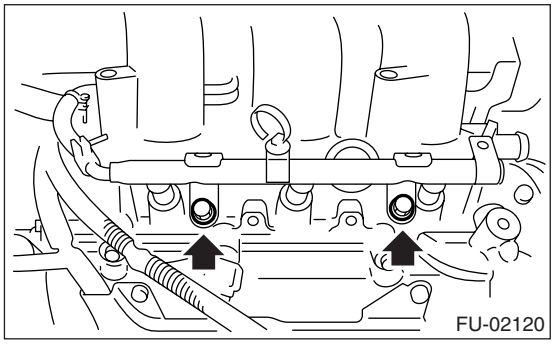
14) Remove the bolts which hold fuel injector pipe LH to cylinder head.



15) Remove the fuel pipe protector RH.

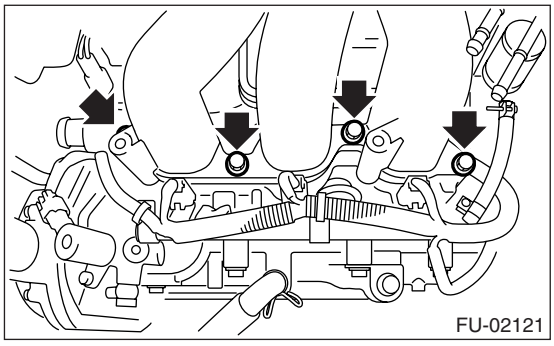


16) Remove the engine harness from fuel injector pipe RH.
17) Remove the bolts which hold the fuel injector pipe RH to the cylinder head.

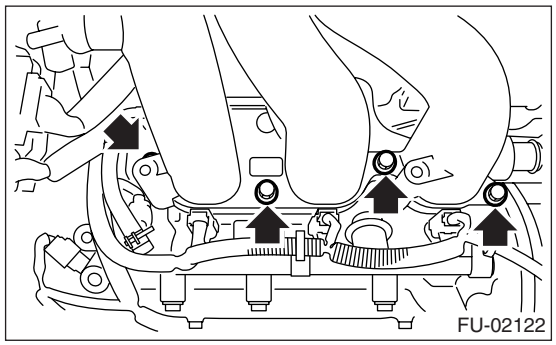


18) Remove the bolts which hold the intake manifold to the cylinder head.

- LH side



- RH side



19) Remove the intake manifold.

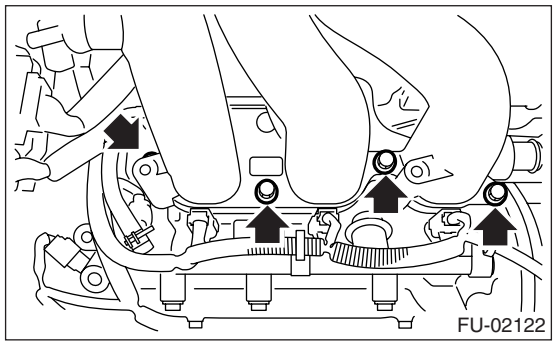
B: INSTALLATION

1) Install the intake manifold onto cylinder heads.

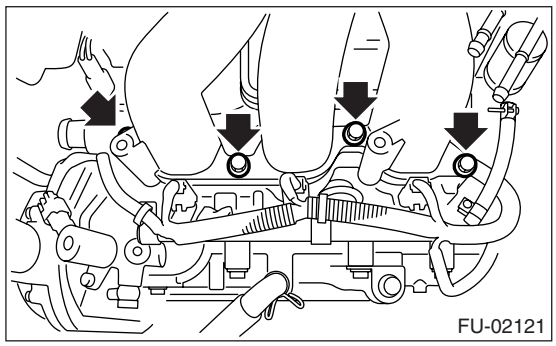
NOTE:
Use new O-rings.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

- RH side

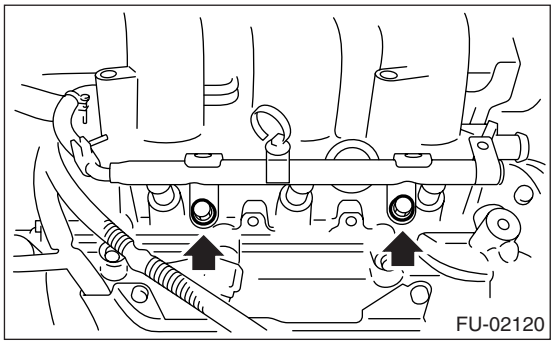


- LH side



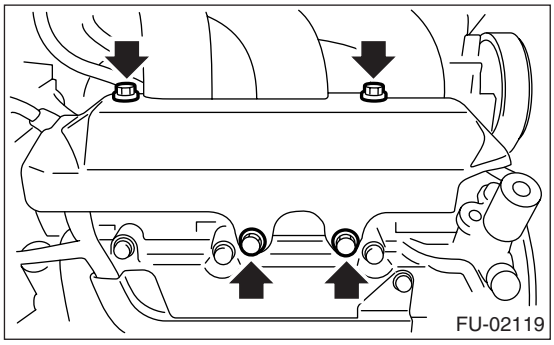
2) Install the bolts which hold fuel injector pipe RH to cylinder head.

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



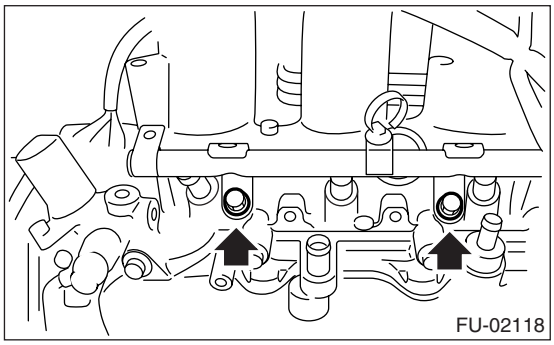
3) Install the engine harness to fuel injector pipe RH.
4) Install the fuel pipe protector RH.

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



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

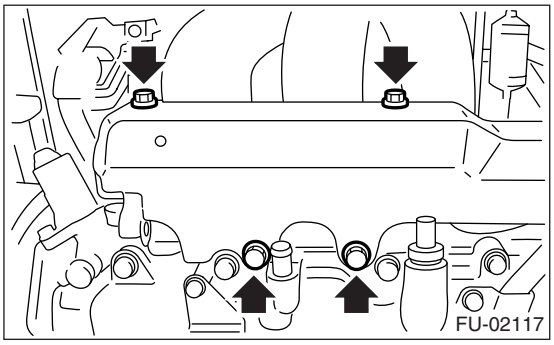
Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



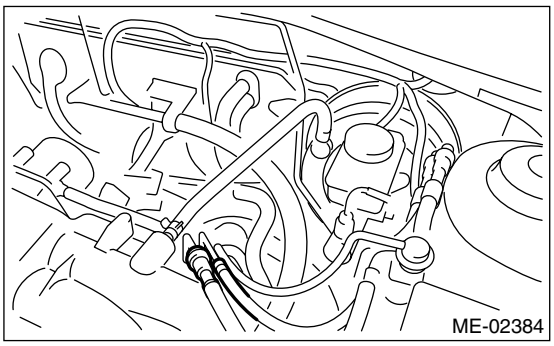
6) Install the engine harness to fuel injector pipe LH.

7) Install the fuel pipe protector LH.

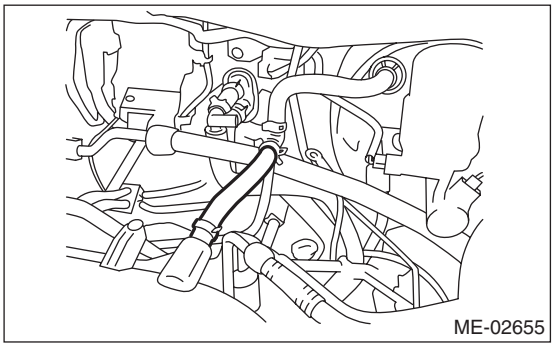
Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



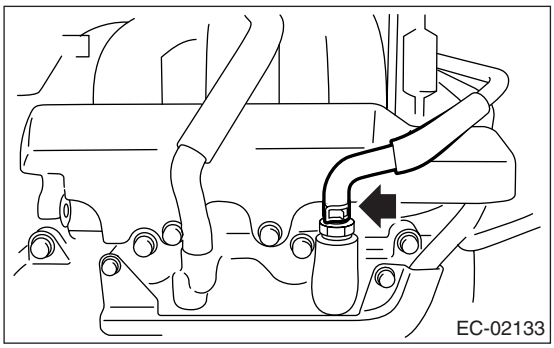
8) Connect the fuel hoses to fuel pipe.



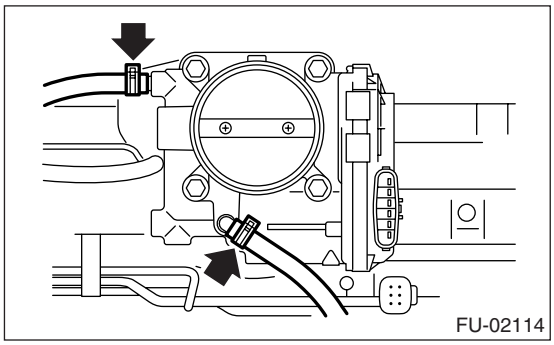
9) Connect the brake booster hose.



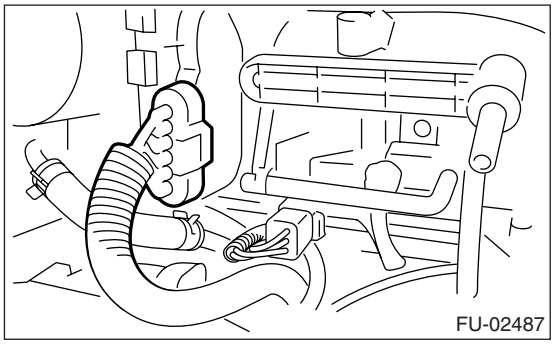
10) Connect the PCV hose.



11) Connect the engine coolant hoses to throttle body.



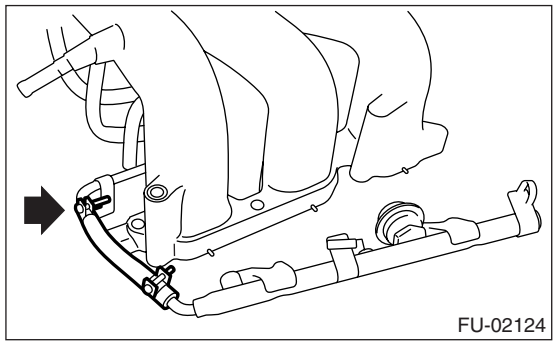
12) Connect the connector to throttle body.



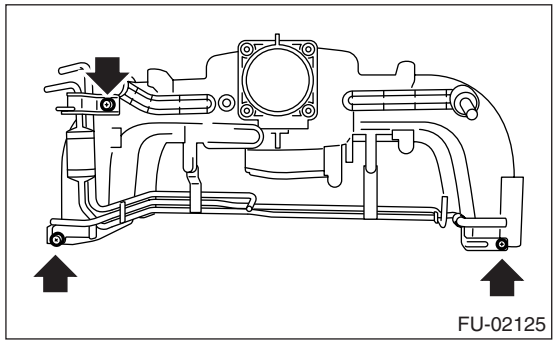
13) Install the generator. <Ref. to SC(H6DO)-19, INSTALLATION, Generator.>
14) Install the air cleaner case and air intake chamber. <Ref. to IN(H6DO)-5, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>
15) Install the fuse of fuel pump to main fuse box.
16) Connect the ground cable to the battery.
17) Install the collector cover.

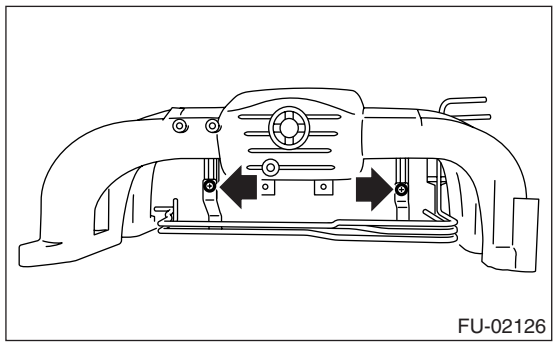
C: DISASSEMBLY

1) Remove the engine harness from intake manifold.
2) Remove the throttle body. <Ref. to FU(H6DO)-11, REMOVAL, Throttle Body.>
3) Remove the manifold absolute pressure sensor. <Ref. to FU(H6DO)-22, REMOVAL, Manifold Absolute Pressure Sensor.>
4) Remove the purge control solenoid valve. <Ref. to EC(H6DO)-6, REMOVAL, Purge Control Solenoid Valve.>
5) Loosen the clamp which holds fuel injector pipe to fuel hose, and then disconnect the pipe from fuel hose.



6) Remove the bolts which install fuel pipes on intake manifold.





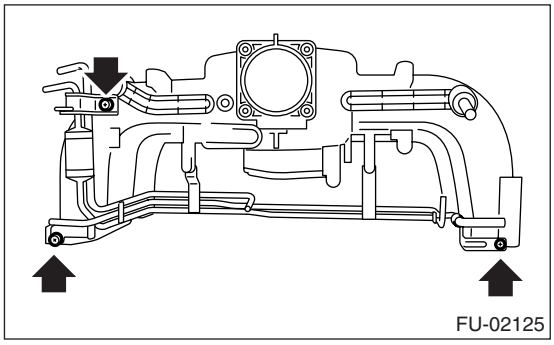
D: ASSEMBLY

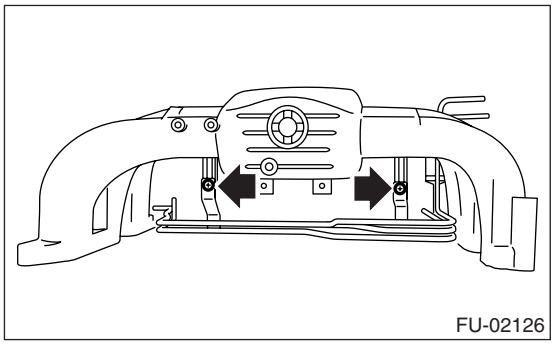
NOTE:
When assembling the nipple, apply liquid gasket.

Liquid gasket:
THREE BOND 1105 (Part No.004403010)

1) Tighten the bolts which install fuel pipes on intake manifold.

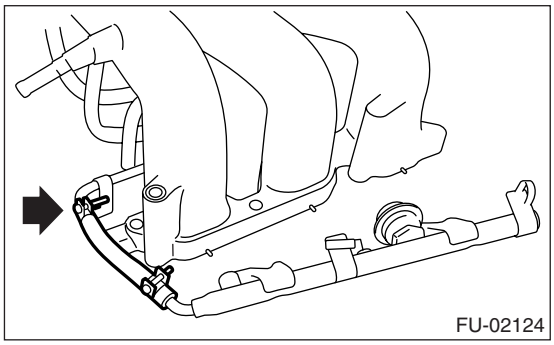
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


FU-02125


FU-02126

2) Connect the fuel injector pipe to fuel hose, and tighten the clamp screw.

Tightening torque:
1.5 N·m (0.15 kgf-m, 1.1 ft-lb)


FU-02124

3) Install the purge control solenoid valve. <Ref. to EC(H6DO)-6, INSTALLATION, Purge Control Solenoid Valve.>
4) Install the manifold absolute pressure sensor. <Ref. to FU(H6DO)-22, INSTALLATION, Manifold Absolute Pressure Sensor.>
5) Install the throttle body to intake manifold. <Ref. to FU(H6DO)-11, INSTALLATION, Throttle Body.>
6) Install the engine harness to the intake manifold.

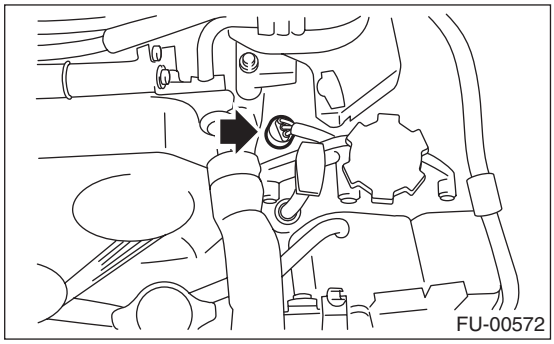
E: INSPECTION

Make sure the fuel pipe and fuel hoses are not damaged and the connections are tightened firmly.

4. Engine Coolant Temperature Sensor

A: REMOVAL

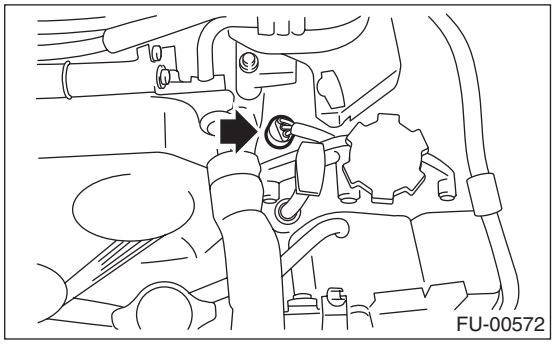
1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Disconnect the connectors from the engine coolant temperature sensor.
4) Remove the engine coolant temperature sensor.



B: INSTALLATION

Install in the reverse order of removal.

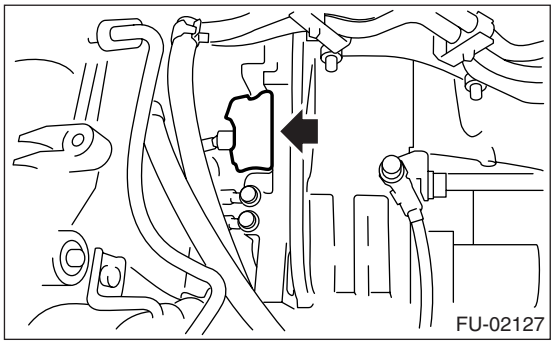
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



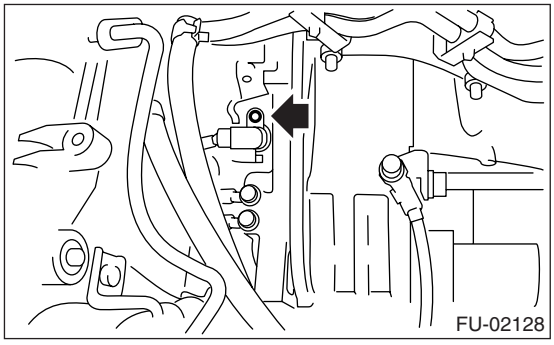
5. Crankshaft Position Sensor

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Remove the air intake chamber. <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
4) Remove the service hole cover.



5) Remove the crankshaft position sensor.

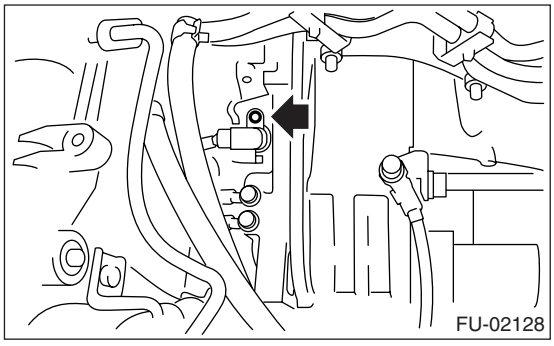


6) Disconnect the connector from crankshaft position sensor.

B: INSTALLATION

Install in the reverse order of removal.

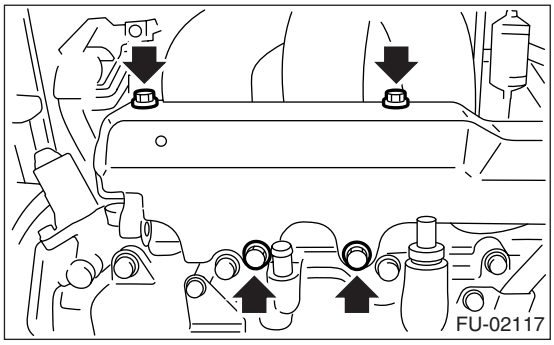
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



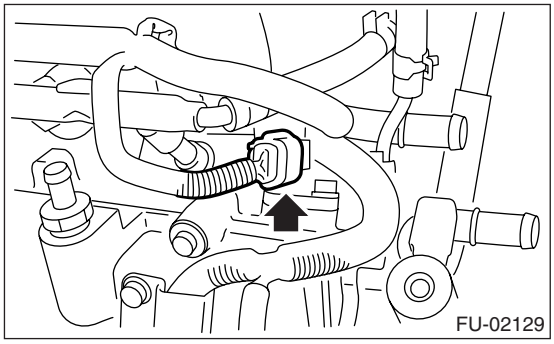
6. Camshaft Position Sensor

A: REMOVAL

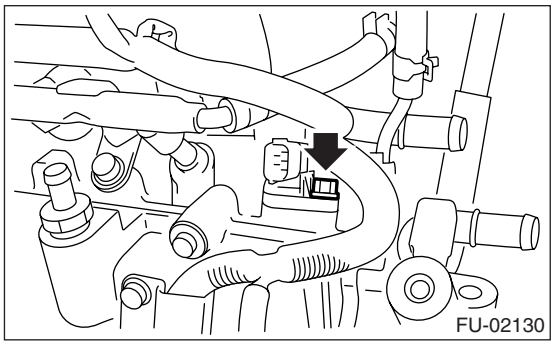
1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Remove the generator harness from fuel pipe protector LH.
4) Remove the fuel pipe protector LH.



5) Disconnect the connector from camshaft position sensor LH.



6) Remove the camshaft position sensor LH.



7) Remove the camshaft position sensor RH in the same procedure as LH.

B: INSTALLATION

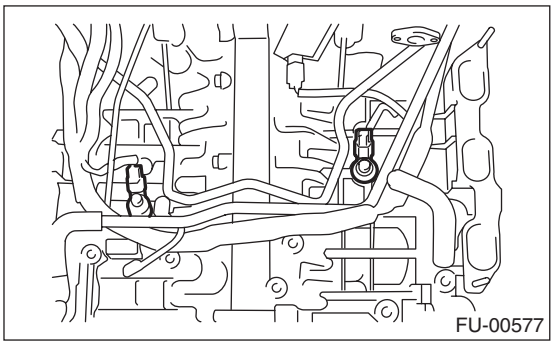
Install in the reverse order of removal.

Tightening torque:
Camshaft position sensor
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
Fuel pipe protector
19 N·m (1.9 kgf-m, 14 ft-lb)

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)-12, REMOVAL, Intake Manifold.>
4) Disconnect the knock sensor connector.
5) Remove the knock sensor from cylinder block.

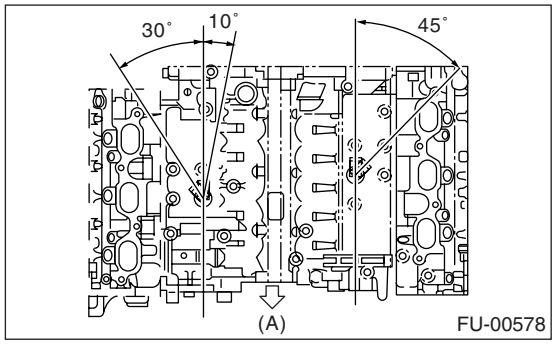


B: INSTALLATION

1) Install the knock sensor to cylinder block.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

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



(A) Front side of vehicle

2) Connect the knock sensor connector.
3) Install the intake manifold. <Ref. to FU(H6DO)-13, INSTALLATION, Intake Manifold.>
4) Connect the battery ground cable to the battery.
5) Install the collector cover.

8. Throttle Position Sensor

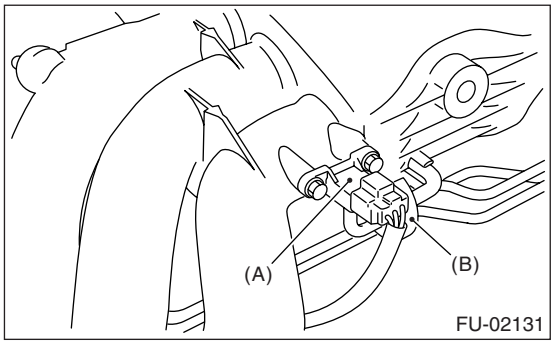
A: SPECIFICATION

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)-11, REMOVAL, Throttle Body.> <Ref. to FU(H6DO)-11, INSTALLATION, Throttle Body.>

9. Manifold Absolute Pressure Sensor

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Disconnect the connector from manifold absolute pressure sensor (A), and remove the filter assembly (B) from intake manifold.



4) Remove the manifold absolute pressure sensor from intake manifold.

B: INSTALLATION

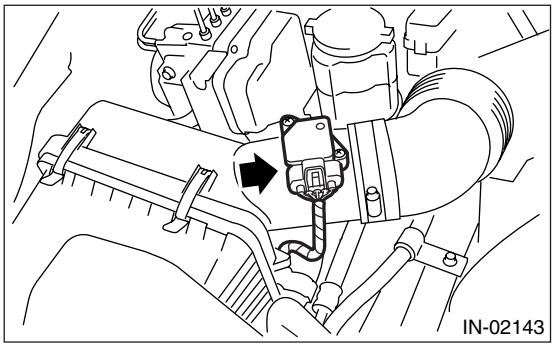
Install in the reverse order of removal.

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

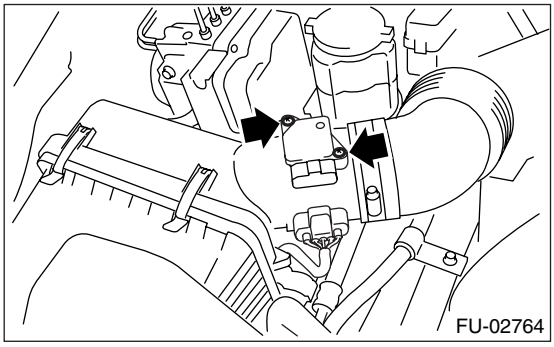
10.Mass Air Flow and Intake Air Temperature Sensor

A: REMOVAL

1) Disconnect the ground cable from 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.

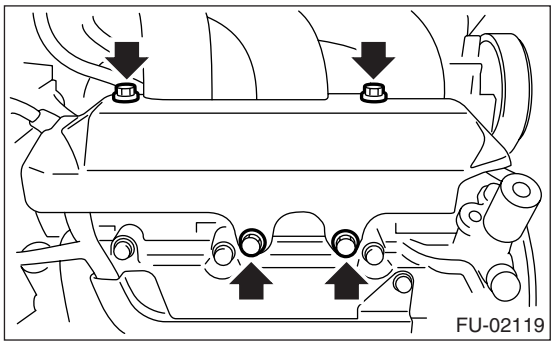
Tightening torque:
1 N·m (0.1 kgf-m, 0.7 ft-lb)

11.Fuel Injector

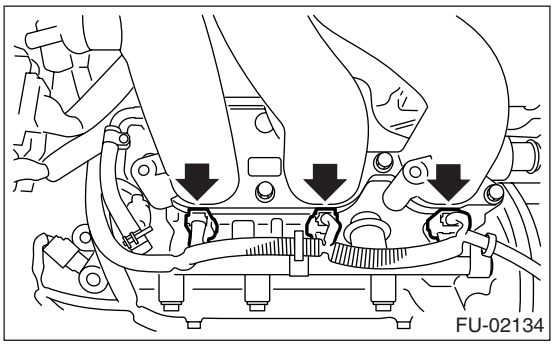
A: REMOVAL

1. RH SIDE

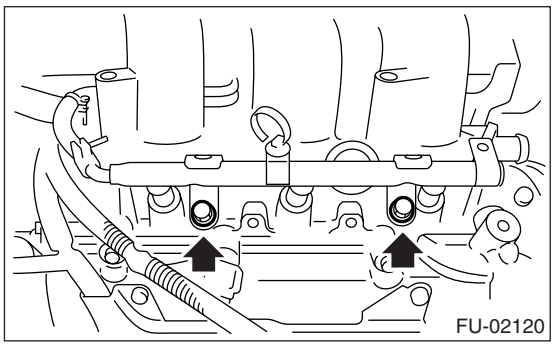
1) Remove the collector cover.
2) Release the fuel pressure. <Ref. to FU(H6DO)-37, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Disconnect the ground cable from battery.
4) Open the fuel filler flap lid, and remove the fuel filler cap.
5) Remove the air cleaner case. <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.>
6) Remove the fuel pipe protector RH.



7) Disconnect the connector from fuel injector.



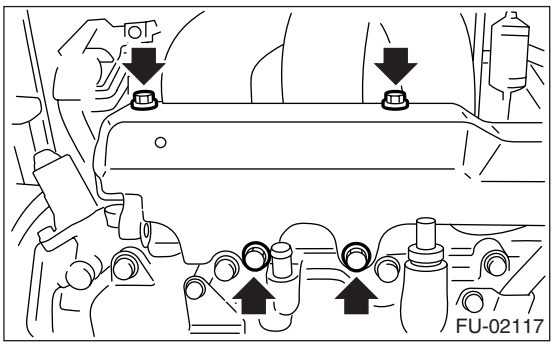
8) Remove the engine harness from fuel injector pipe RH.
9) Remove the bolt which holds fuel injector pipe onto intake manifold.



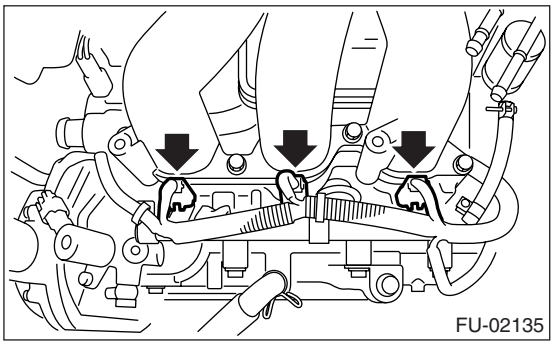
10) Remove the fuel injector while lifting up the fuel injector pipe.

2. LH SIDE

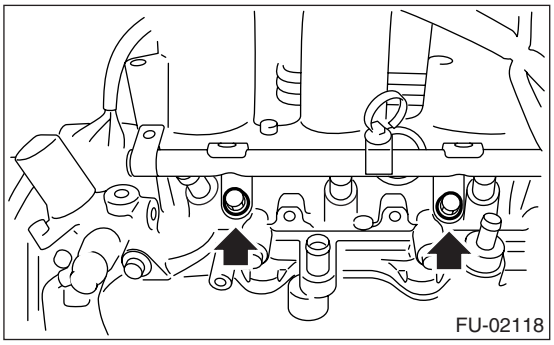
1) Remove the collector cover.
2) Release the fuel pressure. <Ref. to FU(H6DO)-37, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Remove the battery.
4) Open the fuel filler flap lid, and remove the fuel filler cap.
5) Remove the generator harness from fuel pipe protector LH.
6) Remove the fuel pipe protector LH.



7) Disconnect the connector from fuel injector.



8) Remove the engine harness from fuel injector pipe LH.
9) Remove the bolt which holds fuel injector pipe onto intake manifold.



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

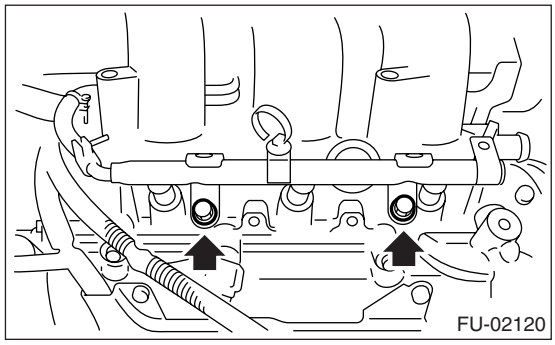
B: INSTALLATION

1. RH SIDE

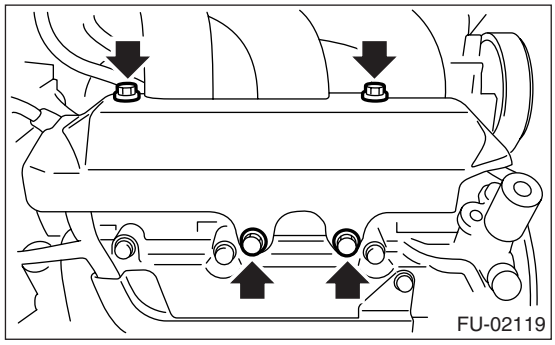
Install in the reverse order of removal.

NOTE:
Use new O-rings.

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



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

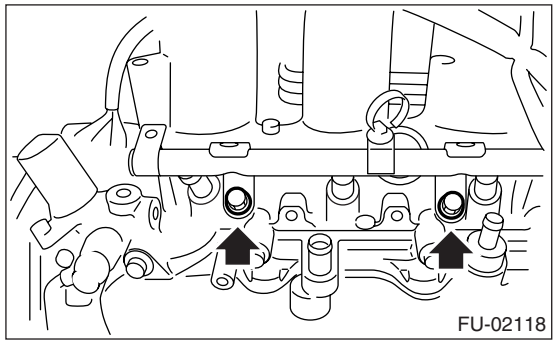


2. LH SIDE

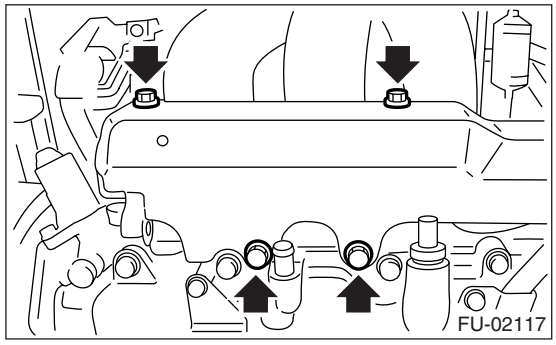
Install in the reverse order of removal.

NOTE:
Use new O-rings.

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



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

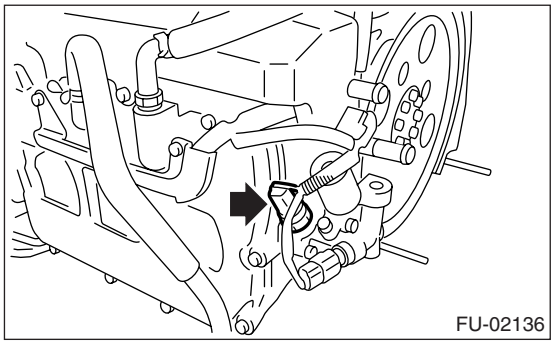


12. Variable Valve Lift Diagnosis Oil Pressure Switch

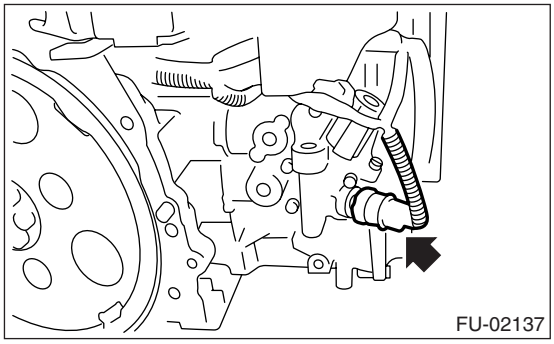
A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Remove the air intake chamber. <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
4) Disconnect the connector from variable valve lift diagnosis oil pressure switch.
5) Remove the variable valve lift diagnosis oil pressure switch.

- LH side



- RH side



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Apply liquid gasket to variable valve lift diagnosis oil pressure switch threads.

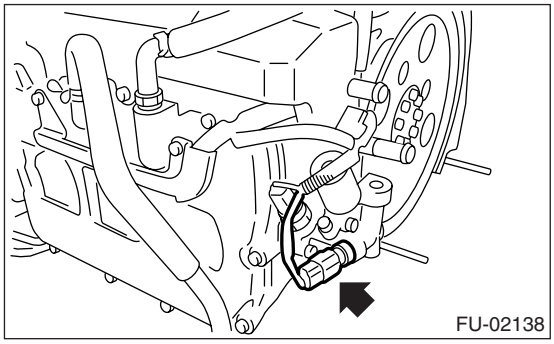
Liquid gasket:
THREE BOND 1324 (Part No. 004403042) or equivalent

Tightening torque:
17 N·m (1.7 kgf-m, 12.5 ft-lb)

13.Oil Temperature Sensor

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Remove the air intake chamber. <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
4) Disconnect the connector from oil temperature sensor.
5) Remove the oil temperature sensor.



B: INSTALLATION

Install in the reverse order of removal.

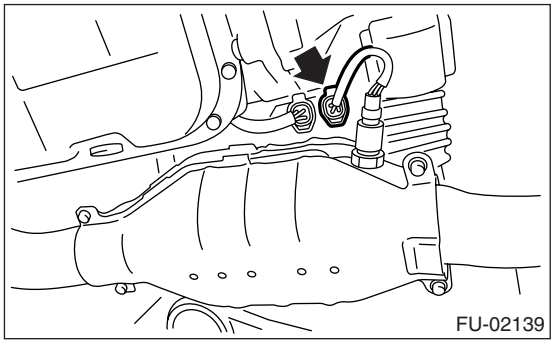
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

14.Front Oxygen (A/F) Sensor

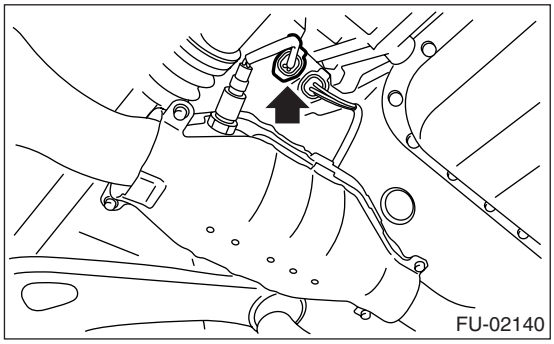
A: REMOVAL

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

- LH side



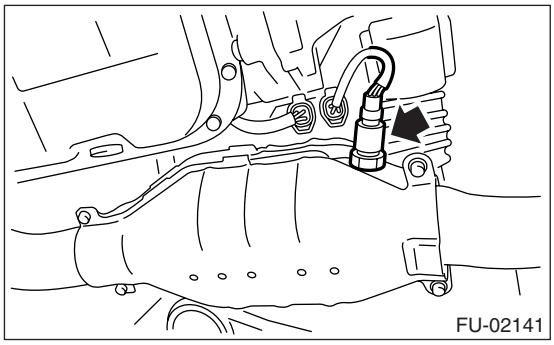
- RH side



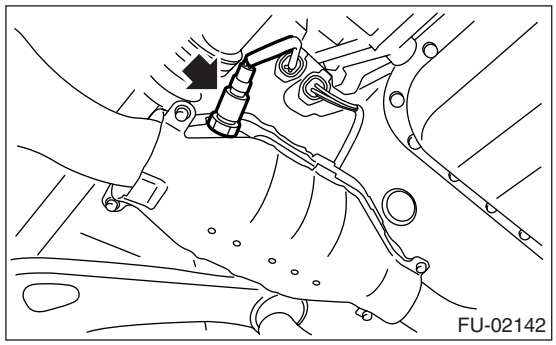
5) Apply spray-type lubricant to the threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.
6) Remove the front oxygen (A/F) sensor.

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

- LH side



- RH side



B: INSTALLATION

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.

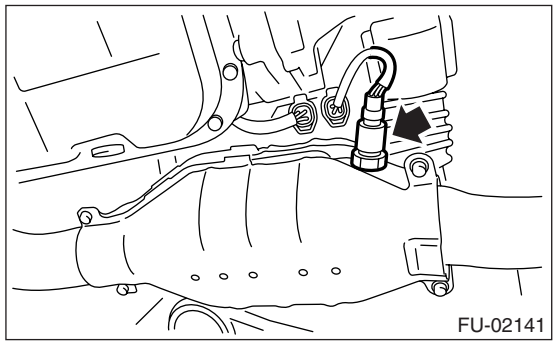
Anti-seize compound:
NEVER-SEEZ NS-165 or the equivalent

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

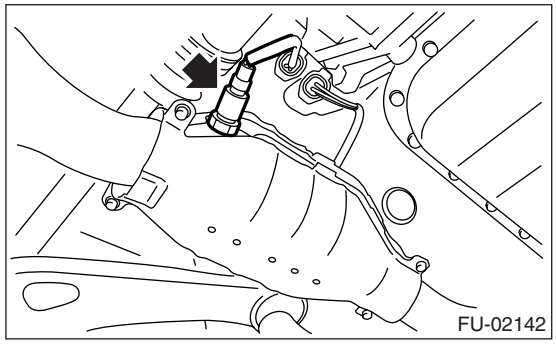
2) Install the front oxygen (A/F) sensor.

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

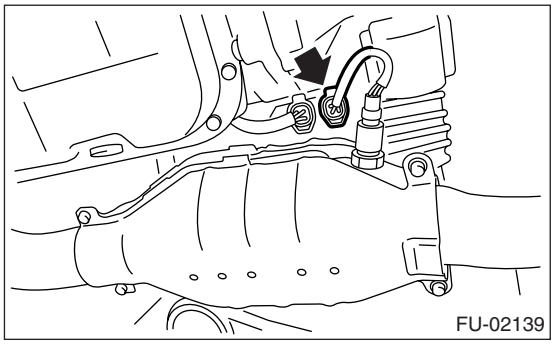
- LH side



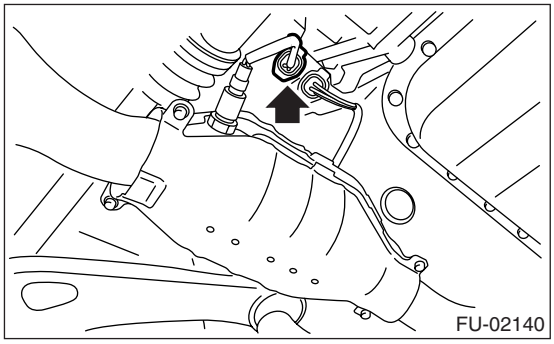
- RH side



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



- RH side



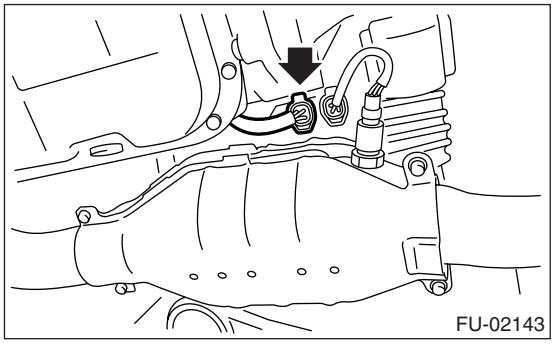
4) Lower the vehicle.
5) Connect the battery ground cable to the battery.

15.Rear Oxygen Sensor

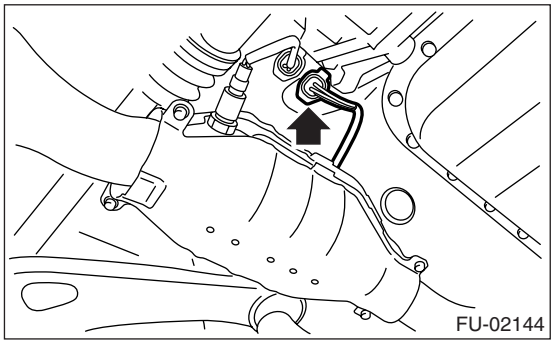
A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Lift-up the vehicle.
4) Disconnect the connector from rear oxygen sensor.

- LH side



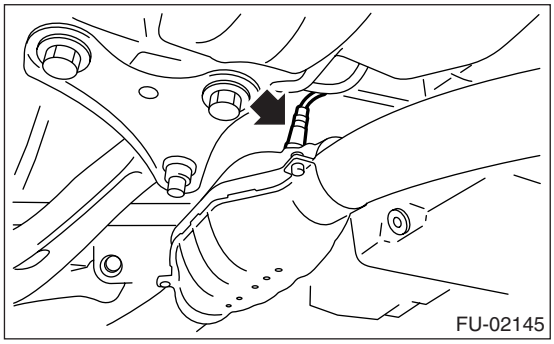
- RH side



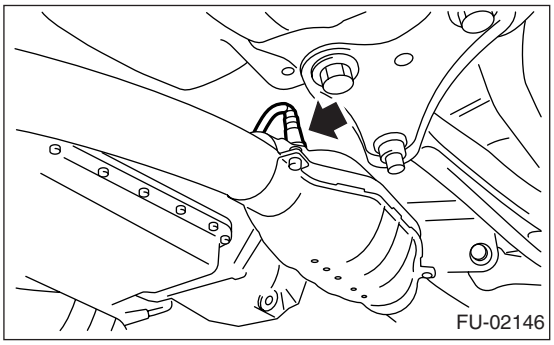
5) Remove the clip holding the harness.
6) Apply spray-type lubricant to the threaded portion of rear oxygen sensor, and leave it for one minute or more.
7) Remove the rear oxygen sensor.

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

- LH side



- RH side



B: INSTALLATION

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.

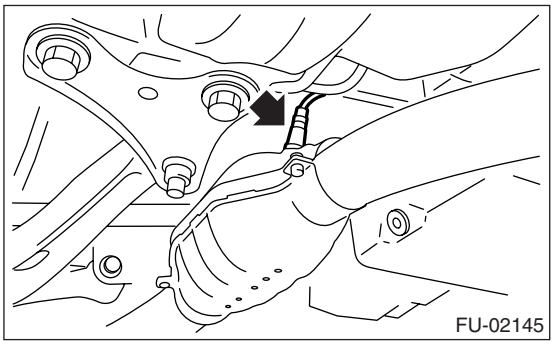
Anti-seize compound:
NEVER-SEEZ NS-165 or the equivalent

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

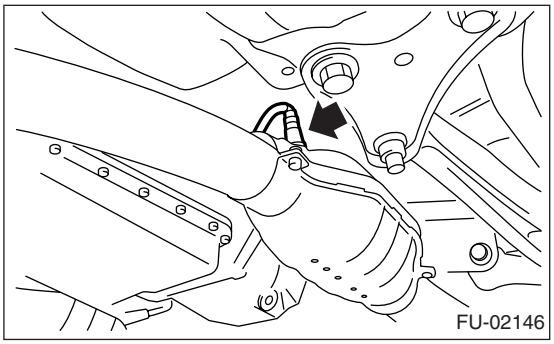
2) Install the rear oxygen sensor.

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

- LH side

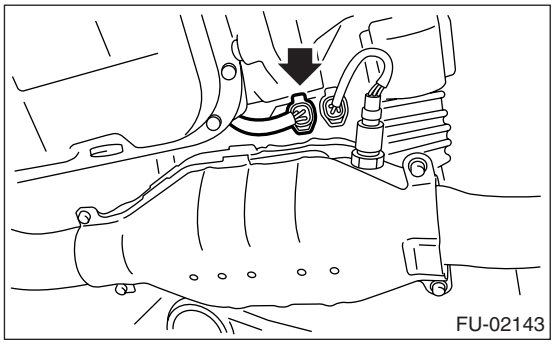


- RH side

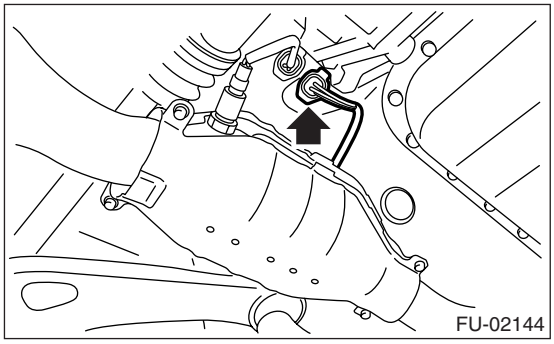


3) Hold the harness with clip.

4) Connect the connector to rear oxygen sensor.
- LH side



- RH side

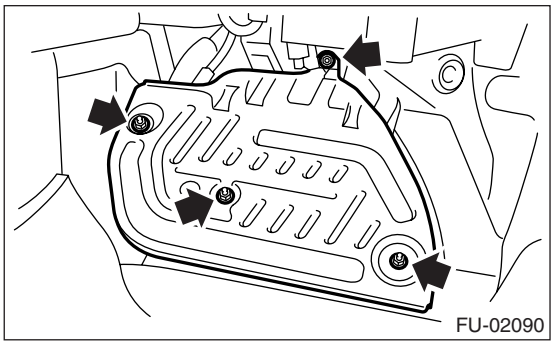


5) Lower the vehicle.
6) Connect the battery ground cable to the battery.

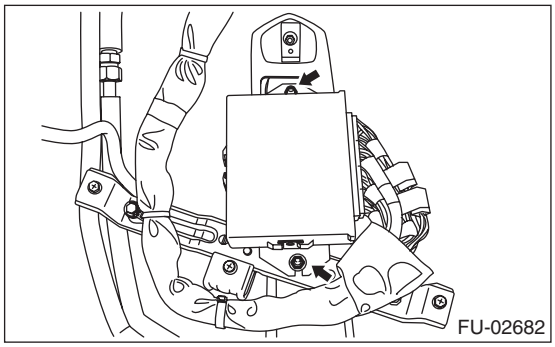
16.Engine Control Module (ECM)

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



B: INSTALLATION

Install in the reverse order of removal.

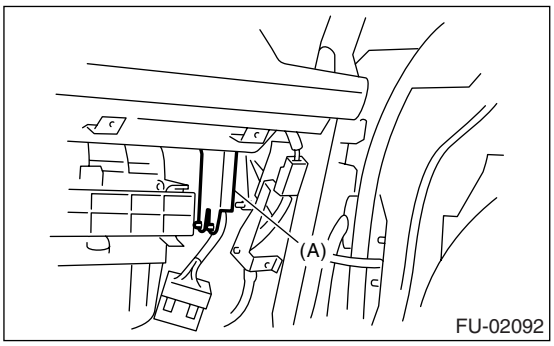
CAUTION:
• When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage on the fuel injection system.
• When replacing the ECM, be careful not to damage the harnesses and connectors.
• When replacing the ECM, immobilizer system must be registered. To do so, all ignition keys and ID cards need to be prepared. Refer to the "IMMOBILIZER TEACHING OPERATION MANUAL".

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

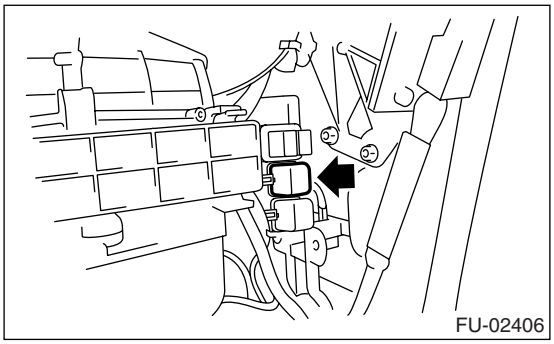
17.Main Relay

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-37, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connectors from main relay.



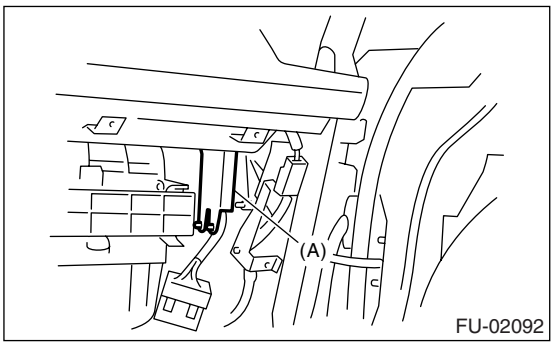
B: INSTALLATION

Install in the reverse order of removal.

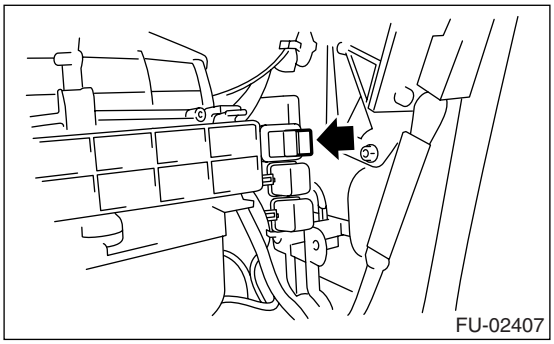
18.Fuel Pump Relay

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-37, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from fuel pump relay.



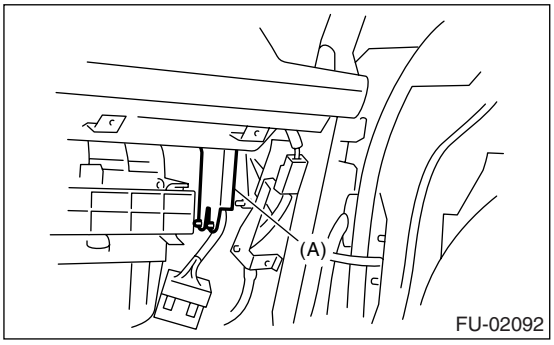
B: INSTALLATION

Install in the reverse order of removal.

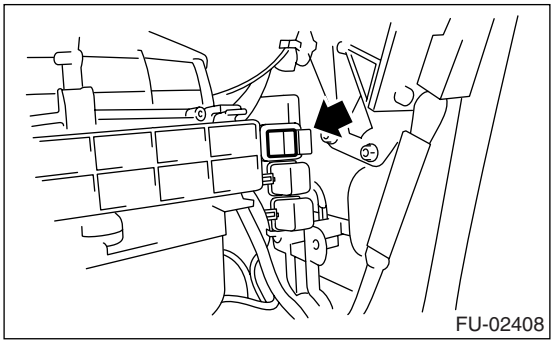
19. Electronic Throttle Control Relay

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-37, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from electric throttle control relay.



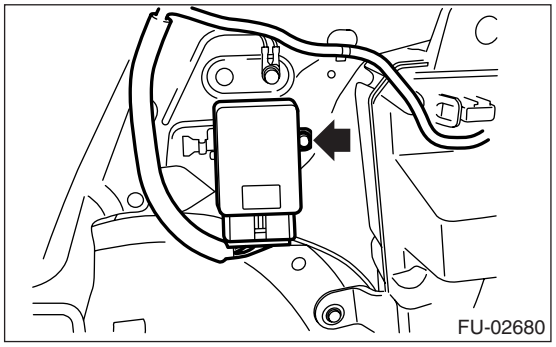
B: INSTALLATION

Install in the reverse order of removal.

20.Fuel Pump Control Unit

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear quarter trim. <Ref. to EI-45, 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.

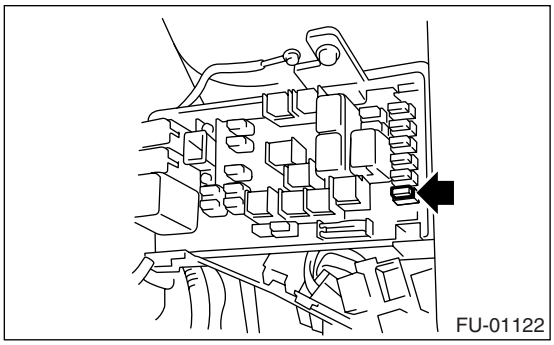
21.Fuel

A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

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

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

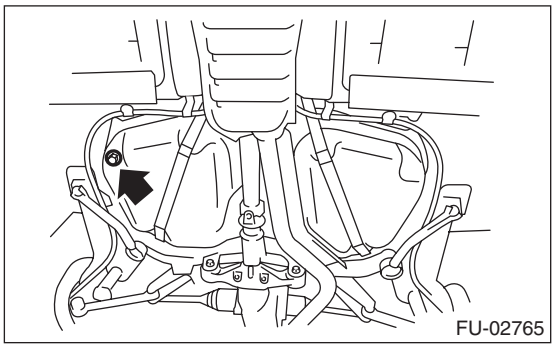


2) Start the engine and run until it stalls.
3) After the engine stalls, crank it for five more seconds.
4) Turn the ignition switch to OFF.

2. DRAINING FUEL

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

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Lift-up the vehicle.
5) Remove the fuel tank protector.
6) Set a container under the vehicle and remove the drain plug from fuel tank to drain fuel from fuel tank.



7) Tighten the fuel drain plugs.

NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

8) Install the fuel tank protector.

NOTE:
Use a new nut.

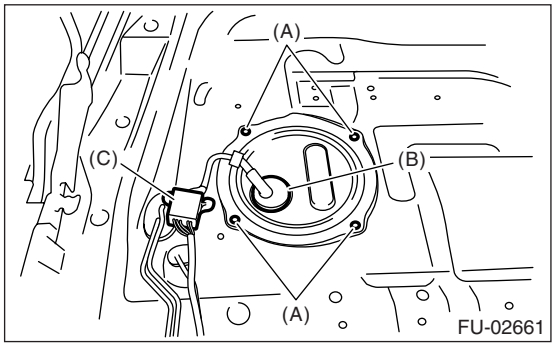
Tightening torque:
Nut
9 N·m (0.9 kgf-m, 6.6 ft-lb)
Bolt
17.5 N·m (1.78 kgf-m, 12.9 ft-lb)

22.Fuel Tank

A: REMOVAL

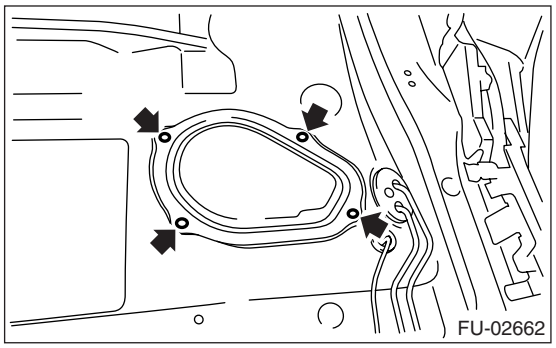
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H6DO)-37, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Disconnect the ground cable from battery.
4) Drain fuel from fuel tank.
<Ref. to FU(H6DO)-37, DRAINING FUEL, PROCEDURE, Fuel.>
5) Remove the second seat. <Ref. to SE-12, REMOVAL, Second-row Seats.>
6) Remove the service hole cover of fuel pump.
   (1) Disconnect the connector.
   (2) Remove the bolt.
   (3) Push the grommet down and remove service hole cover.

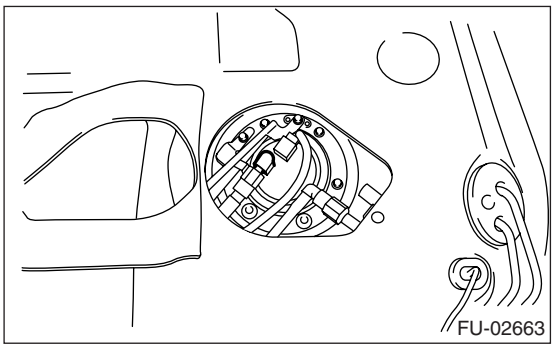


(A) Bolt
(B) Grommet
(C) Connector

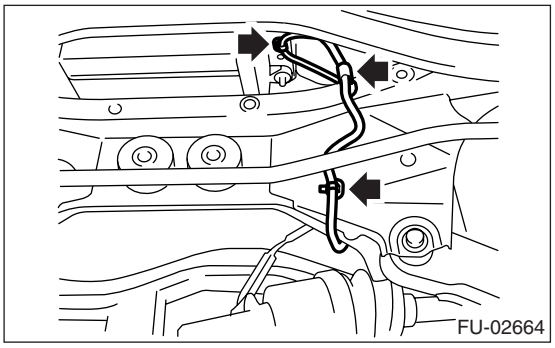
7) Remove the service hole cover of fuel sub level sensor.



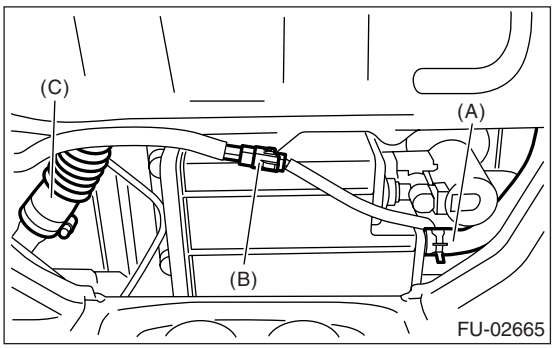
8) Disconnect the quick connector on the fuel delivery hose. <Ref. to FU(H6DO)-48, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>



9) Remove the rear wheels.
10) Lift-up the vehicle.
11) Remove the clip holding the harness.



12) Remove the rear suspension assembly. <Ref. to RS-16, REMOVAL, Rear Sub Frame.>
13) Disconnect the following hoses and connectors.
   (1) Evaporation hose
   (2) Fuel filler hose
   (3) Connector

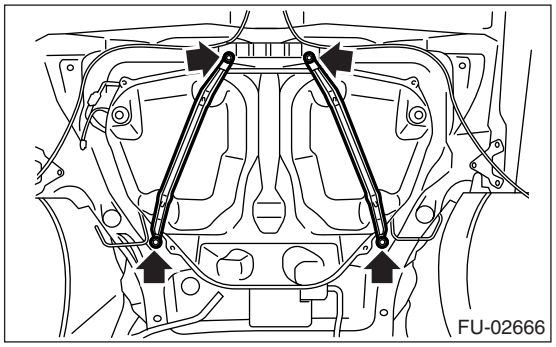


(A) Evaporation hose
(B) Connector
(C) Fuel filler hose

14) Remove the fuel tank from the vehicle.

WARNING:
A helper is required to perform this work.

(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.



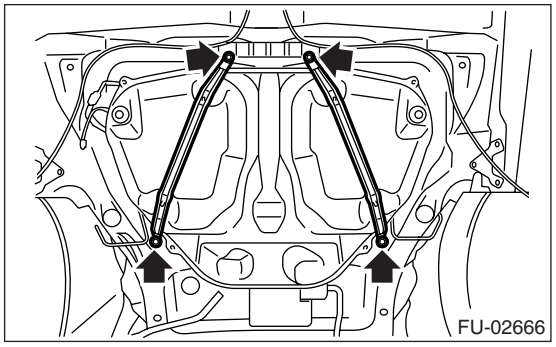
B: INSTALLATION

1) Install the fuel tank to the vehicle.

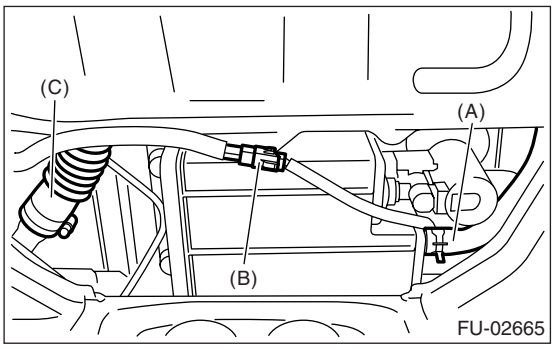
WARNING:
A helper is required to perform this work.

(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, 25 ft-lb)

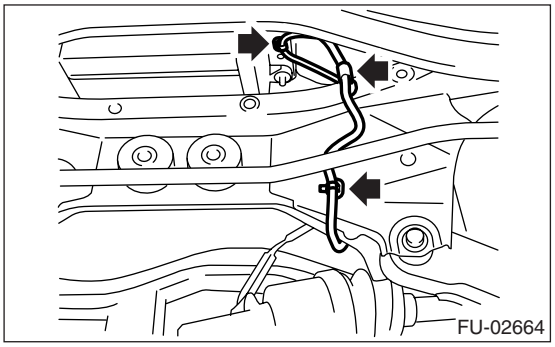


2) Connect the following hoses and connectors.
(1) Evaporation hose
(2) Fuel filler hose
(3) Connector

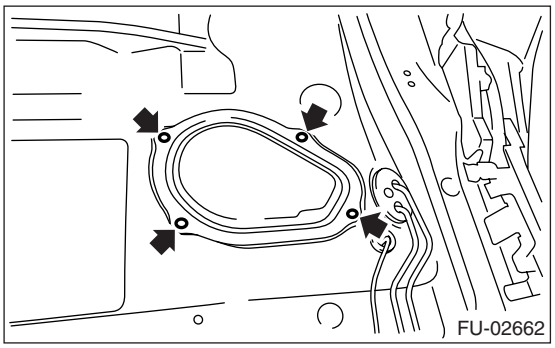


(A) Evaporation hose
(B) Connector
(C) Fuel filler hose

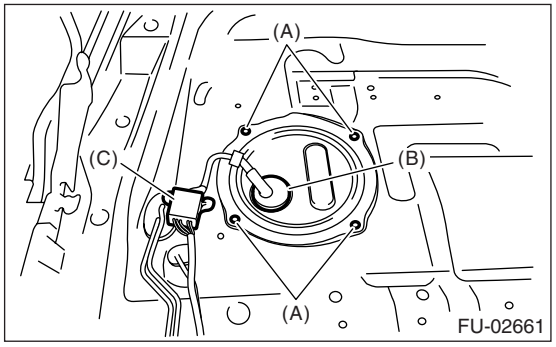
3) Install the rear suspension assembly. <Ref. to RS-16, INSTALLATION, Rear Sub Frame.>
4) Install the clip that holds the harness.



5) Lower the vehicle.
6) Install the rear wheels.
7) Connect the quick connector on fuel delivery hose. <Ref. to FU(H6DO)-49, INSTALLATION, Fuel Delivery, Return 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 to install it to the second hole cover.
(2) Tighten the bolt.
(3) Connect the connector.



(A) Bolt
(B) Grommet
(C) Connector

10) Install the second seat. <Ref. to SE-12, INSTALLATION, Second-row Seats.>
11) Install the fuse of fuel pump to main fuse box.
12) Connect the battery ground cable to the battery.

C: INSPECTION

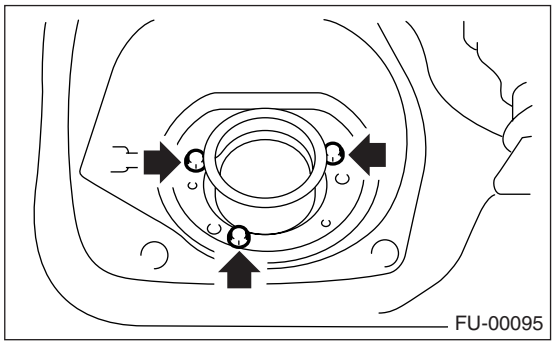
1) Check that the fuel tank does not have holes, cracks or is damaged in any other way.
2) Make sure that the fuel pipe and fuel hose are not cracked and that the connections are tight.

23.Fuel Filler Pipe

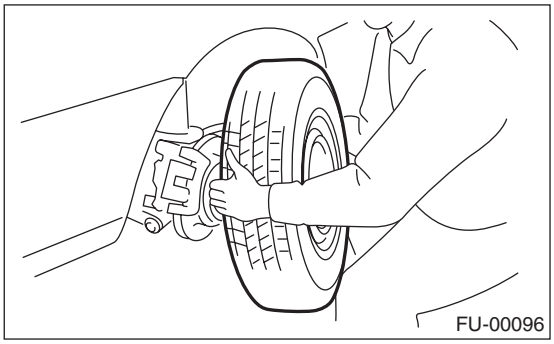
A: REMOVAL

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

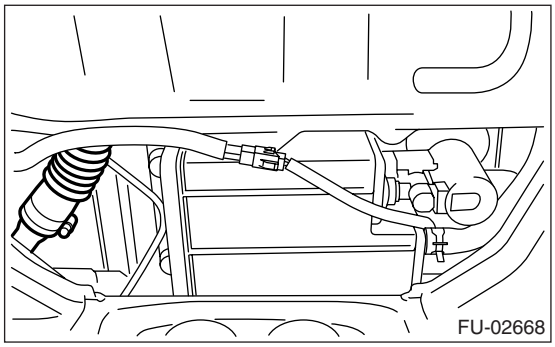
1) Disconnect the ground cable from battery.
2) Open the fuel filler flap lid, and remove the filler cap.
3) Remove the screws which secure the gasket.



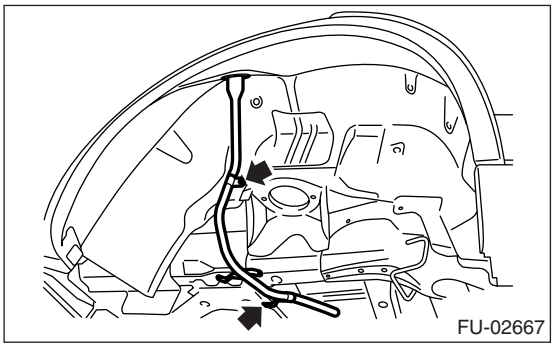
4) Lift-up the vehicle.
5) Remove the rear wheel RH.



6) Drain fuel from fuel tank. <Ref. to FU(H6DO)-37, DRAINING FUEL, PROCEDURE, Fuel.>
7) Remove the mud guard. <Ref. to EI-19, REMOVAL, Mud Guard.>
8) Remove the rear suspension assembly. <Ref. to RS-16, REMOVAL, Rear Sub Frame.>
9) Disconnect the fuel filler hose.



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

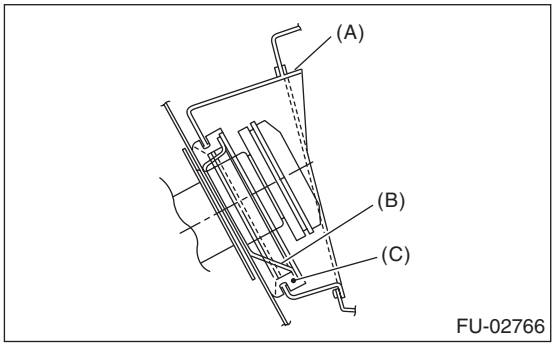


11) Remove the fuel filler pipe to the underside of the vehicle.

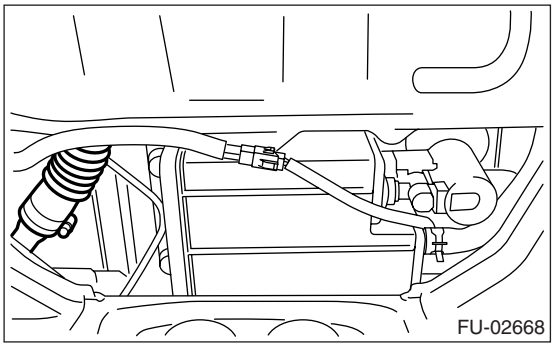
B: INSTALLATION

1) Open the fuel filler flap lid.
2) Set the fuel saucer (A) with rubber packing (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 nuts.

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

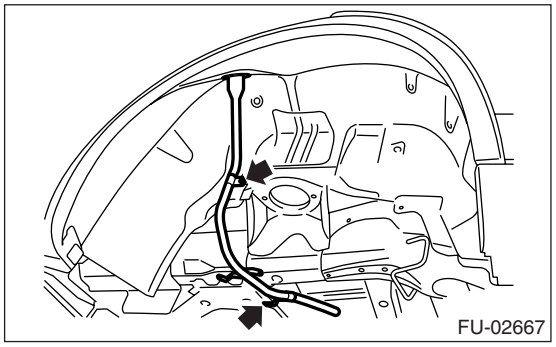


4) Correctly insert the fuel filler hose to specified position, and then tighten the clamp.

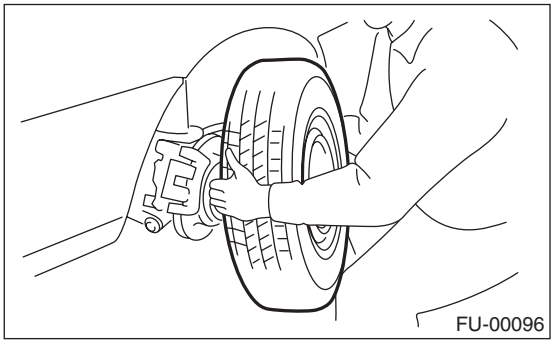


5) Tighten the bolts which hold fuel filler pipe bracket on the body.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



6) Install the rear suspension assembly. <Ref. to RS-16, INSTALLATION, Rear Sub Frame.>
7) Install the mud guard. <Ref. to EI-19, INSTALLATION, Mud Guard.>
8) Install the rear wheel RH.



9) Lower the vehicle.
10) Connect the battery ground cable to the battery.

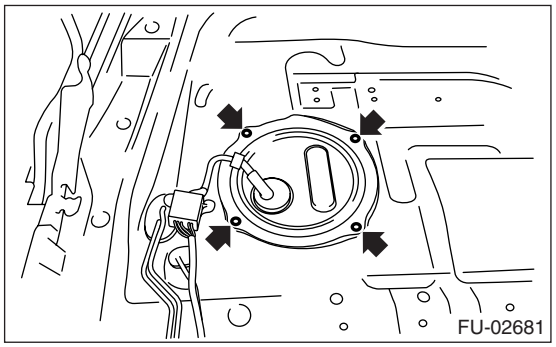
24.Fuel Pump

A: REMOVAL

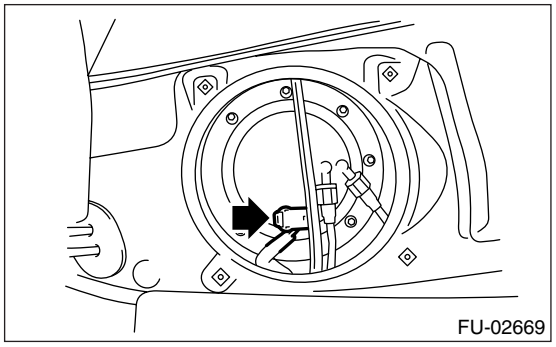
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

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

1) Release the fuel pressure. <Ref. to FU(H6DO)-37, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Drain fuel. <Ref. to FU(H6DO)-37, DRAINING FUEL, PROCEDURE, Fuel.>
3) Remove the second seat. <Ref. to SE-12, REMOVAL, Second-row Seats.>
4) Remove the service hole cover.

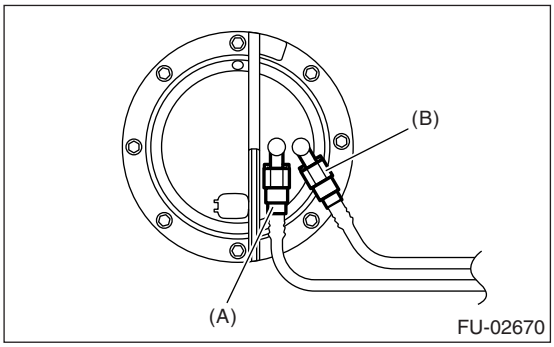

FU-02681

5) Disconnect the connector from fuel pump.


FU-02669

6) Disconnect the quick connector, and then disconnect the fuel delivery hose, return hose and jet pump hose. <Ref. to FU(H6DO)-48, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

7) Remove the nuts which install fuel pump assembly onto fuel tank.



FU-02670

(A) Delivery hose
(B) Jet pump hose

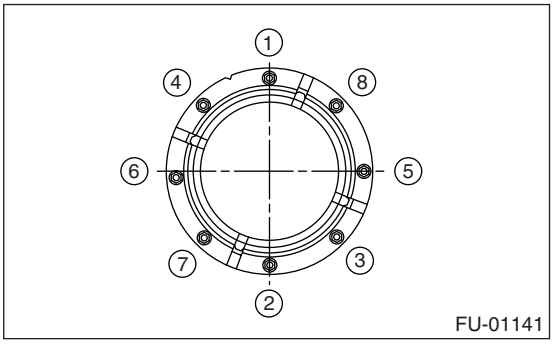
8) Remove the fuel pump assembly from the fuel tank.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
1. Make sure the sealing portion is free from fuel or foreign matter before installation.
2. Tighten the nuts to the specified torque in the order as shown in the figure.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.2 ft-lb)

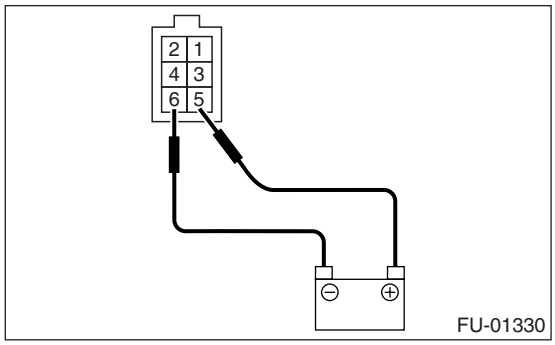


FU-01141

C: INSPECTION

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

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



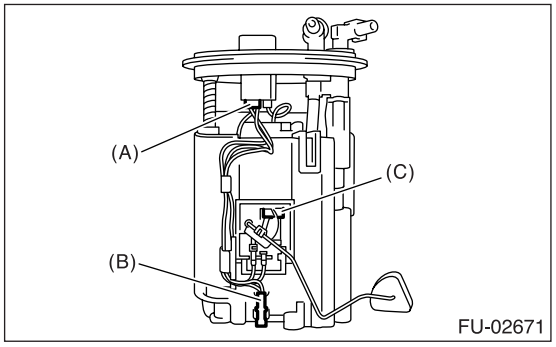
25.Fuel Level Sensor

A: REMOVAL

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

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

1) Remove the fuel pump assembly. <Ref. to FU(H6DO)-43, REMOVAL, Fuel Pump.>
2) Disconnect the connector from fuel pump bracket.
3) Remove the fuel temperature sensor.
4) Remove the fuel level sensor.



(A) Connector
(B) Fuel temperature sensor
(C) Fuel level sensor

B: INSTALLATION

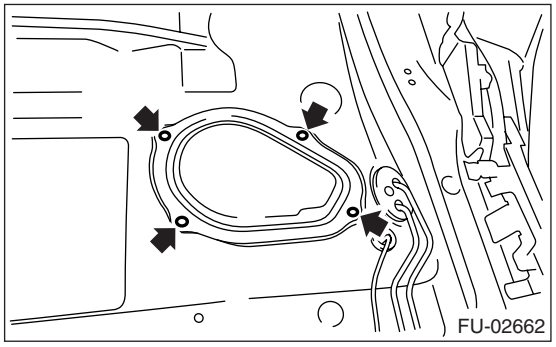
Install in the reverse order of removal.

26.Fuel Sub Level Sensor

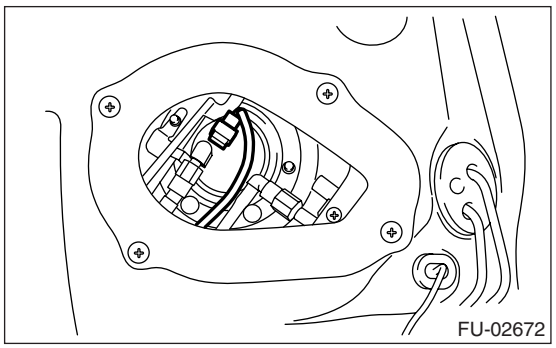
A: REMOVAL

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

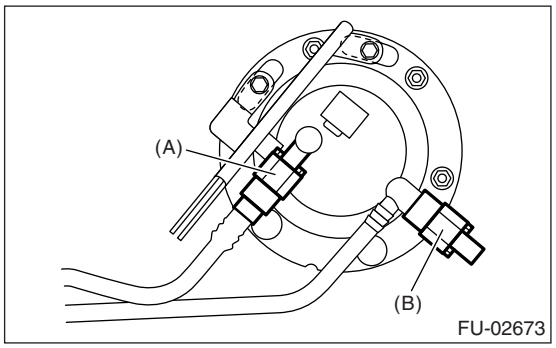
1) Drain fuel. <Ref. to FU(H6DO)-37, DRAINING FUEL, PROCEDURE, Fuel.>
2) Remove the second seat. <Ref. to SE-12, REMOVAL, Second-row Seats.>
3) Remove the service hole cover.



4) Disconnect the connector from the fuel sub level sensor.



5) Disconnect the quick connector, and then disconnect the fuel delivery hose, return hose and jet pump hose. <Ref. to FU(H6DO)-48, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
6) Remove the nuts and bolts which install fuel sub level sensor on fuel tank.



(A) Jet pump hose
(B) Delivery hose

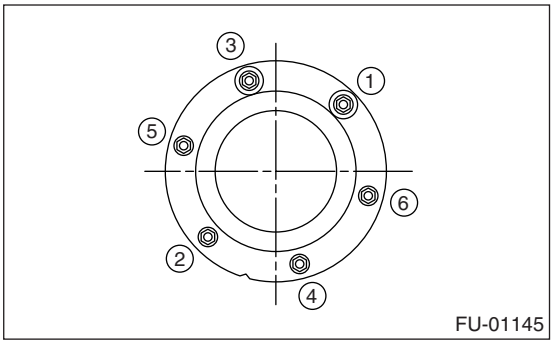
7) Remove the fuel sub level sensor.

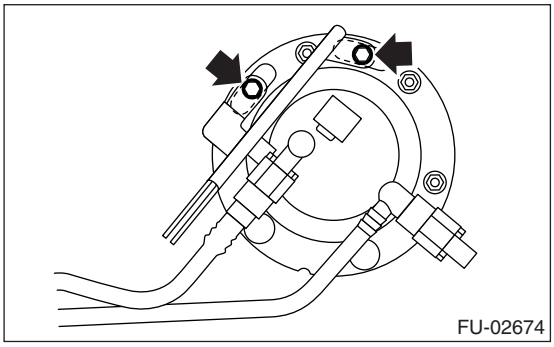
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
1. Make sure the sealing portion is free from fuel or foreign matter before installation.
2. Tighten the nuts and bolts to the specified torque in the order as shown in the figure.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.2 ft-lb)





27.Fuel Filter

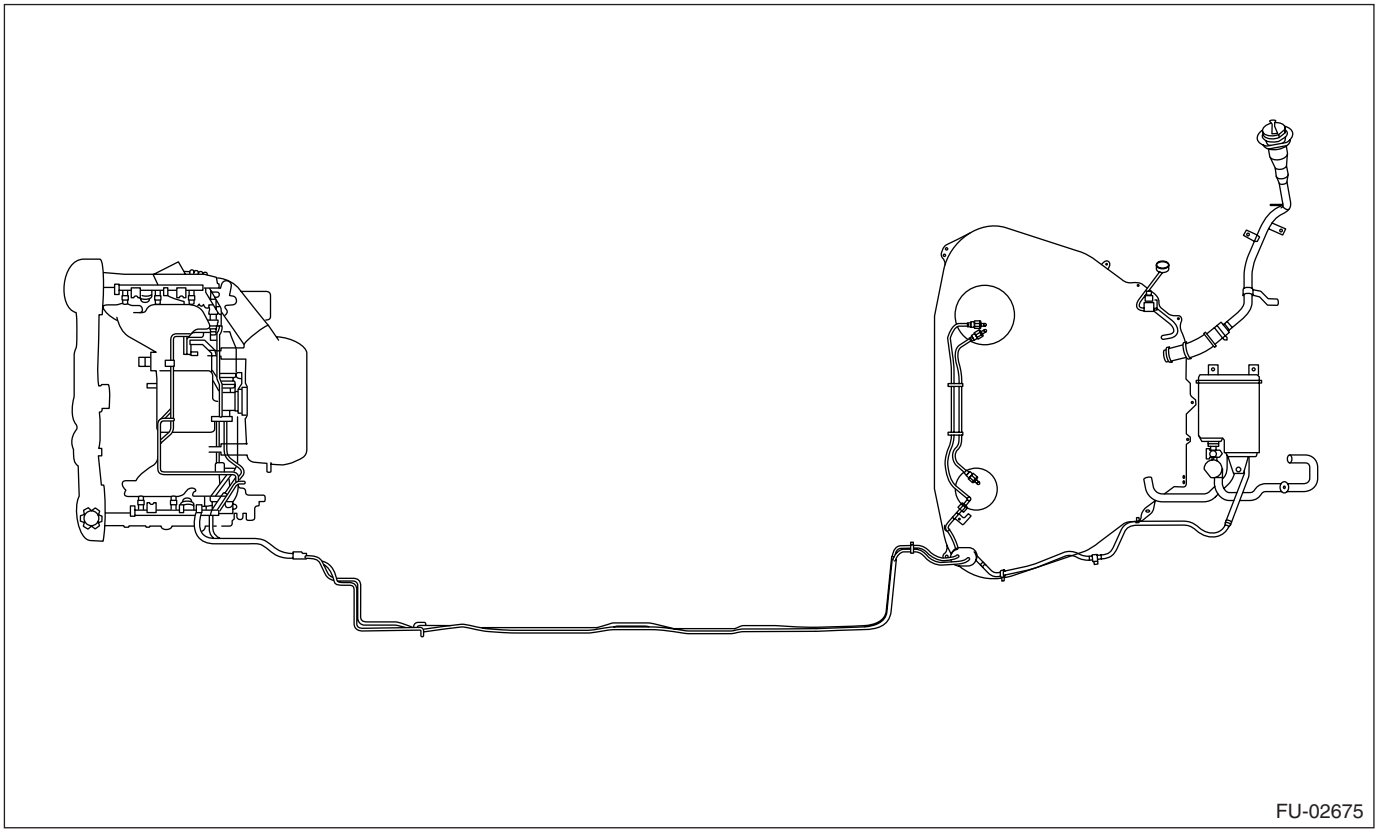
A: SPECIFICATION

Fuel filter forms a single unit with fuel pump.
Refer to “Fuel Pump” for removal and installation.
<Ref. to FU(H6DO)-43, REMOVAL, Fuel Pump.>
<Ref. to FU(H6DO)-43, INSTALLATION, Fuel Pump.>

28.Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H6DO)-37, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Remove the floor mat. <Ref. to EI-47, REMOVAL, Floor Mat.>
5) Disconnect the fuel delivery pipe and hose and the evaporation pipe and hose.

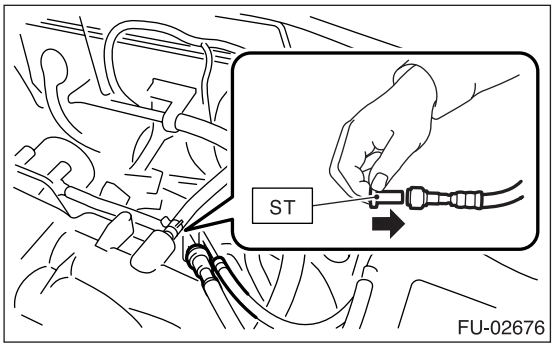


6) In the engine compartment, disconnect the fuel delivery hoses and evaporation hose.
   (1) Disconnect the quick connector of the fuel delivery line by pushing the ST in the direction of the arrow.

ST 42099AE000 CONNECTOR REMOVER

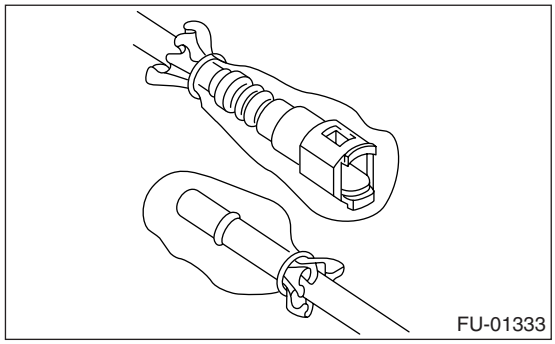
   (2) Remove the clip, and disconnect the evaporation hose from the pipe.

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



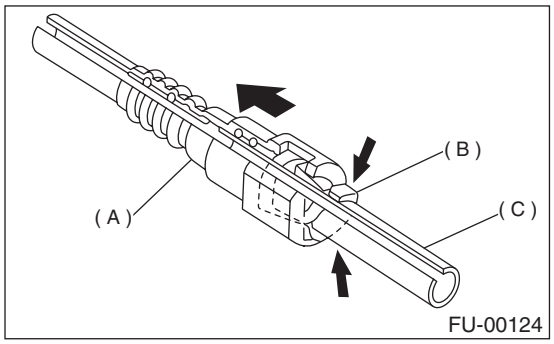
7) Lift-up the vehicle.
8) Remove the fuel tank. <Ref. to FU(H6DO)-38, REMOVAL, Fuel Tank.>

9) Separate the quick connector of fuel line.
(1) Clean the pipe and connector, if they are covered with dust.
(2) To prevent from damaging or entering foreign matter, wrap the pipes and connectors with plastic bag etc.



(3) Hold the connector (A) and push the retainer (B) down.
(4) Pull out the connector (A) from the retainer (B).

CAUTION:
Always use a new retainer except in use of engine compartment.

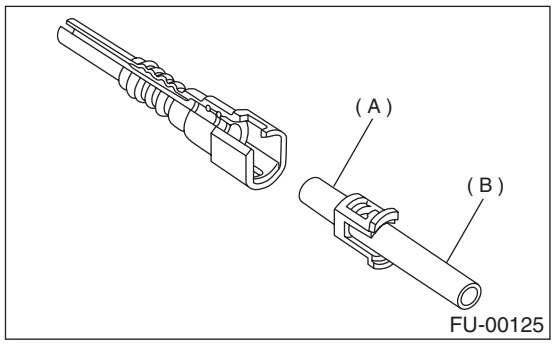


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION

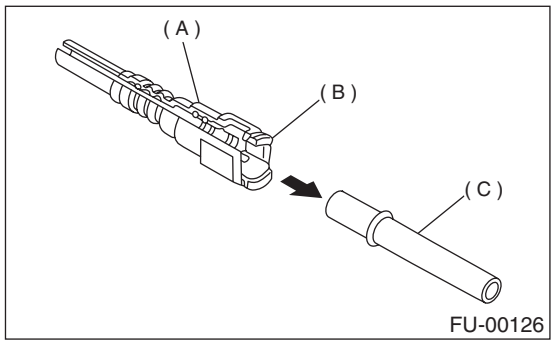
1) Connect the quick connector on fuel line.

CAUTION:
• Always use a new retainer except in use of engine compartment.
• Make sure that the connected portion is not damaged or has dust. If necessary, clean seal surface of pipe.



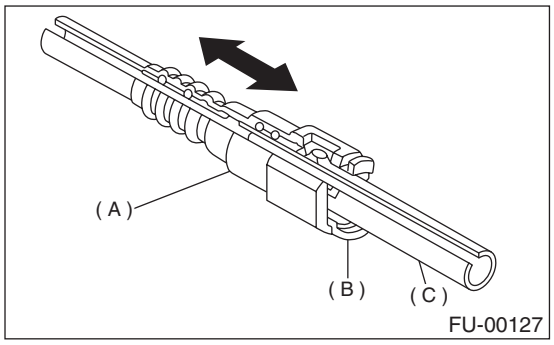
(A) Seal surface
(B) Pipe

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



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

CAUTION:
• Pull the connector to ensure it is connected securely.
• Make sure the two retainer pawls are engaged in their mating positions in the connector.
• Be sure to inspect the hoses and their connections for fuel leakage.

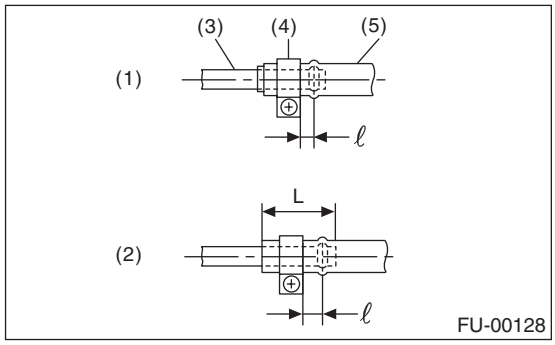


(A) Connector
(B) Retainer
(C) Pipe

2) Connect the fuel delivery hose to the pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When the amount of inserting is specified.
Type B: When the amount to be inserted is not specified.

ℓ : 2.5±1.5 mm (0.098±0.059 in)

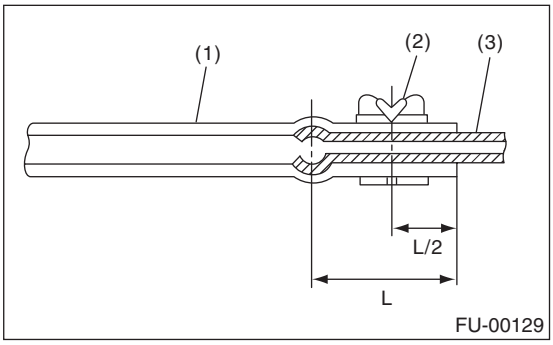
L: 22.5±2.5 mm (0.886±0.098 in)



(1) Type A
(2) Type B
(3) Pipe
(4) Clamp
(5) Hose

3) 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)

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



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

C: INSPECTION

1) Make sure that there are no cracks on the fuel pipes and fuel hoses.
2) Make sure the fuel pipe and fuel hose connections are tightened firmly.

29.Fuel System Trouble in General

A: INSPECTION

Trouble and possible cause		Corrective action
1. Insufficient fuel supply to injector		
1)	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.
2)	Decline of fuel pump function	Replace the fuel pump.
3)	Clogged dust or water in the fuel filter	Replace the fuel pump and clean or replace the fuel tank.
4)	Clogged or bent fuel pipe or hose	Clean, correct or replace the fuel pipe or hose.
5)	Air is mixed in fuel system.	Inspect or retighten each connection part.
6)	Clogged or bent air breather hose or pipe	Clean, correct or replace the air breather hose or pipe.
7)	Damaged diaphragm of pressure regulator	Replace the fuel pump.
2. Leakage or blow out of fuel		
1)	Loose joints of the fuel pipe	Retighten.
2)	Cracked fuel pipe, hose and fuel tank	Replace.
3)	Defective welding part on the fuel tank	Replace.
4)	Defective drain packing of the fuel tank	Replace.
5)	Clogged or bent air breather hose or air vent tube	Clean, correct or replace the air breather hose or air vent tube.
3. Gasoline smell inside of compartment		
1)	Loose joints at air breather hose, air vent tube and fuel filler pipe	Retighten.
2)	Defective packing air tightness on the fuel saucer	Correct or replace the packing.
3)	Inoperative fuel pump modulator or circuit	Replace.
4. Defective fuel meter indicator		
1)	Defective operation of fuel level sensor	Replace.
2)	Defective operation of fuel meter	Replace.
5. Noise		
1)	Large operation noise or vibration of fuel pump	Replace.

NOTE:
• When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent those problem. And also drain water from fuel filter.
• In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use a water removing agent in the fuel system to prevent freezing fuel system and accumulating water. Fill the water removing agent at the time when the fuel reduced at half to maintain the advantage.
• When water is accumulated in fuel filter, drain water from both the fuel filter and fuel tank or use water removing agent in the fuel tank.
• Before using water removing agent, follow the cautions noted on the bottle.

1. List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Index
P0011	Intake Camshaft Position Timing - Over-Advanced (Bank 1)	<Ref. to GD(H6DO)-9, DTC P0011 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1)	<Ref. to GD(H6DO)-11, DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0018	Crankshaft Position - Camshaft Position Correlation (Bank 2)	<Ref. to GD(H6DO)-11, DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0021	Intake Camshaft Position Timing - Over-Advanced (Bank 2)	<Ref. to GD(H6DO)-11, DTC P0021 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0026	Intake Valve Control Solenoid Circuit Range/Performance (Bank 1)	<Ref. to GD(H6DO)-12, DTC P0026 INTAKE VALVE CONTROL SOLENOID CIRCUIT RANGE/PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0028	Intake Valve Control Solenoid Circuit Range/Performance (Bank 2)	<Ref. to GD(H6DO)-15, DTC P0028 INTAKE VALVE CONTROL SOLENOID CIRCUIT RANGE/PERFORMANCE (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-15, 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)-17, 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)-19, 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)-21, 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)-23, 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)-25, 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)-25, 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)-25, 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)-25, 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)-25, 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)-26, DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0076	Intake Valve Control Circuit Low (Bank 1)	<Ref. to GD(H6DO)-28, DTC P0076 INTAKE VALVE CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0077	Intake Valve Control Circuit High (Bank 1)	<Ref. to GD(H6DO)-29, DTC P0077 INTAKE VALVE CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0082	Intake Valve Control Circuit Low (Bank 2)	<Ref. to GD(H6DO)-30, DTC P0082 INTAKE VALVE CONTROL CIRCUIT LOW (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Index
P0083	Intake Valve Control Circuit High (Bank 2)	<Ref. to GD(H6DO)-30, DTC P0083 INTAKE VALVE CONTROL CIRCUIT HIGH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0101	Mass or Volume Air Flow Circuit Range/Performance	<Ref. to GD(H6DO)-31, DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0102	Mass or Volume Air Flow Circuit Low Input	<Ref. to GD(H6DO)-34, 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)-36, 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)-38, 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)-40, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0111	Intake Air Temperature Circuit Range/Performance	<Ref. to GD(H6DO)-42, DTC P0111 INTAKE AIR TEMPERATURE CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0112	Intake Air Temperature Circuit Low Input	<Ref. to GD(H6DO)-44, DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0113	Intake Air Temperature Circuit High Input	<Ref. to GD(H6DO)-46, DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0117	Engine Coolant Temperature Circuit Low Input	<Ref. to GD(H6DO)-48, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0118	Engine Coolant Temperature Circuit High Input	<Ref. to GD(H6DO)-50, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low Input	<Ref. to GD(H6DO)-52, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High Input	<Ref. to GD(H6DO)-54, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0125	Insufficient Coolant Temperature For Closed Loop Fuel Control	<Ref. to GD(H6DO)-56, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0126	Insufficient Coolant Temperature for Stable Operation	<Ref. to GD(H6DO)-58, DTC P0126 INSUFFICIENT COOLANT TEMPERATURE FOR STABLE OPERATION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	<Ref. to GD(H6DO)-60, DTC P0128 COOLANT THERMOSTAT (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)-62, 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)-64, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to GD(H6DO)-66, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (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)-69, 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)-71, 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.>

DTC	Item	Index
P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	<Ref. to GD(H6DO)-75, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0140	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 2)	<Ref. to GD(H6DO)-80, DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0151	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-81, 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)-81, DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0153	O2 Sensor Circuit Slow Response (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-81, DTC P0153 O2 SENSOR CIRCUIT SLOW RESPONSE (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)-82, 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)-82, 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)-82, DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0159	O2 Sensor Circuit Slow Response (Bank 2 Sensor 2)	<Ref. to GD(H6DO)-82, DTC P0159 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0160	O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 2)	<Ref. to GD(H6DO)-82, DTC P0160 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0171	System Too Lean (Bank 1)	<Ref. to GD(H6DO)-83, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0172	System Too Rich (Bank 1)	<Ref. to GD(H6DO)-85, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0174	System Too Lean (Bank 2)	<Ref. to GD(H6DO)-86, DTC P0174 SYSTEM TOO LEAN (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0175	System Too Rich (Bank 2)	<Ref. to GD(H6DO)-86, 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)-87, 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)-90, 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)-92, 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)-94, DTC P0196 ENGINE OIL TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0197	Engine Oil Temperature Sensor Circuit Low	<Ref. to GD(H6DO)-96, DTC P0197 ENGINE OIL TEMPERATURE SENSOR CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0198	Engine Oil Temperature Sensor Circuit High	<Ref. to GD(H6DO)-97, DTC P0198 ENGINE OIL TEMPERATURE SENSOR CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low Input	<Ref. to GD(H6DO)-98, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0223	Throttle/Pedal Position Sensor/ Switch “B” Circuit High Input	<Ref. to GD(H6DO)-100, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0230	Fuel Pump Primary Circuit	<Ref. to GD(H6DO)-102, DTC P0230 FUEL PUMP PRIMARY CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Index
P0301	Cylinder 1 Misfire Detected	<Ref. to GD(H6DO)-104, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0302	Cylinder 2 Misfire Detected	<Ref. to GD(H6DO)-109, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0303	Cylinder 3 Misfire Detected	<Ref. to GD(H6DO)-109, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0304	Cylinder 4 Misfire Detected	<Ref. to GD(H6DO)-109, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0305	Cylinder 5 Misfire Detected	<Ref. to GD(H6DO)-109, DTC P0305 CYLINDER 5 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0306	Cylinder 6 Misfire Detected	<Ref. to GD(H6DO)-109, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	<Ref. to GD(H6DO)-110, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	<Ref. to GD(H6DO)-112, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0332	Knock Sensor 2 Circuit Low Input (Bank 2)	<Ref. to GD(H6DO)-113, DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW INPUT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0333	Knock Sensor 2 Circuit High Input (Bank 2)	<Ref. to GD(H6DO)-113, DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH INPUT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to GD(H6DO)-114, 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)-116, 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)-118, 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)-120, DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to GD(H6DO)-121, 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)-124, 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)-136, 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)-138, DTC P0448 EVAPORATIVE EMISSION CONTROL SYSTEM VENT CONTROL CIRCUIT SHORTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0451	Evaporative Emission Control System Pressure Sensor	<Ref. to GD(H6DO)-140, 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)-142, 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)-144, 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)-146, DTC P0456 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Index
P0457	Evaporative Emission Control System Leak Detected (Fuel Cap Loose/Off)	<Ref. to GD(H6DO)-146, DTC P0457 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low	<Ref. to GD(H6DO)-147, DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0459	Evaporative Emission Control System Purge Control Valve Circuit High	<Ref. to GD(H6DO)-149, DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0461	Fuel Level Sensor Circuit Range/ Performance	<Ref. to GD(H6DO)-151, DTC P0461 FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0462	Fuel Level Sensor Circuit Low Input	<Ref. to GD(H6DO)-153, DTC P0462 FUEL LEVEL SENSOR CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0463	Fuel Level Sensor Circuit High Input	<Ref. to GD(H6DO)-155, DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0464	Fuel Level Sensor Circuit Intermittent	<Ref. to GD(H6DO)-157, DTC P0464 FUEL LEVEL SENSOR CIRCUIT INTERMITTENT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0483	Cooling Fan Rationality Check	<Ref. to GD(H6DO)-160, DTC P0483 COOLING FAN RATIONALITY CHECK, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0500	Vehicle Speed Sensor	<Ref. to GD(H6DO)-161, DTC P0500 VEHICLE SPEED SENSOR, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0506	Idle Control System RPM Lower Than Expected	<Ref. to GD(H6DO)-163, DTC P0506 IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0507	Idle Control System RPM Higher Than Expected	<Ref. to GD(H6DO)-165, DTC P0507 IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0512	Starter Request Circuit	<Ref. to GD(H6DO)-167, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0513	Incorrect Immobilizer Key	<Ref. to GD(H6DO)-168, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0519	Idle Control System Malfunction (Fail-Safe)	<Ref. to GD(H6DO)-169, DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0600	Serial Communication Link	<Ref. to GD(H6DO)-170, DTC P0600 SERIAL COMMUNICATION LINK, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to GD(H6DO)-171, 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)-172, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0607	Control Module Performance	<Ref. to GD(H6DO)-173, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0638	Throttle Actuator Control Range/ Performance (Bank 1)	<Ref. to GD(H6DO)-176, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0691	Cooling Fan 1 Control Circuit Low	<Ref. to GD(H6DO)-179, DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0692	Cooling Fan 1 Control Circuit High	<Ref. to GD(H6DO)-180, DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P0700	Transmission Control System (MIL Request)	<Ref. to GD(H6DO)-181, 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)-182, DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Index
P1153	O2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	<Ref. to GD(H6DO)-184, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1154	O2 Sensor Circuit Range/Performance (Low) (Bank 2 Sensor 1)	<Ref. to GD(H6DO)-186, 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)-186, 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)-187, DTC P1160 RETURN SPRING FAILURE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1443	Vent Control Solenoid Valve Function Problem	<Ref. to GD(H6DO)-189, DTC P1443 VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1518	Starter Switch Circuit Low Input	<Ref. to GD(H6DO)-191, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1560	Back-Up Voltage Circuit Malfunction	<Ref. to GD(H6DO)-192, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1570	Antenna	<Ref. to GD(H6DO)-193, DTC P1570 ANTENNA, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1571	Reference Code Incompatibility	<Ref. to GD(H6DO)-193, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1572	IMM Circuit Failure (Except Antenna Circuit)	<Ref. to GD(H6DO)-193, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1574	Key Communication Failure	<Ref. to GD(H6DO)-193, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1576	EGI Control Module EEPROM	<Ref. to GD(H6DO)-193, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1577	IMM Control Module EEPROM	<Ref. to GD(H6DO)-193, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P1578	Meter Failure	<Ref. to GD(H6DO)-193, DTC P1578 METER FAILURE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2088	OCV Solenoid Valve Signal A Circuit Open (Bank 1)	<Ref. to GD(H6DO)-194, DTC P2088 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2089	OCV Solenoid Valve Signal A Circuit Short (Bank 1)	<Ref. to GD(H6DO)-195, DTC P2089 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2092	OCV Solenoid Valve Signal A Circuit Open (Bank 2)	<Ref. to GD(H6DO)-196, DTC P2092 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2093	OCV Solenoid Valve Signal A Circuit Short (Bank 2)	<Ref. to GD(H6DO)-196, DTC P2093 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	<Ref. to GD(H6DO)-197, 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)-199, 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)-200, 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)-200, DTC P2099 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

DTC	Item	Index
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to GD(H6DO)-201, 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)-203, 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)-205, 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)-207, DTC P2109 THROTTLE/PEDAL POSITION SENSOR A MINIMUM STOP PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2122	Throttle/Pedal Position Sensor/ Switch “D” Circuit Low Input	<Ref. to GD(H6DO)-209, 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)-211, 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)-213, 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)-215, 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 Rationality	<Ref. to GD(H6DO)-217, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/ SWITCH “A”/“B” VOLTAGE RATIONALITY, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2138	Throttle/Pedal Position Sensor/ Switch “D”/“E” Voltage Rationality	<Ref. to GD(H6DO)-219, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/ SWITCH “D”/“E” VOLTAGE RATIONALITY, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2227	Barometric Pressure Circuit Range/Performance	<Ref. to GD(H6DO)-221, DTC P2227 BAROMETRIC PRESSURE CIRCUIT RANGE/ PERFORMANCE, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2228	Barometric Pressure Circuit Low Input	<Ref. to GD(H6DO)-222, DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>
P2229	Barometric Pressure Circuit High Input	<Ref. to GD(H6DO)-223, DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Trouble Code (DTC) Detecting Criteria.>

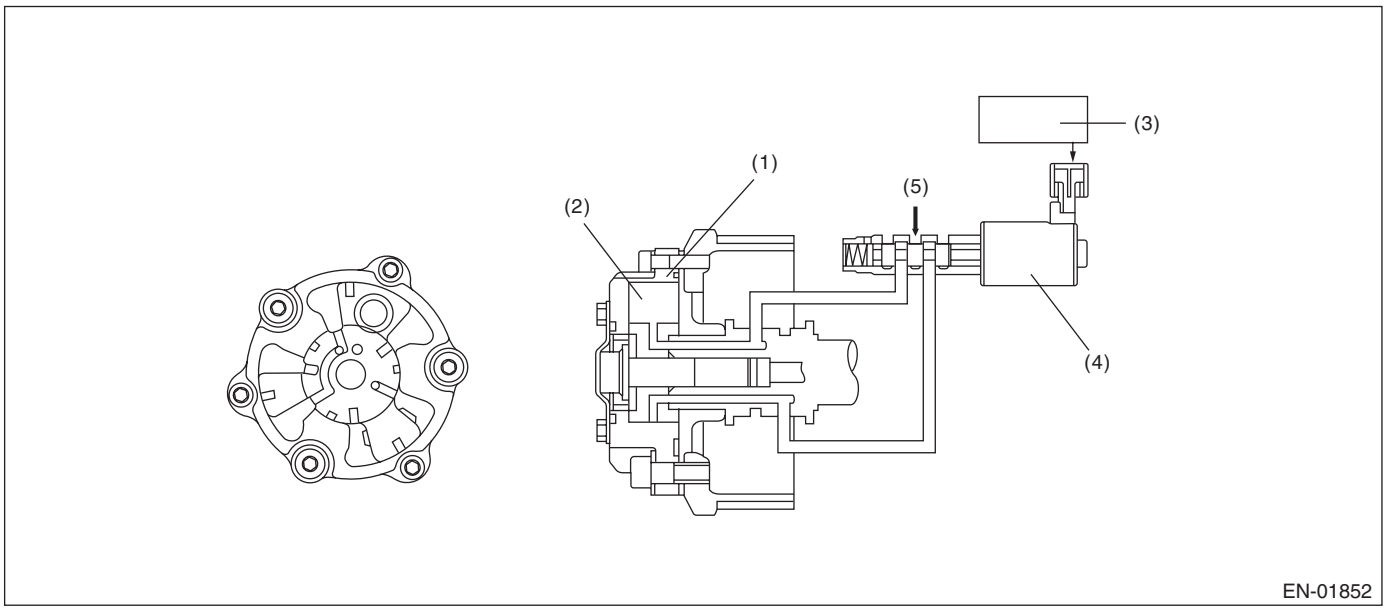
2. Diagnostic Trouble Code (DTC) Detecting Criteria

A: DTC P0011 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the AVCS system malfunction.
There are two types of diagnosis: Crankshaft cam timing diagnosis; and slow response diagnosis. Either of these is performed according to the status of the engine while running.

2. COMPONENT DESCRIPTION



(1) AVCS timing controller
(2) Vane
(3) Engine control module (ECM)
(4) Oil flow control solenoid valve
(5) Oil pressure

3. ENABLE CONDITIONS

1. Crankshaft Timing Diagnosis

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Engine coolant temperature	> 50°C (122°F)
Target timing advance	= 0°CA
Engine speed	≥ 500 rpm
AVCS	Uncontrolled

2. Slow Response Diagnosis

Secondary Parameters	Enable Conditions
All secondary parameters are executable.	≥ 5000 ms
Battery voltage	≥ 10.9 V
Engine coolant temperature	> 50°C (122°F)
Amount of AVCS target timing advance	≠ 0°CA
Engine speed	≥ 1500 rpm
AVCS	Controlled
Target timing advance	< 1.07°CA

4. GENERAL DRIVING CYCLE

1. Crankshaft Timing Diagnosis

Perform the diagnosis continuously after starting engine and while AVCS is not operating.

2. Slow Response Diagnosis

Perform the diagnosis continuously after warm-up, while AVCS is operating and the target timing advance is small.

5. DIAGNOSTIC METHOD

1. Crankshaft Timing Diagnosis

Judge as NG when the timing advance is large. Judge as OK when it is small.
Judge as NG when all the following conditions are established and the continuous time is more than 20 seconds. Judge as OK and clear the NG when the following conditions are not established and the continuous time is more than one second.

Judgment Value

Malfunction Criteria	Threshold Value
Basic timing advance	< –18°CA or > 18°CA

Time Needed for Diagnosis: 20 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

2. Slow Response Diagnosis

Calculates (integrate by positive and negative separately) the AVCS deviation amount when the timing advance is large. Judges NG if the integrated value is large after 30 seconds has passed, and judges OK if it is small.

Abnormality Judgment
When all of the following conditions are established, judged as OK.

Judgment Value

Malfunction Criteria	Threshold Value
AVCS target position	≥ 0°CA
Target timing advance large integrated counter	30 seconds or more
AVCS positive deviation integrated value or AVCS negative deviation integrated value	> 8000 (R Bank)°CA 8000 (L Bank) < –2500 (R Bank)°CA –2500 (L Bank)

Time Needed for Diagnosis: 30 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment
Judges OK when all of the following conditions are established, and clears the NG.

Judgment Value

Malfunction Criteria	Threshold Value
AVCS target position	≥ 0°CA
Target timing advance large integrated counter	30 seconds or more
AVCS positive deviation integrated value or AVCS negative deviation integrated value	≤ 8000 (R Bank)°CA 8000 (L Bank) ≥ –2500 (R Bank)°CA –2500 (L Bank)

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Make the oil flow control solenoid valve driving duty a predetermined value (9.36%).

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

B: DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 1)

NOTE:
For the diagnostic procedure, refer to DTC P0011. <Ref. to GD(H6DO)-9, DTC P0011 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

C: DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION (BANK 2)

NOTE:
For the diagnostic procedure, refer to DTC P0011. <Ref. to GD(H6DO)-9, DTC P0011 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

D: DTC P0021 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 2)

NOTE:
For the diagnostic procedure, refer to DTC P0011. <Ref. to GD(H6DO)-9, DTC P0011 INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

E: DTC P0026 INTAKE VALVE CONTROL SOLENOID CIRCUIT RANGE/PERFORMANCE (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detected as NG with either Low NG or High NG.
A variable valve lift diagnosis oil pressure switch is installed for diagnosis. It is possible to determine whether the intake valve is in high mode (increase the amount of lift) or in low mode (suppressing the amount of lift) when the variable valve lift diagnosis oil pressure switch is turned ON or OFF.

Normal

Oil switching solenoid valve duty	Intake valve	Variable valve lift diagnosis oil pressure switch
Large	High Mode	ON
Minimum	Low Mode	OFF

Low NG

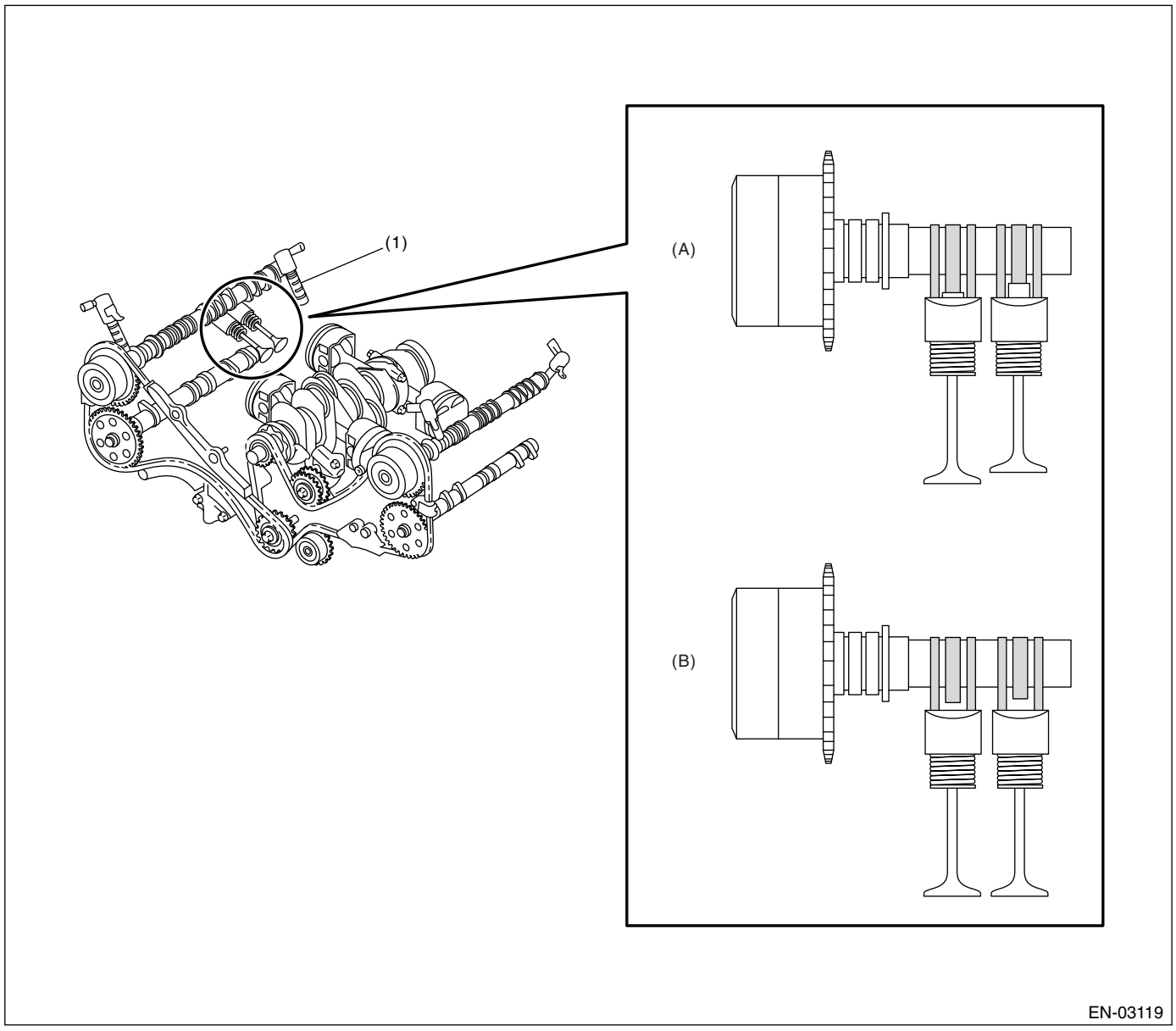
When the variable valve lift diagnosis oil pressure switch remains OFF even though the intake valve tried to enter high mode (oil switching solenoid valve duty is large), this is judged as a Low NG.

High NG

When the variable valve lift diagnosis oil pressure switch remains ON even though the intake valve tried to enter low mode (oil switching solenoid valve duty is small), this is judged as a High NG.

2. COMPONENT DESCRIPTION

The variable valve lift system optimizes the intake valve lift by switching between the low lift cam and the high lift cam according to the engine RPM. The amount of intake valve lift is varied by controlling the oil switching solenoid valve duty according to signals from the ECM.



(A) When at low speed

(B) When at high speed

(1) Oil switching solenoid valve

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
After engine starting	≥ 6 sec.
Engine oil temperature	≥ 0°C (0°F)
Variable valve lift control	Operation

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously 6 seconds after engine start while variable valve lift is being controlled.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time is longer than the predetermined time when the following conditions are established.

Judgment Value

Malfunction Criteria	Threshold Value
Low NG	
Duty ratio	≥ 62%
Variable valve lift diagnosis oil pressure switch	OFF
High NG	
Duty ratio	< 33%
Variable valve lift diagnosis oil pressure switch	ON

Time Needed for Diagnosis:
Low side 0.784 seconds
High side: 3.0 seconds

Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

When the continuous time is more than 3 seconds while the following conditions are established, judge as OK and clear the NG.

Judgment Value

Malfunction Criteria	Threshold Value
Low OK	
Duty ratio	≥ 62%
Variable valve lift diagnosis oil pressure switch	ON
High OK	
Duty ratio	< 33%
Variable valve lift diagnosis oil pressure switch	OFF

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

F: DTC P0028 INTAKE VALVE CONTROL SOLENOID CIRCUIT RANGE/PERFORMANCE (BANK 2)

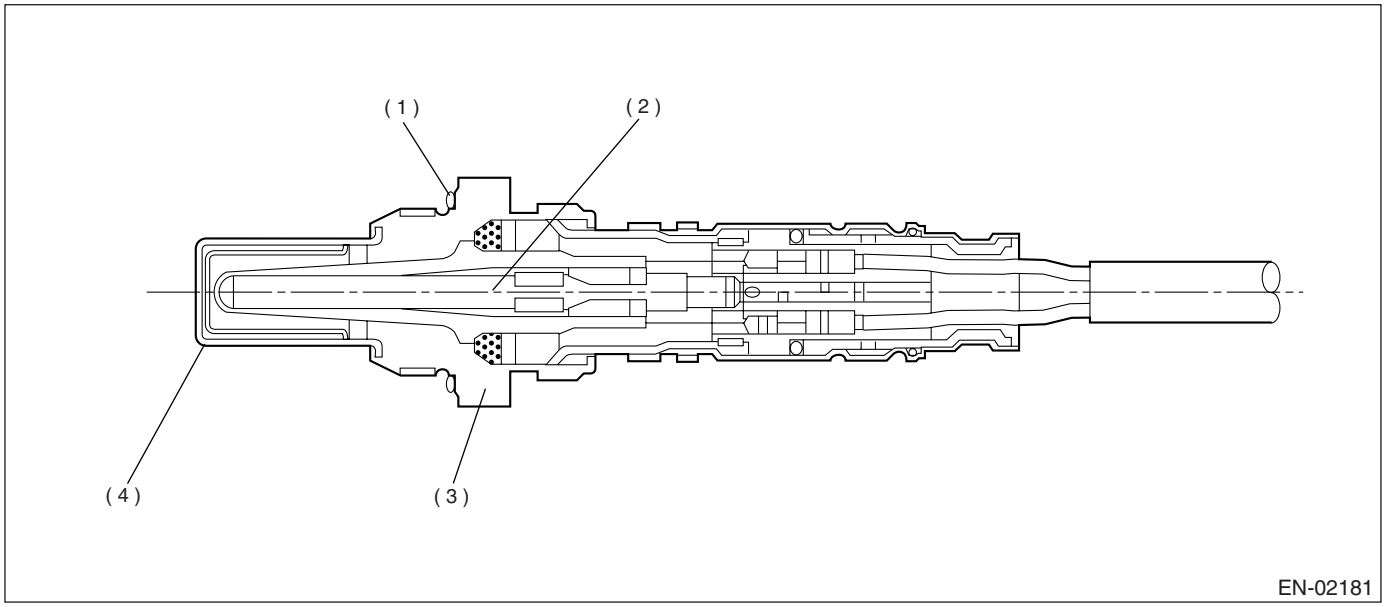
NOTE:
For diagnostic procedures, refer to DTC P0026. <Ref. to GD(H6DO)-12, DTC P0026 INTAKE VALVE CONTROL SOLENOID CIRCUIT RANGE/PERFORMANCE (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

G: 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



(1) Gasket
(2) Ceramic heater
(3) Sensor housing
(4) Protection tube

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Condition established time	30 seconds or more
Battery voltage	> 10.9 V
Control duty ≥ 35%	Experienced
After fuel cut	20 seconds or more

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously in 30 seconds after starting the engine.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time of meeting the malfunction criteria below becomes more than the time needed for diagnosis (10 seconds). Judge as OK and clear NG when the continuous time of not completing the malfunction criteria below becomes more than the time needed for diagnosis (10 seconds).

Judgment Value

Malfunction Criteria	Threshold Value
Front oxygen (A/F) sensor impedance	> 50 Ω

Time Needed for Diagnosis: 10 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- Front oxygen (A/F) sensor main learning compensation: Not allowed to calculate.
- Rear oxygen sensor sub learning compensation: Not allowed to calculate.
- Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

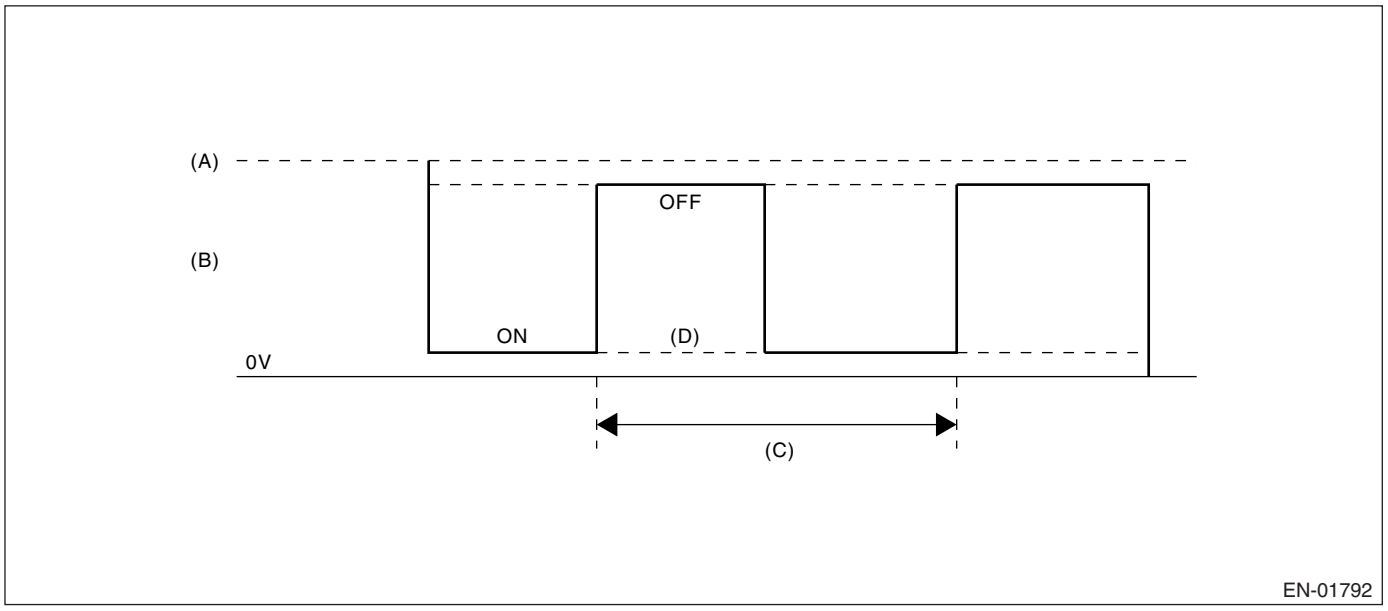
Memorize the freeze frame data. (For test mode $02)

H: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of heater.
The 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 NG when the terminal voltage remains Low.

2. COMPONENT DESCRIPTION



(A) Battery voltage
(B) Front oxygen (A/F) sensor heater output voltage
(C) 128 milliseconds
(D) Low error

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge NG when the continuous time until completing the malfunction criteria below becomes more than 1 second (8 cycles).

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level Front oxygen (A/F) sensor heater control duty	Low < 87.5%

Time Needed for Diagnosis: 1 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

Judge as OK and clear the NG when the malfunction criteria below are completed.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	High

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- A/F main learning: Not allowed to calculate the A/F main learning compensation factor.
- Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

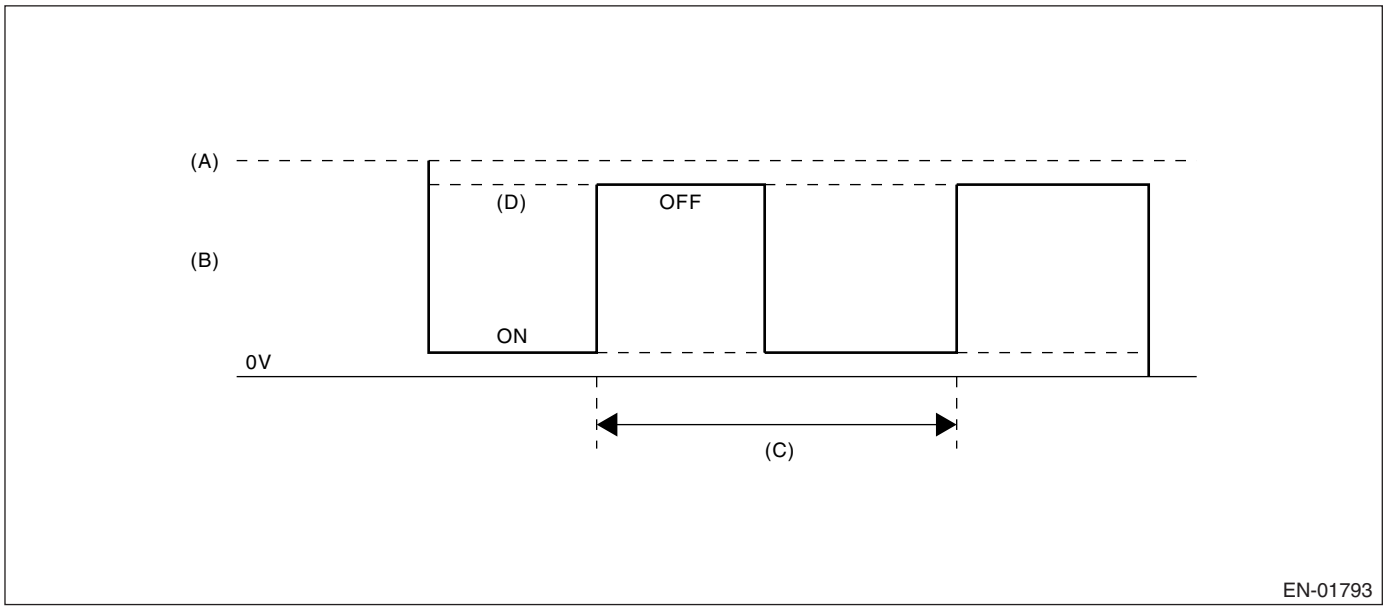
Memorize the freeze frame data. (For test mode $02)

I: DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of heater.
The 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 NG when the terminal voltage remains High.

2. COMPONENT DESCRIPTION



(A) Battery voltage
(B) Front oxygen (A/F) sensor heater output voltage
(C) 128 milliseconds
(D) High malfunction

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge NG when the continuous time until completing the malfunction criteria below becomes more than 1 second (8 cycles).

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level Front oxygen (A/F) sensor heater control duty	High ≥ 12.5%

Time Needed for Diagnosis: 1 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

Judge as OK and clear the NG when the malfunction criteria below are completed.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	Low

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- A/F main learning: Not allowed to calculate the A/F main learning compensation factor.
- Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

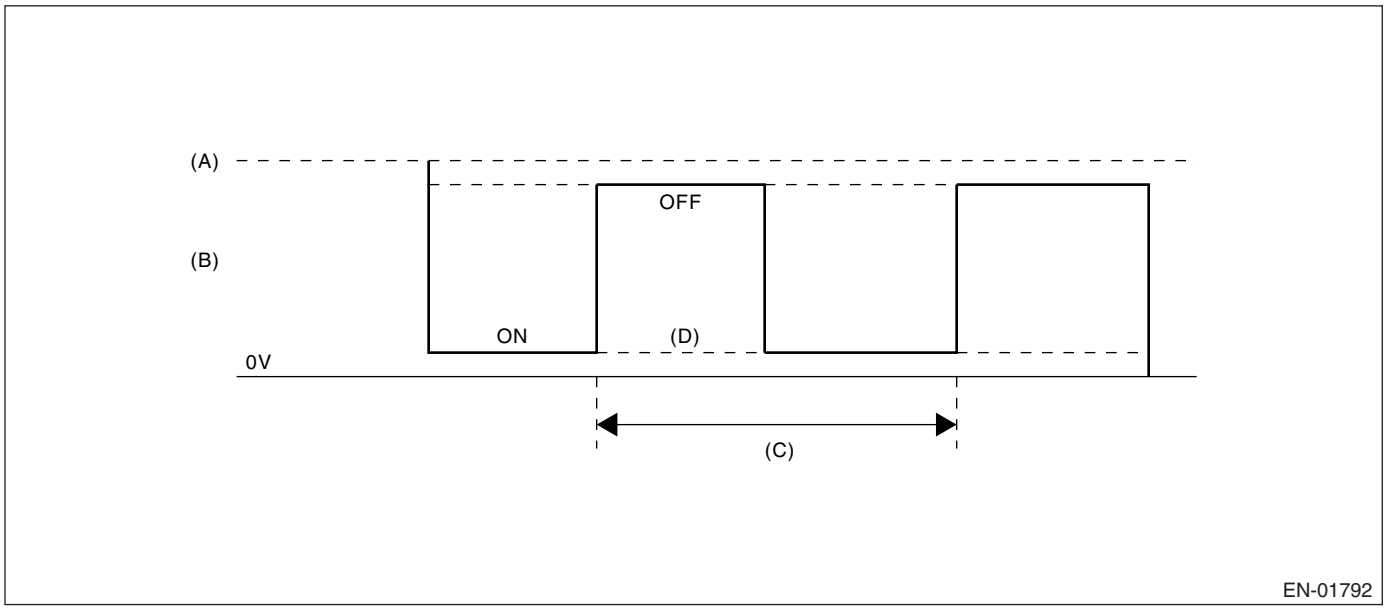
Memorize the freeze frame data. (For test mode $02)

J: 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 NG when the terminal voltage remains Low.

2. COMPONENT DESCRIPTION



(A) Battery voltage
(B) Rear oxygen (A/F) sensor heater output voltage
(C) 256 milliseconds (cycles)
(D) Low error

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge NG when the continuous time until completing all the malfunction criteria below becomes more than 2560 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	Low
Rear oxygen sensor heater control duty	< 75%

Time Needed for Diagnosis: 2.56 second
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK and clear the NG when the malfunction criteria below are completed.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	High

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Sub feedback control: Not allowed

9. ECM OPERATION AT DTC SETTING

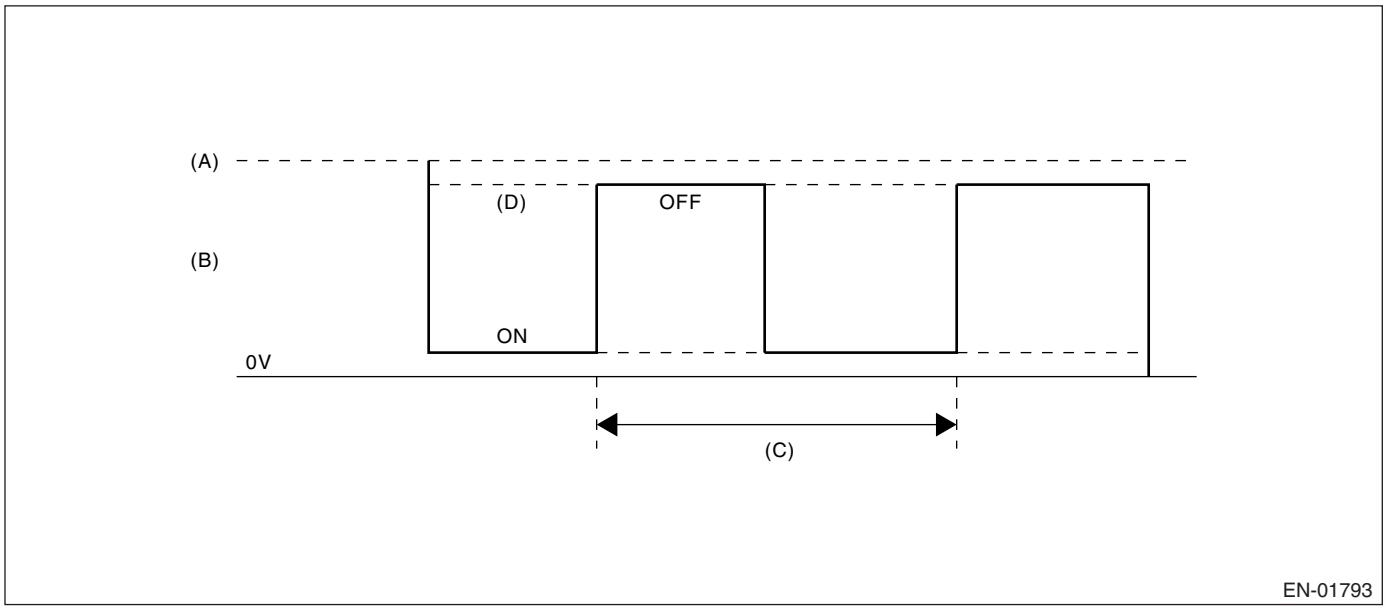
Memorize the freeze frame data. (For test mode $02)

K: 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 NG when the terminal voltage remains High.

2. COMPONENT DESCRIPTION



(A) Battery voltage
(B) Rear oxygen (A/F) sensor heater output voltage
(C) 256 milliseconds (cycles)
(D) High malfunction

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge NG when the continuous time until completing all the malfunction criteria below becomes more than 2560 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	High
Rear oxygen sensor heater control duty	≥ 15%

Time Needed for Diagnosis: 2.56 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK and clear the NG when the malfunction criteria below are completed.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage level	Low

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Sub feedback control: Not allowed

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

L: DTC P0050 HO2S HEATER CONTROL CIRCUIT (BANK 2 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0030. <Ref. to GD(H6DO)-15, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

M: DTC P0051 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0031. <Ref. to GD(H6DO)-17, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

N: DTC P0052 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0032. <Ref. to GD(H6DO)-19, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

O: DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0037. <Ref. to GD(H6DO)-21, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

P: DTC P0058 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

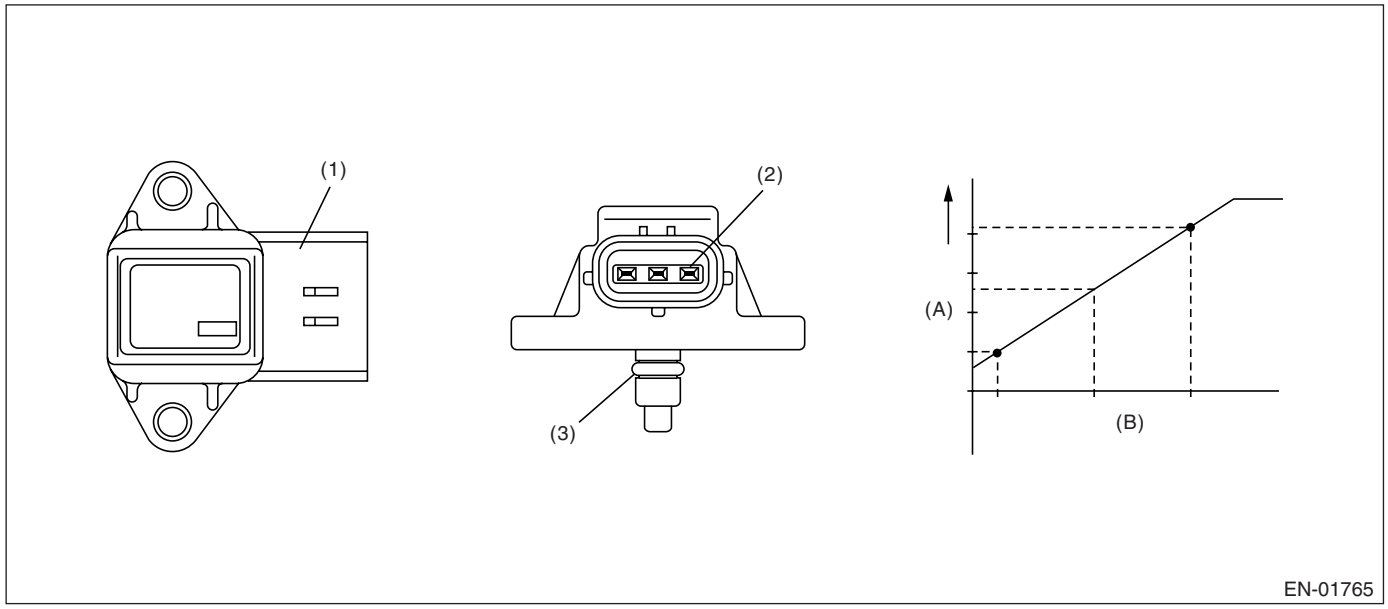
NOTE:
For the diagnostic procedure, refer to DTC P0038. <Ref. to GD(H6DO)-23, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

Q: DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION

1. OUTLINE OF DIAGNOSIS

Detect problems in the intake manifold pressure sensor output properties. Determining from the engine condition, if the intake manifold pressure AD value is small even when operating conditions suggest it should be large, or if the intake manifold pressure AD value is large even though the operating condition suggest it should be small, this is judged as being NG.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Absolute pressure
(1) Connector
(2) Terminals
(3) O-ring

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Engine coolant temperature	≥ 75°C (167°F)

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after idling.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge NG when either Low side or High side becomes NG.
Judge as NG when the continuous time until completing the malfunction criteria below becomes more than the predetermined time.

Judgment Value

Malfunction Criteria	Threshold Value
Low side	
Engine speed	< 2600 rpm
Throttle position	≥ 17°
Output voltage	< 1.99 V
Engine load	> 0.87 g/rev
High side	
Engine speed	500 ←→ 850 rpm
Throttle position	< 3.5°
Output voltage	≥ 2.71 V
Engine load	< 0.6 g/rev

Time Needed for Diagnosis:
3 seconds (Low side)
10 seconds (High side)
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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 when the malfunction criteria below are completed.

Judgment Value

Malfunction Criteria	Threshold Value
Low side	
Engine speed	< 2600 rpm
Throttle position	≥ 17°
Output voltage	≥ 1.99 V
Engine load	> 0.87 g/rev
High side	
Engine speed	500 ←→ 850 rpm
Throttle position	< 3.5°
Output voltage	< 2.71 V
Engine load	< 0.6 g/rev

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- Intake manifold pressure sensor process: Estimate the pressure from the engine RPM and size of the throttle opening. When the throttle opening is also NG, fix at 101 kPa (760 mmHg, 29.8 inHg).
- ISC control: ISC feedback amount calculation prohibited
- Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

R: DTC P0076 INTAKE VALVE CONTROL CIRCUIT LOW (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the open circuit of the oil switching solenoid valve.
Judge NG when the current is small even though the output duty is large.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time when the following conditions are established is higher than 2 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Duty ratio	≥ 30%
Control current	< 0.026 A

Time Needed for Diagnosis: 2 seconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

Judge as OK and clear the NG when the continuous time when the following conditions are established are more than 2 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Oil switching solenoid valve current target current value – oil switching solenoid valve current value	< 0.08 A
Control current	≥ 0.11 A

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

S: DTC P0077 INTAKE VALVE CONTROL CIRCUIT HIGH (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect short circuits of the oil switching solenoid valve.
Judge as a short NG when the current is large even though the output duty is small.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time when the following conditions are established is higher than 2 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Duty ratio	< 7%
Control current	≥ 0.465 A

Time Needed for Diagnosis: 2 seconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

Judge as OK and clear the NG when the continuous time when the following conditions are established are more than 2 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Oil switching solenoid valve current target current value – oil switching solenoid valve current value	< 0.08 A

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

T: DTC P0082 INTAKE VALVE CONTROL CIRCUIT LOW (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0076. <Ref. to GD(H6DO)-28, DTC P0076 INTAKE VALVE CONTROL CIRCUIT LOW (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

U: DTC P0083 INTAKE VALVE CONTROL CIRCUIT HIGH (BANK 2)

1. OUTLINE OF DIAGNOSIS

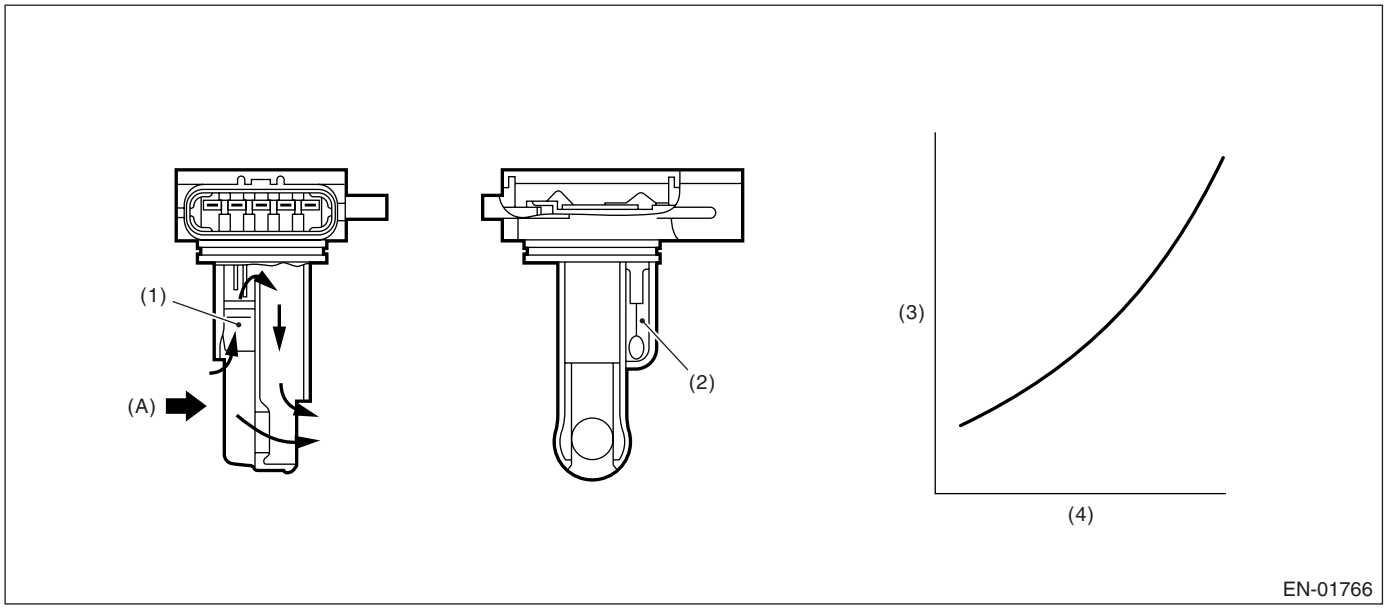
NOTE:
For the diagnostic procedure, refer to DTC P0077. <Ref. to GD(H6DO)-29, DTC P0077 INTAKE VALVE CONTROL CIRCUIT HIGH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

V: DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Detect for abnormalities in the 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



(A) Air

(1) Air flow sensor
(2) Intake air temperature sensor
(3) Voltage (V)
(4) Amount of intake air (kg/s)

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Engine coolant temperature	≥ 75°C (167°F)

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after idling.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes more than the predetermined time.

Judgment Value

Malfunction Criteria	Threshold Value
Low side error	
Output voltage	< 1.79 V
Engine speed	≥ 2200 rpm
Throttle opening angle	≥ 17°
Intake manifold pressure	≥ 73.3 kPa (550 mmHg, 21.7 inHg)
Engine coolant temperature	≥ 75°C (167°F)
High side error (1)	
Output voltage	≥ 1.83 V
Engine speed	500 ←→ 850 rpm
Throttle opening angle	< 3.5°
Intake manifold pressure	< 46.7 kPa (350 mmHg, 13.8 inHg)
High side error (2)	
Output voltage	≥ 1.73 V
Engine speed	500 ←→ 850 rpm
Throttle opening angle	< 3.5°
Intake manifold pressure	< 46.7 kPa (350 mmHg, 13.8 inHg)
Fuel system diagnostics	Rich side malfunction

Time Needed for Diagnosis:
Low side: 5 seconds
High side: 10 seconds

Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK when the criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
(Low side error)	
Output voltage	≥ 1.79 V
Engine speed	≥ 2200 rpm
Throttle opening angle	≥ 17°
Intake manifold pressure	≥ 73.3 kPa (550 mmHg, 21.7 inHg)
Engine coolant temperature	≥ 75°C (167°F)
(High side error)	
Output voltage	< 1.83 V
Engine speed	500 ←→ 850 rpm
Throttle opening angle	< 3.5°
Intake manifold pressure	< 46.7 kPa (350 mmHg, 13.8 inHg)
Fuel system diagnostics	Rich side normal

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

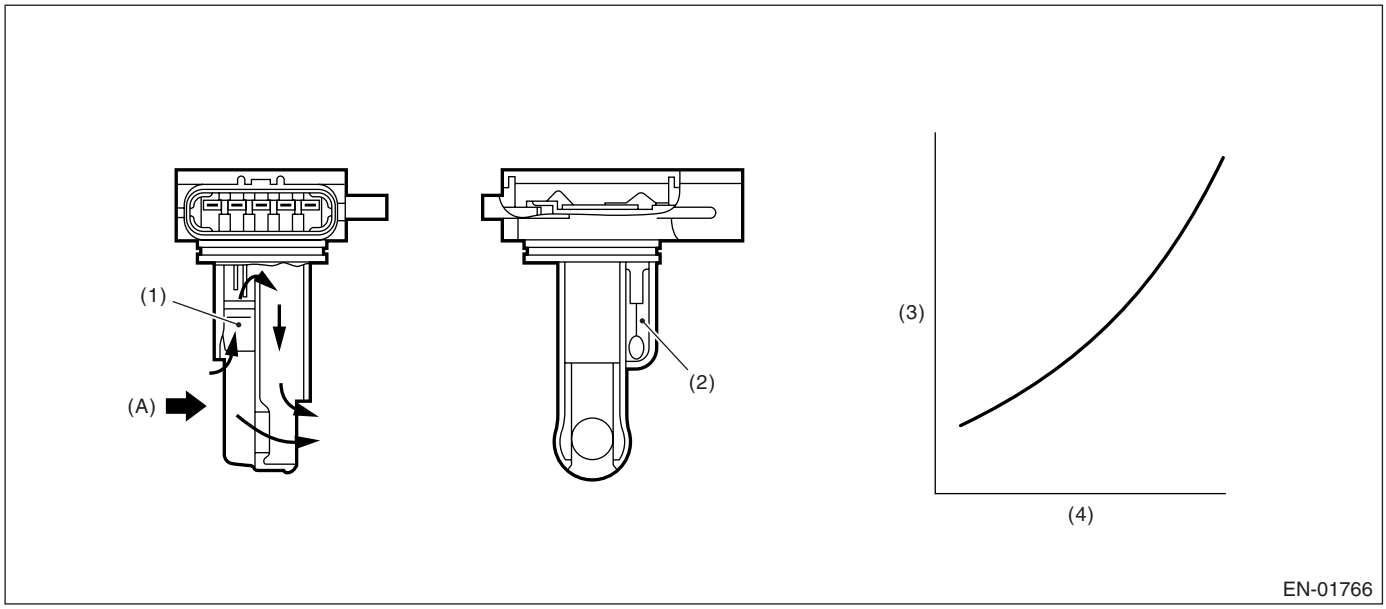
Memorize the freeze frame data. (For test mode $02)

W: 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 it is out of specification.

2. COMPONENT DESCRIPTION



(A) Air

(1) Air flow sensor
(2) Intake air temperature sensor
(3) Voltage (V)
(4) Amount of intake air (kg (lb)/s)

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time until completing the malfunction criteria below becomes 0.5 second or more. Judge as OK and clear the NG when the malfunction criteria below are not met.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≤ 0.2 V

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

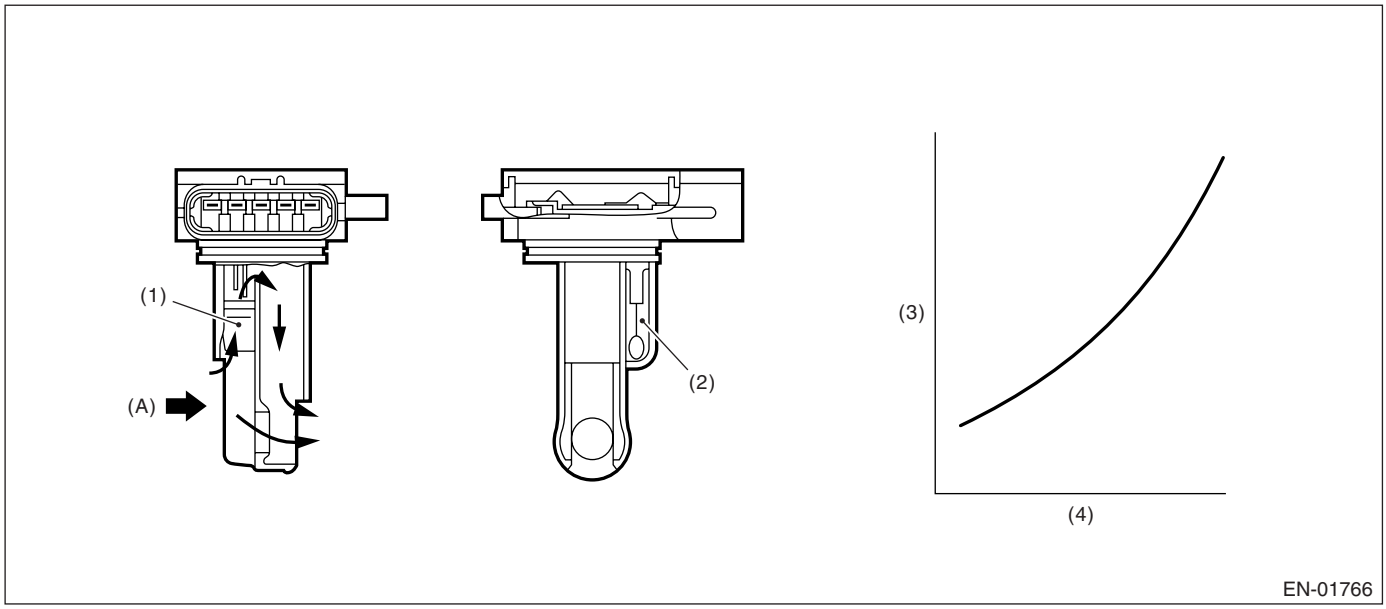
Memorize the freeze frame data. (For test mode $02)

X: 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 it is out of specification.

2. COMPONENT DESCRIPTION



(A) Air

(1) Air flow sensor
(2) Intake air temperature sensor
(3) Voltage (V)
(4) Amount of intake air (kg (lb)/s)

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time of the following base value is higher than 0.5 second. Judge as OK and clear the NG when the malfunction criteria below are not met.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.985 V

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

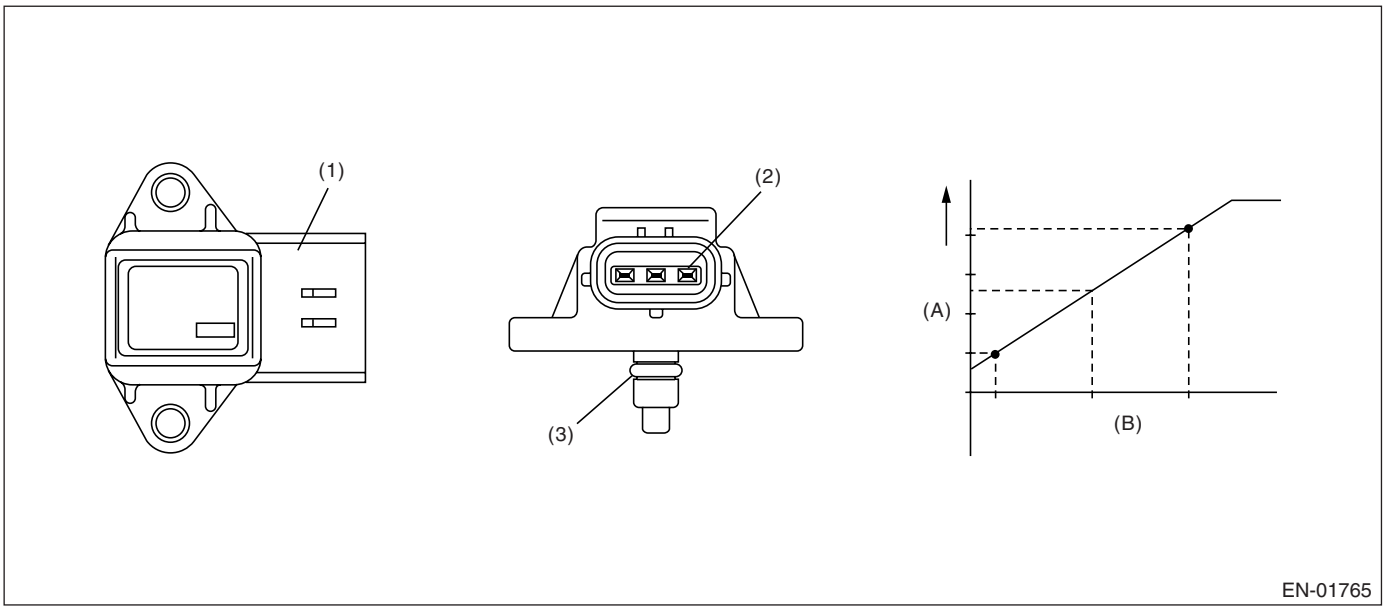
Memorize the freeze frame data. (For test mode $02)

Y: 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 it is out of specification.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Absolute pressure
(1) Connector
(2) Terminals
(3) O-ring

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time until completing the malfunction criteria below becomes 0.5 second or more. Judge as OK and clear the NG when the malfunction criteria below are not met.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.568 V

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

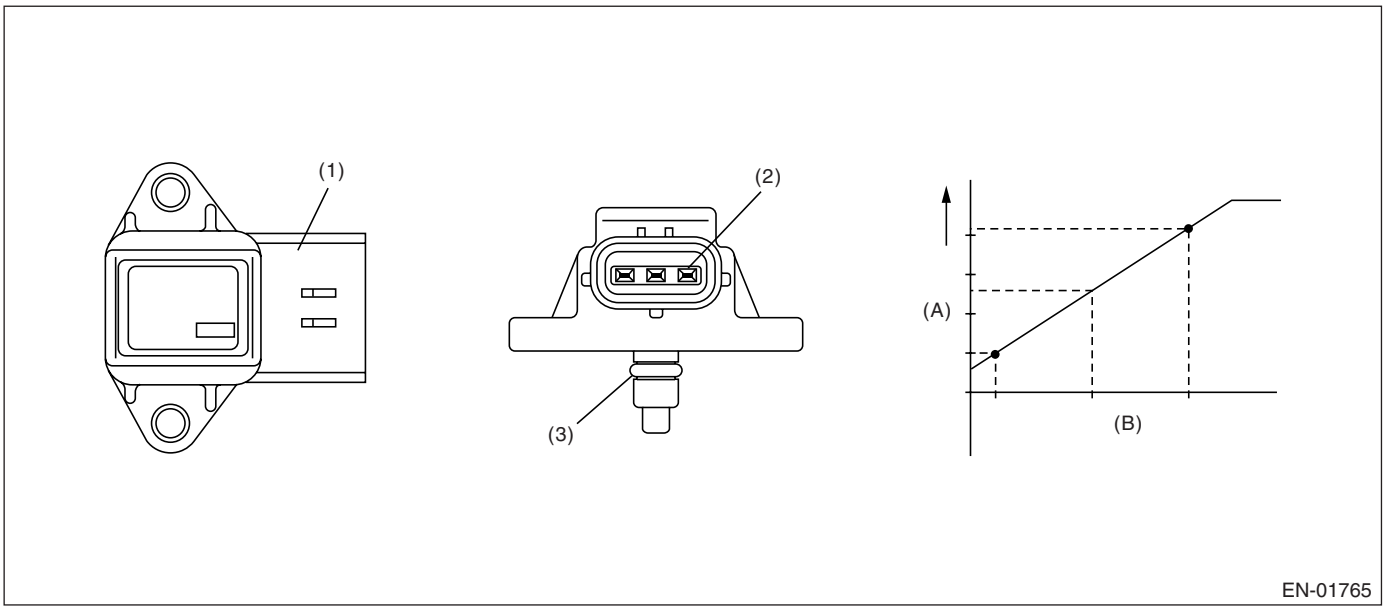
Memorize the freeze frame data. (For test mode $02)

Z: 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 it is out of specification.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Absolute pressure
(1) Connector
(2) Terminals
(3) O-ring

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time until completing the malfunction criteria below becomes 0.5 second or more. Judge as OK and clear the NG when the malfunction criteria below are not met.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.921 V

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

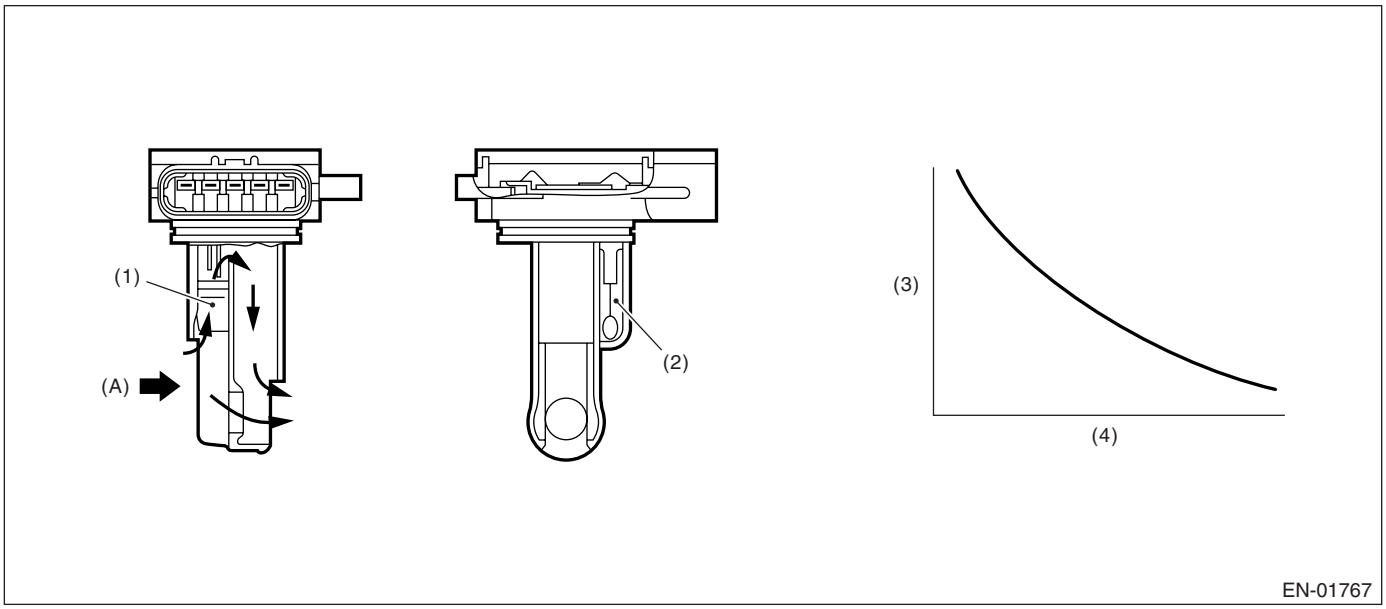
Memorize the freeze frame data. (For test mode $02)

AA:DTC P0111 INTAKE AIR TEMPERATURE 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



(A) Air

(1) Air flow sensor
(2) Intake air temperature sensor
(3) Resistance value (Ω)
(4) Intake air temperature °C (°F)

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Coolant temp. before engine start	< 30°C (86°F)
Engine coolant temperature	> 95°C (203°F)
Battery voltage	≥ 10.9 V
Continuous time when the vehicle speed is less than 60 km/h (37 MPH)	600 seconds or more

4. GENERAL DRIVING CYCLE

Start the engine from a cooled condition, and after idling, fulfill the vehicle speed condition, and then perform diagnosis.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 1 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage difference between Max. and Min.	< 20 mV (Equivalent to approximately 0.5°C (0.9°F) near 25°C)

Time Needed for Diagnosis: 1 second
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
Output voltage difference between Max. and Min.	≥ 20 mV

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Intake air temperature sensor process: Intake air temperature is fixed at 20°C (68°F).

9. ECM OPERATION AT DTC SETTING

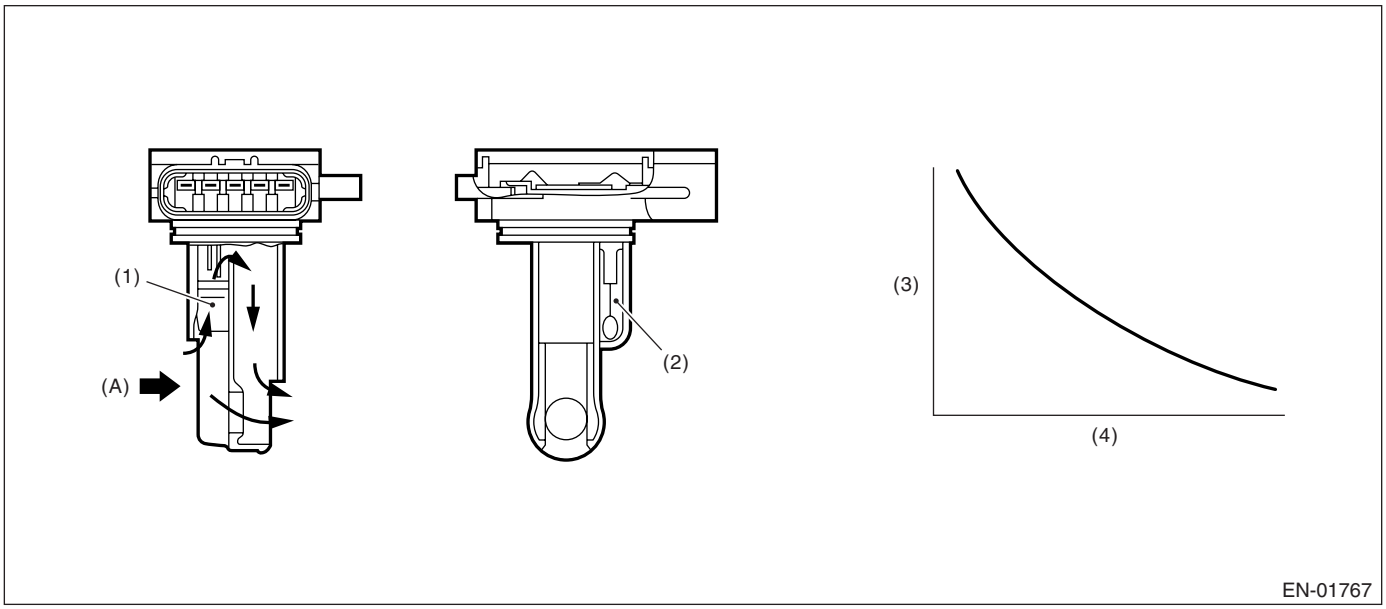
Memorize the freeze frame data. (For test mode $02)

AB:DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the intake air temperature sensor.
Judge as NG if it is out of specification.

2. COMPONENT DESCRIPTION



(A) Air

(1) Air flow sensor
(2) Intake air temperature sensor
(3) Resistance value (Ω)
(4) Intake air temperature °C (°F)

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 0.5 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.166 V
Ignition switch	ON

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: 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
Output voltage	≥ 0.165 V
Ignition switch	ON

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Intake air temperature sensor process: Intake air temperature is fixed at 20°C (68°F).

9. ECM OPERATION AT DTC SETTING

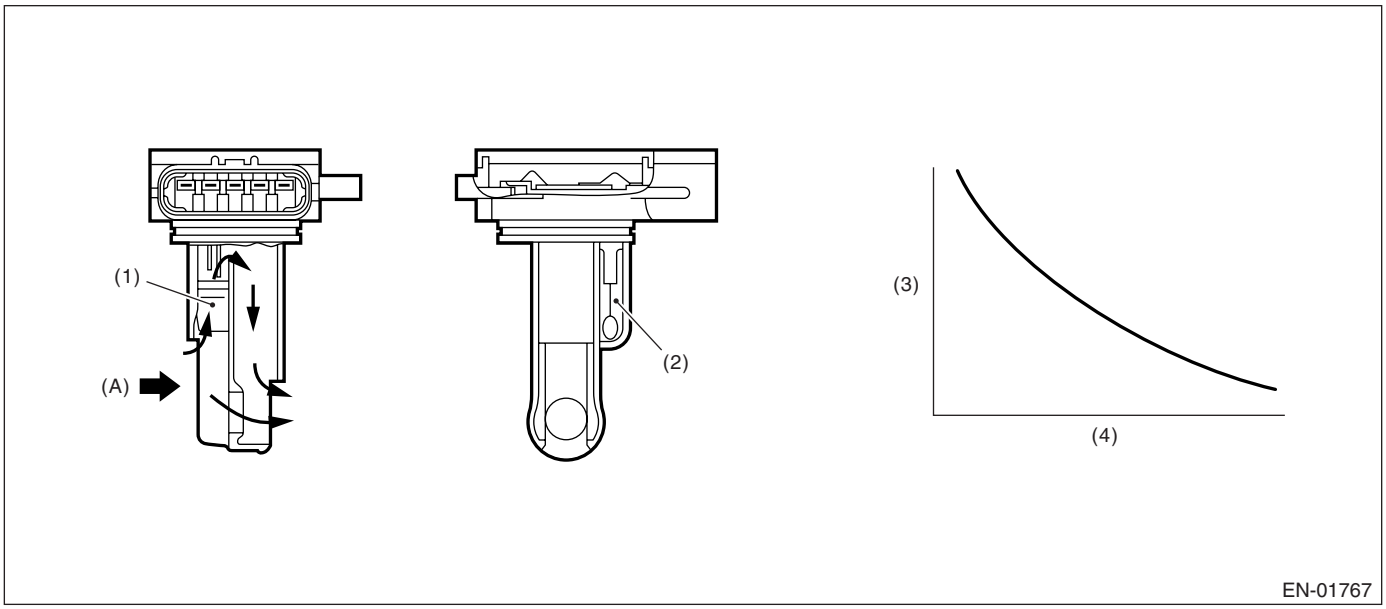
Memorize the freeze frame data. (For test mode $02)

AC:DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the intake air temperature sensor.
Judge as NG if it is out of specification.

2. COMPONENT DESCRIPTION



(A) Air

(1) Air flow sensor
(2) Intake air temperature sensor
(3) Resistance value (Ω)
(4) Intake air temperature °C (°F)

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 0.5 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.716 V
Ignition switch	ON

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: 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
Output voltage	< 4.716 V
Ignition switch	ON

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Intake air temperature sensor process: Intake air temperature is fixed at 20°C (68°F).

9. ECM OPERATION AT DTC SETTING

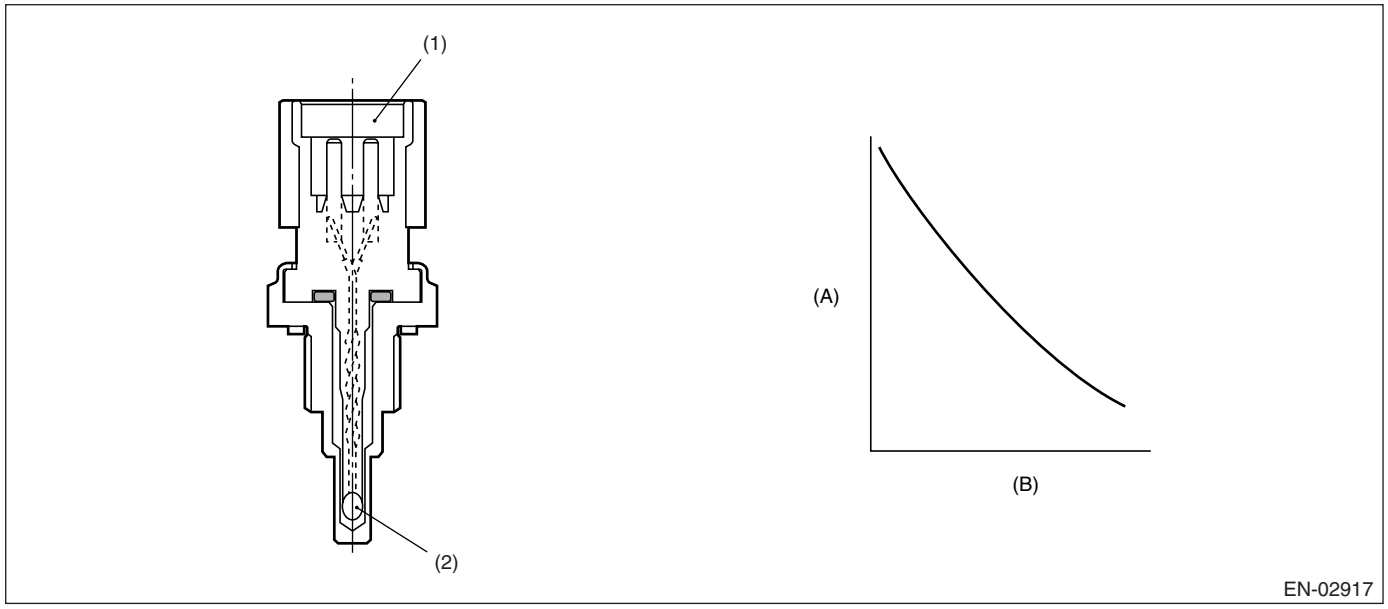
Memorize the freeze frame data. (For test mode $02)

AD:DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the engine coolant temperature sensor.
Judge as NG if it is out of specification.

2. COMPONENT DESCRIPTION



(A) Resistance value (Ω)
(B) Temperature °C (°F)
(1) Connector
(2) Thermistor element

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time until completing the malfunction criteria below becomes 0.5 second or more. Judge as OK and clear the NG when the malfunction criteria below are not met.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≤ 0.166 V

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- Engine coolant temperature sensor process: Engine coolant temperature is fixed at 70°C (158°F).
- ISC Feedback: Calculate target engine RPM as engine coolant temperature 70°C (158°F).
- ISC learning: Not allowed to learn.
- Air conditioner control: Not allowed to turn the air conditioner to ON.
- Radiator fan control: Send the duty signal 50% to the controller.

9. ECM OPERATION AT DTC SETTING

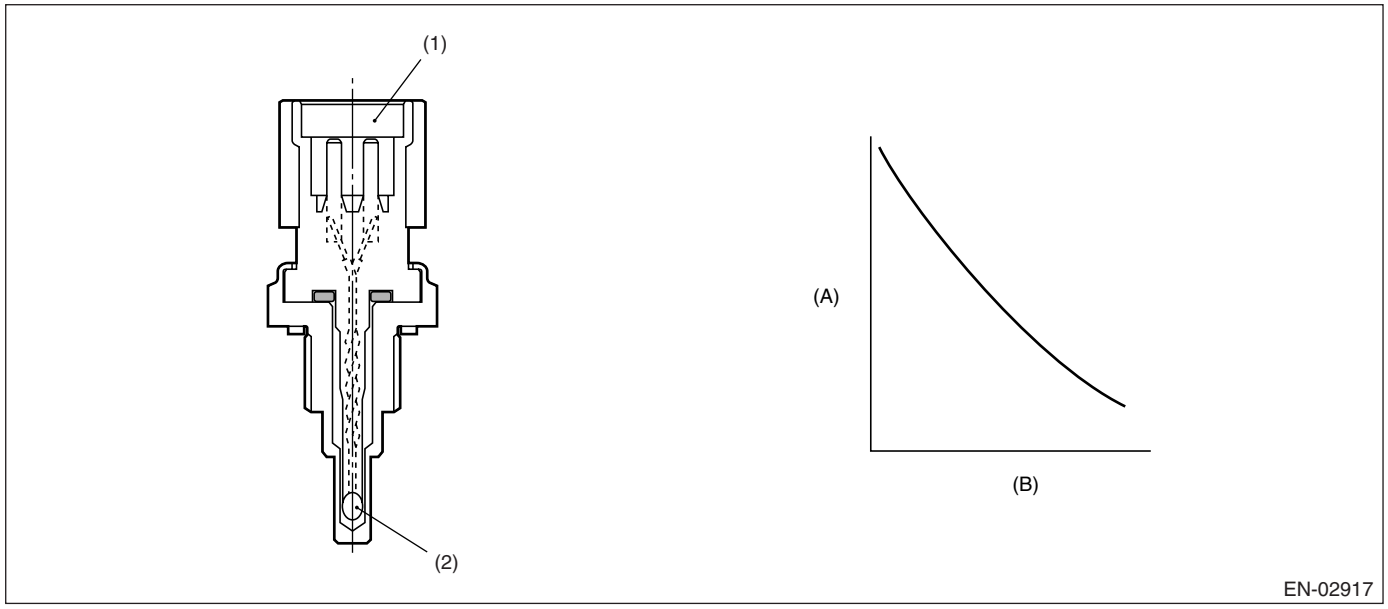
Memorize the freeze frame data. (For test mode $02)

AE:DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the engine coolant temperature sensor.
Judge as NG if it is out of specification.

2. COMPONENT DESCRIPTION



(A) Resistance value (Ω)
(B) Temperature °C (°F)
(1) Connector
(2) Thermistor element

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time until completing the malfunction criteria below becomes 0.5 second or more. Judge as OK and clear the NG when the malfunction criteria below are not met.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.716 V

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- Engine coolant temperature sensor process: Engine coolant temperature is fixed at 70°C (158°F).
- ISC Feedback: Calculate target engine RPM as engine coolant temperature 70°C (158°F).
- ISC learning: Not allowed to learn.
- Air conditioner control: Not allowed to turn the air conditioner to ON.
- Radiator fan control: Send the duty signal 50% to the controller.

9. ECM OPERATION AT DTC SETTING

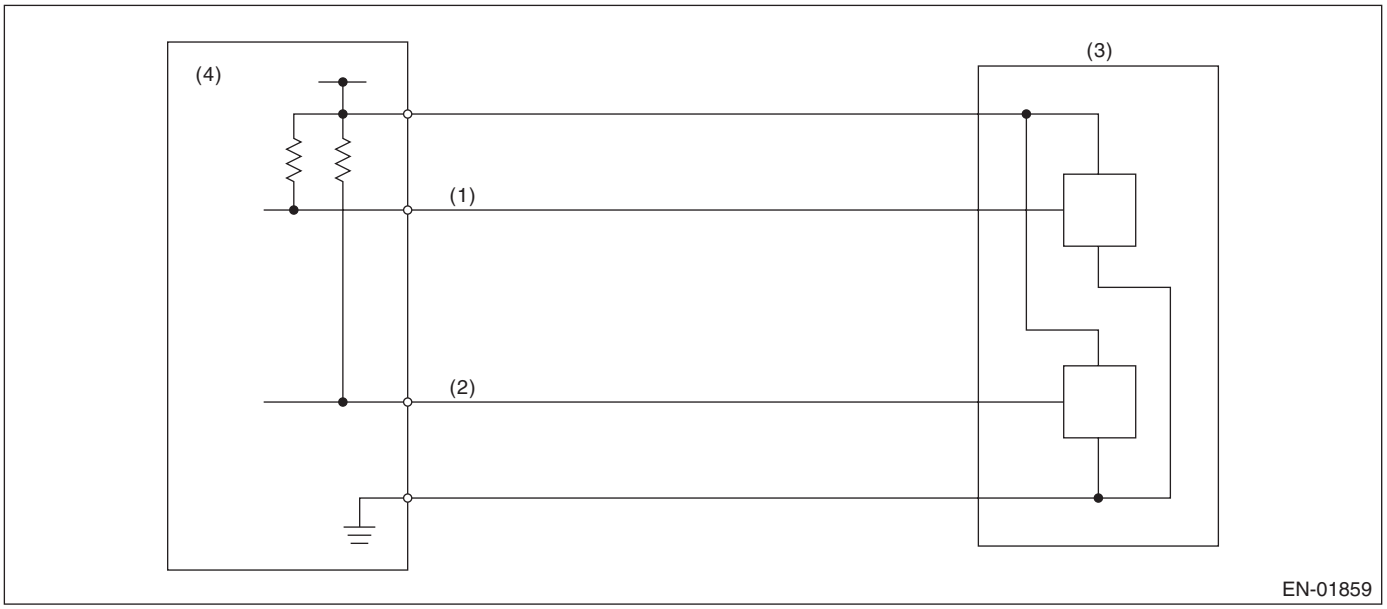
Memorize the freeze frame data. (For test mode $02)

AF:DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 1.
Judge as NG if it is 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 CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

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
Sensor 1 input voltage	≥ 0.224 V

Time Needed for Diagnosis: 24 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

9. ECM OPERATION AT DTC SETTING

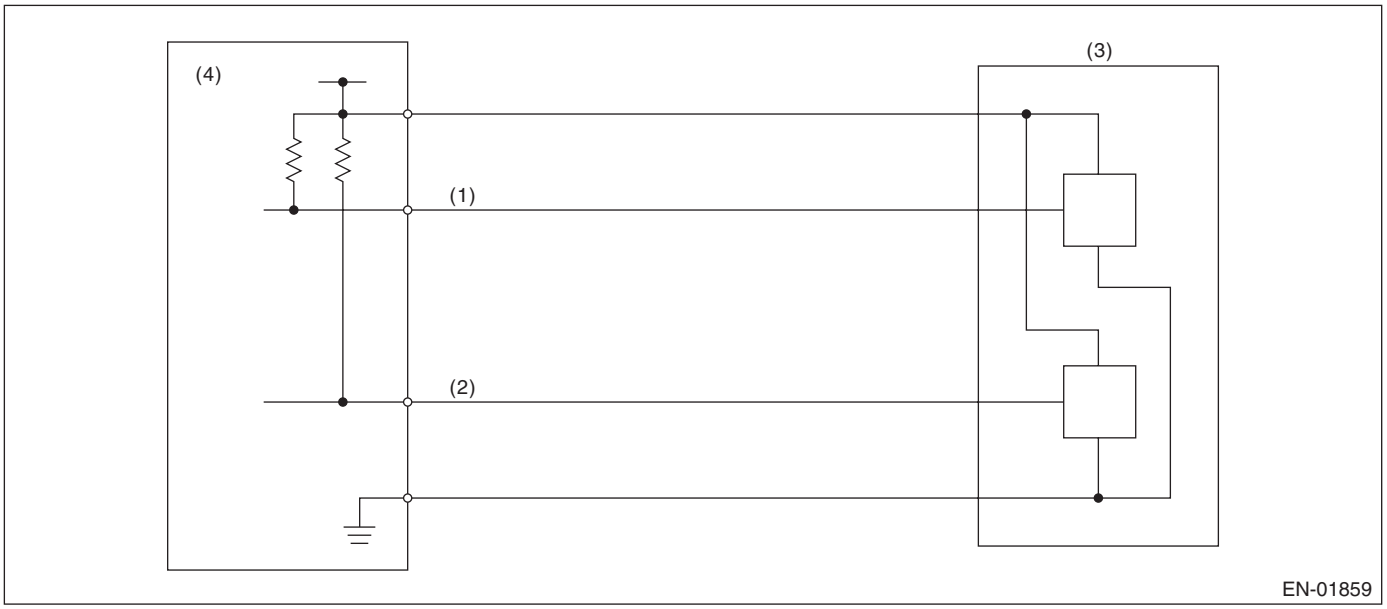
Memorize the freeze frame data. (For test mode $02)

AG:DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 1.
Judge as NG if it is 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 CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

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
Sensor 1 input voltage	≤ 4.851 V

Time Needed for Diagnosis: 24 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

9. ECM OPERATION AT DTC SETTING

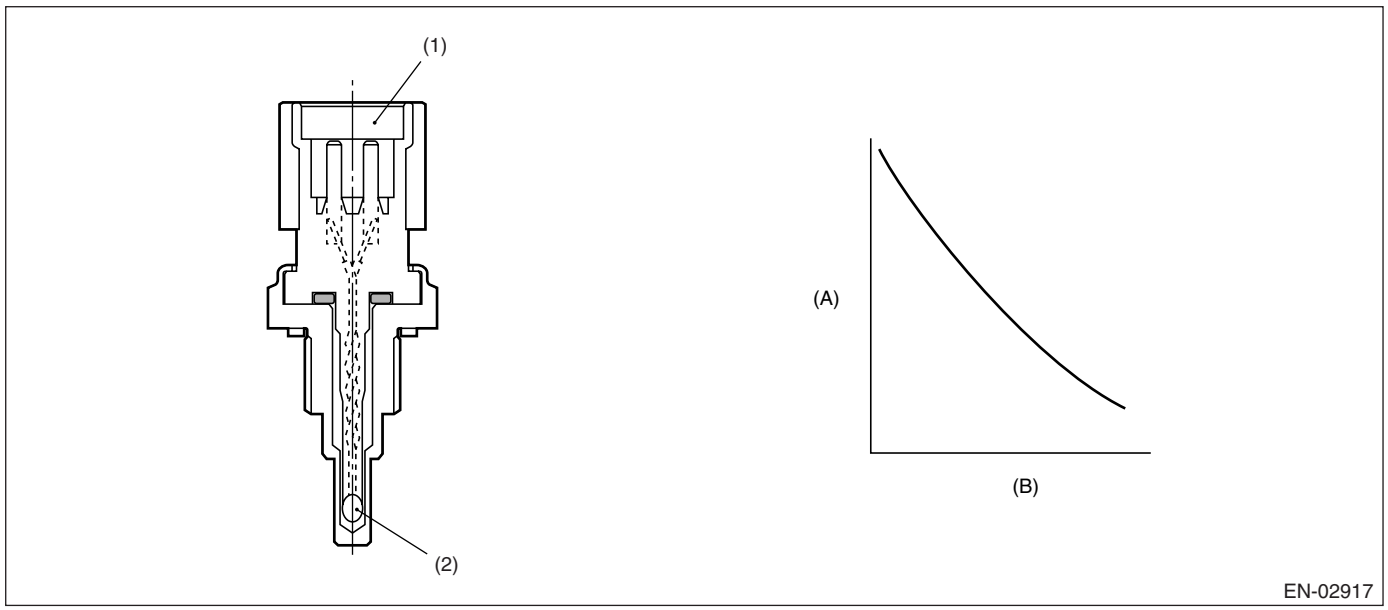
Memorize the freeze frame data. (For test mode $02)

AH: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



(A) Resistance value (Ω)
(B) Temperature °C (°F)
(1) Connector
(2) Thermistor element

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Engine speed	≥ 500 rpm
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after engine start.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the malfunction 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 count up by
64 milliseconds + TWCNT milliseconds at every 64 milliseconds.
TWCNT is defined as follows,
TWCNT = 0 at idle switch ON,
TWCNT show on the following table at idle switch OFF.

Temperature °C (°F)	Vehicle speed km/h (MPH)							
	0 (0)	8 (4.97)	16 (9.94)	24 (14.9)	32 (19.9)	40 (24.9)	48 (29.8)	56 (34.8)
–20 (–4)	0 ms	37.2 ms	74.3 ms	111.4 ms	126.7 ms	141.9 ms	163.6 ms	185.3 ms
–10 (14)	0 ms	27.4 ms	54.8 ms	82.2 ms	99.7 ms	117.1 ms	136.0 ms	154.8 ms
0 (32)	0 ms	17.6 ms	35.3 ms	52.9 ms	72.6 ms	92.3 ms	108.3 ms	124.3 ms
10 (50)	0 ms	7.9 ms	15.8 ms	23.7 ms	45.6 ms	67.6 ms	80.7 ms	93.9 ms
20 (68)	0 ms	7.9 ms	15.8 ms	23.7 ms	45.6 ms	67.6 ms	80.7 ms	93.9 ms

Judgment value of timer after engine starting
$t = 429.5 – 28.605 \times Ti$
Ti is the lowest coolant temperature after starting the engine.
Time Needed for Diagnosis: To be determined. (It is varied by the Min. engine coolant temperature and engine conditions such as vehicle speed and engine coolant temperature.)
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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)

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- Engine coolant temperature sensor process: Engine coolant temperature is fixed at 70°C (158°F).
- ISC Feedback: Calculate target engine RPM as engine coolant temperature 70°C (158°F).
- ISC learning: Not allowed to learn.
- Air conditioner control: Not allowed to turn the air conditioner to ON.
- Radiator fan control: Send the duty signal 50% to the controller.

9. ECM OPERATION AT DTC SETTING

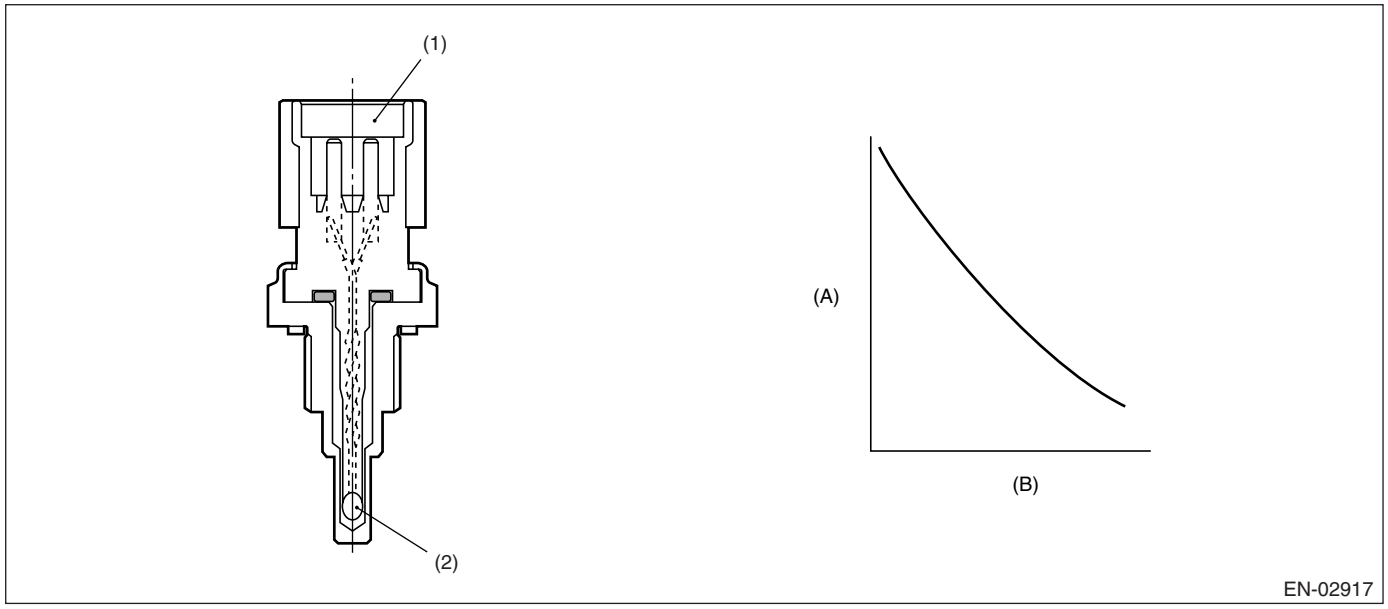
Memorize the freeze frame data. (For test mode $02)

AI: DTC P0126 INSUFFICIENT COOLANT TEMPERATURE FOR STABLE OPERATION

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of engine coolant temperature sensor characteristics.
The engine coolant temperature and fuel temperature is stored in memory from the last time that the engine was stopped. If the engine coolant temperature does not decrease when it is expected to after starting the engine, it is judged to be NG.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature °C (°F)
(1) Connector
(2) Thermistor element

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Fuel fill from last time engine was stopped to starting the engine this time	OFF
Fuel level	≥ 15 ℓ
Engine coolant temperature at last time engine was stopped	≥ 75°C (167°F) and < 95°C (203°F)

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after starting the engine.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG if the continuous time when the following conditions are established is higher than 2.5 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Engine coolant temperature the last time engine was stopped— Lowest engine coolant temperature after starting engine	< 2.5°C (36.5°F)
Fuel temperature at last time engine was stopped — Fuel temperature	≥ 5°C (41°F)
Intake temperature — Fuel temperature	< 2.5°C (36.5°F)
Fuel temperature	< 35°C (95°F)

Normality Judgment

When the following conditions are established, it is OK.

Judgment Value

Malfunction Criteria	Threshold Value
Engine coolant temperature the last time engine was stopped— Lowest engine coolant temperature after starting engine	≥ 2.5°C (36.5°F)

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

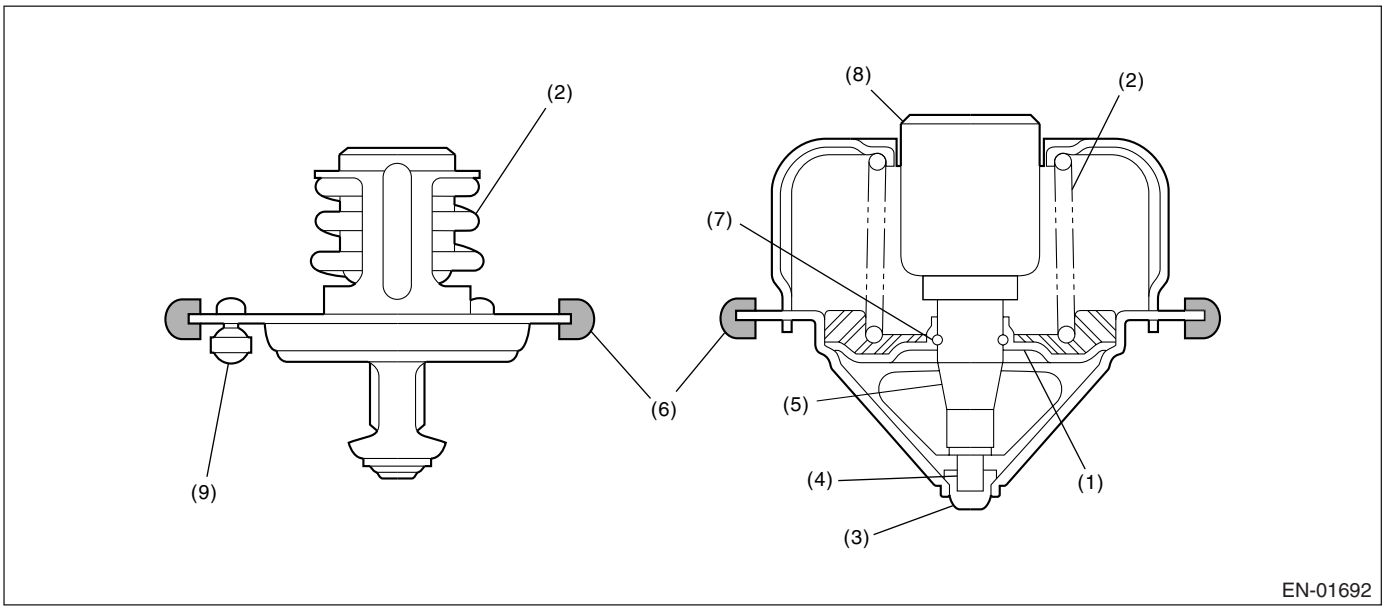
Memorize the freeze frame data. (For test mode $02)

AJ:DTC P0128 COOLANT THERMOSTAT (COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)

1. OUTLINE OF DIAGNOSIS

Detect malfunctions of the thermostat.
Judge as NG when the engine coolant temperature is lower than the estimated engine coolant temperature and the difference between them is large. Judge as OK when the engine coolant temperature becomes to 75°C (167°F), and the difference is small, before judging NG.

2. COMPONENT DESCRIPTION



(1) Valve
(2) Spring
(3) Stopper
(4) Piston
(5) Guide
(6) Rubber packing
(7) Stop ring
(8) Wax element
(9) Jiggle valve

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 23 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	≥ 10.9 V
Estimate ambient temperature	≥ –7°C (19.4°F)
Thermostat malfunction diagnosis	Incomplete
Engine coolant temperature at engine starting	< 55°C (131°F)
Estimated coolant temperature	≥ 75°C (167°F)
Engine coolant temperature	≤ 75°C (167°F)
(Estimated – measured) coolant temperature	> 20°C (68°F)
Vehicle speed	≥ 20 km/h (12 MPH)

Time Needed for Diagnosis: 23 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
Battery voltage	≥ 10.9 V
Estimate ambient temperature	≥ –7°C (19.4°F)
Thermostat malfunction diagnosis	Incomplete
Engine coolant temperature at engine starting	< 55°C (131°F)
Engine coolant temperature	≥ 75°C (167°F)
(Estimated – measured) coolant temperature	≤ 20°C (68°F)

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

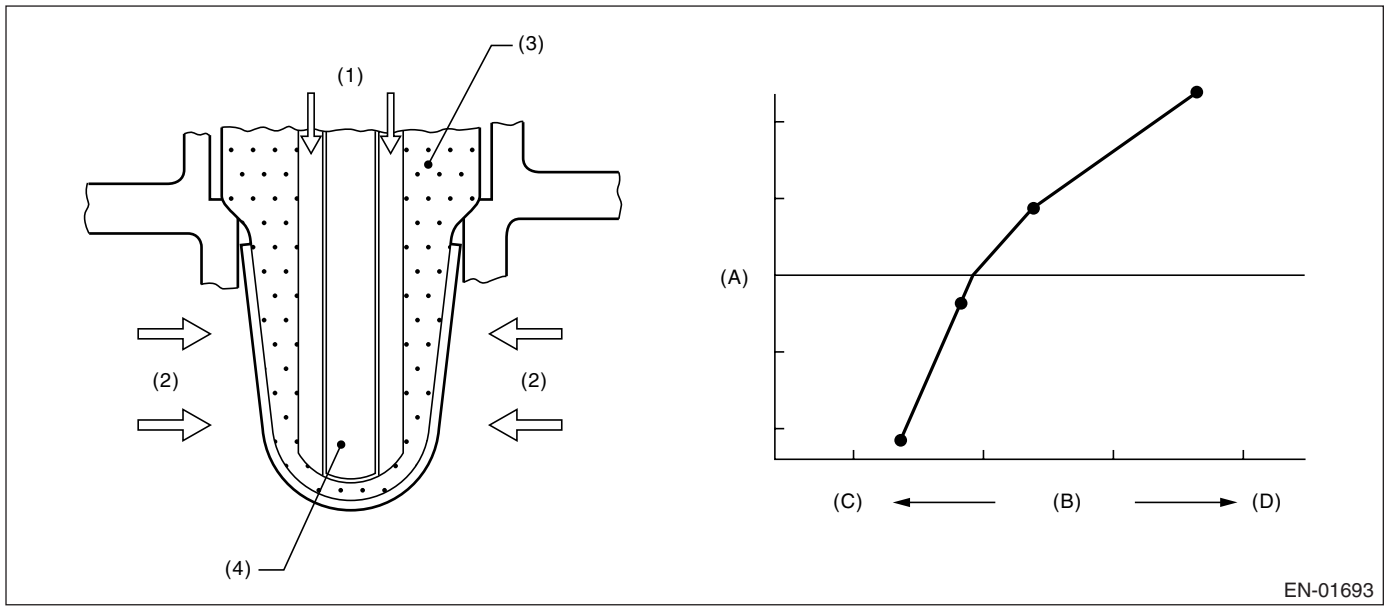
Memorize the freeze frame data. (For test mode $02)

AK: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 impressed voltage is out of range, or the element current is out of range.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(1) Atmosphere
(2) Exhaust gas
(3) ZrO_2
(4) Ceramic heater

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time of completing any malfunction criteria below is more than 1 second.

Judgment Value

Malfunction Criteria	Threshold Value
Input voltage	< 1.8 V
Input current	< –0.005 A

Time Needed for Diagnosis: 1 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- Front oxygen (A/F) sensor heater control: Prohibit heater continuity.
- A/F main learning: Not allowed to calculate the A/F main learning compensation factor.
- A/F sub learning: Not allowed to calculate the A/F sub learning compensation factor.
- Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

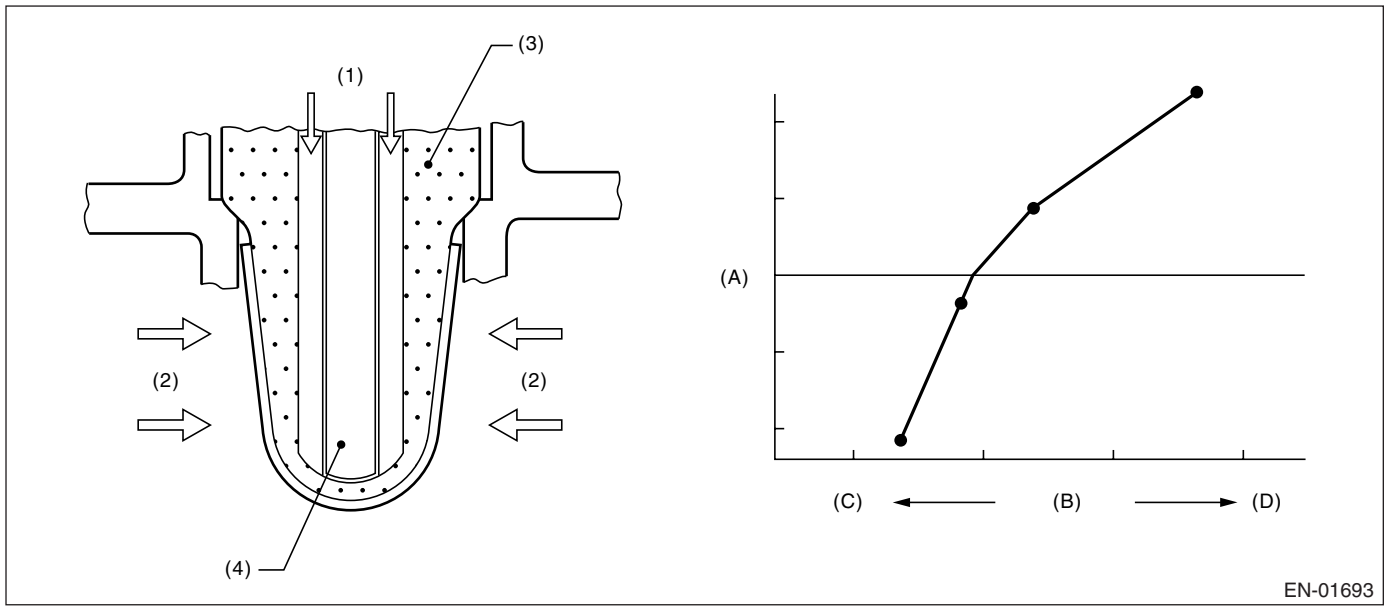
Memorize the freeze frame data. (For test mode $02)

AL: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 impressed voltage is out of range, or the element current is out of range.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(1) Atmosphere
(2) Exhaust gas
(3) ZrO_2
(4) Ceramic heater

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time of completing any malfunction criteria below is more than 1 second.

Judgment Value

Malfunction Criteria	Threshold Value
Input voltage	≥ 3.8 V
Input current	≥ 0.005 A

Time Needed for Diagnosis: 1 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- Front oxygen (A/F) sensor heater control: Prohibit heater continuity.
- A/F main learning: Not allowed to calculate the A/F main learning compensation factor.
- A/F sub learning: Not allowed to calculate the A/F sub learning compensation factor.
- Purge control: Not allowed to purge

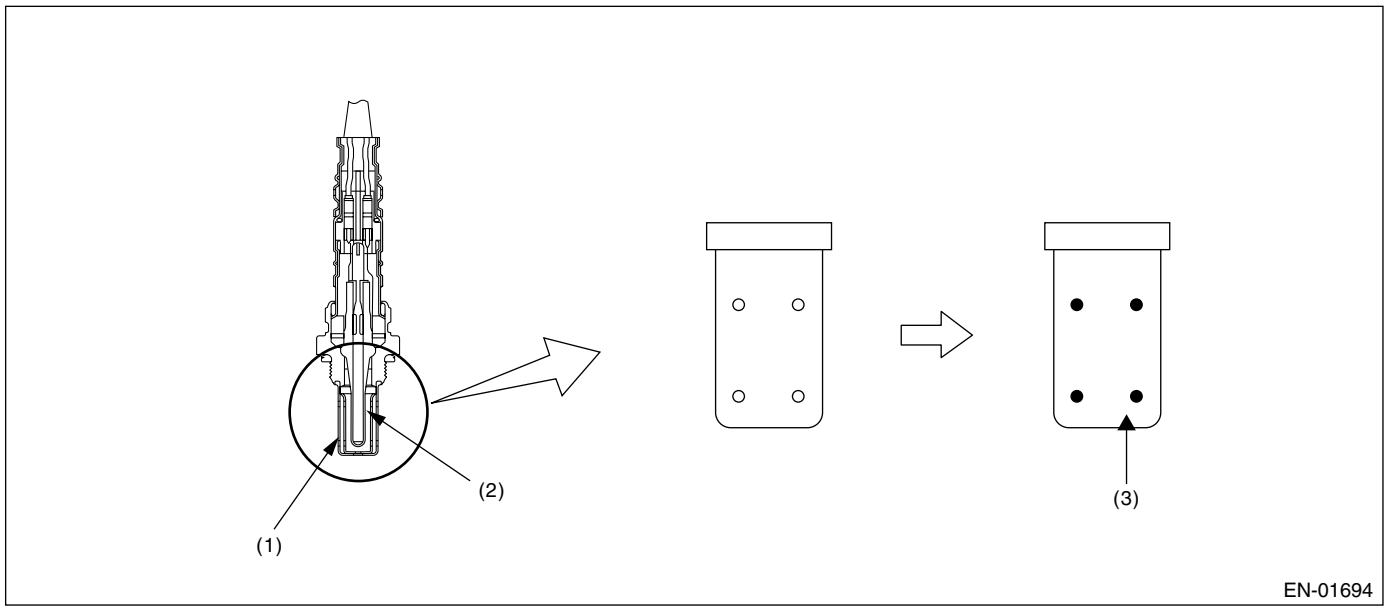
9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

AM:DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

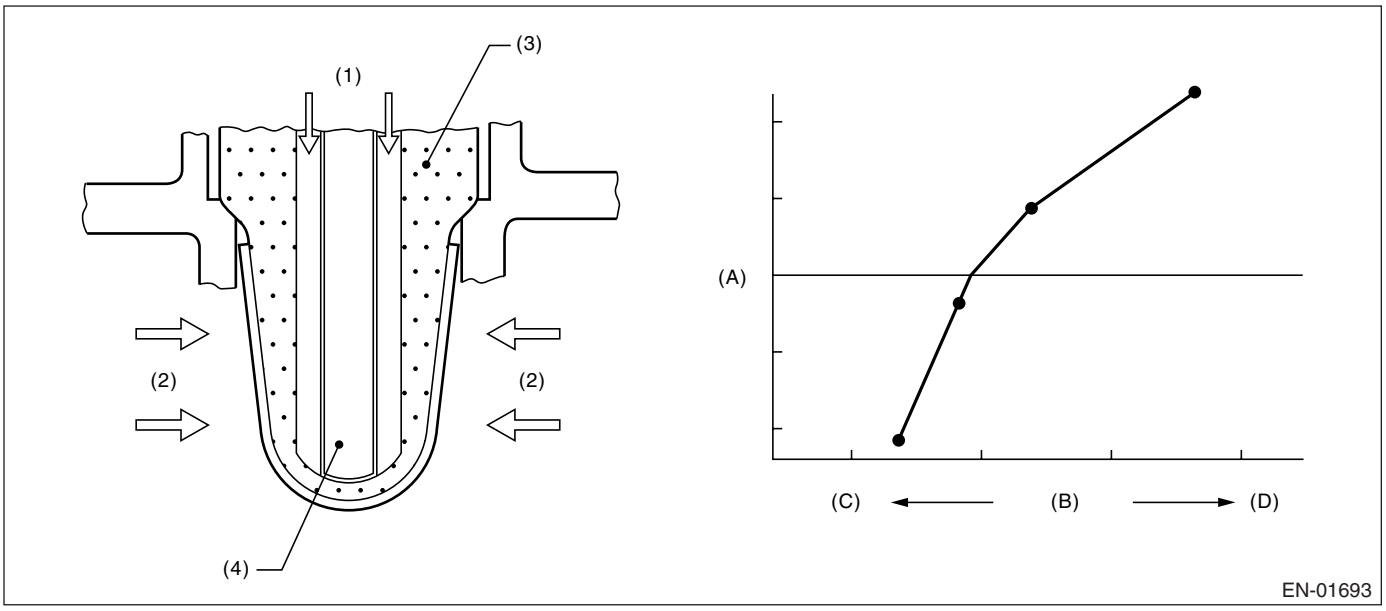
1. OUTLINE OF DIAGNOSIS

Detect the slow response of front oxygen (A/F) sensor.
Front oxygen (A/F) sensor cover has some ventilation holes for exhaust gas. Clogged ventilation holes are diagnosed.
Clogged ventilation holes are diagnosed. When the holes are clogged, the A/F output variation becomes slow comparing with the actual A/F variation because oxygen which reaches the zirconia layer is insufficient. Therefore, if the sensor cover holes are clogged, the rich to lean judgment in the ECM is delayed when the change from rich to lean occurs.
Judge as NG when the actual movement in comparison to the ECM control amount is slow.



(1) Cover (2) Zirconia (3) Clogging

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(1) Atmosphere
(2) Exhaust gas
(3) ZrO_2
(4) Ceramic heater

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
All secondary parameters enable conditions	1 second or more
Battery voltage	> 10.9 V
Atmospheric pressure	> 75.1 kPa (563 mmHg, 22.2 inHg)
Closed loop control with main feedback	OPERATION
Front oxygen (A/F) sensor impedance	0 ←→ 50 Ω
After engine starting	120 seconds or more
Engine coolant temperature	≥ 75°C (167°F)
Engine speed	1000 ←→ 2500 rpm
Vehicle Speed	10 ←→ 120 km/h (6.21 ←→ 74.6 MPH)
Intake Air Flow	10 ←→ 40 g/s
Engine load	< 0.02 g/rev
Learning value of EVAP conc. during purge	≤ 0.12
Total time of operating canister purge	20 seconds or more

4. GENERAL DRIVING CYCLE

Perform diagnosis only once at a constant speed of 10 to 120 km/h (6.21 to 74.6 MPH) 60 seconds or more after starting the engine.

5. DIAGNOSTIC METHOD

Calculate faf difference every 128 milliseconds, and the λvalue difference. Calculate the diagnosis value after calculating 1,640 times (210 seconds).
Judge as NG when the malfunction criteria below are completed. Judge as OK and clear the NG when the malfunction criteria below are not met.

Judgment Value

Malfunction Criteria	Threshold Value
parafca = td2faf/td2lmd where, td2faf (N) = td2faf (n–1) + |d2faf (n)| td2lmd (N) = td2lmd (n–1) + |d2lmd (n)| add up for a total of 300 seconds d2faf (n) = (faf (n) – faf (n–1)) – (faf (n–1) – faf (n–2)) d2lmd (n) = (lmd (n) – lmd (n–1)) – (lmd (n–1) – lmd (n–2)) faf = main feedback compensation coefficient every 128 milliseconds lmd = output lambda every 128 milliseconds	≥ 0.25

Time Needed for Diagnosis: 210 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- Front oxygen (A/F) sensor main learning compensation: Not allowed to calculate.
- Rear oxygen sensor sub learning compensation: Not allowed to calculate.
- Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

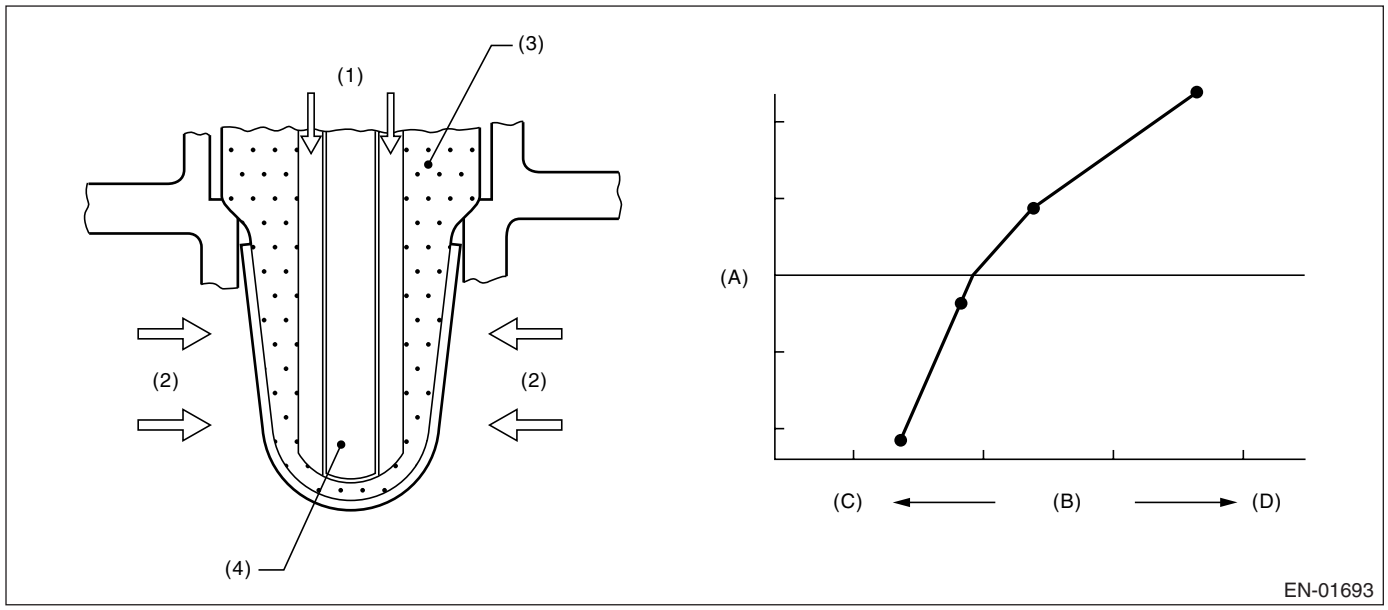
- Memorize the freeze frame data. (For test mode $02)
- Memorize the diagnostic value and trouble standard value. (For test mode $06)

AN: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) Atmosphere
(2) Exhaust gas
(3) ZrO_2
(4) Ceramic heater

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time of completing the malfunction criteria below becomes more than 5 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Voltage	≥ 10.9 V
Time of heater control duty at 70% or more	≥ 30 sec.
Front oxygen (A/F) sensor impedance	≥ 500 Ω

Time Needed for Diagnosis: 5 seconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- Front oxygen (A/F) sensor main learning compensation: Not allowed to calculate.
- Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

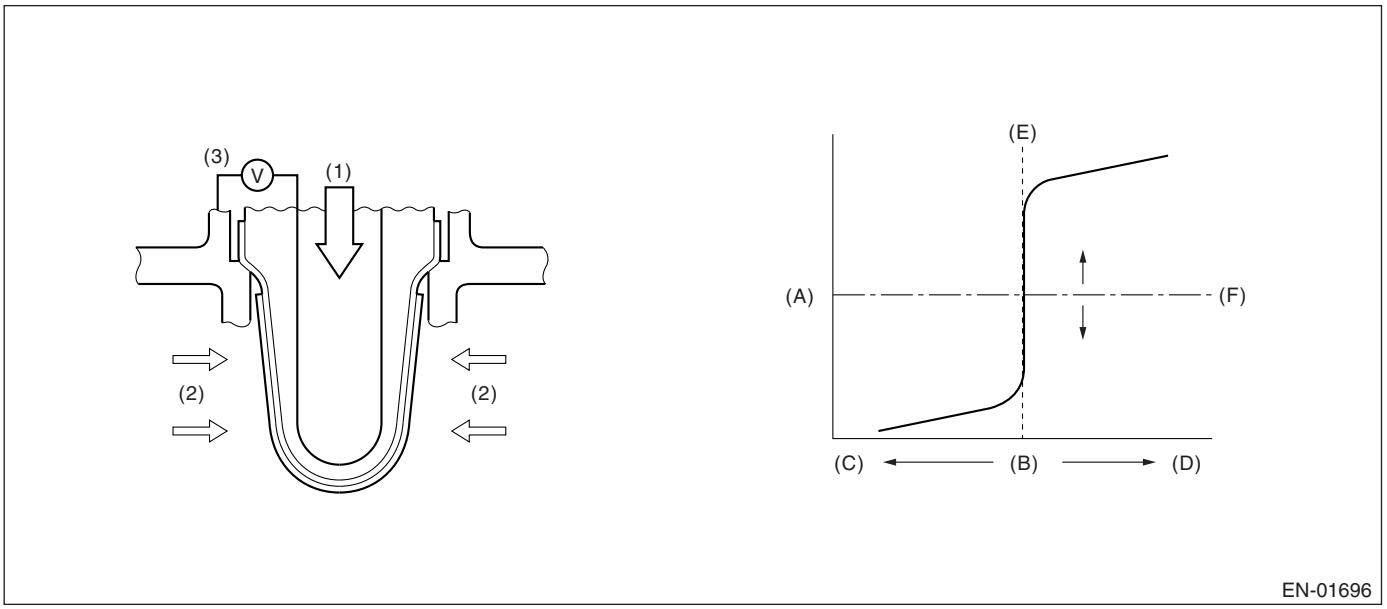
Memorize the freeze frame data. (For test mode $02)

AO:DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

Detect continuity NG of the oxygen sensor. Judge as NG when the O_2 voltage is not within the range of possible values considering driving condition.

2. COMPONENT DESCRIPTION



(A)	Electromotive force	(C)	Rich	(E)	Theoretical air fuel ratio
(B)	Air fuel ratio	(D)	Lean	(F)	Comparative voltage
(1)	Atmosphere	(2)	Exhaust gas	(3)	Electromotive force

3. ENABLE CONDITIONS

Used for abnormality judgment

Secondary Parameters	Enable Conditions
High	
Secondary air system	Not in operation
Closed loop control at the oxygen sensor	In operation
Misfire detection every 200 rotations	< 5 times
Compensation coefficient of the front oxygen (A/F) sensor	Not in limit value
Battery voltage	> 10.9 V
Low side 1	
Closed loop control at the oxygen sensor	In operation
Misfire detection every 200 rotations	< 5 times
Compensation coefficient of the front oxygen (A/F) sensor	Not in limit value
Battery voltage	> 10.9 V
Amount of intake air	≥ 10 g/second
Low side 2	
Closed loop control at the oxygen sensor	In operation
Misfire detection every 200 rotations	< 5 times
Compensation coefficient of the front oxygen (A/F) sensor	Not in limit value
Battery voltage	> 10.9 V
Amount of intake air	< 10 g/second
Current continuation time of the rear oxygen sensor heater	25 seconds or more
Low side 3	
Closed loop control at the oxygen sensor	In operation
Misfire detection every 200 rotations	< 5 times
Compensation coefficient of the front oxygen (A/F) sensor	Not in limit value
Battery voltage	> 10.9 V
Amount of intake air	≥ 10 g/second
Current continuation time of the rear oxygen sensor heater	25 seconds or more
Fuel cut	Experienced

Used for normality judgment

Secondary Parameters	Enable Conditions
Closed loop control at the oxygen sensor	In operation
Misfire detection every 200 rotations	< 5 times
Compensation coefficient of the front oxygen (A/F) sensor	Not in limit value
Battery voltage	> 10.9 V

4. GENERAL DRIVING CYCLE

After starting the engine, continuously perform the diagnosis with the same engine condition.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the following conditions are established and the continuous time is more than specified time. Judge as OK NG when the following conditions are not established.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
High Maximum output voltage without continuity	≥ 1200 mV	P0138 P0158
Low side Maximum output voltage without continuity	< 30 mV	P0137 P0157

Time needed for diagnosis

High side: 2.5 seconds
Low side 1: 20 seconds
Low side 2: 40 seconds
Low side 3: Refer to the map.

Time for fuel cut (second)	Time needed for diagnosis (second)
0	40
2	40
10	60

Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Sub feedback control: Not allowed

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

AP:DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0137. <Ref. to GD(H6DO)-71, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

AQ:DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2)

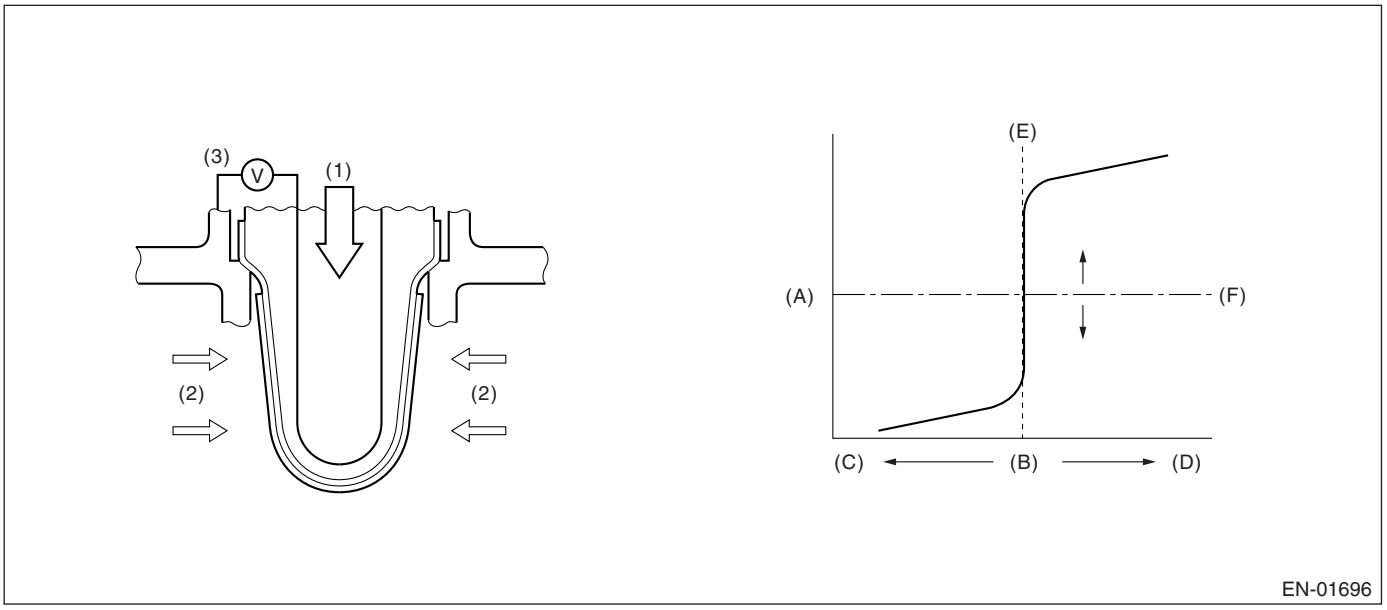
1. OUTLINE OF DIAGNOSIS

Detect the slow response of the oxygen sensor.
Judge as NG if either the rich to lean response diagnosis or lean to rich response diagnosis is NG, and Judge as OK if both are OK.
[Rich → Lean diagnosis response]
1. Measure the response time for oxygen sensor output changes when the A/F ratio changes to rich to lean. If the measured response time is larger than the threshold value, it is NG. If it is smaller, it is OK.
2. Judge as NG when the oxygen sensor voltage is large (rich) when recovering from a deceleration fuel cut.
[Lean → Rich diagnosis response]
1. Measure the response time for oxygen sensor output changes when the A/F ratio changes to lean to rich. If the measured response time is larger than the threshold value, it is NG.
2. Judge as NG when the oxygen sensor voltage remains small when recovering from a deceleration fuel cut.

Diagnostic method

Measure the response time of the output change of the oxygen sensor when the A/F ratio changes to rich to lean. And Judge as NG when the measured response time is larger than the threshold value.

2. COMPONENT DESCRIPTION



(A)	Electromotive force	(C)	Rich	(E)	Theoretical air fuel ratio
(B)	Air fuel ratio	(D)	Lean	(F)	Comparative voltage
(1)	Atmosphere	(2)	Exhaust gas	(3)	Electromotive force

3. ENABLE CONDITIONS

- Rich → lean response diagnosis

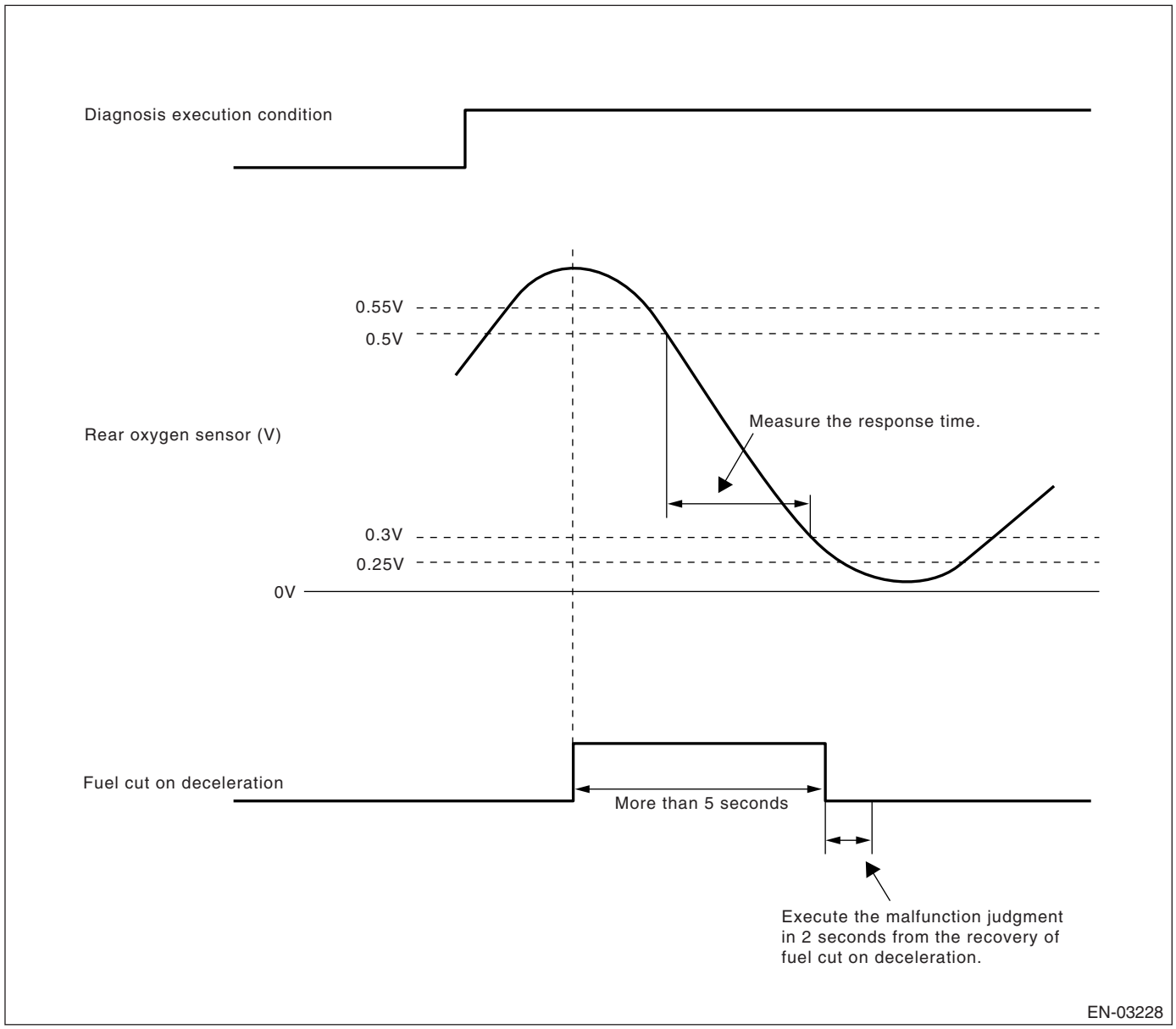
Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
A/F sub feedback control condition	Completed
Deceleration fuel cut time is 5 seconds or more.	Experienced
After fuel cut	≥ 2 sec.
Current calculation time of the rear oxygen sensor heater	≥ 55 sec.
Current continuation time of the rear oxygen sensor heater	≥ 25 sec.
Catalyst warm-up counter	≥ 8,000 times

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once when deceleration fuel cut occurs after rapid acceleration. (Pay attention to the oxygen sensor voltage for the timing of the deceleration.)

5. DIAGNOSTIC METHOD

When the rear oxygen sensor output voltage changes from 0.55 V (rich) to 0.25 V (lean), calculate the minimum response time for output change between 0.5 V and 0.3 V for the judgment criteria.



Abnormality Judgment

1) Judge as NG when the judgment value is larger than the threshold value after deceleration fuel cut.
Response time (diagnosis value) > threshold value → abnormal

NOTE:
Variation time of rear oxygen sensor output voltage is short during fuel shut-off in deceleration. NG judgment should be performed with the condition of deceleration fuel cut. Even without deceleration fuel cut, judge as OK if the value is below the threshold.

When the deceleration fuel cut off time is more than 6 seconds, judge as NG if the following criteria are met 2 seconds after recovering from the deceleration fuel cut.

2) Judge as NG when the oxygen sensor voltage at recovery from a deceleration fuel cut, is large.
If the fuel cut time in a deceleration fuel cut is long (more than 6 s), and even after recovering from a deceleration fuel cut, the oxygen sensor voltage is high (0.55 V or more), judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Shortest time change from rich (500 mV O2 output) to lean (300 mV) if voltage reduces from 550 mV to 250 mV.	> 0.327 sec.
or	
Longest time over 550 mV	> 2 sec.

Time Needed for Diagnosis: 1 time
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

1) Regardless of a deceleration fuel cut, if the response time (diagnosis value) when the oxygen sensor voltage has changed from rich to lean is shorter than the threshold value (judgment value), judge as a normal condition.
Response time (diagnosis value) ≤ threshold value → normal
2) Do not judge as a normal condition.
Judge as OK when the criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Shortest time change from rich (500 mV O2 output) to lean (300 mV) if voltage reduces from 550 mV to 250 mV.	≤ 0.327 sec.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Sub feedback control: Not allowed

9. ECM OPERATION AT DTC SETTING

- Memorize the freeze frame data. (For test mode $02)
- Memorize the diagnostic value and trouble standard value. (For test mode $06)

10.ENABLE CONDITIONS

- Lean → rich response diagnosis

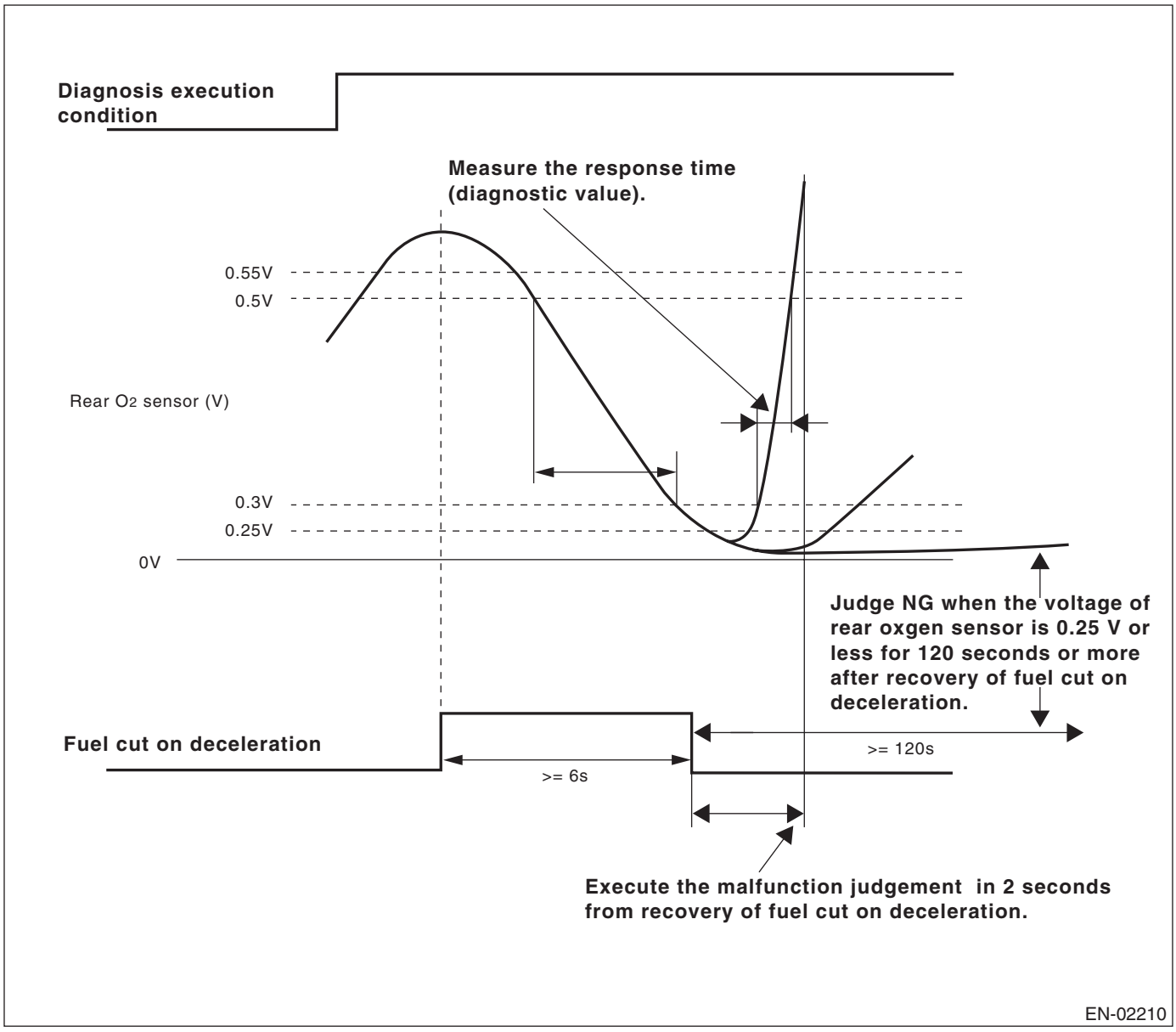
Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
A/F main feedback control condition	Complete
5 seconds or more deceleration fuel cut.	Experienced
After fuel cut	≥ 2 sec.

11.GENERAL DRIVING CYCLE

Perform the diagnosis only once when deceleration fuel cut occurs after rapid acceleration. (Pay attention to the oxygen sensor voltage for the timing of the deceleration.)

12.DIAGNOSTIC METHOD

Calculate the minimum value of 0.3 V to 0.5 V output change response time as judgment value when the rear oxygen sensor output voltage changes from 0.25 V (lean) to 0.55 V (rich).



Abnormality Judgment

1) Judge as NG when the judgment value is larger than the threshold value after deceleration fuel cut.
Response time (diagnosis value) > threshold value → abnormal
2) If the oxygen sensor voltage is small after recovering from a deceleration fuel cut, and remains small, judge as NG.

Judgment Value

Malfunction Criteria	Threshold Value
Shortest time change from lean (300 mV O2 output) to rich (500 mV) when the voltage drops from 500 mV to 250 mV.	> 2 sec.
or	
Longest time under 250 mV	> 120 sec.

Time Needed for Diagnosis: 1 time
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

1) Regardless of a deceleration fuel cut, if the response time (diagnosis value) when the oxygen sensor voltage has changed from rich to lean is shorter than the threshold value (judgment value), judge as a normal condition.
Response time (diagnosis value) ≤ threshold value → normal
2) Do not judge as a normal condition.
Judge as OK when the criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Shortest time change from lean (300 mV O2 output) to rich (500 mV) when voltage drops from 550 mV to 250 mV.	≤ 2 sec.

13.DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

14.MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

15.FAIL SAFE

Sub feedback control: Not allowed

16.ECM OPERATION AT DTC SETTING

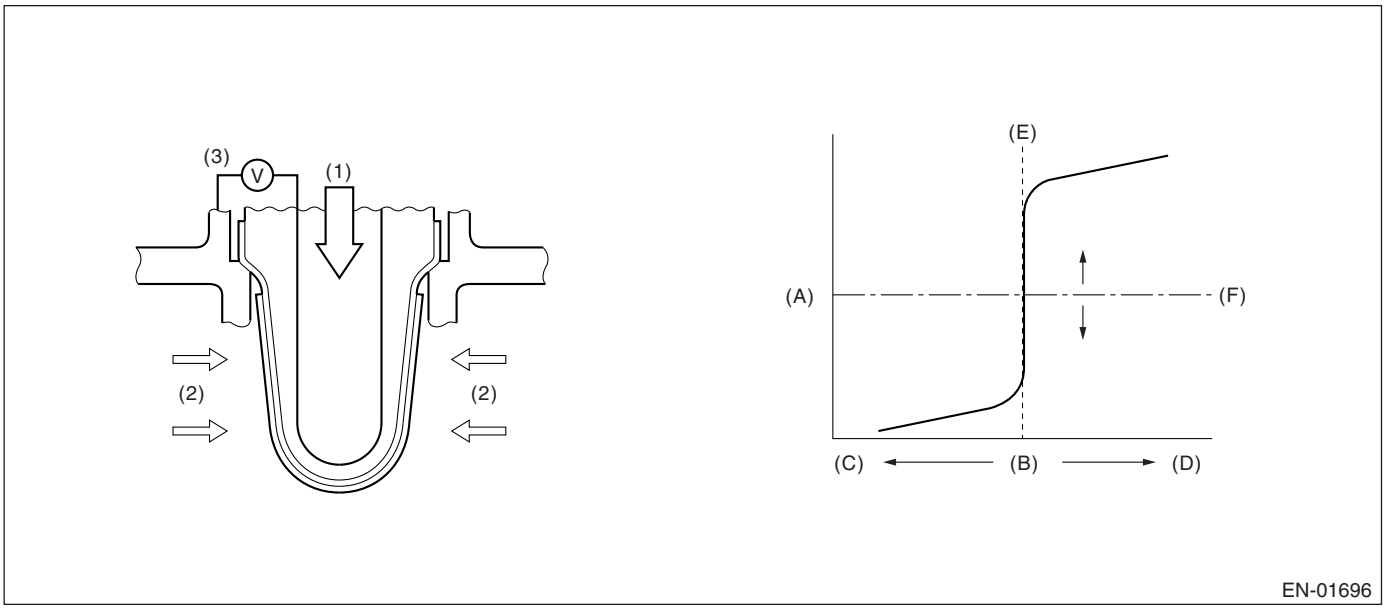
- Memorize the freeze frame data. (For test mode $02)
- Memorize the diagnostic value and trouble standard value. (For test mode $06)

AR:DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 2)

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



(A)	Electromotive force	(C)	Rich	(E)	Theoretical air fuel ratio
(B)	Air fuel ratio	(D)	Lean	(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 the rear oxygen sensor	≥ 0.6 V
Amount of intake air	≥ 10 g/second
Engine coolant temperature	≥ 75°C (167°F)
Misfire detection every 200 rotations	≤ 7 times
Compensation factor for front oxygen (A/F) sensor with main feedback control	Not in limit value
Battery voltage with main feedback control	> 10.9 V
Deceleration fuel cut of 5 seconds or more.	Experienced

4. GENERAL DRIVING CYCLE

Perform the diagnosis once after starting the engine.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Minimum output voltage	> 250 mV
Maximum output voltage	< 500 mV

Time Needed for Diagnosis: 200 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK when the criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Diagnosis of the rear oxygen sensor voltage low side	Incomplete
Minimum output voltage	≤ 250 mV
Maximum output voltage	≥ 500 mV

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Sub feedback control: Not allowed

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

AS:DTC P0151 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0131. <Ref. to GD(H6DO)-62, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

AT:DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0132. <Ref. to GD(H6DO)-64, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

AU:DTC P0153 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0133. <Ref. to GD(H6DO)-66, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

AV:DTC P0154 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0134. <Ref. to GD(H6DO)-69, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

AW:DTC P0157 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0137. <Ref. to GD(H6DO)-71, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

AX:DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0137. <Ref. to GD(H6DO)-71, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

AY:DTC P0159 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0139. <Ref. to GD(H6DO)-75, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

AZ:DTC P0160 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0140. <Ref. to GD(H6DO)-80, DTC P0140 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 2), Diagnostic Trouble Code (DTC) Detecting Criteria.>

BA: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 CONDITIONS

Secondary Parameters	Enable Conditions
A/F main learning system	In operation
Engine coolant temperature	≥ 75°C (167°F)
Engine load	≤ 0.02 g/rev
Intake air flow	≥ Map 5

Map 5

Engine RPM (rpm)	idle	700	1000	1500	2000	2500	3000	3500	4000	4500	5000
Measured value (g(oz)/rev)	NA	0.357 (0.013)	0.25 (0.009)	0.25 (0.009)	0.317 (0.011)	0.326 (0.011)	0.337 (0.012)	0.397 (0.014)	0.439 (0.015)	0.454 (0.016)	0.454 (0.016)

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 diagnosed value (fsobd) with the threshold value, and if a condition where the malfunction criteria below are met continues for more than 50 seconds, judge that there is a fault in the fuel system.

Judgment Value

Malfunction Criteria	Threshold Value
fsobd = (sglmd – tglmda) + faf + flaf In this case: sglmd = measured lambda, tglmda = target lambda, faf = main feedback compensation coefficient (every 64 milliseconds), flaf = main feedback learning compensation coefficient	≥ fsobdL1 Refer to Map 4. fsobdL1 = lean side threshold value of fsobd

Map 4 Threshold value for fuel system malfunction criteria

Amount of air (g(oz)/s)	0 (0)	3.2 (0.113)	6.4 (0.226)	9.6 (0.339)	12.8 (0.451)	16 (0.564)	19.2 (0.677)
fsobdL1 (%)	40	40	33.2	26.5	26.5	26.5	26.5

Time Needed for Diagnosis: 10 seconds × 5 times
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK when the malfunction criteria below are completed for 10 seconds or more.

Judgment Value

Malfunction Criteria	Threshold Value
fsobd = (sglmd – tglmda) + faf + flaf	< 19%

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When similar driving conditions are repeated 3 times and the result is OK.
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

BB: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 CONDITIONS

Secondary Parameters	Enable Conditions
A/F main learning system	In operation
Engine coolant temperature	≥ 75°C (167°F)
Cumulative time of canister purge after engine start	20 seconds or more
Continuous period after canister purge starting	30 seconds or more
Intake manifold absolute pressure	≥ Map 1

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 diagnosed value (fsobd) with the threshold value, and if a condition where the malfunction criteria are met continues for more than 50 seconds, judge that there is a fault in the fuel system.

Judgment Value

Malfunction Criteria	Threshold Value
fsobd = (sglmd – tglmda) + faf + flaf In this case: sglmd = measured lambda, tglmda = target lambda, faf = main feedback compensation coefficient (every 64 milliseconds), flaf = main feedback learning compensation coefficient	≤ fsobdR1 Refer to Map 4. fsobdR1 = rich side threshold value of fsobd

Map 4

Amount of air (g(oz)/s)	0 (0)	3.2 (0.113)	6.4 (0.226)	9.6 (0.339)	12.8 (0.451)	16 (0.564)	19.2 (0.677)
fsobdR1 (%)	–40	–40	–31.2	–26.5	–26.5	–26.5	26.5

Time Needed for Diagnosis: 10 seconds × 5 times
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK when the malfunction criteria below continues for 10 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
fsobd = (sglmd – tglmda) + faf + flaf	≥ –20%

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When similar driving conditions are repeated 3 times and the result is OK.
- When “Clear Memory” is performed

7. FAIL SAFE

Purge control solenoid valve control: Not allowed to purge.

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

BC:DTC P0174 SYSTEM TOO LEAN (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0171. <Ref. to GD(H6DO)-83, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

BD:DTC P0175 SYSTEM TOO RICH (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0172. <Ref. to GD(H6DO)-85, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

BE:DTC P0181 FUEL TEMPERATURE SENSOR “A” CIRCUIT RANGE/PERFORMANCE

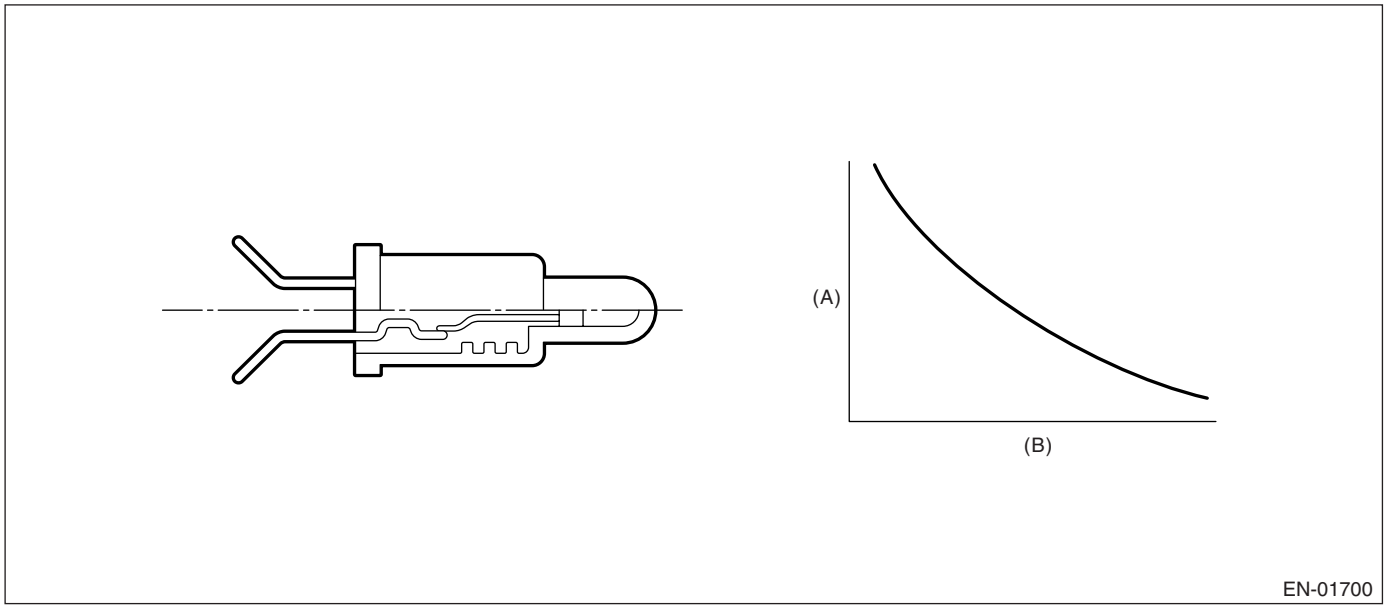
1. OUTLINE OF DIAGNOSIS

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.

2. COMPONENT DESCRIPTION



(A) Resistance value (Ω) (B) Fuel temperature °C (°F)

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 120 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Fuel level	≥ 9.6 ℓ (25.4 US gal, 2.11 Imp gal)
After engine starting	20 seconds or more
Engine coolant temperature - engine coolant temperature at engine starting	> 10°C (50°F)
Fuel temperature – Engine coolant temperature	≥ 10°C (50°F)
Battery voltage	> 10.9 V

Time Needed for Diagnosis: 120 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK when the criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Fuel level	≥ 9.6 ℓ (25.4 US gal, 2.11 Imp gal)
After engine starting	20 seconds or more
Engine coolant temperature - engine coolant temperature at engine starting	> 10°C (50°F)
Fuel temperature – Engine coolant temperature	< 10°C (50°F)
Battery voltage	> 10.9 V
Engine coolant temperature	< 75°C (167°F)

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.

6. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
After engine starting	20 seconds or more
Battery voltage	> 10.9 V

7. GENERAL DRIVING CYCLE

Always perform diagnosis continuously.

8. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Accumulated amount of intake air	≥ 551 kg (1215 lb)
Fuel temperature difference between Max. and Min.	< 2°C (3.6°F)

Time Needed for Diagnosis: Undecided
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK when the criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Accumulated amount of intake air	≥ 551 kg (1215 lb)
Fuel temperature difference between Max. and Min.	≥ 2°C (3.6°F)

9. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

10.MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

11.FAIL SAFE

None

12.ECM OPERATION AT DTC SETTING

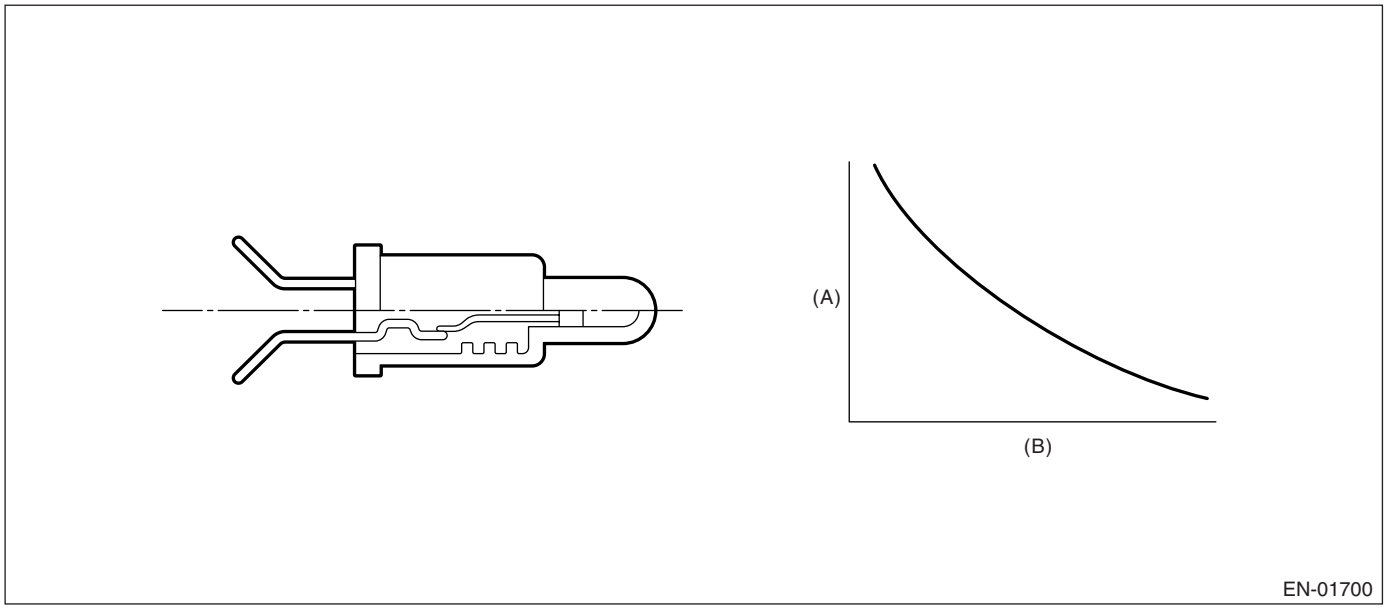
Memorize the freeze frame data. (For test mode $02)

BF: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 it is out of specification.

2. COMPONENT DESCRIPTION



(A) Resistance value (Ω) (B) Fuel Temperature °C (°F)

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 2.5 seconds or more.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.166 V
Battery voltage	≥ 10.9 V

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light: 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
Output voltage	≥ 0.166 V
Battery voltage	≥ 10.9 V

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

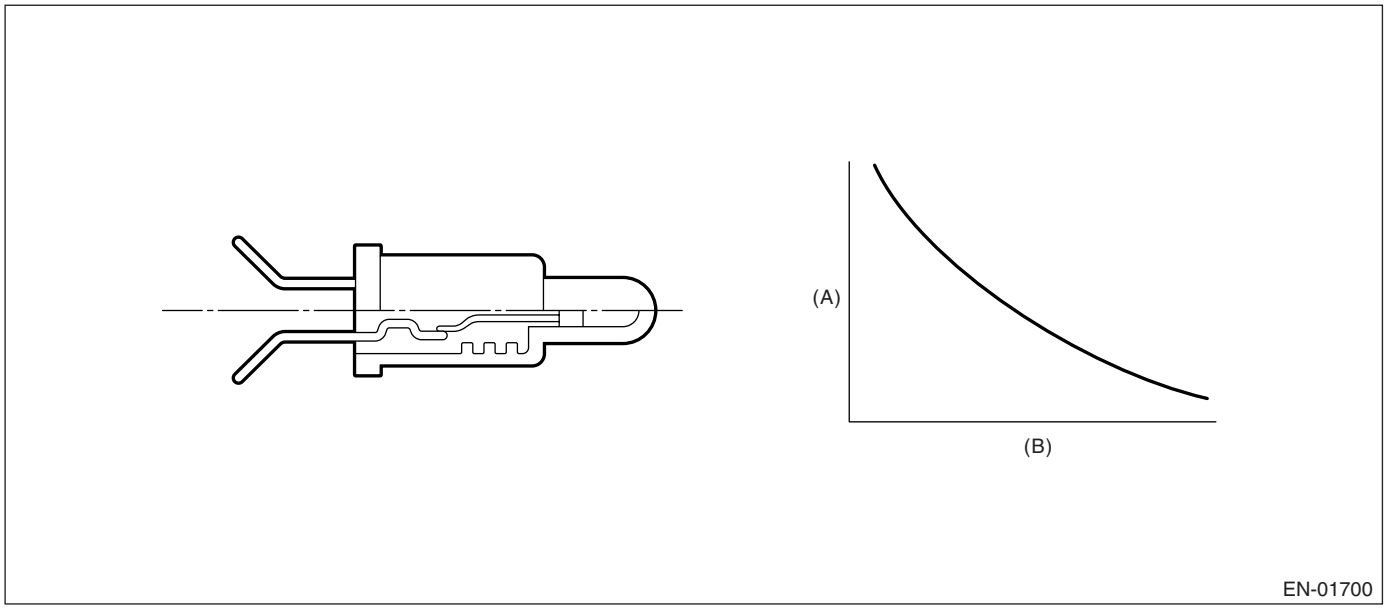
Memorize the freeze frame data. (For test mode $02)

BG: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 it is out of specification.

2. COMPONENT DESCRIPTION



(A) Resistance value (Ω) (B) Fuel temperature °C (°F)

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 2.5 seconds or more.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.716 V
Battery voltage	≥ 10.9 V

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light: 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
Output voltage	< 4.716 V
Battery voltage	≥ 10.9 V

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

BH: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 CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Engine speed	500 rpm

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

4. DIAGNOSTIC METHOD

Abnormality Judgment

When the following conditions are established, it is NG.

Judgment Value

Malfunction Criteria	Threshold Value
Engine oil temperature After engine start oil temperature sensor characteristic diagnosis timer.	< 15°C (59°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 count up by
64 milliseconds + TCILCNT milliseconds at every 64 milliseconds.
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 (10)	24 (15)	32 (20)	40 (25)	48 (30)	56 (35)
Temperature °C (°F)	–40 (–40)	0 ms	32 ms	76 ms	130 ms	149 ms	171 ms	176 ms	181 ms
	–30 (–22)	67 ms	93 ms	121 ms	157 ms	170 ms	184 ms	193 ms	203 ms
	–20 (–4)	98 ms	123 ms	148 ms	184 ms	193 ms	204 ms	214 ms	226 ms
	–10 (14)	145 ms	166 ms	187 ms	208 ms	223 ms	239 ms	242 ms	245 ms
	0 (32)	161 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).
$t = 2400000 - 60000 \times Ti$ ($t \geq 2400000$)
Ti = The lowest coolant temperature after starting the engine.
Time Needed for Diagnosis: Undecided
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

When the following conditions are established, it is OK.

Judgment Value

Malfunction Criteria	Threshold Value
Engine oil temperature	≥ 15°C (59°F)

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

Oil temperature sensor process: Engine oil temperature is fixed at 70°C (158°F).

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

BI: DTC P0197 ENGINE OIL TEMPERATURE SENSOR CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the oil temperature sensor.
Judge as NG when outside of the possible range.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when the continuous time when the following conditions are established is more than 0.5 second. Judge as OK and clear the NG when the following conditions are not established.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≤ 0.166 V

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

Oil temperature sensor process: Engine oil temperature is fixed at 70°C (158°F).

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

BJ:DTC P0198 ENGINE OIL TEMPERATURE SENSOR CIRCUIT 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 CONDITIONS

Secondary Parameters	Enable Conditions
None	

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when the continuous time when the following conditions are established is more than 0.5 second. Judge as OK and clear the NG when the following conditions are not established.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.716 V

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

Oil temperature sensor process: Engine oil temperature is fixed at 70°C (158°F).

8. ECM OPERATION AT DTC SETTING

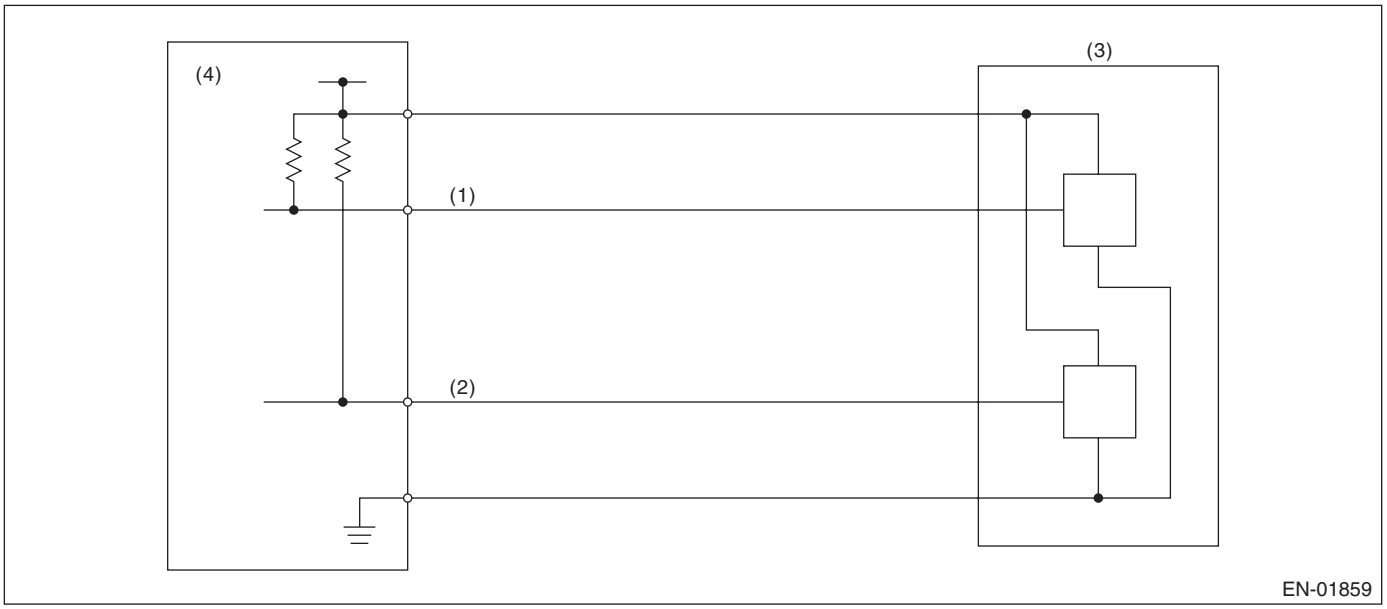
Memorize the freeze frame data. (For test mode $02)

BK:DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 2.
Judge as NG if it is 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 CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

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
Sensor 2 input voltage	≥ 0.224 V

Time Needed for Diagnosis: 24 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

9. ECM OPERATION AT DTC SETTING

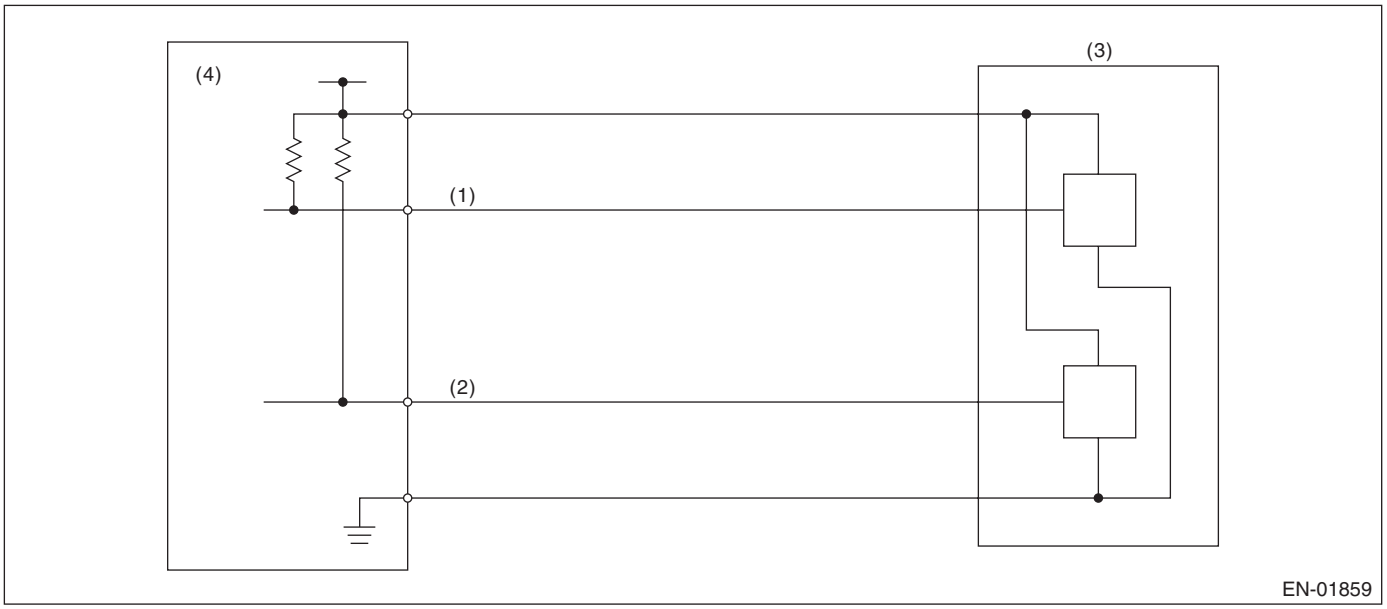
Memorize the freeze frame data. (For test mode $02)

BL:DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 2.
Judge as NG if it is 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 CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

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
Sensor 2 input voltage	≤ 4.851 V

Time Needed for Diagnosis: 24 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

9. ECM OPERATION AT DTC SETTING

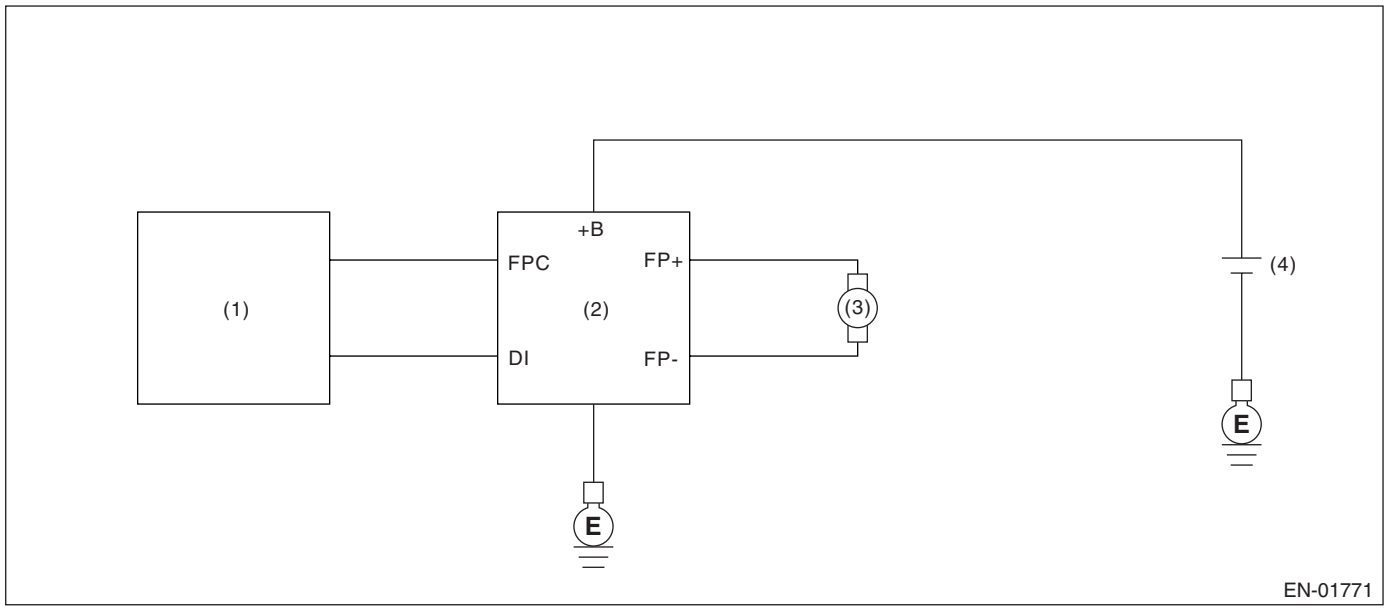
Memorize the freeze frame data. (For test mode $02)

BM: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)
(2) Fuel pump control unit
(3) Fuel pump
(4) Battery

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 2.5 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Battery voltage	≥ 8 V
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal)
Fuel pump control unit output diagnosis signal	Low

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
Battery voltage	≥ 8 V
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal)
Fuel pump control unit output diagnosis signal	High

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

OFF setting may be needed depending on the NG portion.

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

BN: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 three patterns below. Intermittent misfire (Different cylinders misfire intermittently.):

- 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 less)

2) Misfire every time: FTP 1.5 times misfire, Catalyst damage misfire

- 360° Interval Difference Method

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
All secondary parameters enable conditions	1 second or more
120° Intake manifold pressure change at CA	< 20 kPa (150 mmHg, 5.9 inHg)
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	400 — 8000 rpm
Intake manifold pressure	>Value of Map 3 or more
Battery voltage	≥ 8 V
Atmospheric pressure	≥ 75.0 kPa (563 mmHg, 22.17 inHg)
Fuel parameter determination	Not extremely low volatility

Map 3

rpm	700	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000
kPa (mmHg, inHg)	26.7 (200.0, 7.87)	26.7 (200.0, 7.87)	24.0 (180.0, 7.09)	24.1 (181.0, 7.13)	24.3 (182.0, 7.17)	24.7 (185.0, 7.28)	28.3 (212.3, 8.36)	30.9 (232.1, 9.14)	32.9 (247.0, 9.72)	33.1 (248.0, 9.76)	34.3 (257.0, 10.12)	38.1 (286.0, 11.26)	41.9 (314.0, 12.36)	48.9 (367.0, 14.45)

3. GENERAL DRIVING CYCLE

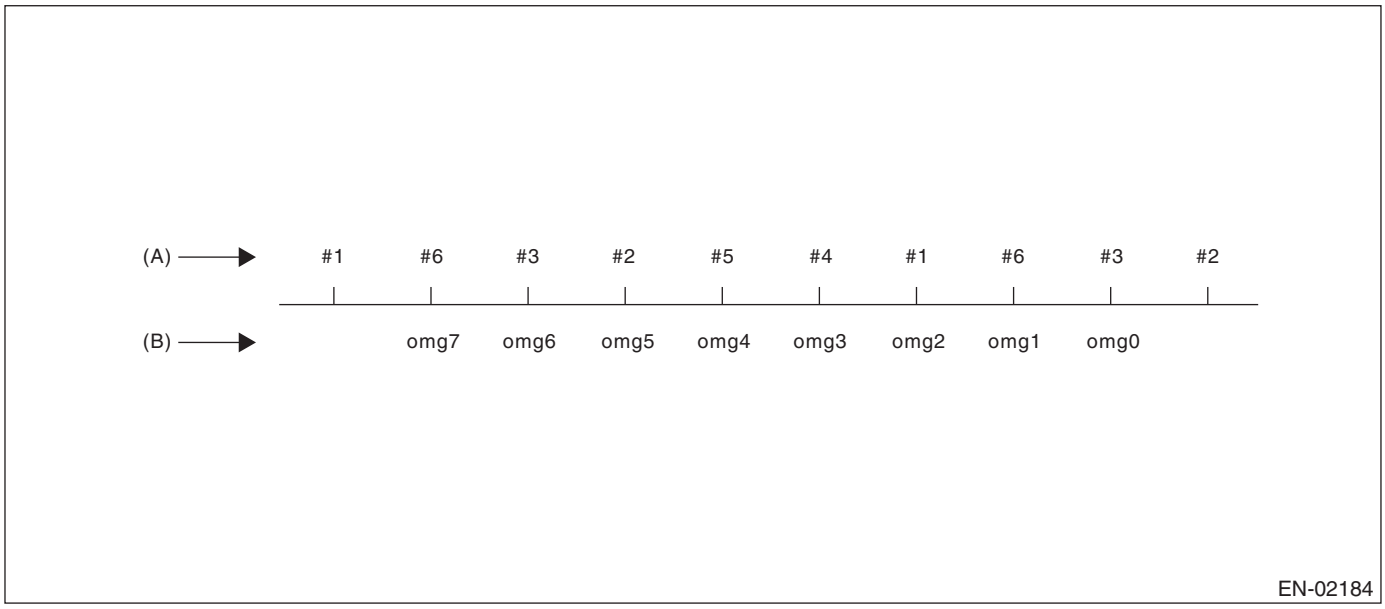
- If conditions are met, detect misfire from idling to high rotation.
- Perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

When a misfire occurs, the engine RPM will decreased 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. Counting the number of misfires, if the misfire ratio is higher during 1000 rev. or 200 rev. 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)
	• 120 degree difference method • 360 degree difference method • 720 degree difference method	• FTP 1.5 times misfire NG judgment • Catalyst damage misfire NG judgment

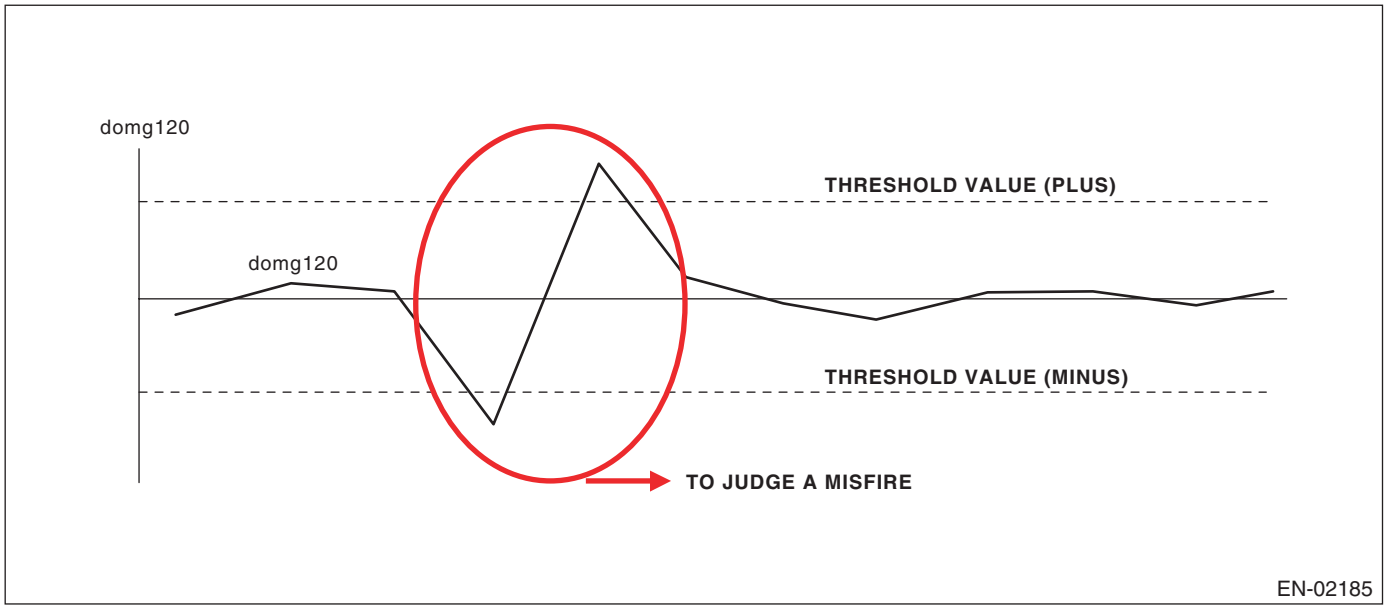
As shown in the following figure, pick a cylinder as the standard and name it omg 0. And the former crankshaft position speed is named omg 1, the second former crankshaft position speed is named omg 2, the third is named omg 3, etc.



(A) Ignition order (B) Crankshaft position speed

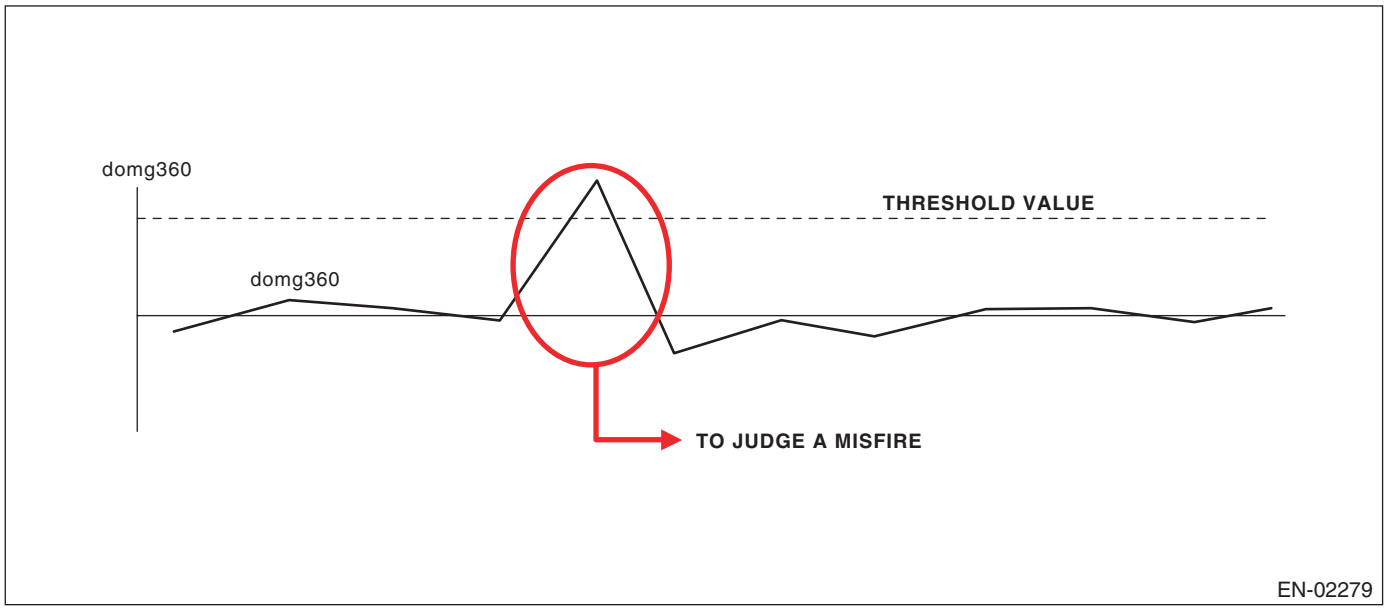
120° Interval Difference Method

Diagnostic value	domg 120 = (omg 1 – omg 0) – (omg 7 – omg 1)/6
Judge as a misfire in the following cases. • domg 120 > judgment value of positive side • domg 121 ≤ judgment value of negative side (Judgment value before 120°CA)	



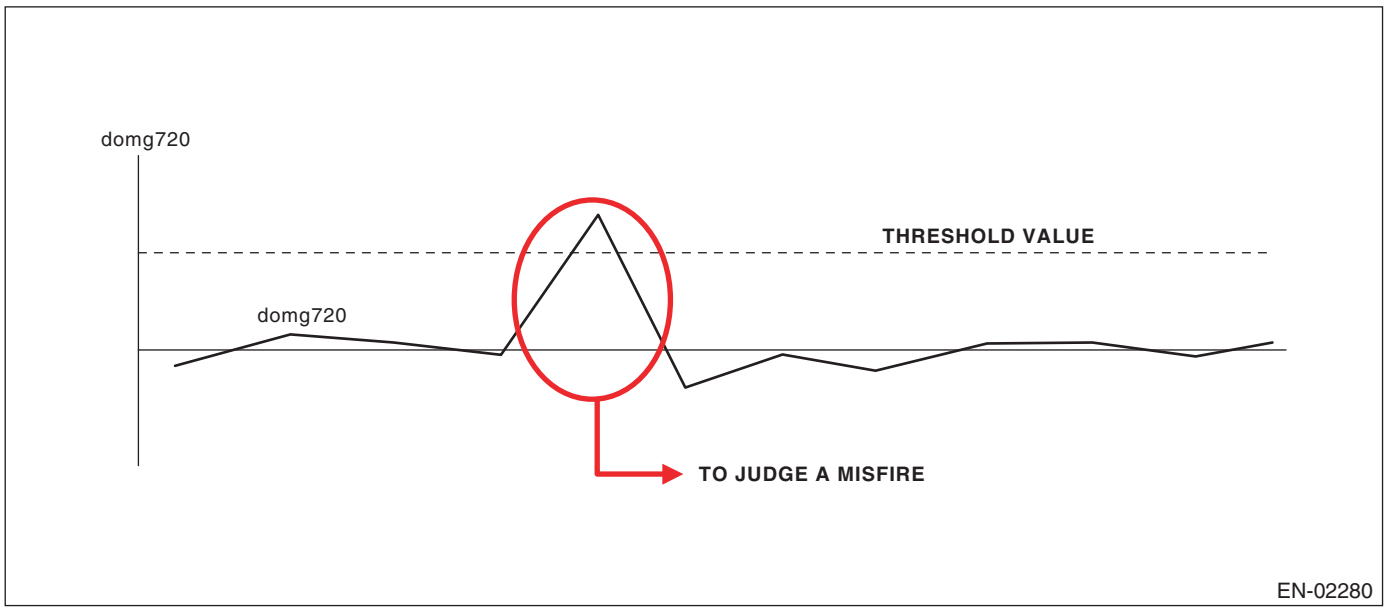
360° Interval Difference Method

Diagnostic value	domg 360 = (omg 1 – omg 0) – (omg 4 – omg 3)
Misfire judgment	domg 360 > Judgment value → Judge as misfire



720° Interval Difference Method

Diagnostic value	domg 720 = (omg 1 – omg 0) – (omg 7 – omg 6)
Misfire judgment	domg 720 > Judgment value → Judge as misfire



FTP 1.5 times misfire (Misfire occurrence level which influences exhaust gas)

Judgment Value (Judge that malfunction occurs when the misfire ratio is high in 1000 engine revs.)

Malfunction Criteria	Threshold Value
FTP emission judgment value	> 1.0 % in 1000 revs.

Time Needed for Diagnosis: 1000 engine revs.
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Catalyst damage misfire (Misfire occurrence level damaging catalyst)

Judgment Value

Malfunction Criteria	Threshold Value
Catalyst damage misfire judgment value	Refer to Map.

Map

		Intake air (g(oz)/rev)									
		0.2 (0.035)	0.4 (0.014)	0.6 (0.021)	0.8 (0.028)	1 (0.035)	1.2 (0.042)	1.4 (0.049)	1.6 (0.056)	1.8 (0.063)	2 (0.071)
Engine RPM (rpm)	700	90	90	88	76	68	78	78	78	78	78
	1000	90	90	88	76	68	78	78	78	78	78
	1500	89	88	80	64	56	62	62	62	62	62
	2000	88	84	64	40	36	35	35	35	35	35
	2500	88	80	56	36	24	34	34	34	34	34
	3000	64	56	26	23	23	33	33	33	33	33
	3500	50	40	24	24	32	32	32	32	32	32
	4000	40	38	30	26	20	20	20	20	20	20
	4500	50	28	20	20	20	20	20	20	20	20
	5000	40	30	20	20	20	20	20	20	20	20
	5500	40	25	26	21	20	20	20	20	20	20
	6000	36	36	25	20	20	20	20	20	20	20
	6500	32	32	20	20	20	20	20	20	20	20
	7000	32	32	20	20	20	20	20	20	20	20

Time Needed for Diagnosis: 200 engine revs.
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

BO:DTC P0302 CYLINDER 2 MISFIRE DETECTED

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0301. <Ref. to GD(H6DO)-104, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

BP:DTC P0303 CYLINDER 3 MISFIRE DETECTED

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0301. <Ref. to GD(H6DO)-104, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

BQ:DTC P0304 CYLINDER 4 MISFIRE DETECTED

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0301. <Ref. to GD(H6DO)-104, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

BR:DTC P0305 CYLINDER 5 MISFIRE DETECTED

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0301. <Ref. to GD(H6DO)-104, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

BS:DTC P0306 CYLINDER 6 MISFIRE DETECTED

1. OUTLINE OF DIAGNOSIS

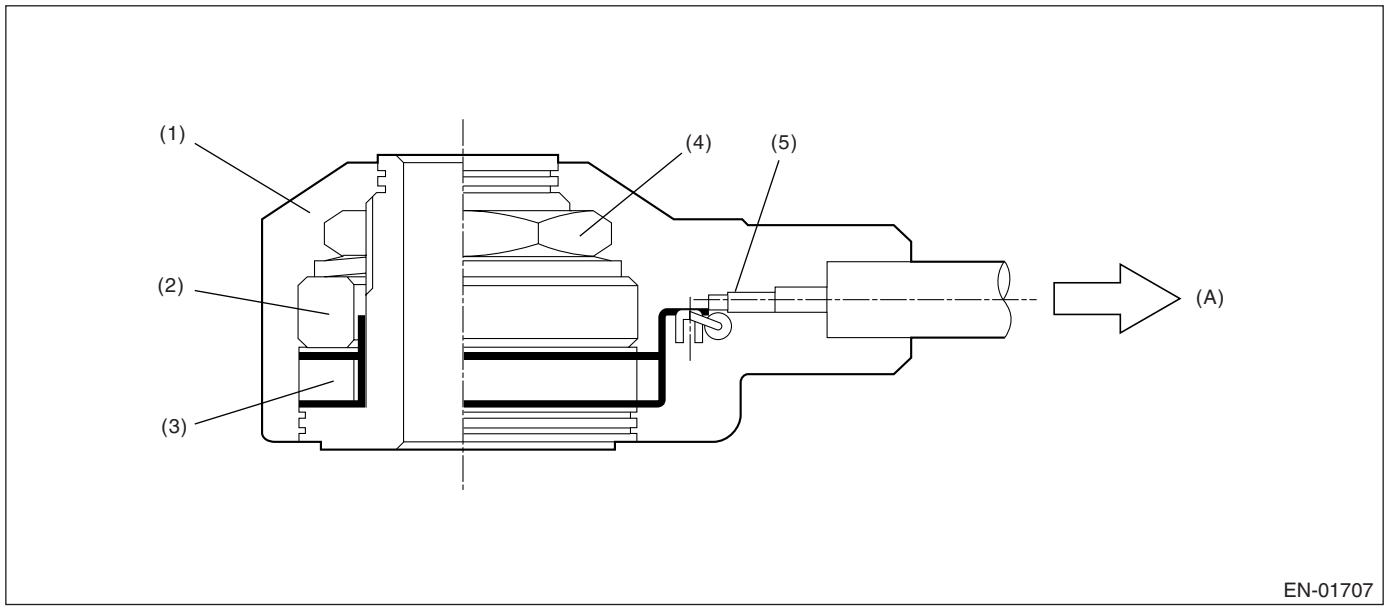
NOTE:
For the diagnostic procedure, refer to DTC P0301. <Ref. to GD(H6DO)-104, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Trouble Code (DTC) Detecting Criteria.>

BT:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of knock sensor.
Judge as NG if it is out of specification.

2. COMPONENT DESCRIPTION



(A) To knock sensor harness

(1) Case
(2) Weight
(3) Piezoelectric element
(4) Nut
(5) Resistance

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
OFF	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 1 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	< 0.238 V
Ignition switch	ON

Time Needed for Diagnosis: 1 second
Malfunction Indicator Light: 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
Output voltage	≥ 0.238 V
Ignition switch	ON

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Knocking compensation
When normal: Learning ignition advance angle value = knock F/B advance angle + entire learning advance angle value + portional learning advance angle value
Failure: Learning ignition advance angle value = –5.0°CA
Knock F/B advancing angle = 0°CA
Whole learning not allowed.
Portional learning not allowed.

9. ECM OPERATION AT DTC SETTING

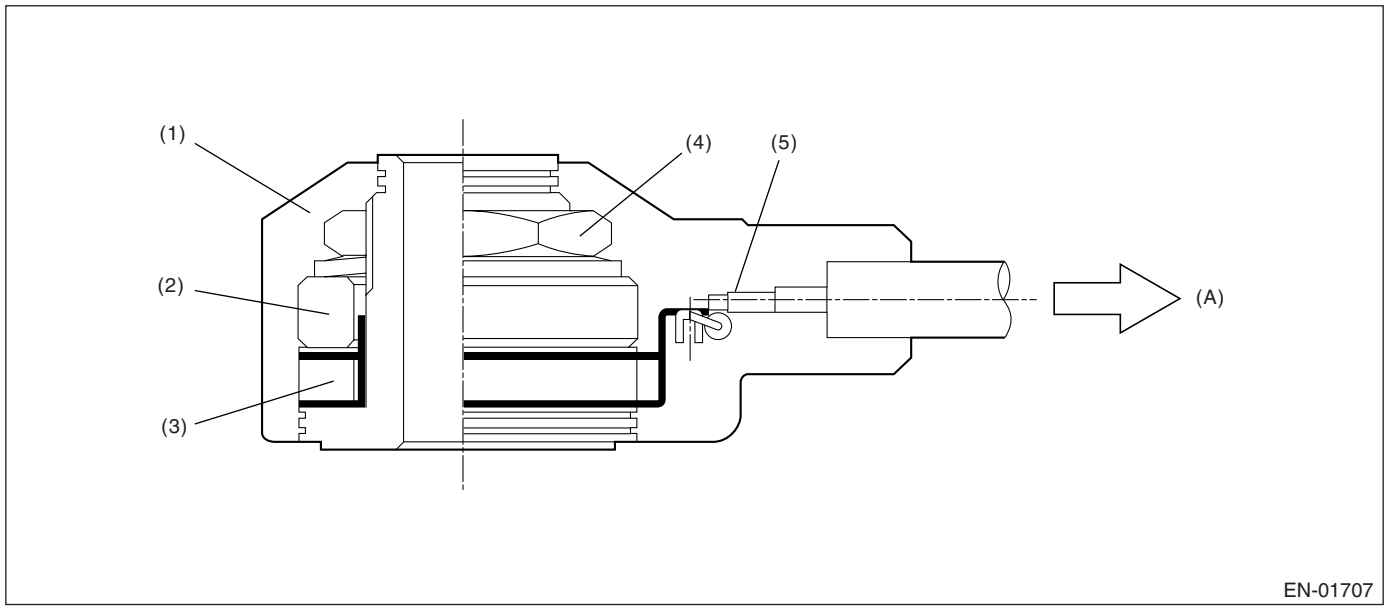
Memorize the freeze frame data. (For test mode $02)

BU:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of knock sensor.
Judge as NG if it is out of specification.

2. COMPONENT DESCRIPTION



(A) To knock sensor harness

(1) Case
(2) Weight
(3) Piezoelectric element
(4) Nut
(5) Resistance

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 1 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.714 V
Ignition switch	ON

Time Needed for Diagnosis: 1 second
Malfunction Indicator Light: 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
Output voltage	< 4.714 V
Ignition switch	ON

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Knocking compensation
When normal: Learning ignition advance angle value = knock F/B advance angle + entire learning advance angle value + portional learning advance angle value
Failure: Learning ignition advance angle value = –5.0°CA
Knock F/B advancing angle = 0°CA
Whole learning prohibited
Portional learning prohibited

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

BV:DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW INPUT (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P0327. <Ref. to GD(H6DO)-110, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

BW:DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH INPUT (BANK 2)

1. OUTLINE OF DIAGNOSIS

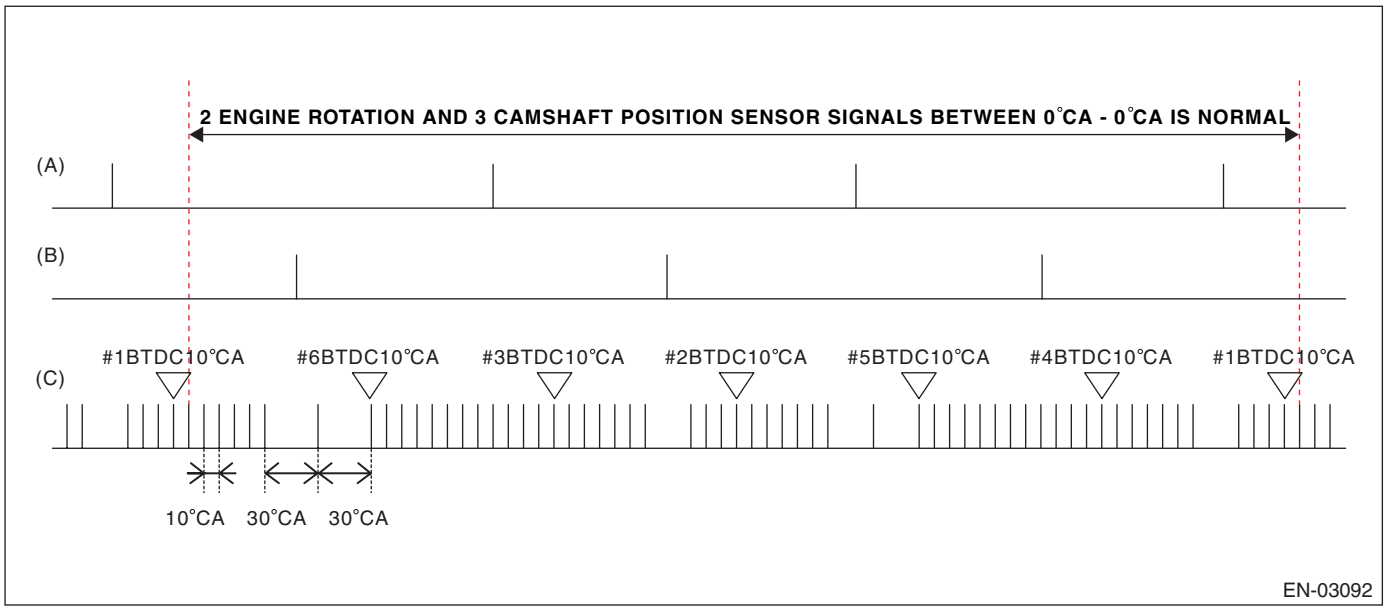
NOTE:
For the diagnostic procedure, refer to DTC P0328. <Ref. to GD(H6DO)-112, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

BX:DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT

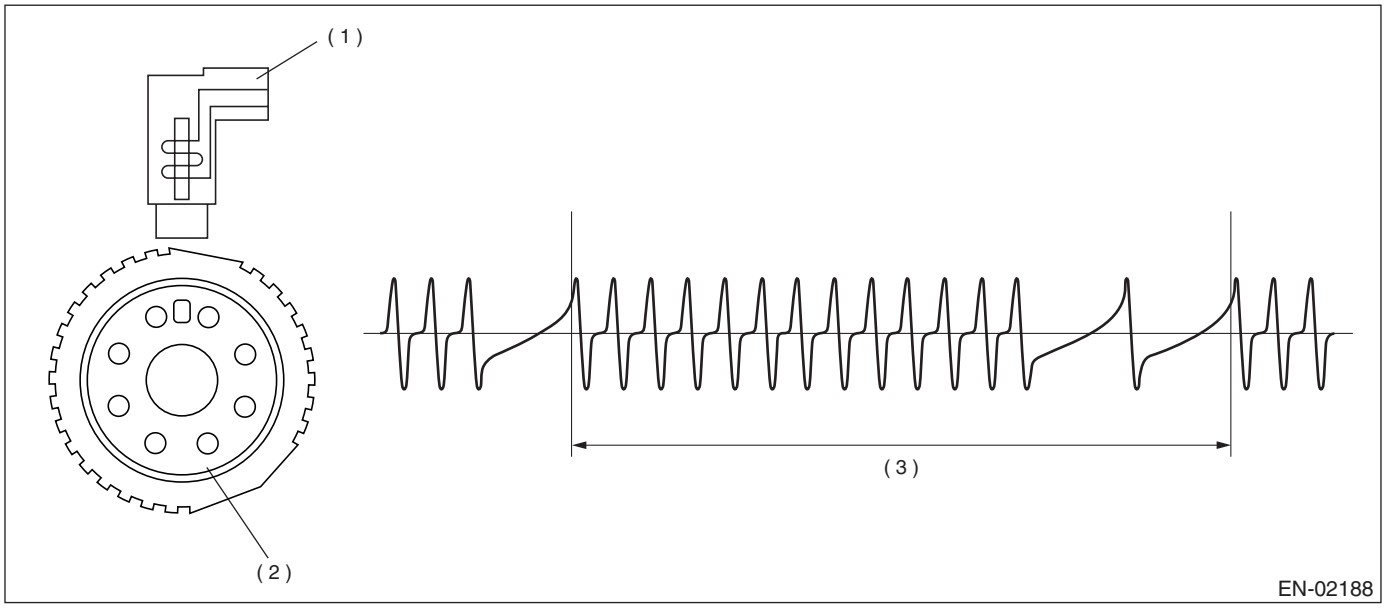
1. OUTLINE OF DIAGNOSIS

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 CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time of completing the malfunction criteria below becomes more than 3 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Starter switch	ON
Crankshaft position sensor signal	Not detected
Battery voltage	≥ 8 V

Time Needed for Diagnosis: 3 seconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

Judge as OK when the continuous time while meeting the malfunction criteria below is 3 seconds or more.

Judgment Value

Malfunction Criteria	Threshold Value
Crankshaft position sensor signal	Input exists
Battery voltage	≥ 8 V

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

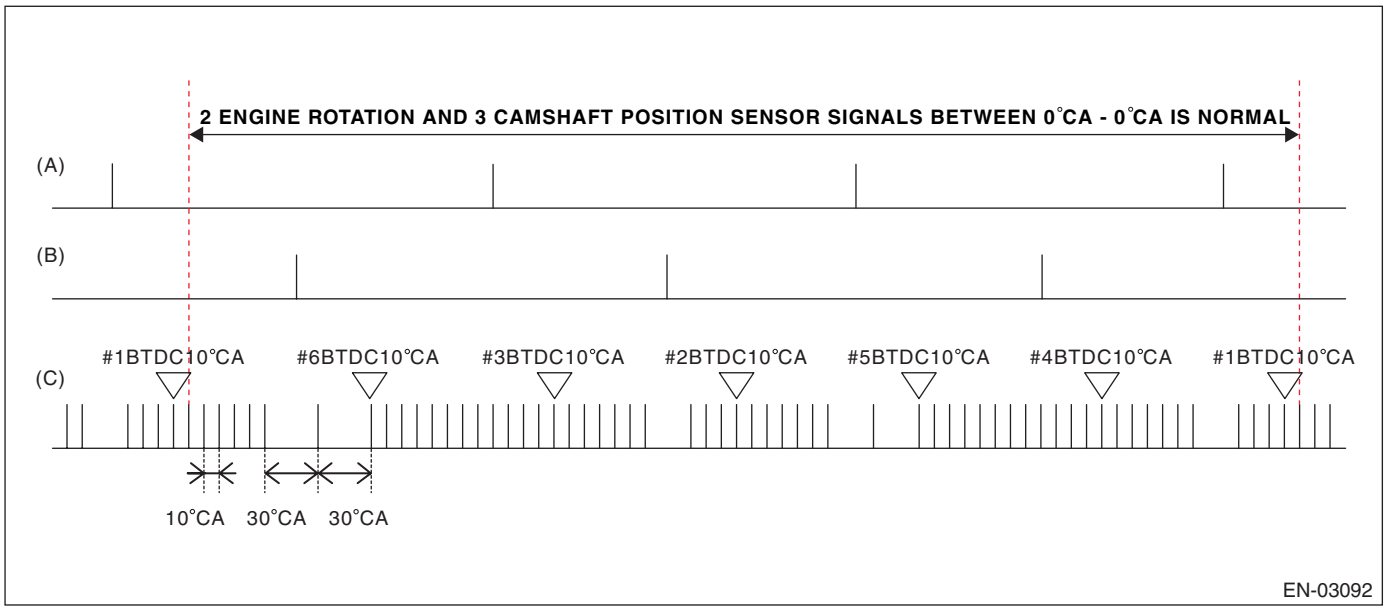
Memorize the freeze frame data. (For test mode $02)

BY:DTC P0336 CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE

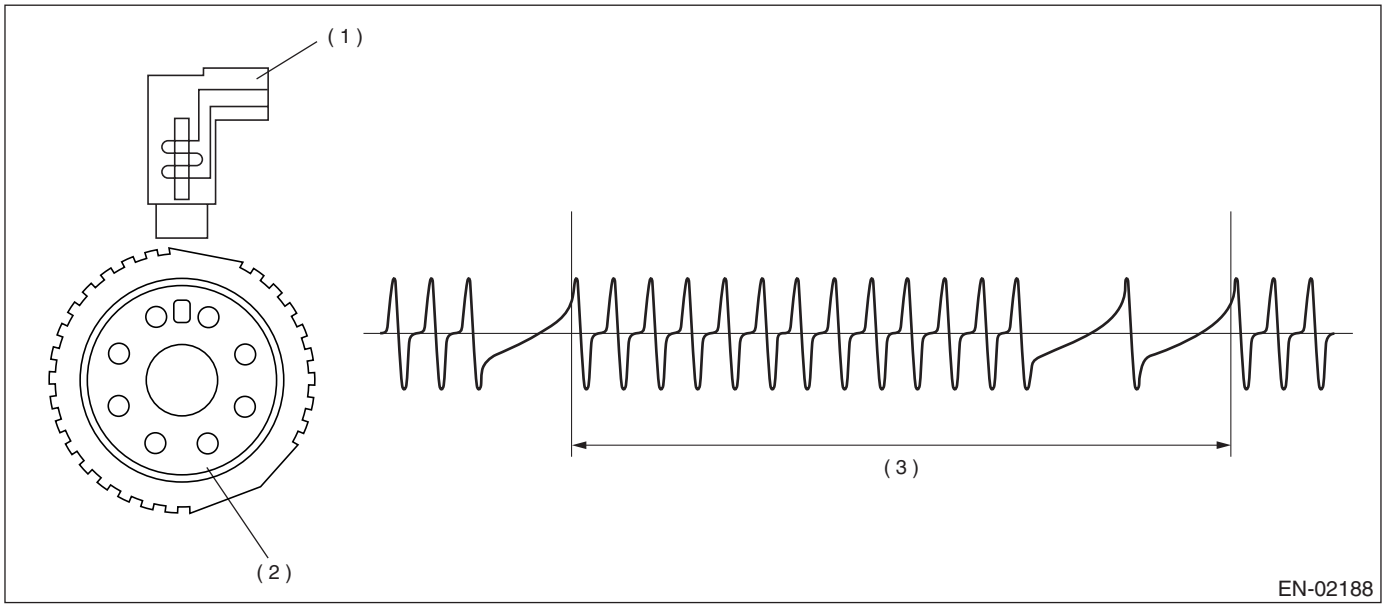
1. OUTLINE OF DIAGNOSIS

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.

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 CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V
Engine speed	< 3000 rpm

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously under 3000 rpm engine RPM.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when all the malfunction criteria below are completed more than 10 times in a row.

Judgment Value

Malfunction Criteria	Threshold Value
Cylinder number identification	Completed
Amount of crank sensor signal during 1 rev.	Not = 30

Time Needed for Diagnosis: 10 engine rotations
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
Cylinder number distinction	Completed
Amount of crank sensor signal during 1 rev.	= 30

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

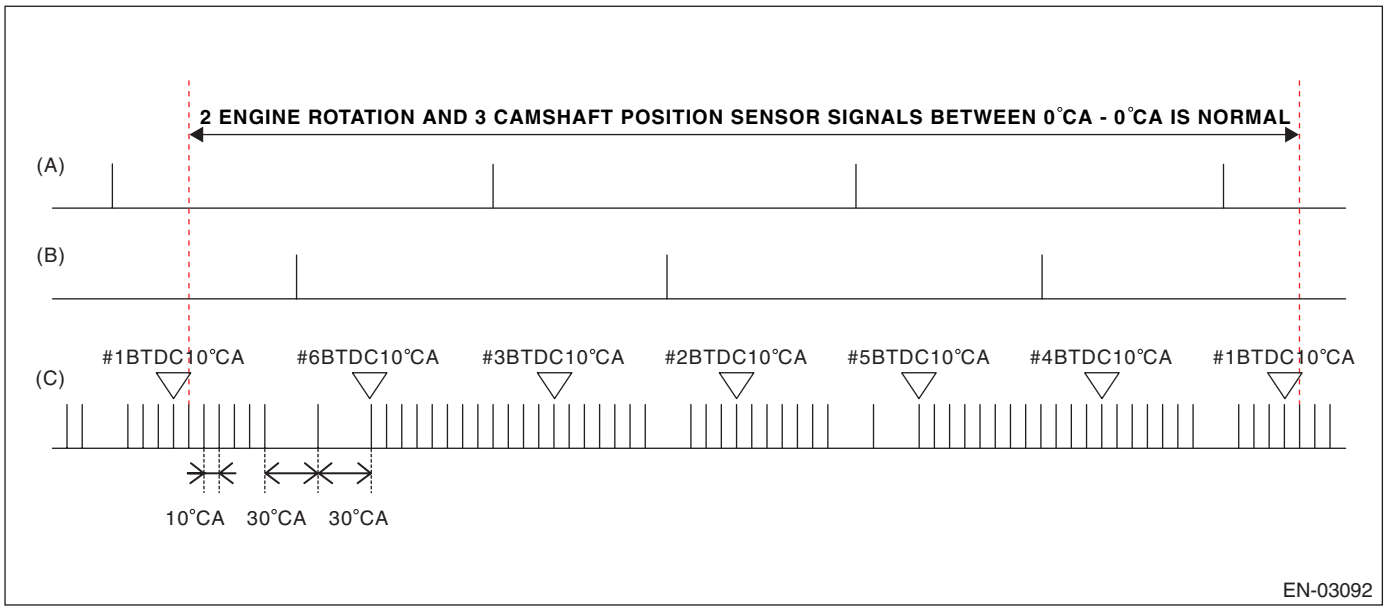
Memorize the freeze frame data. (For test mode $02)

BZ:DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

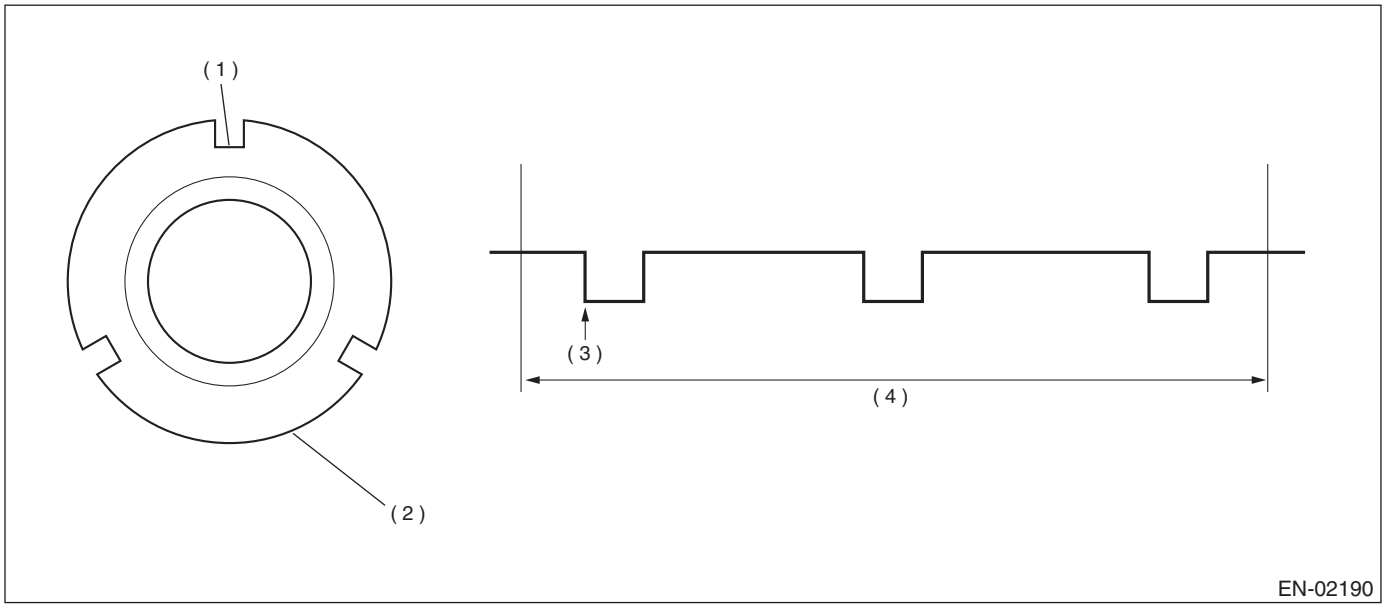
1. OUTLINE OF DIAGNOSIS

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



(A) Camshaft signal (RH)
(B) Camshaft signal (LH)
(C) Crankshaft signal



(1) Throttle
(2) Camshaft plate
(3) Detecting point
(4) Camshaft one revolution (engine two revolutions)

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 8 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

If a condition where the number of camshaft position sensor signals for 2 engine revolutions is not 3 times, continues for more than 3 seconds.
Judge as OK and clear the NG when the following criteria are not established.

Judgment Value

Malfunction Criteria	Threshold Value
Amount of camshaft sensor signal during 2 revs.	≠ 3

Time Needed for Diagnosis: 8 seconds
Malfunction Indicator Light: 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

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Make the oil flow control solenoid valve driving duty a predetermined value (9.36%).

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CA:DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2)

1. OUTLINE OF DIAGNOSIS

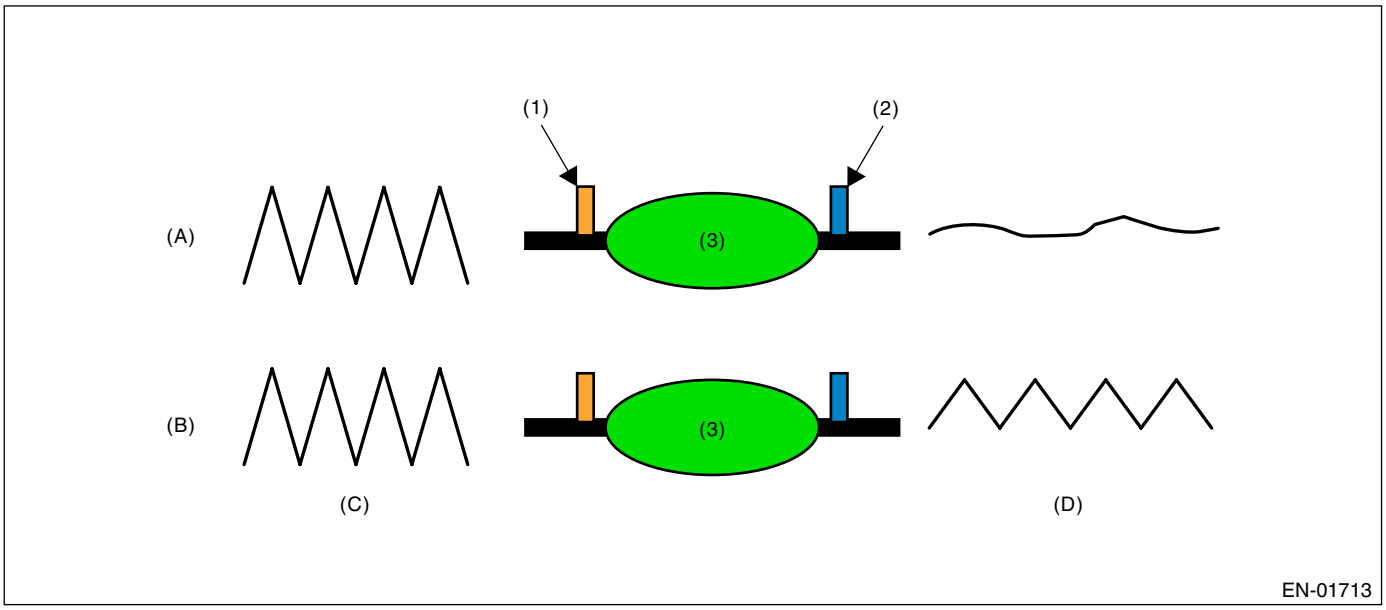
NOTE:
For the diagnostic procedure, refer to DTC P0340. <Ref. to GD(H6DO)-118, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CB:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

1. OUTLINE OF DIAGNOSIS

Detect the deterioration of the catalyst function.
Though the rear 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 rear oxygen sensor output and comparing it with the front oxygen A/F sensor output.

2. COMPONENT DESCRIPTION



(A) Normal
(B) Deterioration
(C) Output waveform from the front oxygen (A/F) sensor
(D) Output waveform from the rear oxygen sensor
(1) Front oxygen (A/F) sensor
(2) Rear oxygen sensor
(3) Catalytic converter

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	> 10.9 V
Atmospheric pressure	> 75.1 kPa (563 mmHg, 22.2 inHg)
Engine coolant temperature	≥ 75°C (167°F)
Catalyst warm-up counter (Map 2)	≥ 8000
Misfire detection every 200 rotations	< 5 times
Sub feedback	In operation
Evaporative system diagnosis	Not in operation
Time of difference (< 0.10) between actual and target lambda	1000 milliseconds or more
Vehicle speed	≥ 70 km/h (43 MPH)
Amount of intake air	15 ←→ 50 g (0.53 ←→ 1.76 oz)/s
Rear O2 output change from lower than to higher than 600 mV	Experienced after fuel cut
Load change absolute value	< 0.02 g (0.007 oz)/rev
Total time of canister purge operation	≥ 5 sec.
Learning value of evaporation gas density	≤ 0.12
After engine starting	≥ 205 sec.

Map 2

Add the following value every 512 milliseconds.

Amount of intake air (g(oz)/s)	0 (0)	3.2 (0.113)	6.4 (0.226)	9.6 (0.339)	12.8 (0.451)	16 (0.564)	19.2 (0.677)	22.4 (0.790)	25.6 (0.903)	28.8 (1.016)	32 (1.129)	35.2 (1.242)
Total value for warm-up counter	–19	–8	11	19	30	44	61	81	104	130	159	161

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once at a constant 70 km/h (43 MPH) or higher.

5. DIAGNOSTIC METHOD

After the execution criteria are established, calculate the output fluctuation value of front oxygen (A/F) sensor (averaged for the right and left) and output fluctuation value of rear oxygen sensor. Calculate the diagnosis value when the front oxygen (A/F) sensor output fluctuation value is more than specified value. A/F response properties and diagnosis values are parameters for the judgment value.
Judge as NG when the malfunction criteria below are met. Judge as OK if the criteria below are not met.

Judgment Value

Malfunction Criteria	Threshold Value
Accumulated variation of output voltage of rear oxygen sensor per 32 milliseconds × 4 divided by accumulated variation of lambda of front oxygen (A/F) sensor per 32 milliseconds × 4	≥ 30

Time Needed for Diagnosis: 30 to 55 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

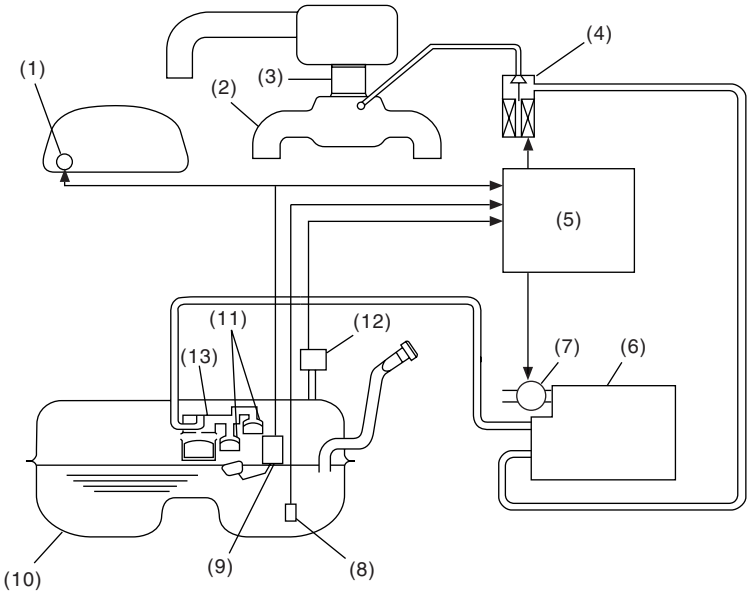
9. ECM OPERATION AT DTC SETTING

- Memorize the freeze frame data. (For test mode $02)
- Memorize the diagnostic value and trouble standard value. (For test mode $06)

CC:DTC P0442 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK)

1. OUTLINE OF DIAGNOSIS

Check if there is a leakage in fuel system or not, and perform the function diagnosis of valve.

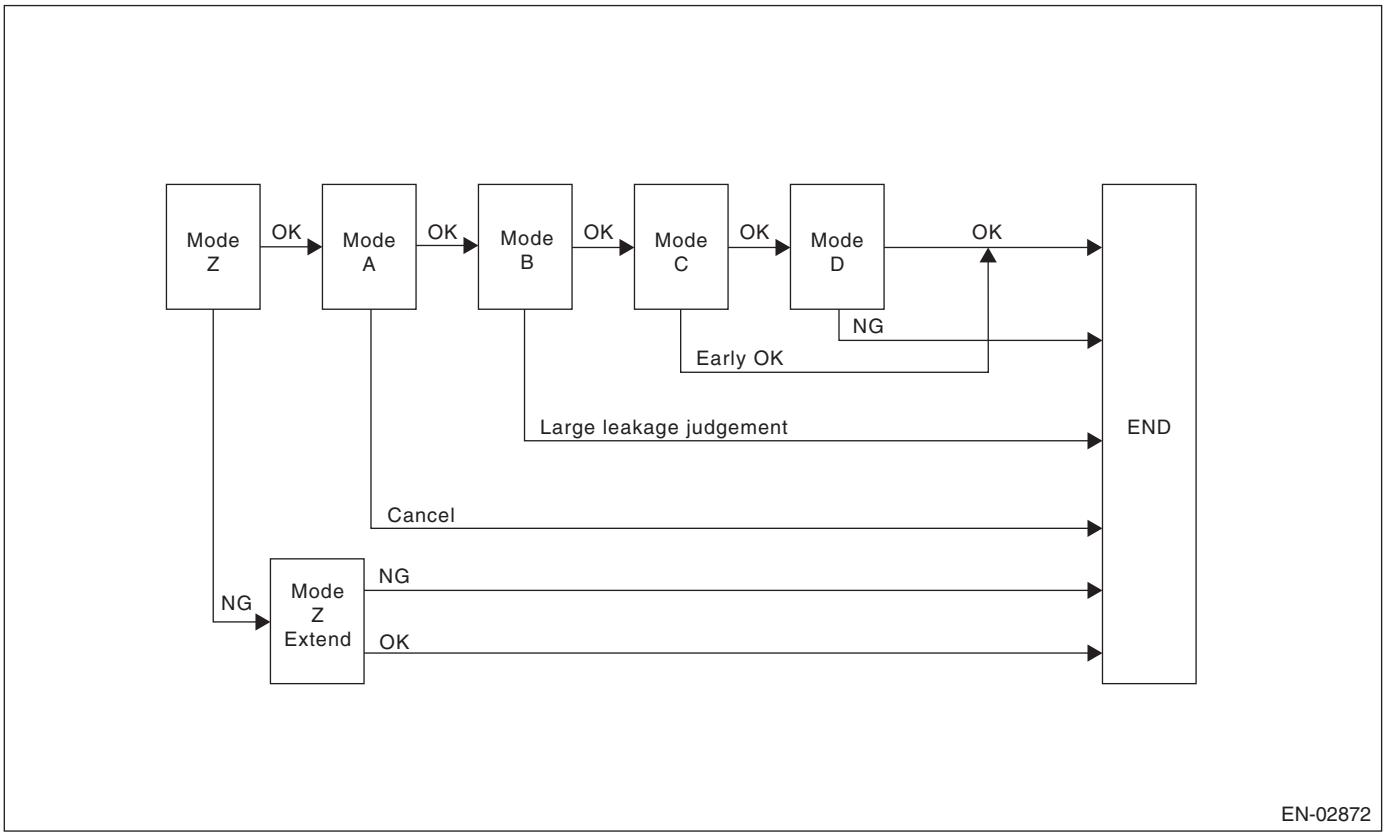


EN-03722

(1) Fuel gauge
(2) Intake manifold
(3) Throttle body
(4) Purge control solenoid valve
(5) Engine control module (ECM)
(6) Canister
(7) Drain valve
(8) Fuel temperature sensor
(9) Fuel level sensor
(10) Fuel tank
(11) Fuel cut valve
(12) Fuel tank pressure sensor
(13) Vent valve

In this system diagnosis, check for leakage and valve function is conducted by changing the fuel tank pressure and monitoring the pressure change using the fuel tank pressure sensor.
When in 0.04 inch diagnosis, perform in the order of mode Z → mode A → mode B → mode C and mode D;
When in 0.02 inch diagnosis, perform in the order of mode A → mode B → mode C → mode D and mode E.

0.04-inch Diagnosis

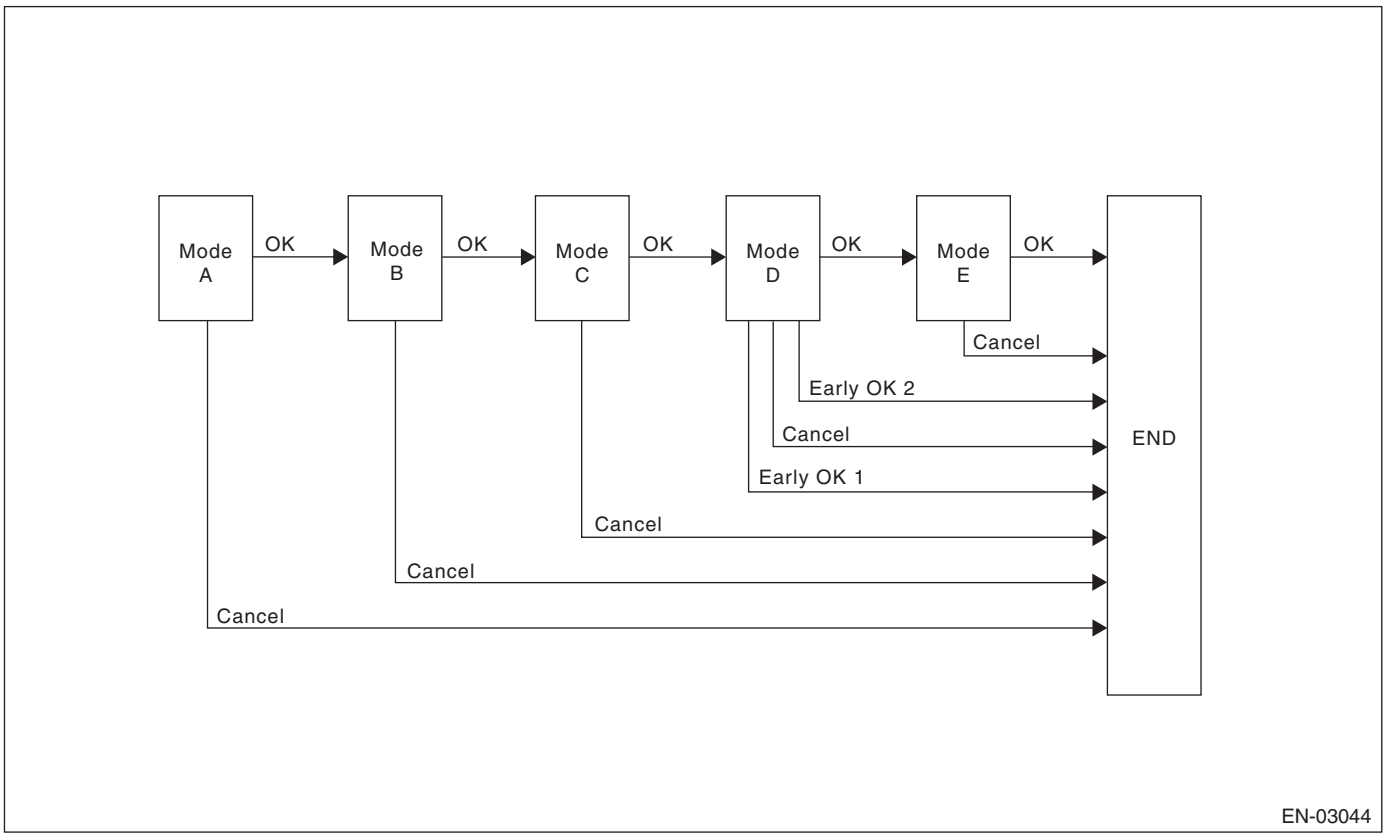


Mode	Mode Description	Diagnosis Period
Mode Z (Purge control solenoid valve opening failure diagnosis)	Diagnosis starts when there is a change in fuel tank pressure amount. Purge control solenoid valve open trouble diagnosis begins.	3 — 16 seconds
Mode A (Estimated evaporation amount)	Calculate the tank pressure change amount (P1).	10 seconds
Mode B (Sealed negative pressure, large leakage judgment)	Introduce the intake manifold pressure to the fuel tank and reduce the tank pressure to the desired value. If the tank pressure cannot be reduced, it is diagnosed as large leak.	5 — 25 seconds
Mode C (Pressure increase check, advanced OK judgment)	Wait until the tank pressure returns to the targeted pressure (start level of P2 calculation). If the tank pressure does not become the value, make advanced OK judgment.	1 — 15 seconds
Mode D (Negative pressure variation measurement, evaporation leakage diagnosis)	Calculate the tank pressure variation (P2) and obtain the diagnostic value using P1 found in Mode A. Perform the evaporation diagnosis using the diagnostic value.	10 seconds

Mode Table for Evaporative Emission Control System Diagnosis

Mode	When normal	Diagnostic item	DTC
Mode Z	Roughly same as atmospheric pressure (Same pressure as 0 kPa (0 mmHg, 0 inHg))	Purge control solenoid valve is judged to be open.	P0457
Mode A	Pressure is in proportion to amount of evaporative emission.	—	—
Mode B	Negative pressure is formed due to intake manifold negative pressure	Large leak	P0457
Mode C	Reaches target pressure	—	—
Mode D	Pressure change is small.	EVAP system large leak [1.0 mm (0.04 in)]	P0442

0.02-inch Diagnosis



Mode	Mode Description	Diagnosis Period
Mode A (0 Point Compensation)	When pressure in tank is high, wait for 0 point (Near 0 kPa (0 mmHg, 0 inHg)) to return.	0 — 12 seconds
Mode B (Negative pressure introduced)	Decrease the pressure in the tank to the target value by introducing the intake hose pressure to the fuel tank.	0 — 27 seconds
Mode C (Negative pressure maintained)	Wait until the tank pressure returns to the target (start level of P2 calculation).	0 — 20 seconds
Mode D (Negative pressure change calculated)	Calculate the time it takes for the tank pressure to return to the P2 calculation complete pressure. If the tank pressure does not return to the P2 calculation complete pressure, make advanced OK judgment.	0 — 200 seconds
Mode E (Evaporation generated amount calculation)	Calculate the amount of evaporation (P1).	0 — 280 seconds

2. ENABLE CONDITIONS

0.04-inch Diagnosis

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Barometric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg)
Total time of canister purge operation	120 seconds or more
After engine starting	851 seconds or more
Learning value of evaporation gas density	≤ 0.08
Engine speed	1050 ←→ 7000 rpm
Fuel tank pressure	≥ –4.0 kPa (–30 mmHg, –1.18 inHg)
Intake manifold relative vacuum (relative pressure)	< –26.7 kPa (–200 mmHg, –7.87 inHg)
Vehicle speed	≥ 32 km/h (20 MPH)
Fuel level	9.6 ←→ 54.4 ℓ (2.53 ←→ 14.37 US gal, 2.11 ←→ 12.00 Imp gal)
Closed air/fuel ratio control	In operation
Fuel temperature	– 10 ←→ 45°C (14 ←→ 113°F)
Intake air temperature	≥ –10°C (14°F)
Pressure change per second	< 0.23 kPa (1.7 mmHg, 0.023 inHg)
Minimum pressure change value every one second – Maximum pressure change value	< 0.23 kPa (1.7 mmHg, 0.023 inHg)
Change of fuel level	< 2 ℓ (2.1 US qt, 1.76 Imp qt)/131 milliseconds
Air fuel ratio	0.76 — 1.25

0.02-inch Diagnosis

Secondary Parameters	Enable Conditions
(At starting a diagnosis)	
Evap. diagnosis	Incomplete
Battery voltage	≥ 10.9 V
Atmospheric pressure	≥ 75.1 kPa (563 mmHg, 22.2 inHg)
Time since last incomplete diagnosis event of 0.02-inch leakage	> 600 seconds (Canceled with the mode other than mode A) > 120 seconds (Canceled with mode A)
Total time of canister purge operation	120 seconds or more
After engine starting	120 seconds or more
Fuel temp.	–10 ←→ 50°C (14 ←→ 122°F)
Fuel level	9.6 ←→ 54.4 ℓ (2.54 ←→ 14.37 US gal, 2.11 ←→ 12.00 Imp gal)
Intake manifold relative vacuum (relative pressure)	< –8.0 kPa (–60 mmHg, –2.36 inHg)
Fuel tank pressure	–0.53 — 0.39 kPa (–4 — 2.9 mmHg, –0.16 — 0.12 inHg)
Vehicle speed	≥ 30 km/h (62 MPH)
Closed air/fuel ratio control	In operation
Engine speed	500 — 7000 rpm
(During diagnosis)	
Change of fuel level	≤ 5 ℓ (1.3 US qt, 1.1 Imp qt)
Pressure change every one second	< 0.04 kPa (0.3 mmHg, 0.01 inHg)
Minimum pressure change value every one second – Maximum pressure change value every one second (Mode A)	< 0.06 kPa (0.45 mmHg, 0.018 inHg)
Minimum pressure change value every one second – Maximum pressure change value every one second (Mode D)	< 0.08 kPa (0.564 mmHg, 0.024 inHg)
Atmospheric pressure change (Mode D)	–0.47 ←→ 0.32 kPa (–3.5 ←→ 2.4 mmHg, –0.14 ←→ 0.09 inHg)
Atmospheric pressure change (Mode E)	–0.32 ←→ 0.32 kPa (–2.4 ←→ 2.4 mmHg, –0.09 ←→ 0.09 inHg)

3. GENERAL DRIVING CYCLE

0.04-inch Diagnosis
Perform the diagnosis only once in 851 seconds or more after starting the engine, at a constant speed of 32 km/h (20 MPH) or more.
Pay attention to the fuel temperature and fuel level.
0.02-inch Diagnosis
Perform the diagnosis after 120 seconds or more after starting the engine, at a constant engine RPM of 30 km/h (19 MPH) or higher, to judge as NG or OK.
If OK/NG judgment is not possible, repeat the diagnosis.
Pay attention to the fuel temperature and fuel level.

4. DIAGNOSTIC METHOD

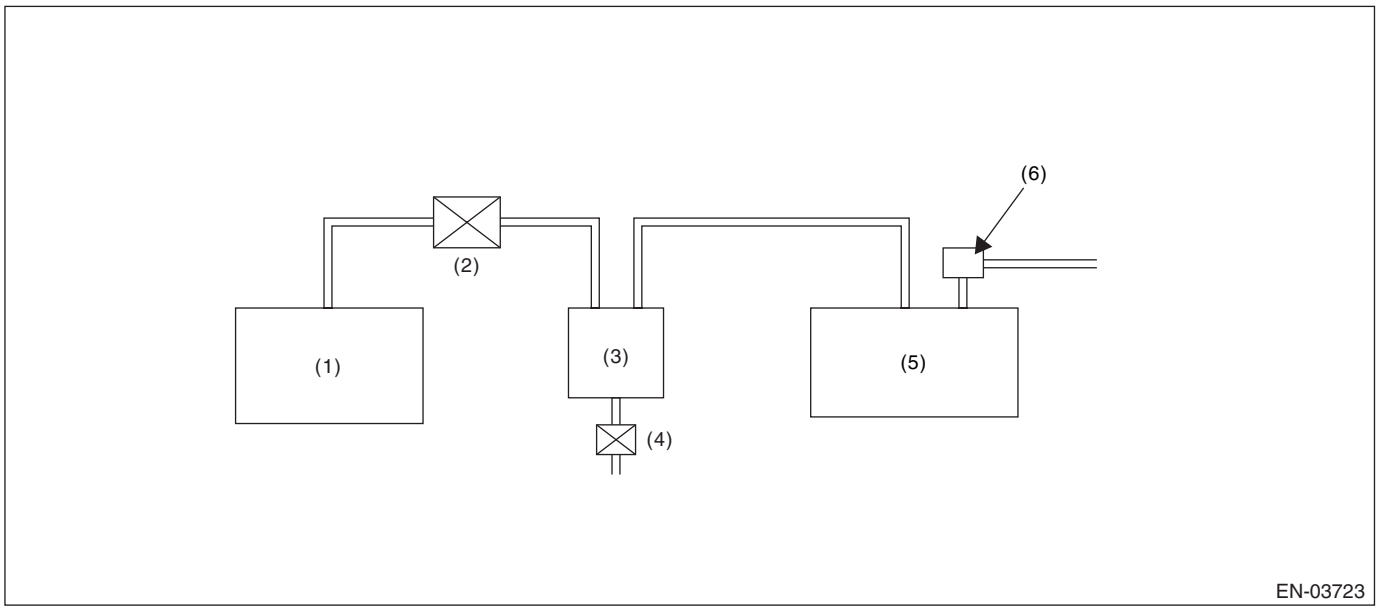
0.04-inch Diagnosis
Mode Z: (Purge control solenoid valve opening failure diagnosis)
When performing the leakage diagnosis of the EVAP system, the purge control solenoid valve must operate properly. Therefore, mode Z is used to diagnose a stuck open condition of the purge control solenoid valve by monitoring the tank pressure.
Note that if a purge control solenoid valve stuck open fault is detected, the EVAP system leakage diagnosis is cancelled.

Purge Control Solenoid Valve Stuck Open Diagnosis

DTC
P0457 Evaporative Emission Control System Leak Detected (Fuel Cap Loose/Off)

Diagnostic method

Purge control solenoid valve stuck open diagnosis is performed in mode Z as shown in the figure below.



(1) Engine
(2) Purge control solenoid valve
(3) Canister
(4) Drain valve
(5) Fuel tank
(6) Fuel tank pressure sensor

Purge Control Solenoid Valve Function Diagnosis

DTC

P0457 Evaporative Emission Control System Leak Detected (Fuel Cap Loose/Off)

Purge control solenoid valve functional diagnosis is performed by monitoring the tank pressure in mode Z.

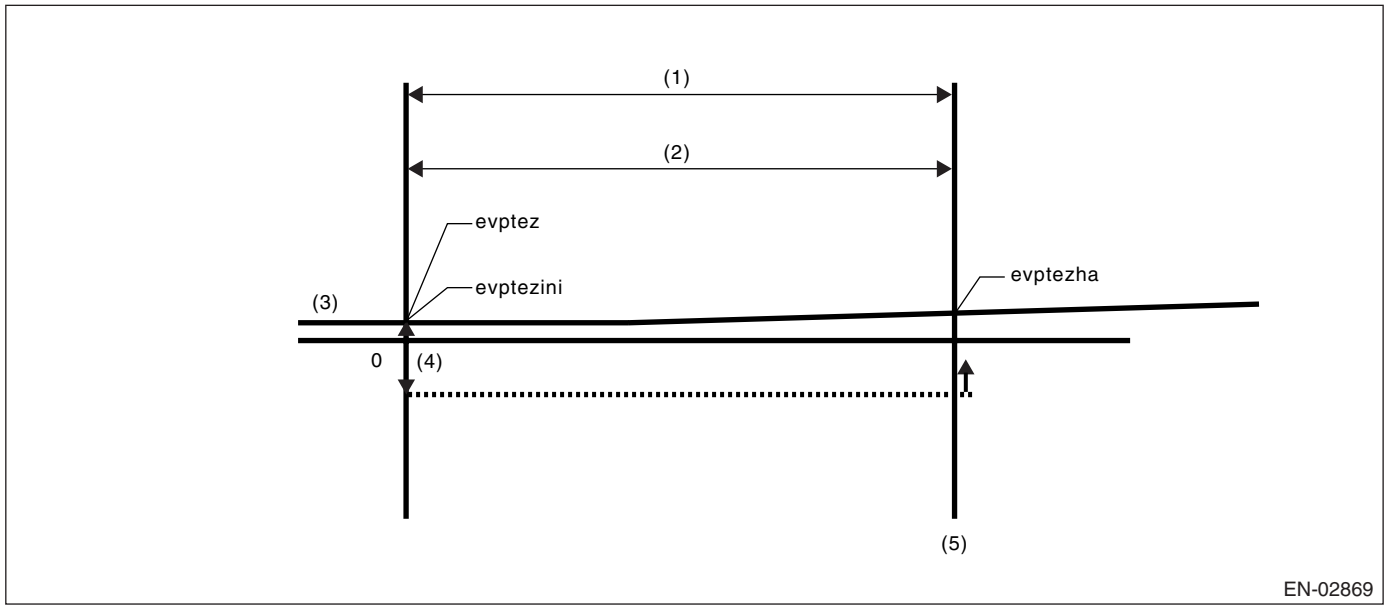
Normality Judgment

Make OK judgment 3 seconds after Mode Z starts, and change to Mode A if OK.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
(Tank pressure when Mode Z started) – (Tank pressure when Mode Z finished)	≤ 0.4 kPa (3 mmHg, 0.12 inHg)	P0457

Normal



(1) Mode Z
(2) 3 seconds
(3) Fuel tank pressure
(4) 0.4 kPa (3.0 mmHg, 0.12 inHg)
(5) OK judgement

- evptez – evptezha ≤ 0.4 kPa (3.0 mmHg, 0.12 inHg)
- evptezini – evptezha ≤ 0.4 kPa (3.0 mmHg, 0.12 inHg)

Judge normal when these calculations are completed.

Abnormality Judgment

If OK judgment cannot be made, extend Mode Z 16 seconds more, and Judge as NG when all the criteria below are completed in 16 seconds.

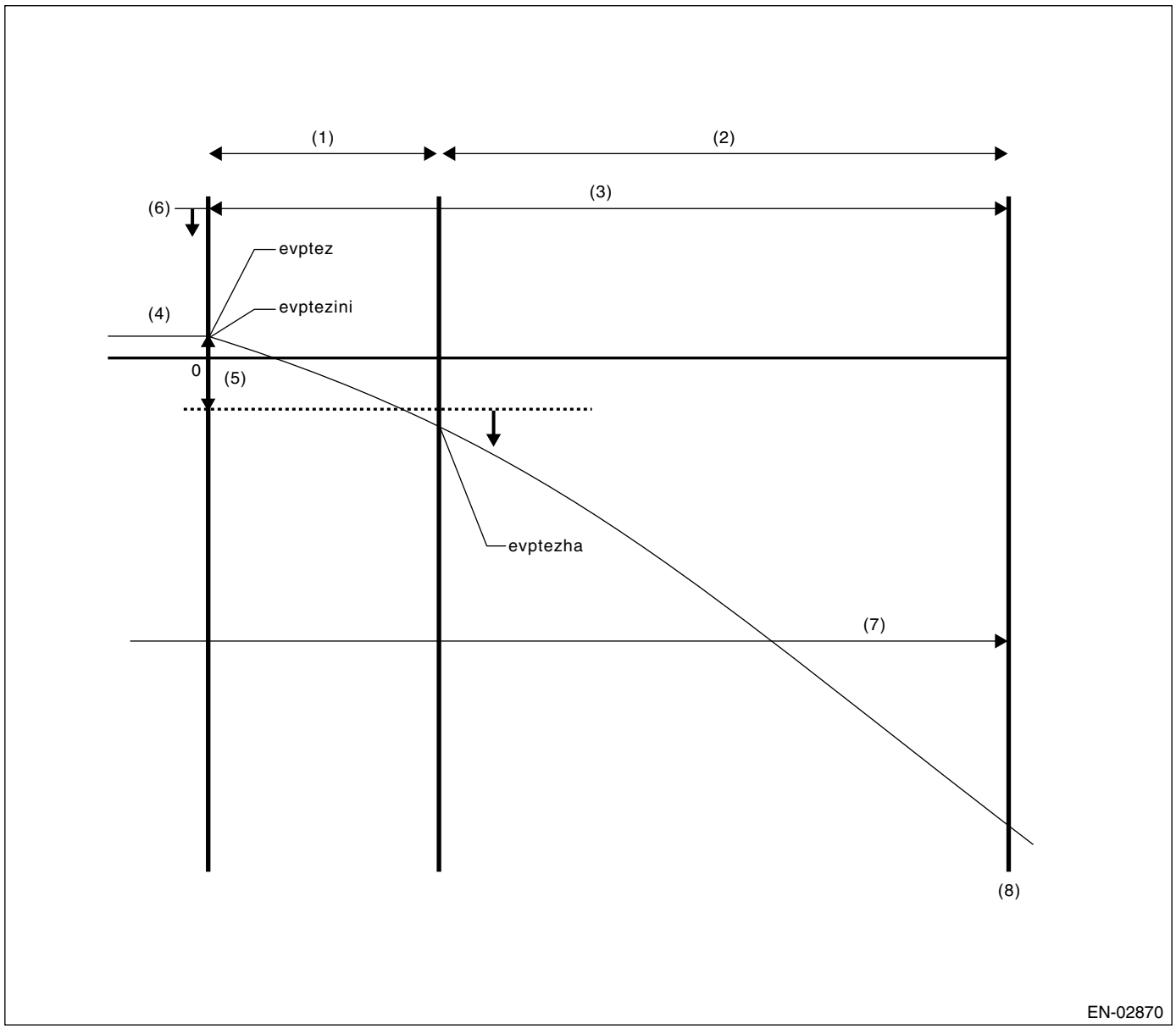
Judgment Value

Malfunction Criteria	Threshold Value	DTC
(Tank pressure when Mode Z started) – (Tank pressure when Mode Z finished)	> 0.6 kPa (4.5 mmHg, 0.18 inHg)	P0457
Tank pressure when Mode Z started	≤ 1.43 kPa (10.7 mmHg, 0.42 inHg)	
Time of 2 ℓ or more fuel no sloshing	≥ 40 sec.	

Time Needed for Diagnosis: 16 seconds

Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

When judgment for purge control solenoid valve stuck open NG is made, end the evaporative diagnosis. Cancel the evaporative diagnosis when the OK/NG judgment for drain valve stuck closed and purge control solenoid valve stuck open cannot be made in Mode Z.



(1)	Mode Z	(4)	Fuel tank pressure	(7)	40 seconds no fuel sloshing
(2)	Extended mode Z	(5)	0.87 kPa (6.5 mmHg, 0.26 inHg)	(8)	NG Judgment
(3)	16 seconds	(6)	1.43 kPa (10.7 mmHg, 0.42 inHg)		

- evptezini, evptez ≤ 1.43 kPa (10.7 mmHg, 0.42 inHg)
- evptez – evptezha ≤ 0.87 kPa (6.5 mmHg, 0.26 inHg)
- evptezini – evptezha ≤ 0.87 kPa (6.5 mmHg, 0.26 inHg)
- No fuel sloshing of over 2 ℓ (0.79 US gal, 0.67 Imp gal) for more than 40 seconds.

Judge as normal when all are established.

Leak Diagnosis

DTC
P0442 Evaporative Emission Control System Leak Detected (Small Leak)
P0457 Evaporative Emission Control System Leak Detected (Fuel Cap Loose/Off)

Diagnostic method

The diagnostic method consists of creating a sealed vacuum in the fuel tank and then determining the presence of leakage from the speed at which the tank internal pressure returns to atmospheric pressure.

Mode A: (Estimated evaporation gas amount)
Calculate the tank pressure change amount (P1) when using mode A. After calculating P1, switch to mode B.

Mode B: (Negative pressure sealed)
Introduce negative pressure in the intake manifold to the tank.
Approx. 0 → –1.4 (0 → –10.5, 0 → –0.41) kPa (mmHg, inHg)
When the pressure above (desired negative pressure) is reached, enters Mode C.
In this case, if the tank pressure does not become the desired negative pressure, judge that there is a large leakage (10 seconds or 25 seconds) in the system.

Abnormality Judgment
Judge as NG (large leak) when the criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
Time to reach targeted negative pressure	≥ 25 sec.	P0457
Or mode B time	≥ 10 sec.	
(Min. pressure value in tank when in mode B) – (Tank pressure when mode B started)	< –0.5 kPa (–4 mmHg, –0.15 inHg)	

Mode C: (Check pressure rise)
Stop the introduction of negative pressure. (Wait until the tank pressure returns to the start level of P2 calculation.)
Change to Mode D when the tank pressure returns to the start level of P2 calculation.
Judge immediate OK and change to Mode E when it does not return in spite of spending the specified time.

Tank pressure when starting calculation of P2	Time for advanced OK judgment
–1.3 kPa (–9.75 mmHg, –0.38 inHg)	15 seconds

Mode D: (Measure amount of negative pressure change)
Monitor the tank pressure change amount when using mode D. In this case, the tank pressure increases, (nears atmospheric pressure) because evaporation occurs. However, if any leakage exists, the pressure increases additionally in proportion to this leakage. The pressure variation of this tank is P2.
After calculating P2, perform a small leak diagnosis according to the items below.

When Mode D is ended
Assign tank variations measured in Mode A and Mode B; P1 and P2, to the formula below, judge small leaks in the system. If the measured judgment value exceeds the threshold value, it is judged to be a malfunction.
Judge as NG when the criteria below are completed and Judge as OK when not completed.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
P2 – 1.5 × P1 P2: Tank pressure that changes every 10 seconds in mode D P1: Tank pressure that changes every 10 seconds in mode A	> Value of Map 1 * Threshold value: Figure (Remaining Fuel vs Tank temperature)	P0442

* 1.5: Evaporation amount compensation value when below negative pressure (Amount of evaporation occurrence increases as a vacuum condition increases.)

Map 1 Failure diagnosis reference limit for 0.04 in leaks for evaporation diagnosis

Fuel temperature & Fuel level	25°C (77°F)	30°C (86°F)	35°C (95°F)	40°C (104°F)	45°C (113°F)
10 L (2.6 US gal, 2.2 Imp gal)	0.28 kPa (2.1 mmHg, 0.083 inHg)	0.29 kPa (2.2 mmHg, 0.087 inHg)	0.31 kPa (2.3 mmHg, 0.090 inHg)	0.31 kPa (2.35 mmHg, 0.092 inHg)	0.32 kPa (2.4 mmHg, 0.094 inHg)
20 L (5.3 US gal, 4.4 Imp gal)	0.31 kPa (2.3 mmHg, 0.091 inHg)	0.32 kPa (2.4 mmHg, 0.094 inHg)	0.33 kPa (2.5 mmHg, 0.098 inHg)	0.35 kPa (2.6 mmHg, 0.102 inHg)	0.36 kPa (2.7 mmHg, 0.106 inHg)
30 L (7.9 US gal, 6.6 Imp gal)	0.39 kPa (2.9 mmHg, 0.114 inHg)	0.41 kPa (3.05 mmHg, 0.120 inHg)	0.42 kPa (3.15 mmHg, 0.124 inHg)	0.43 kPa (3.25 mmHg, 0.128 inHg)	0.45 kPa (3.35 mmHg, 0.134 inHg)
40 L (10.6 US gal, 8.8 Imp gal)	0.39 kPa (2.9 mmHg, 0.114 inHg)	0.42 kPa (3.15 mmHg, 0.124 inHg)	0.44 kPa (3.3 mmHg, 0.130 inHg)	0.45 kPa (3.4 mmHg, 0.134 inHg)	0.47 kPa (3.5 mmHg, 0.138 inHg)
50 L (13.2 US gal, 11.0 Imp gal)	0.43 kPa (3.2 mmHg, 0.126 inHg)	0.44 kPa (3.3 mmHg, 0.130 inHg)	0.47 kPa (3.5 mmHg, 0.138 inHg)	0.48 kPa (3.6 mmHg, 0.142 inHg)	0.49 kPa (3.7 mmHg, 0.146 inHg)

Time Needed for Diagnosis: 30 to 100 seconds

0.02-inch Diagnosis

DTC

P0456 Evaporative Emission Control System Leak Detected (very small leak)

Diagnostic method

The diagnostic method consists of creating a sealed vacuum in the fuel tank and then determining the presence of leakage from the speed at which the tank internal pressure returns to atmospheric pressure.

Mode A: (0 Point Compensation)

When pressure in tank is high, wait for 0 point 0 kPa (Near 0 mmHg, 0 inHg) to return.Shift to mode B when 0 point returns.

Cancel the diagnosis when 0 point does not return in the specified time.

Mode B: (Negative pressure introduced)

Introduce negative pressure in the intake manifold to the tank.

Approx. 0 → –2.0 kPa (0 mmHg → –15 mmHg, 0 → –0.59 inHg)

When the pressure above (desired negative pressure) is reached, Mode C is entered.

Cancel the diagnosis when the targeted pressure in the tank is not reached.

Mode C: (Negative pressure maintained)

Stop the introduction of negative pressure and wait until the tank pressure returns to the start level of P2 calculation.

Change to Mode D either when the tank pressure returns to the start level of P2 calculation, or when the predetermined amount of time has passed.

Mode D: (Calculate the amount of negative pressure change)

Monitor the tank pressure in mode D, calculate (P2) the pressure change in the tank, and measure the time (evpdset) for the tank pressure to return when calculation of P2 is completed. Shift to mode E when pressure returns. Make an advance OK judgment using the value of P2, or cancel, when the pressure in the tank does not return after calculation of P2 is completed even when the predetermined amount of time has passed.

When the following conditions are established, it is OK.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
Advanced OK judgment 1		P0456
Mode D holding time	≥ 30 s	
Tank pressure	≤ Value of Map 2	
Advanced OK judgment 2		
Mode D Time	≥ 200 s	
P2	≥ 0.9 — 1.3 kPa (7 — 9.6 mmHg, 0.28 — 0.38 inHg)	

Map 2 Fuel level and corresponding tank pressure

Fuel level	10 L (2.6 US gal, 2.2 Imp gal)	20 L (5.3 US gal, 4.4 Imp gal)	30 L (7.9 US gal, 6.6 Imp gal)	40 L (10.6 US gal, 8.8 Imp gal)	50 L (13.2 US gal, 11.0 Imp gal)
Tank pressure	–1.8 kPa (–13.5 mmHg, –0.53 inHg)	–1.77 kPa (–13.3 mmHg, –0.52 inHg)	–1.75 kPa (–13.1 mmHg, –0.52 inHg)	–1.67 kPa (–12.5 mmHg, –0.49 inHg)	–1.6 kPa (–12 mmHg, –0.47 inHg)

Mode E: (Evaporation occurrence amount calculation)
Calculate the change of tank pressure with the time evpdset to Judge as NG/OK according to the value of P1. (ambiguous determination acceptable.)
Abnormality Judgment
When the following conditions are established, it is NG.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
P1	< Value of Map 3 * Threshold value: Figure (Residual Fuel Amount vs evpdset)	P0456

Map 3 Failure diagnosis reference limit for 0.02 in leaks for evaporative emission control system diagnosis

Time evpdset & Fuel level	0 seconds	50 seconds	65 seconds	120 seconds	150 seconds	200 seconds
10 L (2.6 US gal, 2.2 Imp gal)	0 kPa (0 mmHg, 0 inHg)	0.19 kPa (1.4 mmHg, 0.056 inHg)	0.25 kPa (1.84 mmHg, 0.074 inHg)	0.25 kPa (1.84 mmHg, 0.074 inHg)	0.25 kPa (1.84 mmHg, 0.074 inHg)	0.25 kPa (1.84 mmHg, 0.074 inHg)
20 L (5.3 US gal, 4.4 Imp gal)	0 kPa (0 mmHg, 0 inHg)	0.21 kPa (1.54 mmHg, 0.062 inHg)	0.23 kPa (1.76 mmHg, 0.068 inHg)	0.23 kPa (1.76 mmHg, 0.068 inHg)	0.23 kPa (1.76 mmHg, 0.068 inHg)	0.23 kPa (1.76 mmHg, 0.068 inHg)
30 L (7.9 US gal, 6.6 Imp gal)	0 kPa (0 mmHg, 0 inHg)	0.22 kPa (1.68 mmHg, 0.065 inHg)	0.22 kPa (1.68 mmHg, 0.065 inHg)	0.22 kPa (1.68 mmHg, 0.065 inHg)	0.22 kPa (1.68 mmHg, 0.065 inHg)	0.22 kPa (1.68 mmHg, 0.065 inHg)
40 L (10.6 US gal, 8.8 Imp gal)	0 kPa (0 mmHg, 0 inHg)	0.18 kPa (1.315 mmHg, 0.053 inHg)	0.18 kPa (1.315 mmHg, 0.053 inHg)	0.18 kPa (1.315 mmHg, 0.053 inHg)	0.18 kPa (1.315 mmHg, 0.053 inHg)	0.18 kPa (1.315 mmHg, 0.053 inHg)
50 L (13.2 US gal, 11.0 Imp gal)	0 kPa (0 mmHg, 0 inHg)	0.13 kPa (0.95 mmHg, 0.038 inHg)	0.13 kPa (0.95 mmHg, 0.038 inHg)	0.13 kPa (0.95 mmHg, 0.038 inHg)	0.13 kPa (0.95 mmHg, 0.038 inHg)	0 kPa (0 mmHg, 0 inHg)

Normality Judgment
When the following conditions are established, it is OK.

Judgment Value

Malfunction Criteria	Threshold Value	DTC
P1	> Value of Map 4 * Threshold value: Figure (Residual Fuel Amount vs evpdset)	P0456

Map 4

Time evpdset & Fuel level	0 seconds	50 seconds	65 seconds	120 seconds	150 seconds	200 seconds
10 L (2.6 US gal, 2.2 Imp gal)	0.13 kPa (1.0 mmHg, 0.039 inHg)	0.38 kPa (2.88 mmHg, 0.112 inHg)	0.44 kPa (3.28 mmHg, 0.13 inHg)	0.44 kPa (3.28 mmHg, 0.13 inHg)	0.44 kPa (3.28 mmHg, 0.13 inHg)	0.44 kPa (3.28 mmHg, 0.13 inHg)
20 L (5.3 US gal, 4.4 Imp gal)	0.13 kPa (1.0 mmHg, 0.039 inHg)	0.39 kPa (2.91 mmHg, 0.1115 inHg)	0.41 kPa (3.11 mmHg, 0.121 inHg)	0.41 kPa (3.11 mmHg, 0.121 inHg)	0.41 kPa (3.11 mmHg, 0.121 inHg)	0.41 kPa (3.11 mmHg, 0.121 inHg)
30 L (7.9 US gal, 6.6 Imp gal)	0.13 kPa (1.0 mmHg, 0.039 inHg)	0.39 kPa (2.93 mmHg, 0.115 inHg)	0.39 kPa (2.93 mmHg, 0.115 inHg)	0.39 kPa (2.93 mmHg, 0.115 inHg)	0.39 kPa (2.93 mmHg, 0.115 inHg)	0.39 kPa (2.93 mmHg, 0.115 inHg)
40 L (10.6 US gal, 8.8 Imp gal)	0.13 kPa (1.0 mmHg, 0.039 inHg)	0.37 kPa (2.76 mmHg, 0.109 inHg)	0.37 kPa (2.76 mmHg, 0.109 inHg)	0.37 kPa (2.76 mmHg, 0.109 inHg)	0.37 kPa (2.76 mmHg, 0.109 inHg)	0.37 kPa (2.76 mmHg, 0.109 inHg)
50 L (13.2 US gal, 11.0 Imp gal)	0.13 kPa (1.0 mmHg, 0.039 inHg)	0.34 kPa (2.58 mmHg, 0.100 inHg)	0.34 kPa (2.58 mmHg, 0.100 inHg)	0.34 kPa (2.58 mmHg, 0.100 inHg)	0.34 kPa (2.58 mmHg, 0.100 inHg)	0.34 kPa (2.58 mmHg, 0.100 inHg)

Time Needed for Diagnosis: 65 to 514 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

- Memorize the freeze frame data. (For test mode $02)
- Memorize the diagnostic value and trouble standard value. (For test mode $06)

CD: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

The drain valve adjusts the pressure in the canister by introducing/extracting air when pressure differences occur in the canister with the atmospheric pressure.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time of completing the malfunction criteria below becomes more than 2.5 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	1 second or more
Terminal output voltage when ECM outputs OFF signal	Low

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light: 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
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	1 second or more
Terminal output voltage when ECM outputs OFF signal	High

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CE: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

The drain valve adjusts the pressure in the canister by introducing/extracting air when pressure differences occur in the canister with the atmospheric pressure.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time of completing the malfunction criteria below becomes more than 2.5 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	1 second or more
Terminal output voltage when ECM outputs OFF signal	High

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light: 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
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	1 second or more
Terminal output voltage when ECM outputs OFF signal	Low

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Pressure control solenoid valve control: Open the pressure control solenoid valve

9. ECM OPERATION AT DTC SETTING

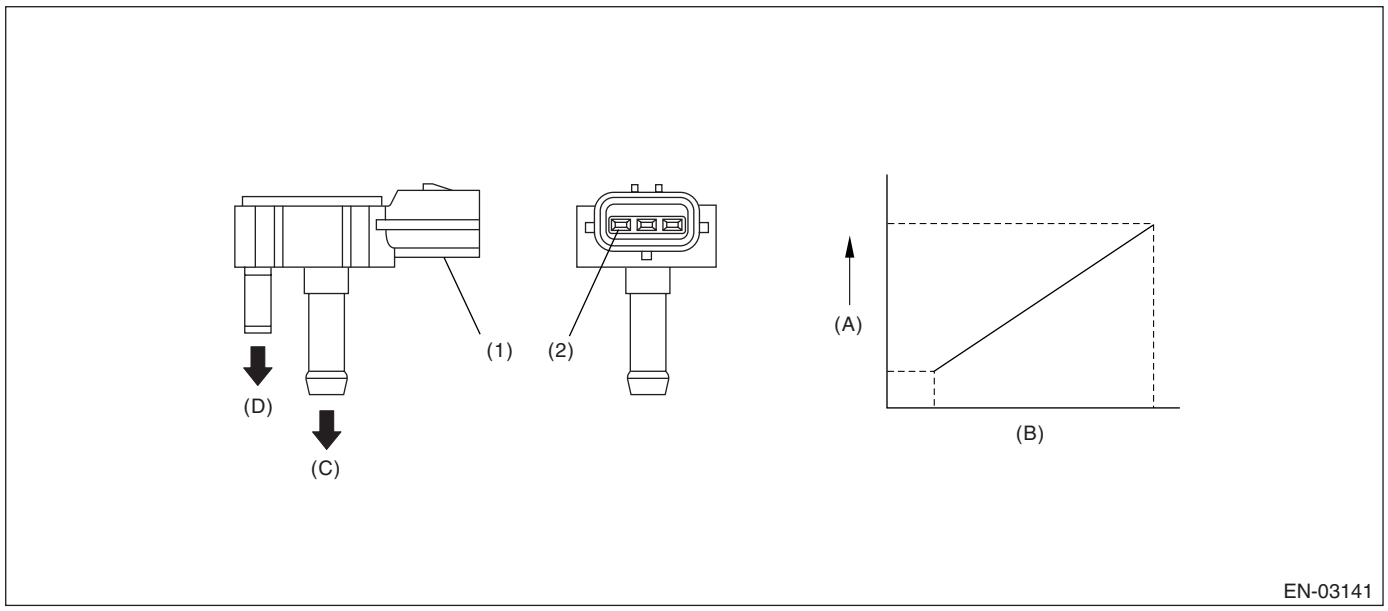
Memorize the freeze frame data. (For test mode $02)

CF:DTC P0451 EVAPORATIVE EMISSION CONTROL SYSTEM PRESSURE SENSOR

1. OUTLINE OF DIAGNOSIS

Detect the tank pressure sensor output property abnormality.
Judge NG when there is no pressure variation, which should exist in the tank, considering the engine status.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Input voltage
(C) To fuel tank
(D) To atmosphere
(1) Connector
(2) Terminals

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
After engine starting	60 seconds or more
Fuel level	≥ 9.6 ℓ (2.45 US gal, 2.11 Imp gal)
Fuel temperature	< 35°C (95°F)
Battery voltage	≥ 10.9 V
Atmospheric pressure	> 75.1 kPa (563 mmHg, 22.2 inHg)
Engine speed	< 7000 rpm

4. GENERAL DRIVING CYCLE

- Always perform the diagnosis continuously in 60 seconds after starting the engine.
- Be sure to check the fuel level and fuel temperature.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Experienced 10 seconds of purge ON continuous time	
All the following criteria are established.	Experienced
Time for establishing the following criteria	10 seconds or more
Canister purge duty	> 0.9%
Experienced 10 seconds of purge OFF continuous time	
All the following criteria are established.	Experienced
Time for establishing the following criteria	10 seconds or more
Canister purge duty	= 0%
Number of times the difference between the Max. fuel level and the Min. fuel level every 60 seconds is 2 ℓ (0.52 US gal, 0.44 Imp gal) or more (with enable condition completed)	≥ 16 times
Maximum - Minimum tank pressure (with enable condition completed)	< 0.05 kPa (0.375 mmHg, 0.02 inHg)
Maximum - Minimum fuel temperature (with enable condition completed)	≥ 7°C (44.6°F)

If the maximum value – minimum value for the fuel level is less than 2 liters (0.52 US gal, 0.44 Imp gal) every 60 seconds, extend 60 seconds more and make judgment with the maximum and minimum values for the fuel level in 120 seconds. If a difference does not appear though the time was extended 60 seconds, extend the time (180, 240, 300 seconds) and continue the judgment. If the maximum value – minimum value for the fuel level is more than 2 liters (0.52 US gal, 0.44 Imp gal), the diagnosis counter counts up.
Time Needed for Diagnosis: 60 seconds × more than 16 times
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK when the criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Maximum - Minimum tank pressure	≥ 0.05 kPa (0.375 mmHg, 0.02 inHg)

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Purge control solenoid valve control: Purge fixed mode is prohibited.

9. ECM OPERATION AT DTC SETTING

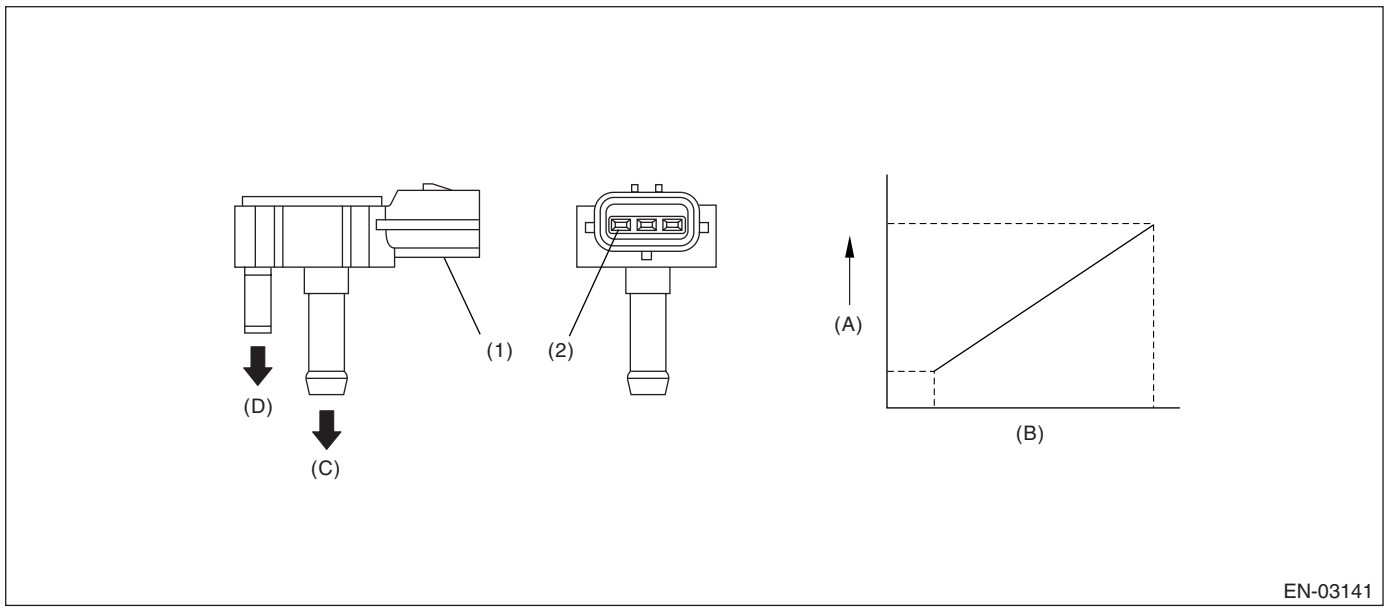
Memorize the freeze frame data. (For test mode $02)

CG: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 it is out of specification.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Input voltage
(C) To fuel tank
(D) To atmosphere
(1) Connector
(2) Terminals

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 15 seconds or more.

Judgment Value

Malfunction Criteria	Threshold Value
Fuel tank pressure	< –7.4 kPa (–55.85 mmHg, –2.20 inHg)
Battery voltage	≥ 10.9 V

Time Needed for Diagnosis: 15 seconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

Judge as OK when the criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Fuel tank pressure	≥ –7.4 kPa (–55.85 mmHg, –2.20 inHg)
Battery voltage	≥ 10.9 V

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Purge control solenoid valve control: Purge fixed mode is prohibited.

9. ECM OPERATION AT DTC SETTING

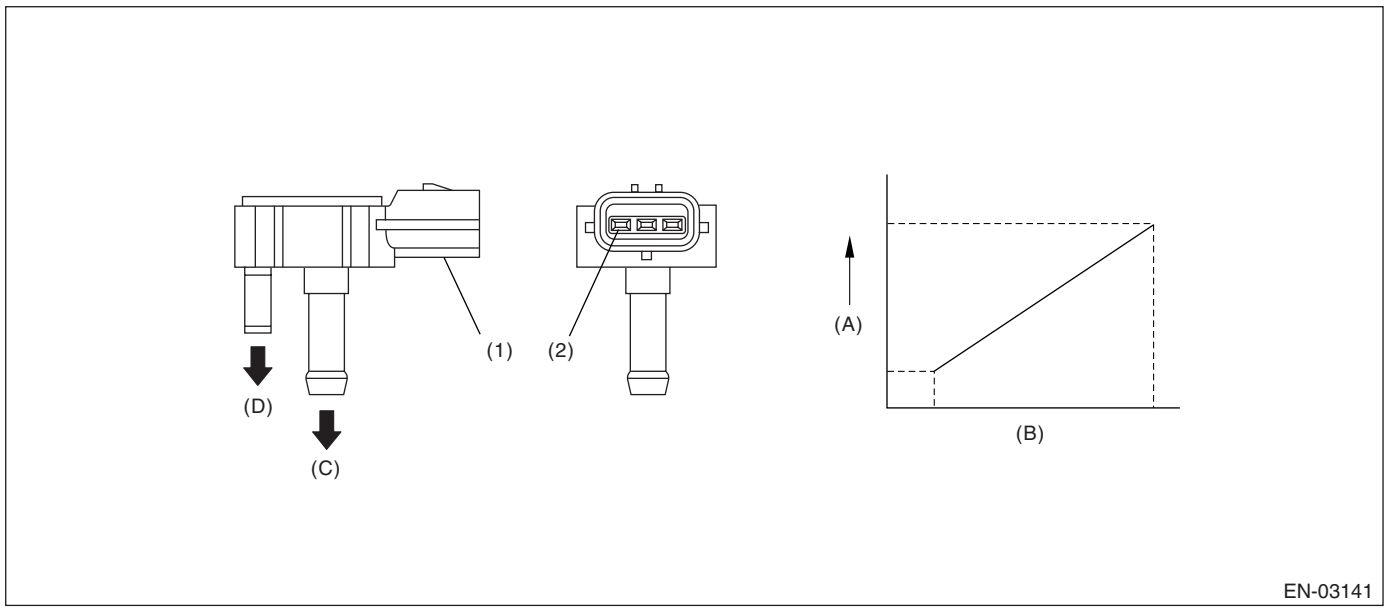
Memorize the freeze frame data. (For test mode $02)

CH: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 it is out of specification.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Input voltage
(C) To fuel tank
(D) To atmosphere
(1) Connector
(2) Terminals

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Vehicle speed	≥ 2 km/h (1.24 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)	≥ 0.9
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis when purging.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 15 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Fuel tank pressure	≥ 7.98 kPa (59.85 mmHg, 2.36 inHg)
Fuel temperature	< 35°C (95°F)
Atmospheric pressure	75.1 kPa (563 mmHg, 22.2 inHg)

Time Needed for Diagnosis: 15 seconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

Judge as OK when the criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Fuel tank pressure	< 7.98 kPa (59.85 mmHg, 2.36 inHg)

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Purge control solenoid valve control: Purge fixed mode is prohibited.

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CI: DTC P0456 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK)

1. OUTLINE OF DIAGNOSIS

For the detection conditions, refer to DTC P0442 Evaporative system (Small leak). <Ref. to GD(H6DO)-124, DTC P0442 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CJ:DTC P0457 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF)

1. OUTLINE OF DIAGNOSIS

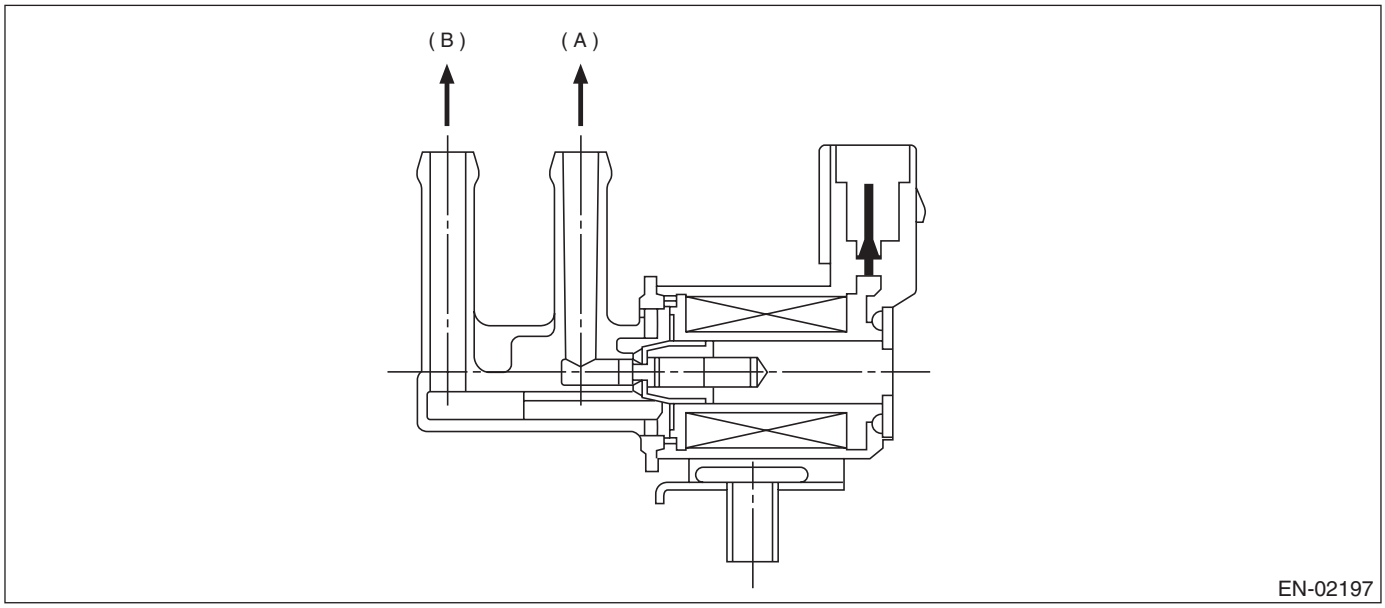
For the detection conditions, refer to DTC P0442 Evaporative system (Small leak). <Ref. to GD(H6DO)-124, DTC P0442 EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK), Diagnostic Trouble Code (DTC) Detecting Criteria.>

CK:DTC P0458 EVAPORATIVE EMISSION CONTROL 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



(A) To canister (B) To intake manifold

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	1 second or more

4. GENERAL DRIVING CYCLE

Always perform the diagnosis after starting the engine.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes more than time needed for diagnosis (2.5 seconds).

Judgment Value

Malfunction Criteria	Threshold Value
Duty ratio of “ON”	< 75%
Terminal output voltage	Low

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
Terminal output voltage	High

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

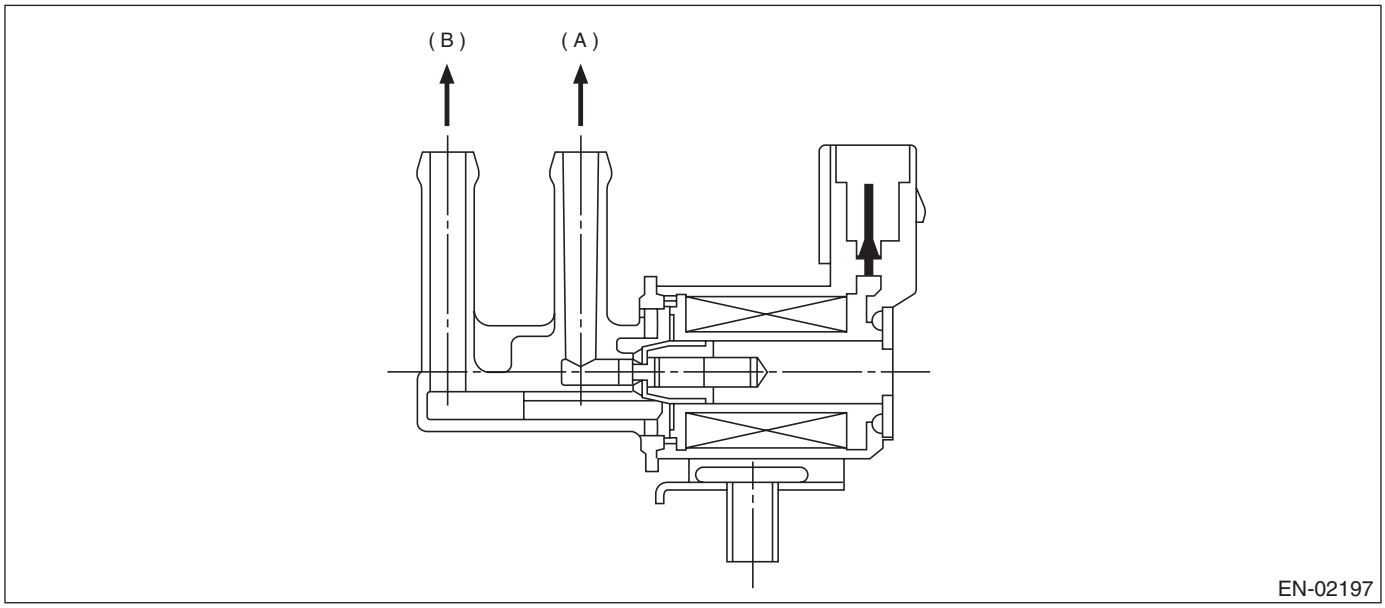
Memorize the freeze frame data. (For test mode $02)

CL:DTC P0459 EVAPORATIVE EMISSION CONTROL 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 CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	1 second or more

4. GENERAL DRIVING CYCLE

Always perform the diagnosis after starting the engine.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes more than time needed for diagnosis (2.5 seconds).

Judgment Value

Malfunction Criteria	Threshold Value
Duty ratio of “ON”	≥ 25%
Terminal output voltage	High

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
Terminal output voltage	Low

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

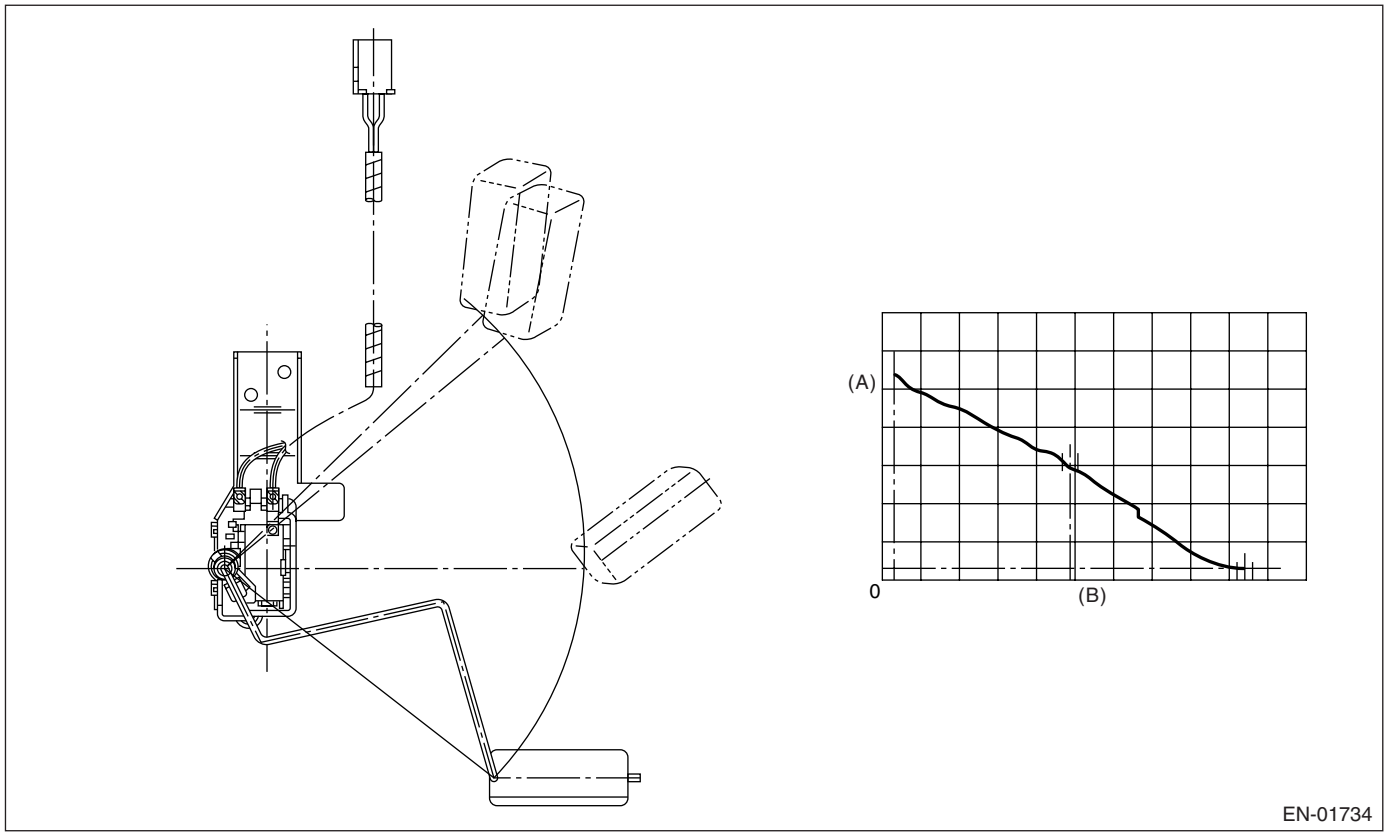
Memorize the freeze frame data. (For test mode $02)

CM:DTC P0461 FUEL LEVEL SENSOR 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



(A) Fuel level (B) Resistance

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Accumulated amount of intake air	> 331 kg (729.7 lb)
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	< 7000 rpm
After engine starting	5 seconds or more

Time Needed for Diagnosis: Undecided
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
Accumulated amount of intake air	> 331 kg (729.7 lb)
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	< 7000 rpm
After engine starting	5 seconds or more

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

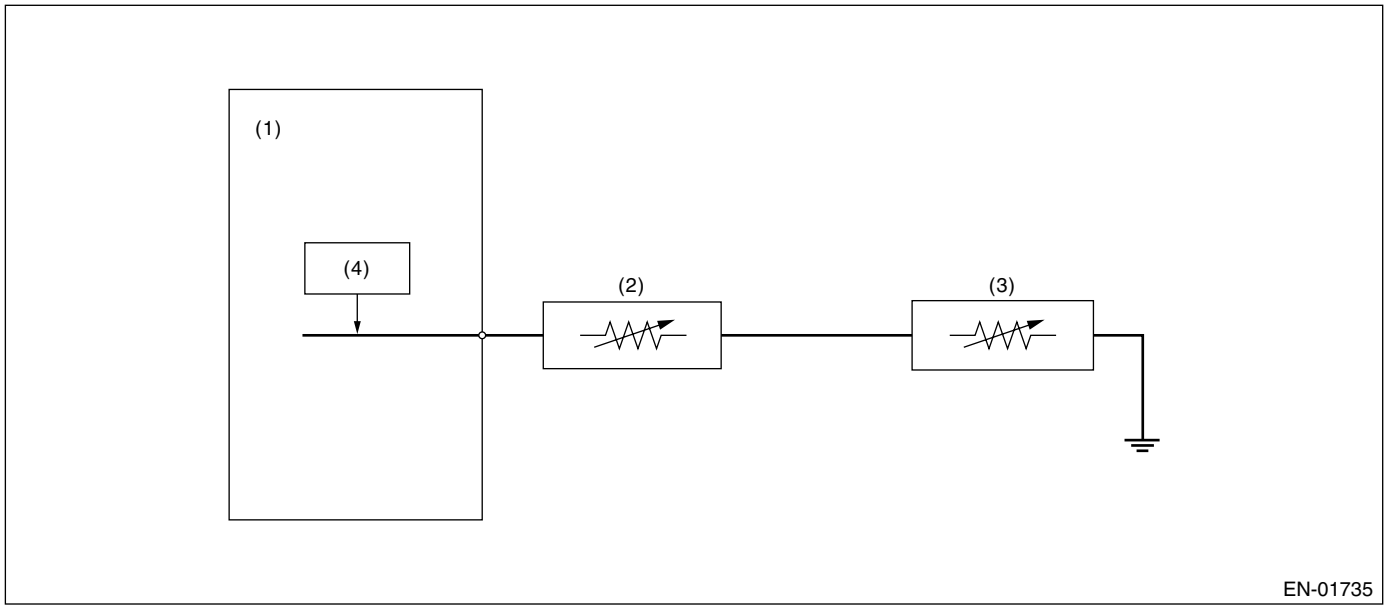
Memorize the freeze frame data. (For test mode $02)

CN:DTC P0462 FUEL LEVEL SENSOR CIRCUIT LOW INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of fuel level sensor. Judge as NG if it is out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Fuel level sensor
(3) Fuel sub level sensor
(4) Detecting circuit

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes more than time needed for diagnosis (2.5 seconds).

Judgment Value

Malfunction Criteria	Threshold Value
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	3 seconds or more
Output voltage	< 0.173 V

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	3 seconds or more
Output voltage	≥ 0.173 V

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

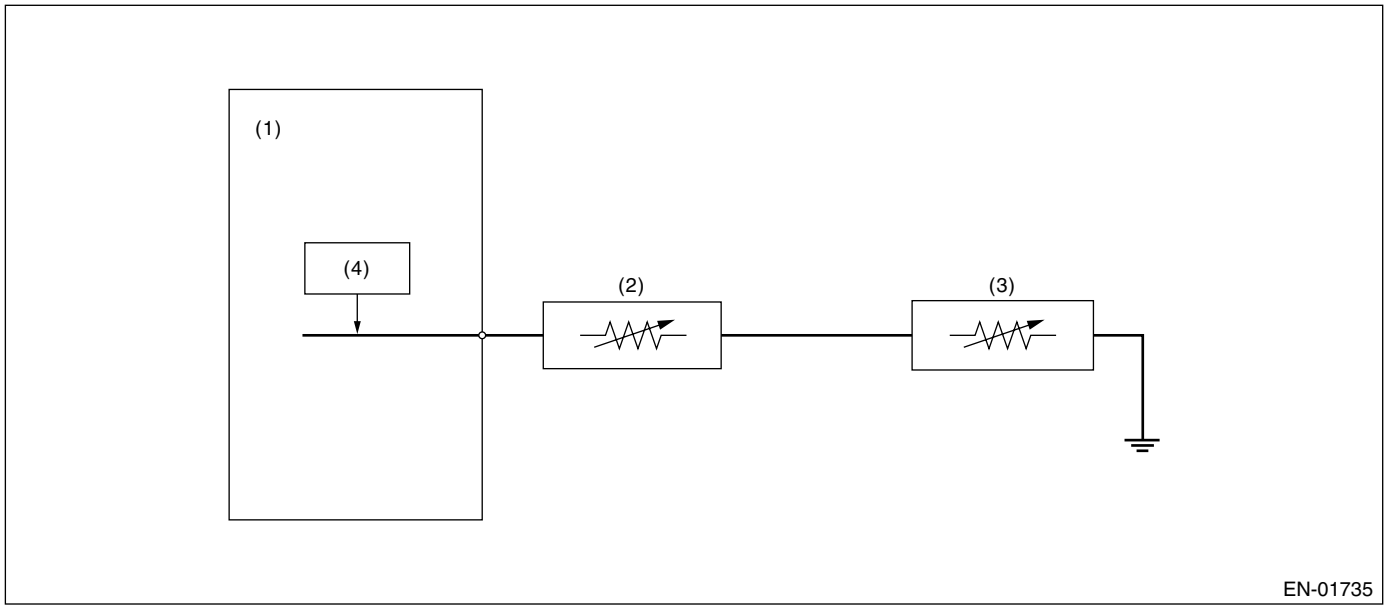
Memorize the freeze frame data. (For test mode $02)

CO:DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of fuel level sensor. Judge as NG if it is out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Fuel level sensor
(3) Fuel sub level sensor
(4) Detecting circuit

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time of completing the malfunction criteria below exceeds the time required for diagnosis (1 second).

Judgment Value

Malfunction Criteria	Threshold Value
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	3 seconds or more
Output voltage	≥ 7.212 V

Time Needed for Diagnosis: 1 second
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	3 seconds or more
Output voltage	< 7.212 V

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CP: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 CONDITIONS

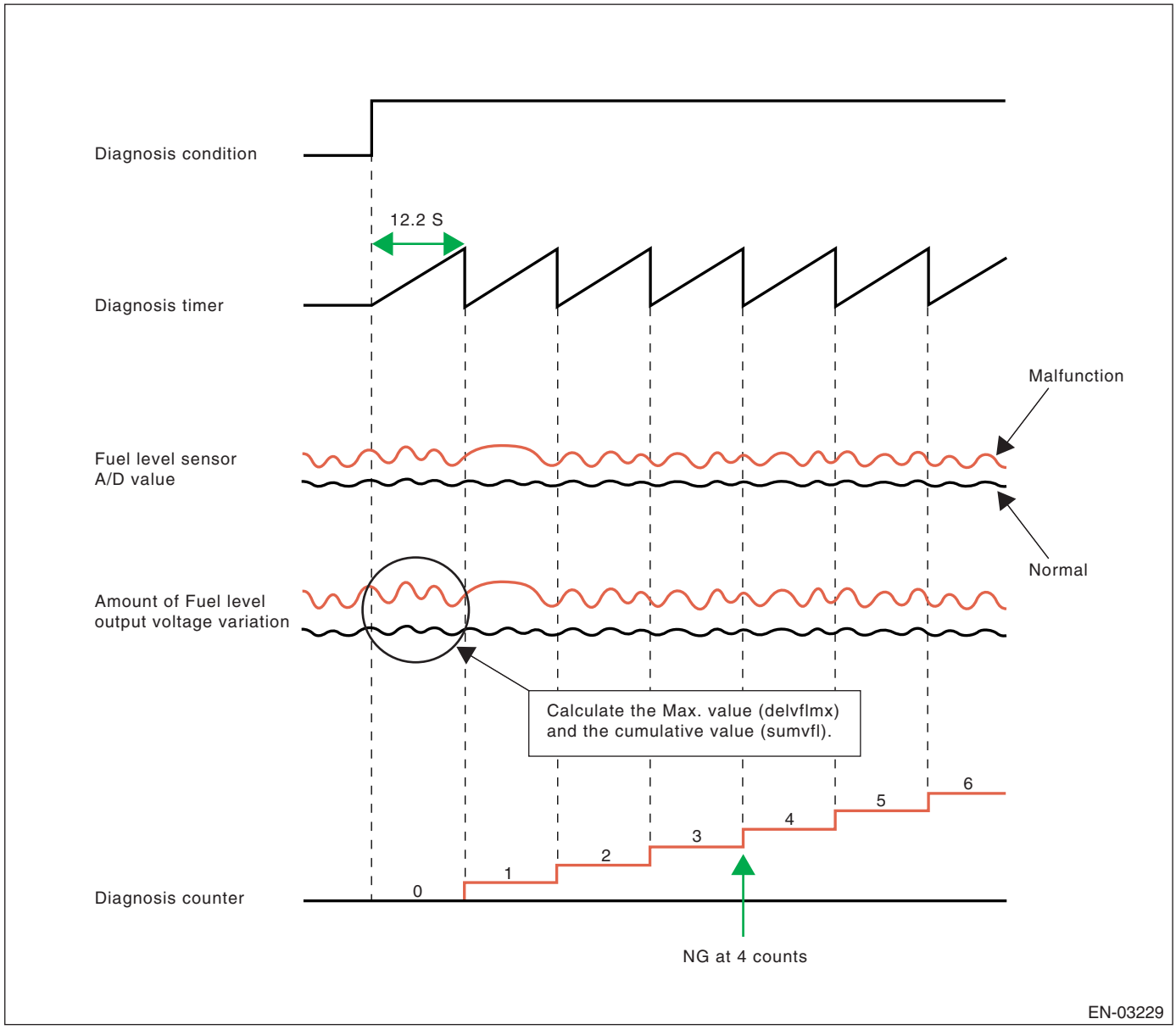
Malfunction Criteria	Threshold Value
Engine speed	≥ 500 rpm
After engine starting	1 second or more
Ignition switch	ON
Battery voltage	> 10.9 V
Idle switch	ON
Fuel level	9.6 ←→ 54.4 ℓ (2.54 ←→ 14.37 US gal, 2.11 ←→ 11.97 Imp gal)
Vehicle speed = 0 km/h (0 MPH)	10 seconds or more

3. GENERAL DRIVING CYCLE

- Always perform the diagnosis continuously at idle speed.
- Pay attention to the fuel level.

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 counts.



Abnormality Judgment

Judge as NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Integrated times of the condition reaching follows, DELFLMAX 0.27 ←→ 0.894 V or SUMFL ≥ 25.92 V At that time, DELFLMAX: Maximum difference of sensor output for 12.2 seconds; SUMFL: Integrated value of the sensor output deviation for 12.2 seconds	≥ 4 times

The diagnosis counter does not count up when the following conditions are completed within 12.2 seconds.

Maximum value – minimum value of change of tank pressure during 12.2 seconds	≥ 0.05 kPa (0.375 mmHg, 0.02 inHg)
Maximum value – minimum value of battery voltage during 12.2 seconds	≥ 0.609 V

Time Needed for Diagnosis: 12.2 seconds × 4 times
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
DELFLMAX	0.27 ←→ 0.894 V
SUMFL	< 25.92 V
At that time, DELFLMAX: Maximum difference of sensor output for 12.2 seconds; SUMFL: Integrated value of the sensor output deviation for 12.2 seconds	

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CQ:DTC P0483 COOLING FAN RATIONALITY CHECK

1. OUTLINE OF DIAGNOSIS

Detect the function abnormality of the radiator fan.
Judge as NG when the engine coolant temperature slowly decreases even when the radiator fan is rotating.

2. ENABLE CONDITIONS

Diagnostic enable condition is established if the radiator fan changes from OFF → ON when all of the conditions below are met.
When one of the conditions below is not met, the diagnostic enable condition is not established.

Secondary Parameters	Enable Conditions
Engine speed	500 — 900 rpm
Idle switch	ON
Vehicle speed	< 2 km/h (1 MPH)
Battery voltage	≥ 10.9 V

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when the radiator fan changes from OFF → ON when idling.

4. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time of completing the malfunction criteria below becomes more than 5 minutes.

Judgment Value

Malfunction Criteria	Threshold Value
Engine coolant temperature	≥ 102°C (216°F)
Engine coolant temperature	Does not decrease

Time Needed for Diagnosis: 5 minutes
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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	Decreases

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CR:DTC P0500 VEHICLE SPEED SENSOR

1. OUTLINE OF DIAGNOSIS

Judge as NG when outside of the judgment value.
Judge as NG when the data received from the ABS control module and hydraulic control module are at erroneous vehicle speeds, and if the vehicle speed of the data is impossible.

2. COMPONENT DESCRIPTION

Vehicle speed signals are taken in to the ABS control module and hydraulic control unit, and normal/erroneous data of the ABS wheel speed sensor is received by CAN communication from the ABS control module and hydraulic control unit.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Elapsed time after engine starting	≥ 2 sec.

4. GENERAL DRIVING CYCLE

Always perform diagnosis more than 2 seconds after starting the engine.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 2.5 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Front ABS wheel speed sensor status	Defective
Either of the following is established	
Front left wheel speed	≥ 300 km/h (186 MPH)
Front right wheel speed	≥ 300 km/h (186 MPH)

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

Judge as OK and clear the NG when all of the following criteria are established.

Judgment Value

Malfunction Criteria	Threshold Value
Front Left Wheel Speed	> 0 km/h (0 MPH) and < 300 km/h (186 MPH)
Front Right Wheel Speed	> 0 km/h (0 MPH) and < 300 km/h (186 MPH)

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- ABS wheel speed sensor signal process: Vehicle speed = 10 km/h (6 MPH)
- ISC control: ISC feedback amount calculation prohibited
- Radiator fan control: Send the duty signal 50% to the controller.

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CS:DTC P0506 IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED

1. OUTLINE OF DIAGNOSIS

Detect the malfunction that actual engine rpm is not close to target engine rpm during idling. Judge as NG when actual engine RPM is not close to target engine RPM during idling.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Engine coolant temperature	≥ 75°C (167°F)
Battery voltage	≥ 10.9V
Atmospheric pressure	> 75.1 kPa (563 mmHg, 22.2 inHg)
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal)
After engine starting	10 seconds or more
Feedback in ISC	In operation
Lambda value (left and right)	0.9 ←→ 1.1
After air condition switching ON-OFF, OFF-ON	5.1 seconds or more
After intake manifold pressure changes more than 4 kPa (30 mmHg, 1.2 inHg)	> 5.1 sec.
After neutral switch ON-OFF change	> 5.1 sec.
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

Judge as NG when the continuous time of completing the malfunction criterion below is 10 seconds × 3 times.

Judgment Value

Malfunction Criteria	Threshold Value
Actual - target engine RPM	< –100 rpm
Feedback value for ISC	Max.

Time Needed for Diagnosis: 10 seconds × 3 times
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK and clear NG when the continuous time of completing the malfunction criterion below becomes more than the time needed for diagnosis (10 seconds).

Judgment Value

Malfunction Criteria	Threshold Value
Actual - target engine RPM	≥ –100 rpm

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

Judgment of heavy fuel: Not allowed to make the judgment of heavy fuel

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CT:DTC P0507 IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED

1. OUTLINE OF DIAGNOSIS

Detect the malfunction that actual engine rpm is not close to target engine rpm during idling. Judge as NG when actual engine RPM is not close to target engine RPM during idling.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Engine coolant temperature	≥ 75°C (167°F)
Battery voltage	≥ 10.9V
Atmospheric pressure	> 75.1 kPa (563 mmHg, 22.2 inHg)
Fuel level	≥ 9.6 ℓ (2.54 US gal, 2.11 Imp gal)
After engine starting	10 seconds or more
Feedback in ISC	In operation
Lambda value (left and right)	0.9 ←→ 1.1
After air condition switching ON-OFF, OFF-ON	5.1 seconds or more
After intake manifold pressure changes to more than 4 kPa (30 mmHg, 1.2 inHg)	> 5.1 sec.
After neutral switch ON-OFF change	> 5.1 sec.
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

Judge as NG when the continuous time of completing the malfunction criterion below is 10 seconds × 3 times.

Judgment Value

Malfunction Criteria	Threshold Value
Actual – Target engine RPM	≥ 200 rpm
Feedback value for ISC	Min.

Time Needed for Diagnosis: 10 seconds × 3 times
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK and clear NG when the continuous time of completing the malfunction criterion below becomes more than the time needed for diagnosis (10 seconds).

Judgment Value

Malfunction Criteria	Threshold Value
Actual – Target engine RPM	< 200 rpm

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

Judgment of heavy fuel: Not allowed to make the judgment of heavy fuel

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CU:DTC P0512 STARTER REQUEST CIRCUIT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of starter SW.
Judge ON NG when the starter SW signal remains on.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as ON NG when the continuous time of completing the malfunction criteria below becomes more than 3 minutes.

Judgment Value

Malfunction Criteria	Threshold Value
Engine speed	> 500 rpm
Starter ON signal	Not detected
Battery voltage	> 8 V

Time Needed for Diagnosis: 180 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge ON OK and clear the NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Starter switch	ON
Battery voltage	> 8 V

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CV: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	Failure of body integrated unit to verify key (transponder) ID code or transponder failure
P1576	EGI Control Module EEPROM	ECM malfunctioning
P1577	IMM Control Module EEPROM	Body integrated unit malfunctioning
P1578	Meter Failure	Reference code incompatibility between body integrated unit and combination meter

2. ENABLE CONDITIONS

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.

CW:DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE)

1. OUTLINE OF DIAGNOSIS

Detect malfunctions in which the engine RPM continues to rise during idling.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Feedback in ISC	In operation
Vehicle speed	< 4 km/h (2.49 MPH)
After engine starting	1 second or more

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously if the vehicle speed at less than 4 km/h (2.49 MPH).

4. DIAGNOSTIC METHOD

Judge as NG when the continuous time until completing the all malfunction criteria below becomes more than the time needed for diagnosis (2 seconds).

Judgment Value

Malfunction Criteria	Threshold Value
Engine RPM - Targeted engine RPM	≥ 1500 rpm
Feedback value for ISC	≤ 0
Change of engine RPM for every engine 120 °CA	≥ –5 rpm

Time Needed for Diagnosis: 2 seconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

Judge as OK and clear NG when the continuous time until completing the malfunction criteria below becomes more than the time needed for diagnosis (5 seconds).

Judgment Value

Malfunction Criteria	Threshold Value
Engine RPM - Targeted engine RPM	< 1500 rpm

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

Fuel cut: Cuts off fuel only #1 and #2 cylinders, or for all cylinders according to vehicle speed, engine RPM, and throttle position.

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CX:DTC P0600 SERIAL COMMUNICATION LINK

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
When CAN communications is not possible, and CAN communications with AT is not possible, judge as NG if data from the AT is not normal.

2. COMPONENT DESCRIPTION

ECM and TCM are connected by high speed CAN.
(Common Specifications)
CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
(High Speed CAN)
Conforms to ISO11898
Communication Speed: 500 kbps

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Starter switch	OFF
Engine	run

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

Abnormality Judgment

When either of the following conditions are established, it is judged NG.
Judge as OK and clear the NG when the continuous time when all of the following criteria are established is more than the predetermined time (1 second).

Judgment Value

Malfunction Criteria	Threshold Value
Bus off flag or error warning flag	set
ID from body integrated module is not received.	= 500 milliseconds
Data from body integrated module is not updated.	= 500 milliseconds

Time Needed for Diagnosis: 1 time
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CY:DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of microcomputer (RAM). Zero clear all normal RAM areas with the initial routine, and Judge as NG when the sum of all added RAM after clearing is more than $0000.

2. ENABLE CONDITIONS

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

Judge as NG when the malfunction criteria below are met. Judge as OK and clear the NG when the malfunction criteria below are not met.

Judgment Value

Malfunction Criteria	Threshold Value
Zero clear all normal RAM areas. Result of sum of all RAM after clearing	Not = 0

Time Needed for Diagnosis: Undecided
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

CZ: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 CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 0.5 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
SUM value of ROM	Specification

Time Needed for Diagnosis: Undecided
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

8. ECM OPERATION AT DTC SETTING

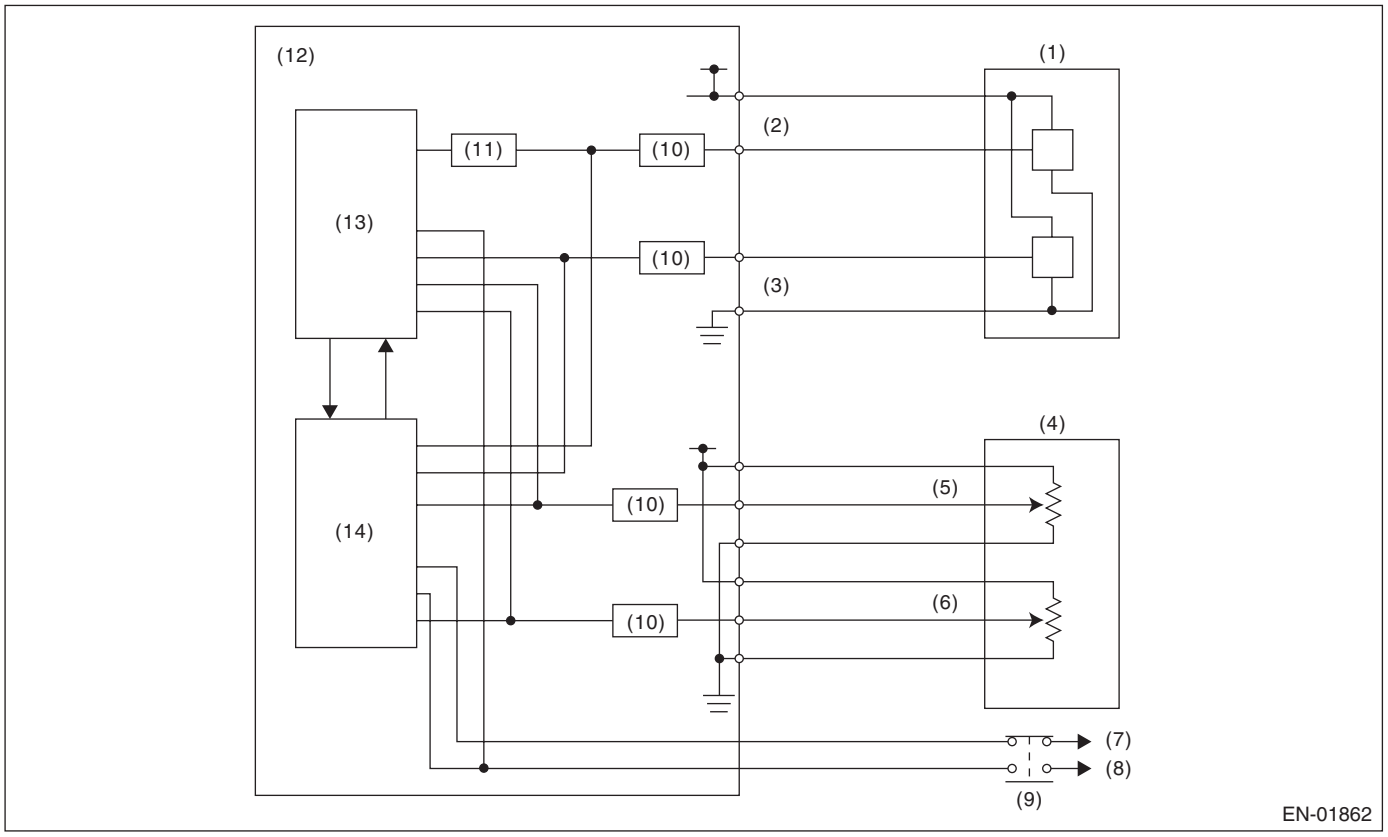
Memorize the freeze frame data. (For test mode $02)

DA:DTC P0607 CONTROL MODULE PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Judge as NG when either the following is completed.
- When the read value of throttle position sensor 1 signal is mismatched between main CPU and sub CPU.
- When the read value of accelerator position sensor 1 signal is mismatched between main CPU and sub CPU.
- When the sub CPU operates abnormally.
- When the communication between main CPU ←→ sub CPU is abnormal.
- When the input amplifier circuit of throttle position sensor 1 is abnormal.
- When the cruise control cannot be canceled correctly.
- When the signal of brake SW1 and 2 is mismatched.
- When the directed angle from the main CPU is abnormal.

2. COMPONENT DESCRIPTION



(1)	Throttle position sensor	(6)	Accelerator pedal position sensor 2	(11)	Amplifier circuit
(2)	Throttle position sensor 1	(7)	Battery	(12)	Engine control module (ECM)
(3)	Throttle position sensor 2	(8)	Stop light	(13)	Sub CPU
(4)	Accelerator pedal position sensor	(9)	Brake switch	(14)	Main CPU
(5)	Accelerator pedal position sensor 1	(10)	I/F circuit		

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
(1) Ignition switch	ON
(2) Ignition switch	ON
(3) None	—
(4) None	—
(5) Throttle opening angle	
(6) Brake SW (only with cruise control)	ON
(7) None	—
(8) Cruise control	OFF

4. GENERAL DRIVING CYCLE

(1) — (4): Always perform the diagnosis continuously.
(5): Always perform the diagnosis continuously when idling.
(6): Perform the diagnosis when the brake pedal is depressed.
(7): Always perform the diagnosis continuously.
(8): Always perform the diagnosis continuously when the cruise control pedal is not operating.

5. DIAGNOSTIC METHOD

Judge as OK and clear the NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
(1) Difference of CPU reading value of the throttle position sensor signal	Within 0.085 V
(2) Difference of CPU read value of the accelerator position sensor signal	Within 0.047 V
(3) WD pulse from sub CPU	WD pulse occur
(4) Communication between CPU	Possible to communicate
(5) Throttle position sensor 1 opening angle — (Throttle position sensor 1 opening angle after passing amplifier) 1/4	< 3°
(6) Cruise control cancel signal at brake ON	Cruise control cancel signal ON
(7) Brake switch 1, 2 signal	SW 1 and 2 are matched

Time Needed for Diagnosis:
1. 250 milliseconds
2. 250 milliseconds
3. 200 milliseconds
4. 200 milliseconds
5. 24 milliseconds
6. 250 milliseconds
7. 200 milliseconds

Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

9. ECM OPERATION AT DTC SETTING

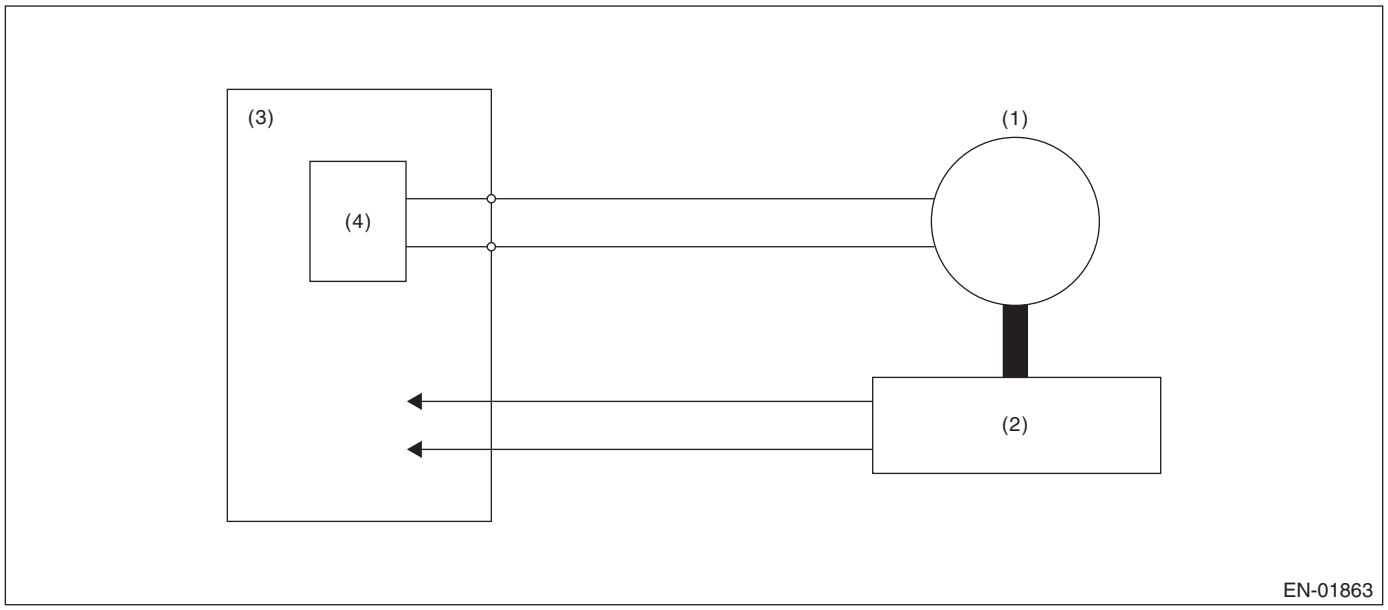
Memorize the freeze frame data. (For test mode $02)

DB: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 more than specified duty for specified time continuously.

2. COMPONENT DESCRIPTION



(1) Motor
(2) Throttle position sensor
(3) Engine control module (ECM)
(4) Drive circuit

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON
Normal operation of electric throttle control	ON

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously when the electric throttle control is operating.

5. DIAGNOSTIC METHOD

Judge as OK and clear the NG when the malfunction criteria below are met.

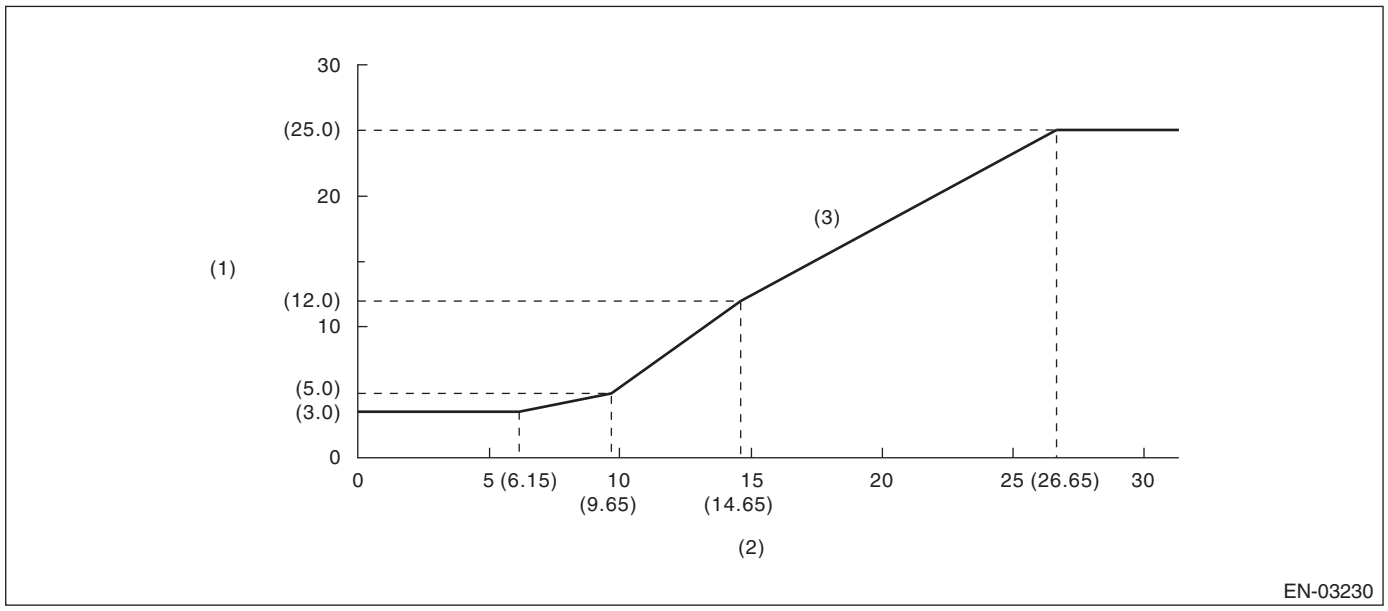
Judgment Value

Malfunction Criteria	Threshold Value
Difference between target opening angle and actual opening angle	3° or less
Output duty to drive circuit	95% or less

Time Needed for Diagnosis:

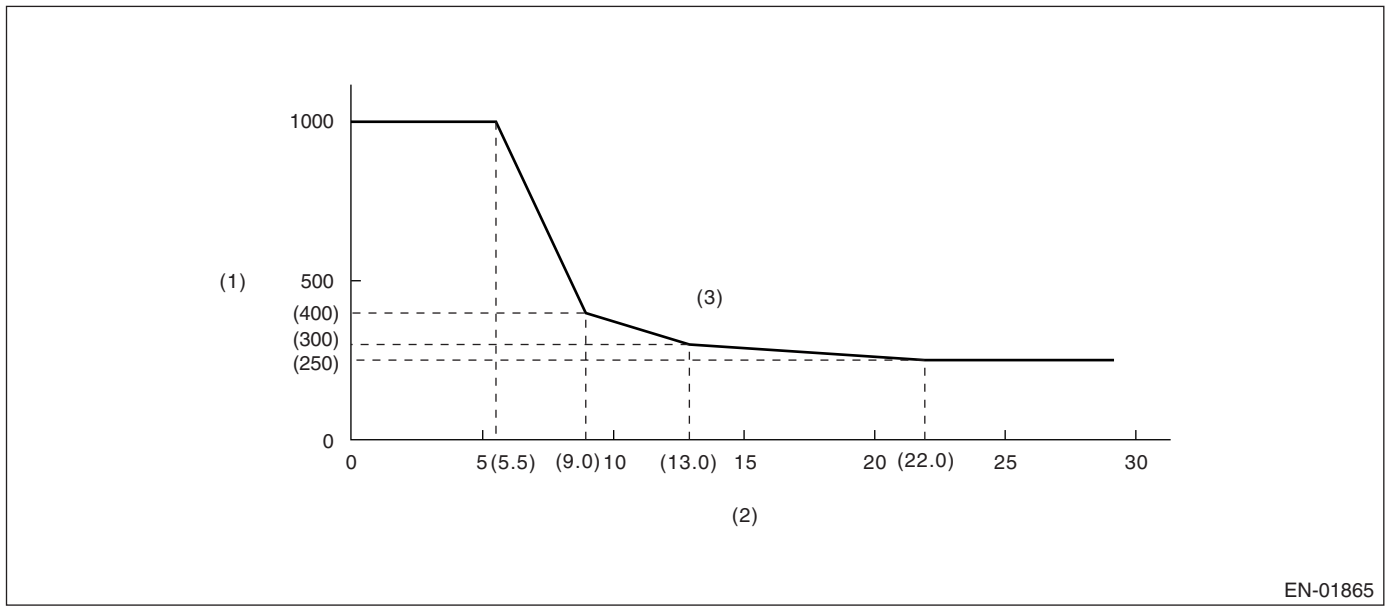
- Target opening angle and actual opening angle: 250 milliseconds (For NG) 2000 milliseconds (For OK)
- Output duty to drive circuit: 2000 milliseconds

Details of Judgment Value



(1) Difference between target opening angle and actual opening angle (°)
(2) Target throttle opening angle (°)
(3) NG area

Details of Judgment (The actual opening angle ≤ target opening angle is always 1000 milliseconds)



(1) Judgment time (milliseconds)
(2) Throttle position sensor 1 opening angle
(3) NG area

Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

DC:DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW

1. OUTLINE OF DIAGNOSIS

Detect the open/short circuit of radiator fan circuit.
Judge as NG when the ECM output level differs from the actual terminal level.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	≥ 1 sec.
Engine speed	500 ←→ 850 rpm

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously when idling.

4. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time of completing the malfunction criteria below becomes more than 2.5 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Duty ratio	= 100%
Terminal voltage level	Low level
Duty ratio	5% ←→ 95%
Terminal voltage level	Low level

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
Duty ratio	= 100%
Terminal voltage level	High level
Duty ratio	5% ←→ 95%
Terminal voltage level	High level

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

DD:DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

Detect the open/short circuit of radiator fan circuit.
Judge as NG when the ECM output level differs from the actual terminal level.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON
Battery voltage	≥ 10.9 V
After engine starting	≥ 1 sec.
Engine speed	500 ←→ 850 rpm

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously when idling.

4. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time of completing the malfunction criteria below becomes more than 2.5 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Duty ratio	= 0%
Terminal voltage level	High level
Duty ratio	5% ←→ 95%
Terminal voltage level	High level

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur 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
Duty ratio	= 0%
Terminal voltage level	Low level
Duty ratio	5% ←→ 95%
Terminal voltage level	Low level

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

DE:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

1. OUTLINE OF DIAGNOSIS

CAN communication is established with AT. Judge as NG when there is a MIL lighting request.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when the continuous time when the following conditions are established is longer than the predetermined amount of time (2.5 seconds).
Judge as OK when the following conditions are not established, and clear the NG.

Judgment Value

Malfunction Criteria	Threshold Value
MIL lighting request from TCM	set

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

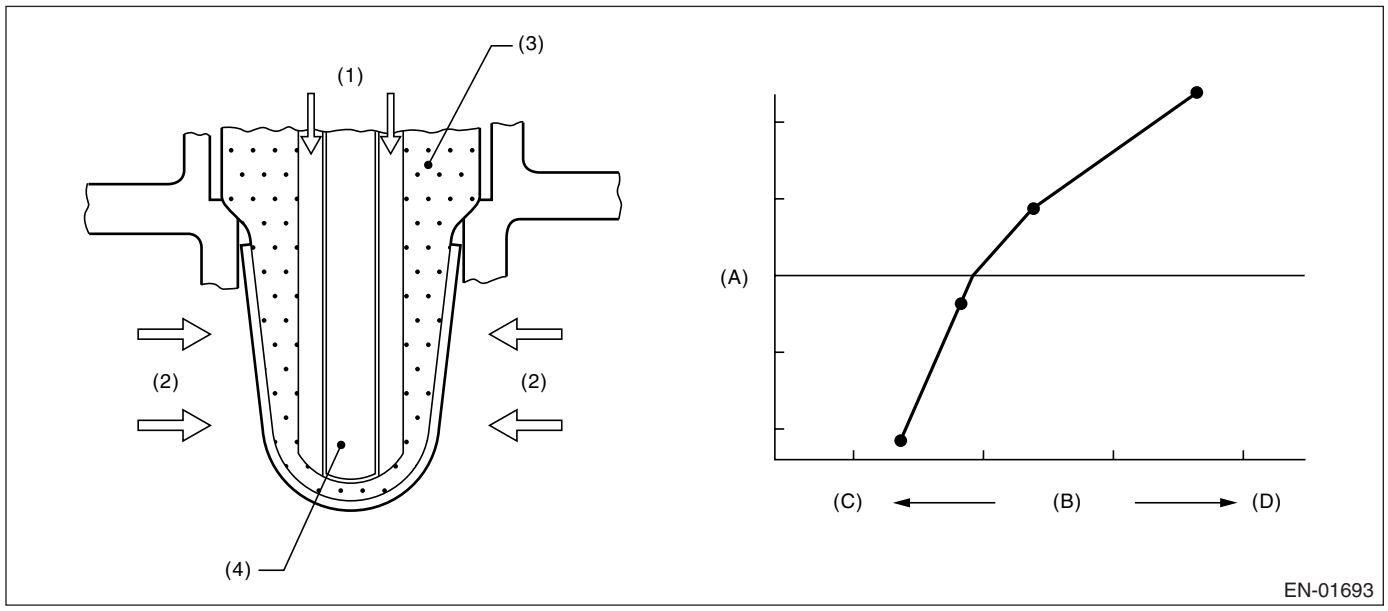
DF:DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect that λ value remains low.
Judge as NG when lambda value is abnormal in accordance with λ 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.

λ value = Actual air fuel ratio/Theoretical air fuel ratio
λ >1: Lean
λ < 1: Rich

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(1) Atmosphere
(2) Exhaust gas
(3) ZrO_2
(4) Ceramic heater

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
All secondary parameters enable conditions	4 seconds or more
Battery voltage	> 10.9 V
Atmospheric pressure	> 75.1 kPa (563 mmHg, 22.2 inHg)
Rear oxygen sensor sub feedback	Execution
Rear oxygen sensor output voltage – Feedback target voltage	–0.2 V ←→ 0.1 V
or rear oxygen sensor sub feedback compensation coefficient	On Min.
or rear oxygen sensor sub feedback compensation coefficient	On Max.
After engine starting	60 seconds or more
Engine coolant temperature	≥ 75°C (167°F)
Vehicle speed	≥ 20 km/h (12 MPH)
Amount of intake air	≥ 8 g (0.28 oz)/s
Load change in 1/3 engine revolution.	≤ 0.02g (0.001 oz)/rev
Front oxygen (A/F) sensor impedance	0 ←→ 50 Ω
Learning value of evaporation gas density	≤ 0.12
Total time of operating canister purge	20 seconds or more
Targeted lambda value load compensation coefficient	–0.05 ←→ 0.05

4. GENERAL DRIVING CYCLE

Perform diagnosis continuously at a constant speed of 20 km/h (12 MPH) or more, starting from 60 seconds after starting the engine.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time of meeting the malfunction criteria below becomes more than the time needed for diagnosis (10 seconds). Judge as OK and clear the NG when the malfunction criteria below are not met.

Judgment Value

Malfunction Criteria	Threshold Value
Output λ value when rear oxygen sensor sub feedback compensation coefficient is not at maximum limit	≤ 0.85

Time Needed for Diagnosis: 10 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- Front oxygen (A/F) sensor main learning compensation: Not allowed to calculate.
- Rear oxygen sensor sub learning compensation: Not allowed to calculate.
- Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

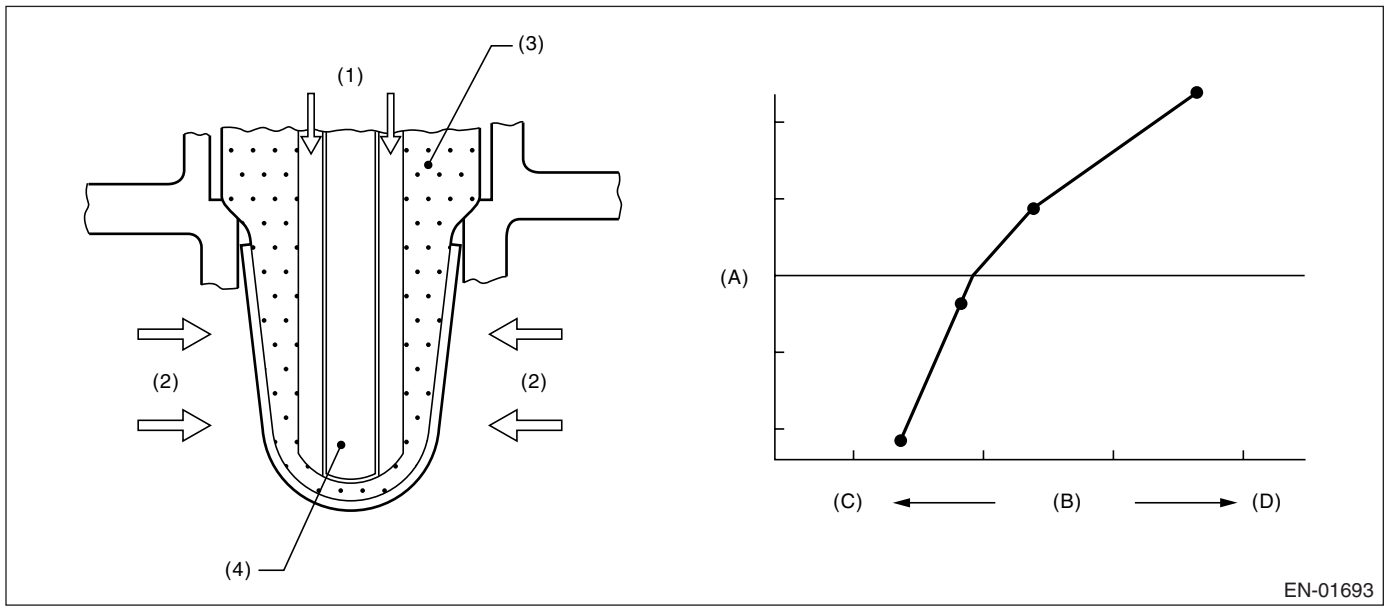
DG:DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 1 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

Detect that λ value remains high.
Judge as NG when lambda value is abnormal in accordance with λ 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.

λ value = Actual air fuel ratio/Theoretical air fuel ratio
λ >1: Lean
λ < 1: Rich

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(1) Atmosphere
(2) Exhaust gas
(3) ZrO_2
(4) Ceramic heater

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
All secondary parameters enable conditions	4 seconds or more
Battery voltage	> 10.9 V
Atmospheric pressure	> 75.1 kPa (563 mmHg, 22.2 inHg)
Rear oxygen sensor sub feedback	Execution
Rear oxygen sensor output voltage – Feedback target voltage	–0.2 V ←→ 0.1 V
or rear oxygen sensor sub feedback compensation coefficient	On Min.
or rear oxygen sensor sub feedback compensation coefficient	On Max.
After engine starting	60 seconds or more
Engine coolant temperature	≥ 75°C (167°F)
Vehicle speed	≥ 20 km/h (12 MPH)
Intake air flow	≥ 8 g (0.28 oz)/s
Load change in 1/3 engine revolution.	≤ 0.02g (0.001 oz)/rev
Front oxygen (A/F) sensor impedance	0 ←→ 52 Ω
Learning value of evaporation gas density	≤ 0.12
Total time of operating canister purge	20 seconds or more
Targeted lambda value load compensation coefficient	–0.05 ←→ 0.05

4. GENERAL DRIVING CYCLE

Perform diagnosis continuously at a constant vehicle speed of 20 km/h (12 MPH) or more, from 60 seconds after starting the engine.

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time of meeting the malfunction criteria below becomes more than the time needed for diagnosis (10 seconds). Judge as OK and clear the NG when the malfunction criteria below are not met.

Judgment Value

Malfunction Criteria	Threshold Value
Output λ value when rear oxygen sensor sub feedback compensation coefficient cannot be at minimum limit	≥ 1.15

Time Needed for Diagnosis: 10 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

- Front oxygen (A/F) sensor main learning compensation: Not allowed to calculate.
- Rear oxygen sensor sub learning compensation: Not allowed to calculate.
- Purge control: Not allowed to purge

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

DH:DTC P1154 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 2 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the diagnostic procedure, refer to DTC P1152. <Ref. to GD(H6DO)-182, DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

DI: DTC P1155 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 2 SENSOR 1)

1. OUTLINE OF DIAGNOSIS

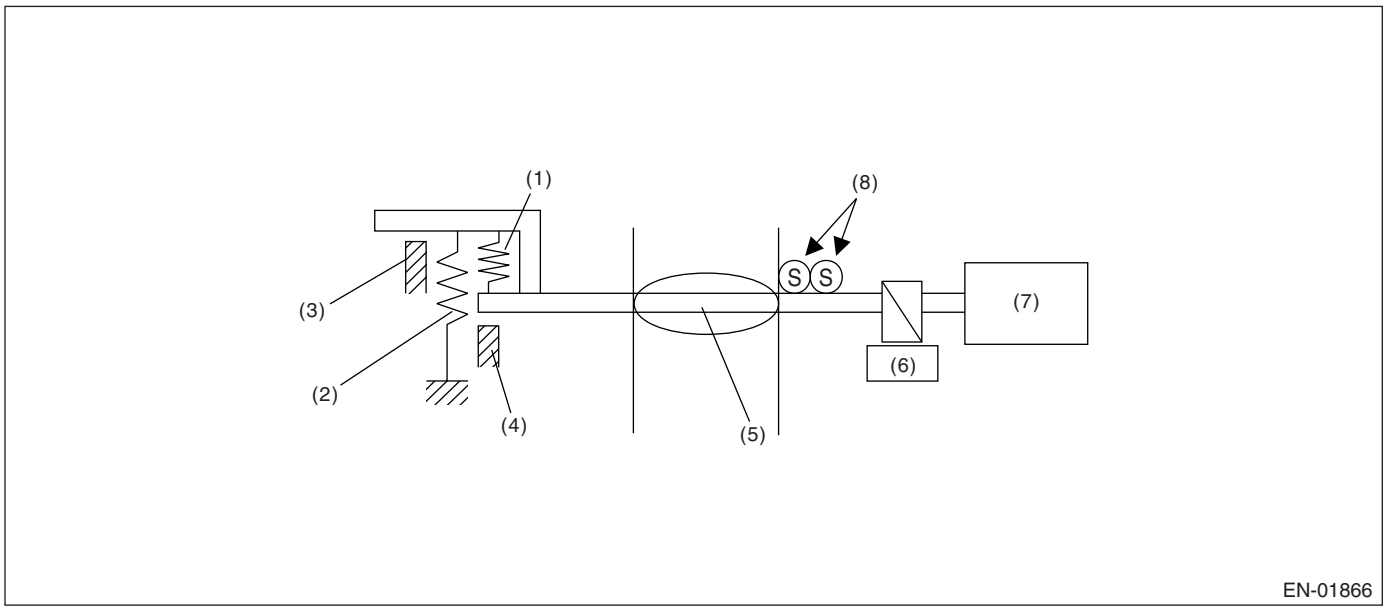
NOTE:
For the diagnostic procedure, refer to DTC P1153. <Ref. to GD(H6DO)-184, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK 1 SENSOR 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

DJ: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
(2) Return spring
(3) Intermediate stopper
(4) Full closed stopper
(5) Throttle valve
(6) Gear
(7) DC motor
(8) Main and sub throttle sensor

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Throttle opening angle	OFF
Motor continuity	OFF

4. GENERAL DRIVING CYCLE

- Ignition switch ON → OFF
- Ignition switch OFF → ON (Only after clearing memory)

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 1.6 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Opening variation after continuity is set to OFF	≥ 2°

Time Needed for Diagnosis: 1600 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

DK:DTC P1443 VENT CONTROL SOLENOID VALVE FUNCTION PROBLEM

1. OUTLINE OF DIAGNOSIS

Detect the abnormal functioning (stuck closed) of drain valve.
Judge as NG when fuel tank pressure is low.

2. COMPONENT DESCRIPTION

The drain valve adjusts the pressure in the canister by introducing/extracting air when pressure differences occur in the canister with the atmospheric pressure.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V
Ignition switch	ON
Atmospheric pressure	≥ 75.0 kPa (563 mmHg, 22.17 inHg)
Tank pressure when starter is OFF → ON	–0.53 ←→ 0.39 kPa (–4 ←→ 2.9 mmHg, –0.16 ←→ 0.12 inHg)
Drain valve	Open

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time of completing the malfunction criteria below becomes more than 3 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Tank pressure	≤ – 4.0 kPa (–30 mmHg, –1.18 inHg)

Time Needed for Diagnosis: 3 seconds
Malfunction Indicator Light: 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
Tank pressure	> – 4.0 kPa (–30 mmHg, –1.18 inHg)
Cumulative time when all of the malfunction criteria below is completed.	≥ 30 sec.
Purge control solenoid valve duty	Not = 0
Fuel temp.	–10 ←→ 45°C (14 ←→ 113°F)
Intake manifold relative pressure	≤ – 26.7 kPa (–200 mmHg, –7.87 inHg)

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Pressure control solenoid valve control: Open the pressure control solenoid valve

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

DL:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of starter SW.
Judge OFF NG when it turns to “after engine starting” while the starter has never been set to ON.

2. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Abnormality Judgment

Judge OFF NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Vehicle speed	< 1 km/h (0.62 MPH)
Starter OFF signal	Not detected
Engine speed in 0.8 seconds or more for which the condition that engine speed is less than 500 rpm continues.	≥ 500 rpm

Time Needed for Diagnosis: 0.8 second
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge OFF OK and clear the NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Starter OFF	Experienced
Starter OFF diagnosis	Not diagnosed
Battery voltage	> 8 V

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

DM: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 CONDITIONS

Secondary Parameters	Enable Conditions
None	

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time of completing the malfunction criteria below becomes more than 2.5 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Voltage of back-up power supply	Low
Battery voltage	≥ 10.9 V
Engine speed	> 500 rpm

Time Needed for Diagnosis: 2.5 seconds
Malfunction Indicator Light: 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
Voltage of back-up power supply	High
Battery voltage	≥ 10.9 V
Engine speed	> 500 rpm

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

None

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

DN:DTC P1570 ANTENNA

1. OUTLINE OF DIAGNOSIS

For the detection standard, refer to DTC P0513 NO INCORRECT IMMOBILIZER KEY. <Ref. to GD(H6DO)-168, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DO:DTC P1571 REFERENCE CODE INCOMPATIBILITY

1. OUTLINE OF DIAGNOSIS

For the detection standard, refer to DTC P0513 NO INCORRECT IMMOBILIZER KEY. <Ref. to GD(H6DO)-168, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DP:DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT)

1. OUTLINE OF DIAGNOSIS

For the detection standard, refer to DTC P0513 NO INCORRECT IMMOBILIZER KEY. <Ref. to GD(H6DO)-168, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DQ:DTC P1574 KEY COMMUNICATION FAILURE

1. OUTLINE OF DIAGNOSIS

For the detection standard, refer to DTC P0513 NO INCORRECT IMMOBILIZER KEY. <Ref. to GD(H6DO)-168, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DR:DTC P1576 EGI CONTROL MODULE EEPROM

1. OUTLINE OF DIAGNOSIS

For the detection standard, refer to DTC P0513 NO INCORRECT IMMOBILIZER KEY. <Ref. to GD(H6DO)-168, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DS:DTC P1577 IMM CONTROL MODULE EEPROM

1. OUTLINE OF DIAGNOSIS

For the detection standard, refer to DTC P0513 NO INCORRECT IMMOBILIZER KEY. <Ref. to GD(H6DO)-168, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DT:DTC P1578 METER FAILURE

1. OUTLINE OF DIAGNOSIS

For the detection standard, refer to DTC P0513 NO INCORRECT IMMOBILIZER KEY. <Ref. to GD(H6DO)-168, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Trouble Code (DTC) Detecting Criteria.>

DU:DTC P2088 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (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 CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 2 seconds or more.

Judgment Value

Malfunction Criteria	Threshold Value
Oil flow control solenoid valve control duty	≥ 99.61%
Oil control solenoid valve control present current	< 0.306 A

Time Needed for Diagnosis: 2000 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

Judge as OK and clear the NG when the continuous time of completing the malfunction criteria below becomes more than 2 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Target current value of the oil flow control solenoid valve	≥ 0.14%
|Target current value of the oil flow control solenoid valve – Oil flow control solenoid valve control current value|	≥ 0.08 A

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

Make the oil flow control solenoid valve driving duty a predetermined value (9.36%).

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

DV:DTC P2089 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (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 CONDITIONS

Secondary Parameters	Enable Conditions
Battery voltage	≥ 10.9 V

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 2 seconds or more.

Judgment Value

Malfunction Criteria	Threshold Value
Oil flow control solenoid valve control duty	< 0.39%
Oil control solenoid valve control present current	≥ 0.306 A

Time Needed for Diagnosis: 2000 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Normality Judgment

Judge as OK and clear the NG when the continuous time of completing the malfunction criteria below becomes more than 2 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
|Target current value of the oil flow control solenoid valve – Oil flow control solenoid valve control current value|	< 0.08 A

5. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

6. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

7. FAIL SAFE

Make the oil flow control solenoid valve driving duty a predetermined value (9.36%).

8. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

DW:DTC P2092 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection procedure, refer to DTC P2088. <Ref. to GD(H6DO)-194, DTC P2088 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

DX:DTC P2093 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 2)

1. OUTLINE OF DIAGNOSIS

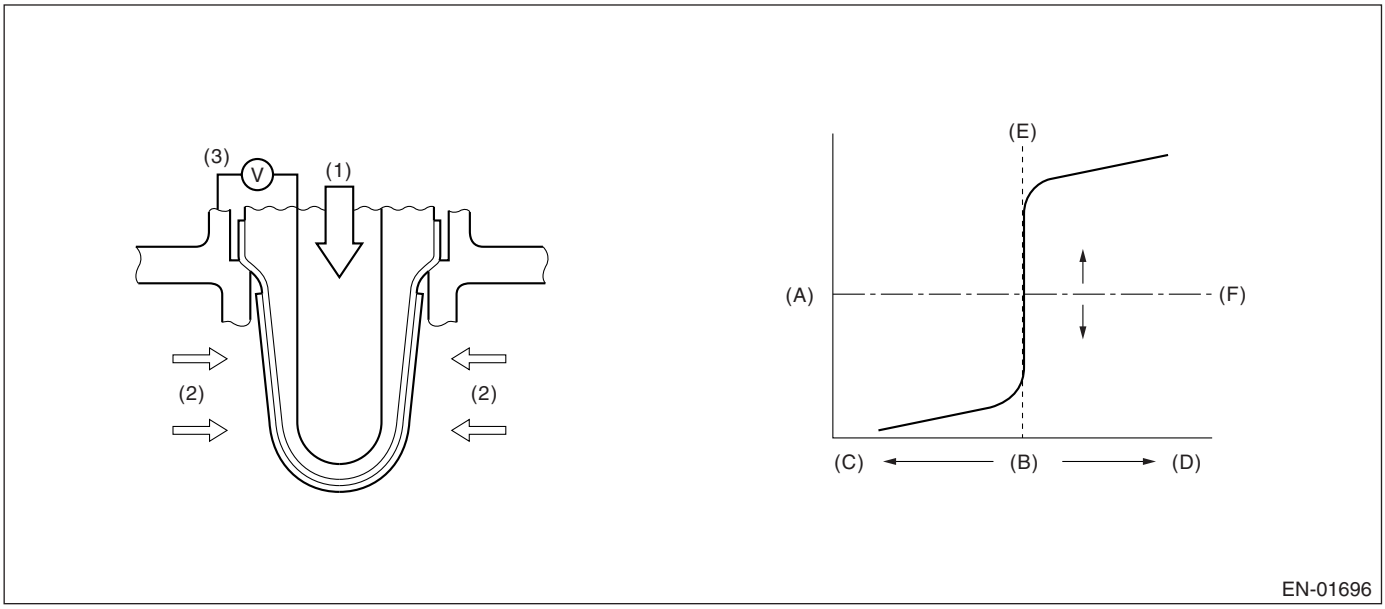
NOTE:
For the detection procedure, refer to DTC P2089. <Ref. to GD(H6DO)-195, DTC P2089 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

DY: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	(C)	Rich	(E)	Theoretical air fuel ratio
(B)	Air fuel ratio	(D)	Lean	(F)	Comparative voltage
(1)	Atmosphere	(2)	Exhaust gas	(3)	Electromotive force

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Continuous time when all conditions are established.	≥ 1 sec.
Sub feedback learning execution conditions	Complete

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when idling or when the vehicle is at a constant speed of 80 km/h (50 MPH).

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time when the following conditions are established is higher than 5 seconds.
Judge as OK and clear the NG when the continuous time of the following conditions not being established is more than 5 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Sub feedback learning value	< –0.023

Time Needed for Diagnosis: 5 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When similar driving conditions are repeated 3 times and the result is OK.
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

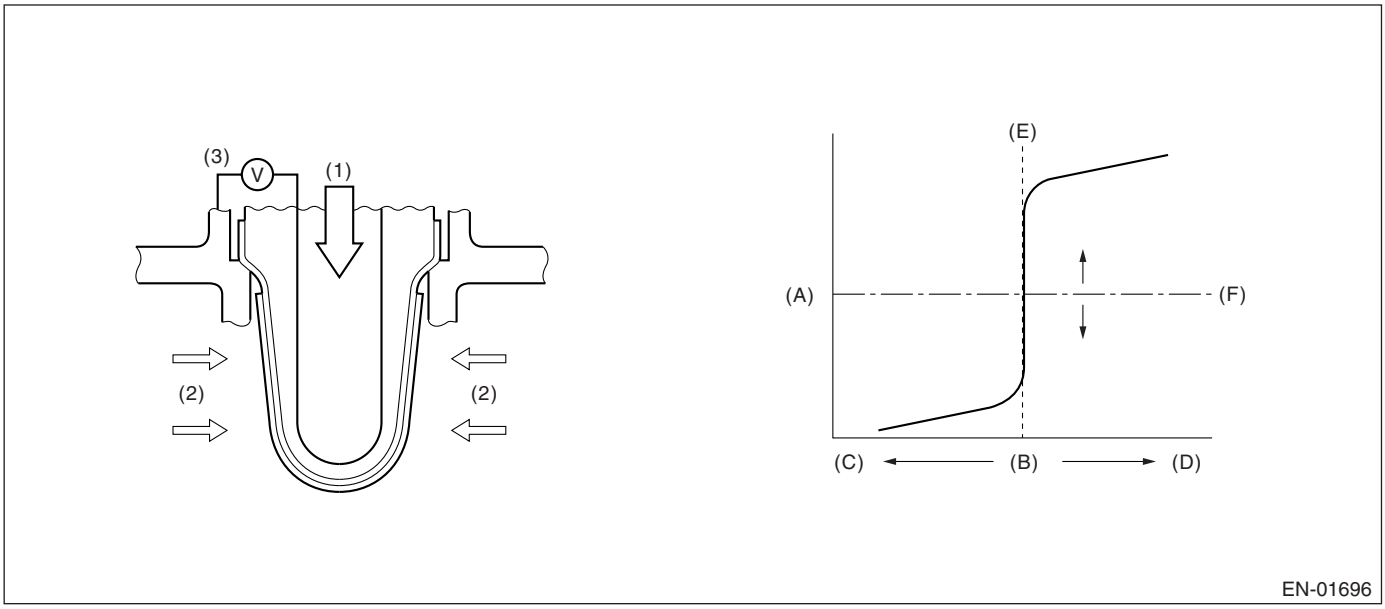
Memorize the freeze frame data. (For test mode $02)

DZ: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



(A)	Electromotive force	(C)	Rich	(E)	Theoretical air fuel ratio
(B)	Air fuel ratio	(D)	Lean	(F)	Comparative voltage
(1)	Atmosphere	(2)	Exhaust gas	(3)	Electromotive force

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Continuous time when all conditions are established.	≥ 1 sec.
Sub feedback learning execution conditions	Completed

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when idling or when the vehicle is at a constant speed of 80 km/h (50 MPH).

5. DIAGNOSTIC METHOD

Judge as NG when the continuous time when the following conditions are established is higher than 5 seconds.
Judge as OK and clear the NG when the continuous time when the following conditions are not established is more than 5 seconds.

Judgment Value

Malfunction Criteria	Threshold Value
Sub feedback learning value	≥ 0.018

Time Needed for Diagnosis: 5 seconds
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When similar driving conditions are repeated 3 times and the result is OK.
- When “Clear Memory” is performed

8. FAIL SAFE

None

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

EA:DTC P2098 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 2)

1. OUTLINE OF DIAGNOSIS

NOTE:
For the detection procedure, refer to DTC P2096. <Ref. to GD(H6DO)-197, DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

EB:DTC P2099 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 2)

1. OUTLINE OF DIAGNOSIS

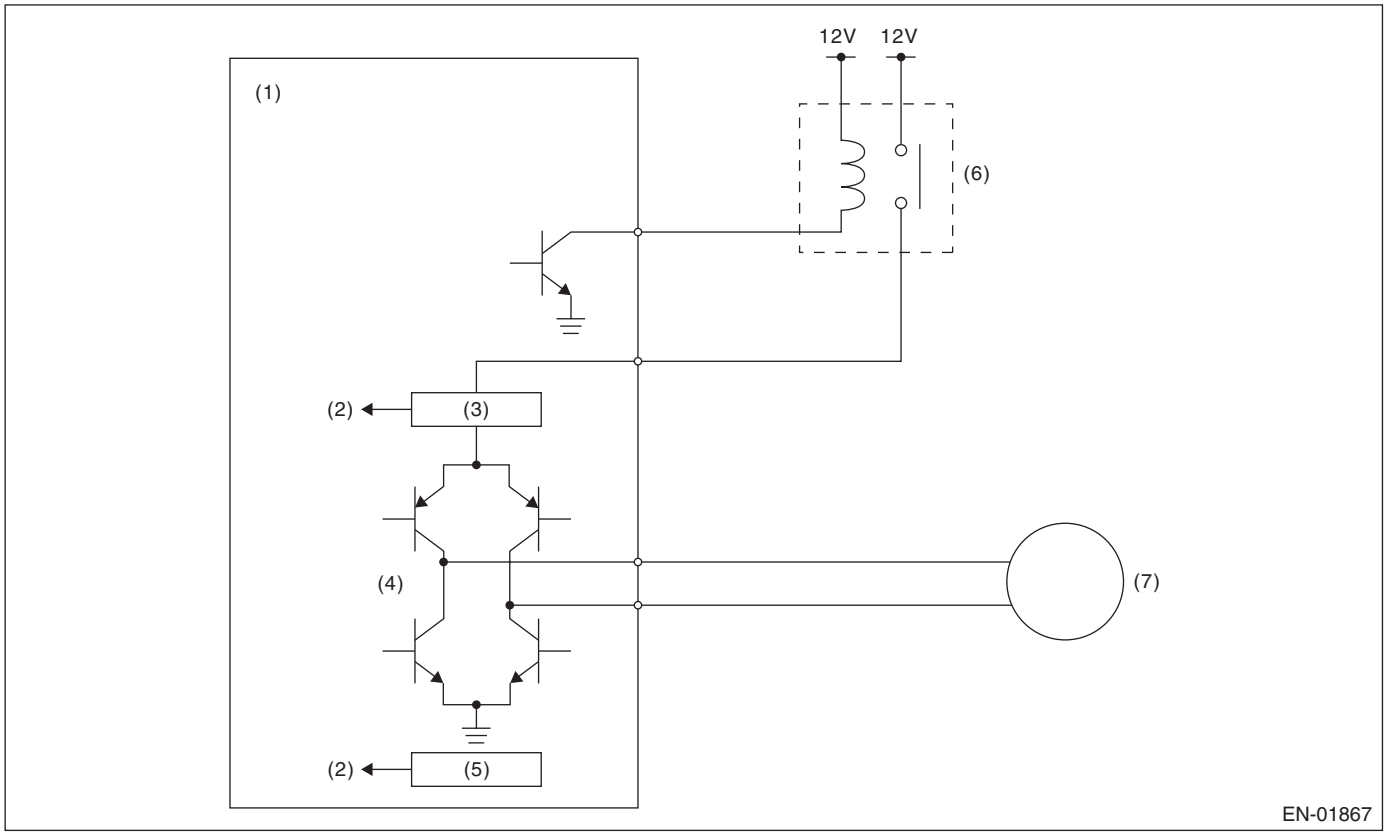
NOTE:
For the detection procedure, refer to DTC P2097. <Ref. to GD(H6DO)-199, DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH (BANK 1), Diagnostic Trouble Code (DTC) Detecting Criteria.>

EC: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



(1) Engine control module (ECM)
(2) Detecting circuit
(3) Overcurrent detection circuit
(4) Drive circuit
(5) Temperature detection circuit
(6) Electronic throttle control relay
(7) Motor

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Under control of electronic throttle control	ON

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
Motor current	≤ 8 A
Drive circuit inner temperature	≤ 175°C (347°F)

Time Needed for Diagnosis:
- 500 milliseconds (For NG)
- 2000 milliseconds (For OK)

Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

9. ECM OPERATION AT DTC SETTING

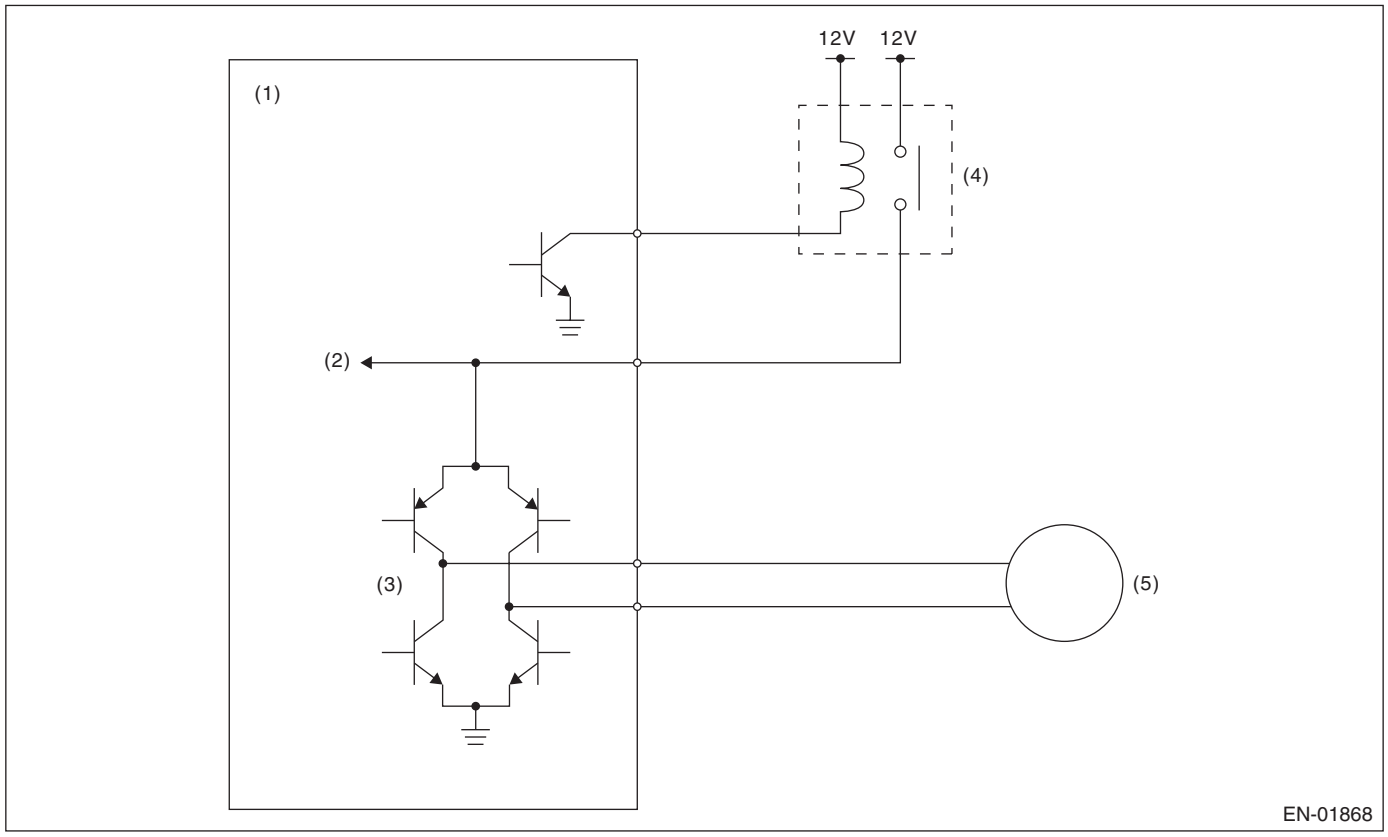
Memorize the freeze frame data. (For test mode $02)

ED: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 electric control throttle relay to ON.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Voltage detection circuit
(3) Drive circuit
(4) Electronic throttle control relay
(5) Motor

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Electronic control throttle relay output	ON

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
Motor power voltage	≥ 5 V

Time Needed for Diagnosis:
- 400 milliseconds (For NG)
- 2000 milliseconds (For OK)

Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

9. ECM OPERATION AT DTC SETTING

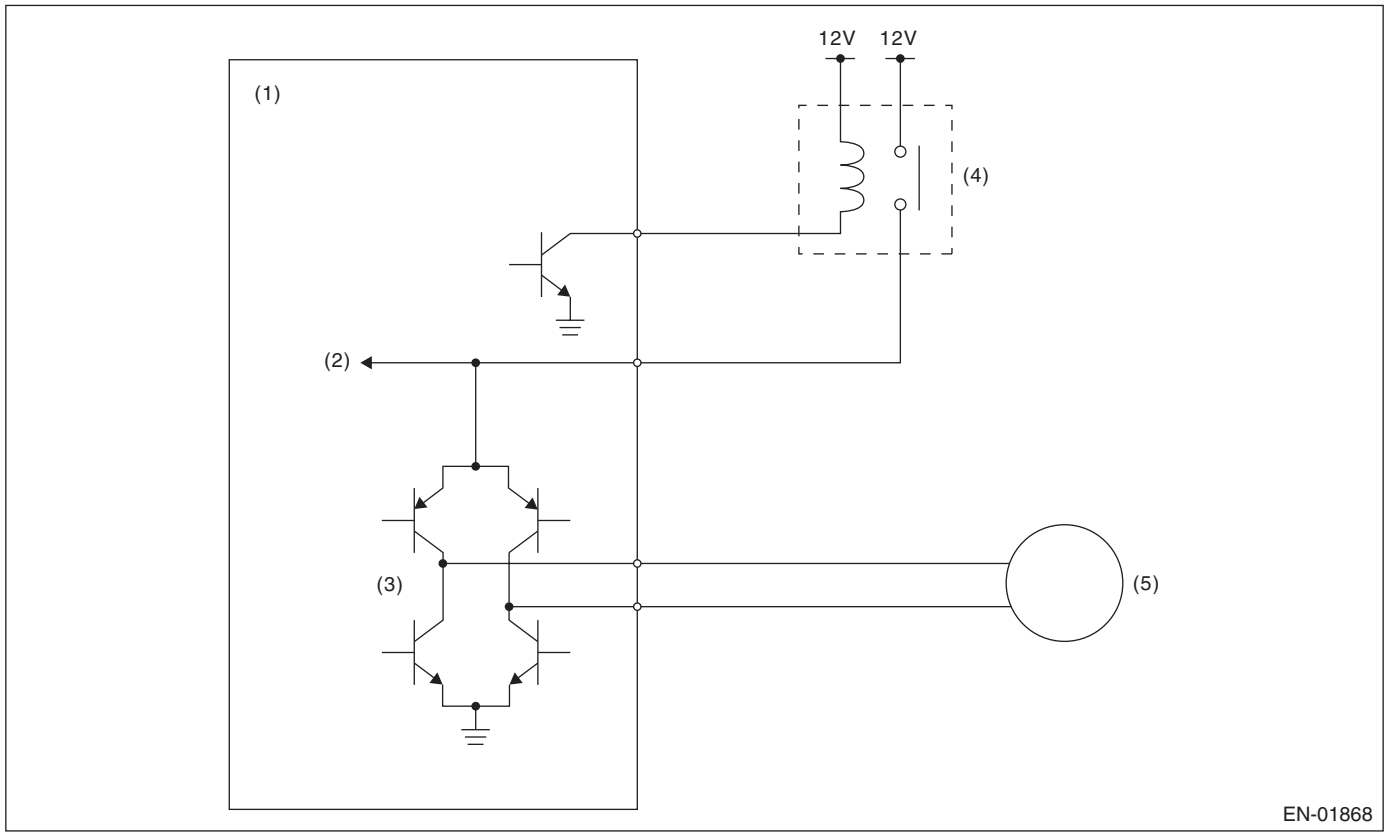
Memorize the freeze frame data. (For test mode $02)

EE:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

1. OUTLINE OF DIAGNOSIS

Judge as NG when the electronic throttle control power is not supplied even when ECM sets the electric throttle control relay to OFF.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Voltage detection circuit
(3) Drive circuit
(4) Electronic throttle control relay
(5) Motor

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Electronic control throttle relay output	OFF

4. GENERAL DRIVING CYCLE

- When ignition switch ON → OFF
- Ignition switch OFF → ON (Only after clearing memory)

5. DIAGNOSTIC METHOD

Judge as OK and clear the NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Motor power voltage	≤ 5 V

Time Needed for Diagnosis:
- 600 milliseconds (For NG)
- 400 milliseconds (For OK)

Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

9. ECM OPERATION AT DTC SETTING

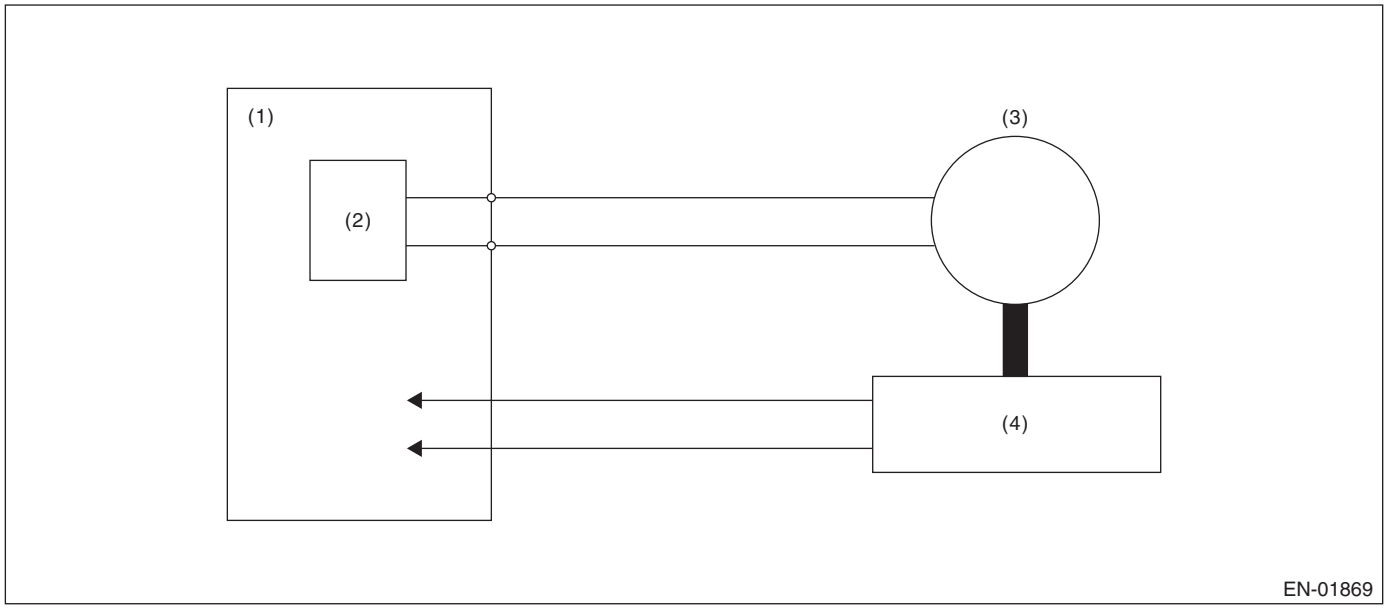
Memorize the freeze frame data. (For test mode $02)

EF:DTC P2109 THROTTLE/PEDAL POSITION SENSOR A MINIMUM STOP PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Judge as NG when fully close point learning cannot conducted or abnormal value is detected.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Drive circuit
(3) Motor
(4) Throttle position sensor

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON → OFF
Ignition switch (after clear memory only)	OFF → ON

4. GENERAL DRIVING CYCLE

Perform the diagnosis at all close point learning.

5. DIAGNOSTIC METHOD

Judge as OK and clear the NG when the malfunction criteria below are met.

Judgement Value 1

Malfunction Criteria	Threshold Value
Main throttle full closed point learning position when IG is ON	10.127° — 19.872°
Main throttle full closed point learning position when IG is OFF	10.127° — 19.872°

Time Needed for Diagnosis: 8 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

Judgement Value 2

Malfunction Criteria	Threshold Value
Throttle opening angle when IG is ON – Throttle full closed position	≥ 1.683°

Time Needed for Diagnosis: 80 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6°.)

9. ECM OPERATION AT DTC SETTING

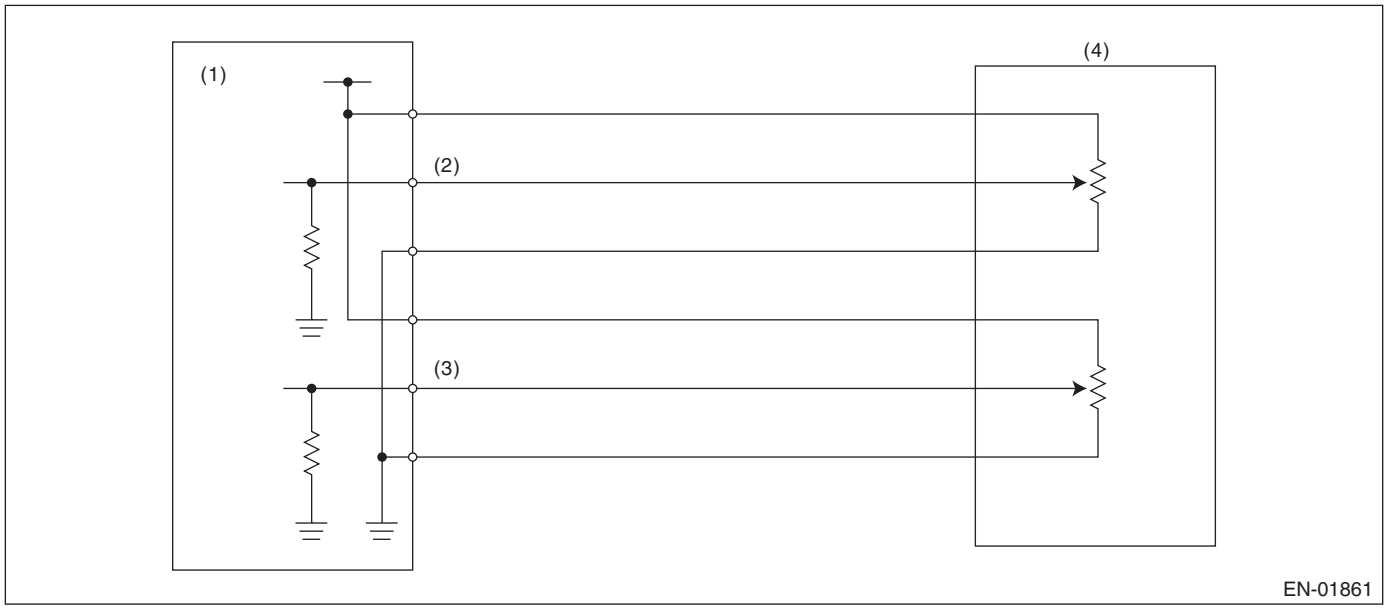
Memorize the freeze frame data. (For test mode $02)

EG: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 it is out of specification.

2. COMPONENT DESCRIPTION



(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 CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

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
Sensor 1 input voltage	≥ 0.219 V

Time Needed for Diagnosis: 100 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

- Single malfunction: Control with normal sensor
- Simultaneous failure: Throttle opening is fixed to 6.375°.

9. ECM OPERATION AT DTC SETTING

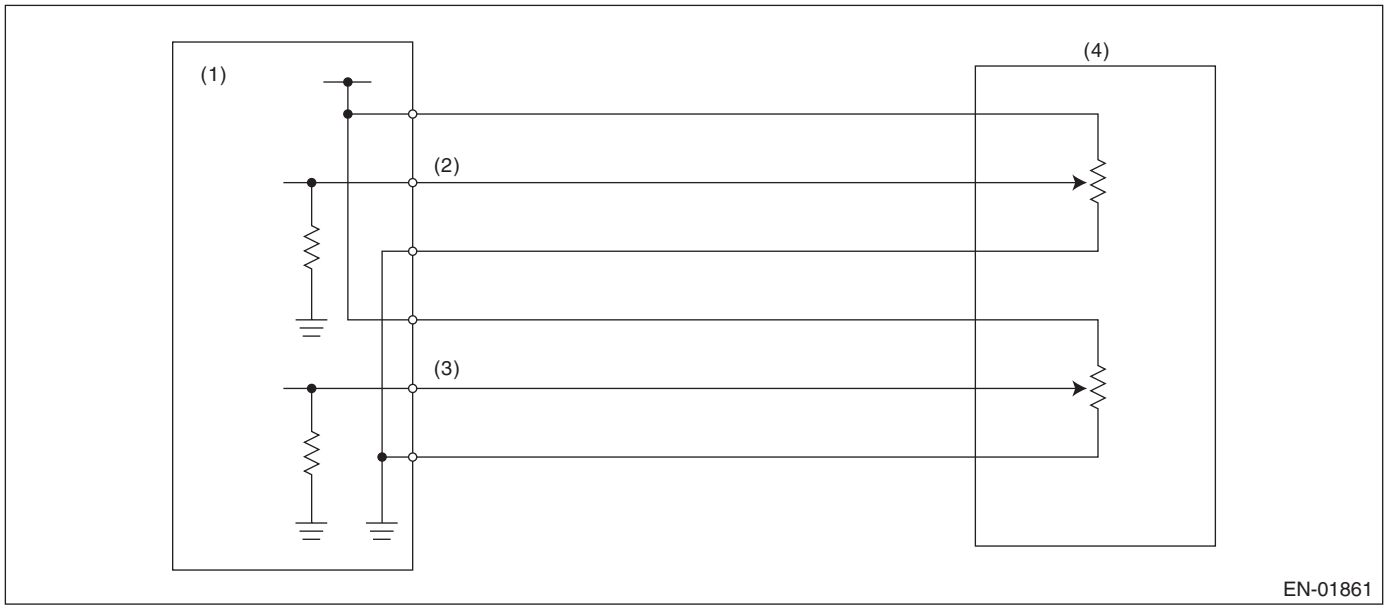
Memorize the freeze frame data. (For test mode $02)

EH: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 it is out of specification.

2. COMPONENT DESCRIPTION



(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 CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

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
Sensor 1 input voltage	≤ 4.781 V

Time Needed for Diagnosis: 32 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

- Single malfunction: Control with normal sensor
- Simultaneous failure: Throttle opening is fixed to 6.375°.

9. ECM OPERATION AT DTC SETTING

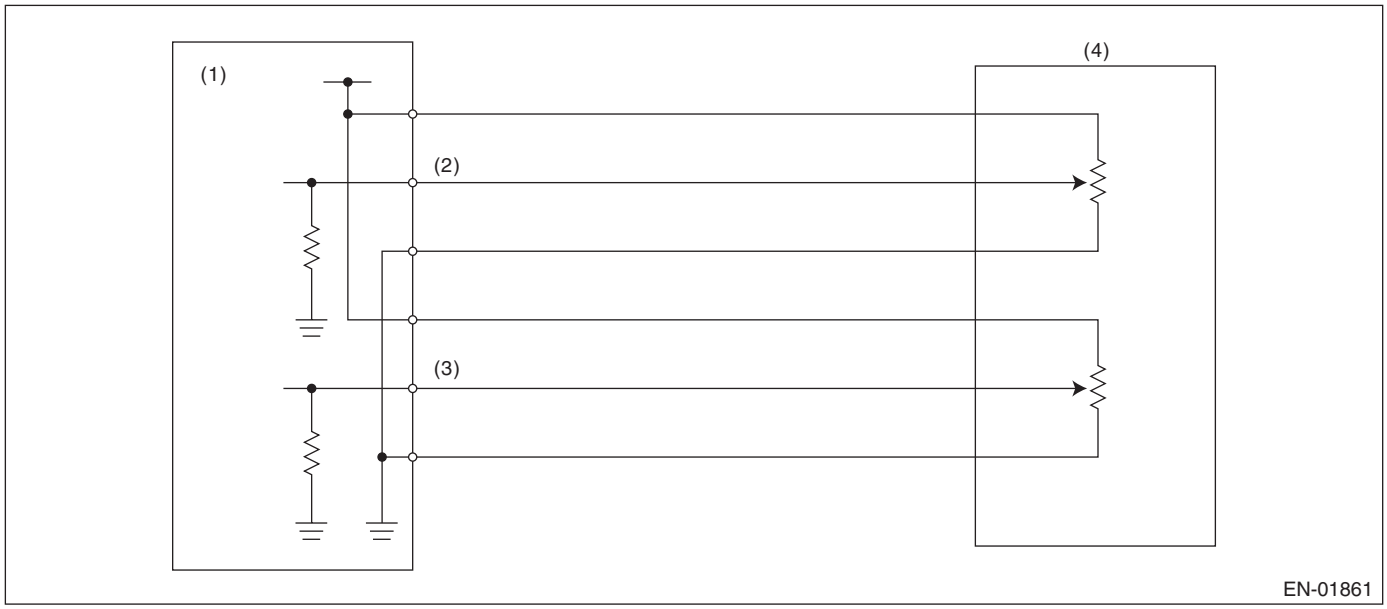
Memorize the freeze frame data. (For test mode $02)

EI: 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 it is out of specification.

2. COMPONENT DESCRIPTION



(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 CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

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
Sensor 2 input voltage	≥ 0.219 V

Time Needed for Diagnosis: 100 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

- Single malfunction: Control with normal sensor
- Simultaneous failure: Throttle opening is fixed to 6.375°.

9. ECM OPERATION AT DTC SETTING

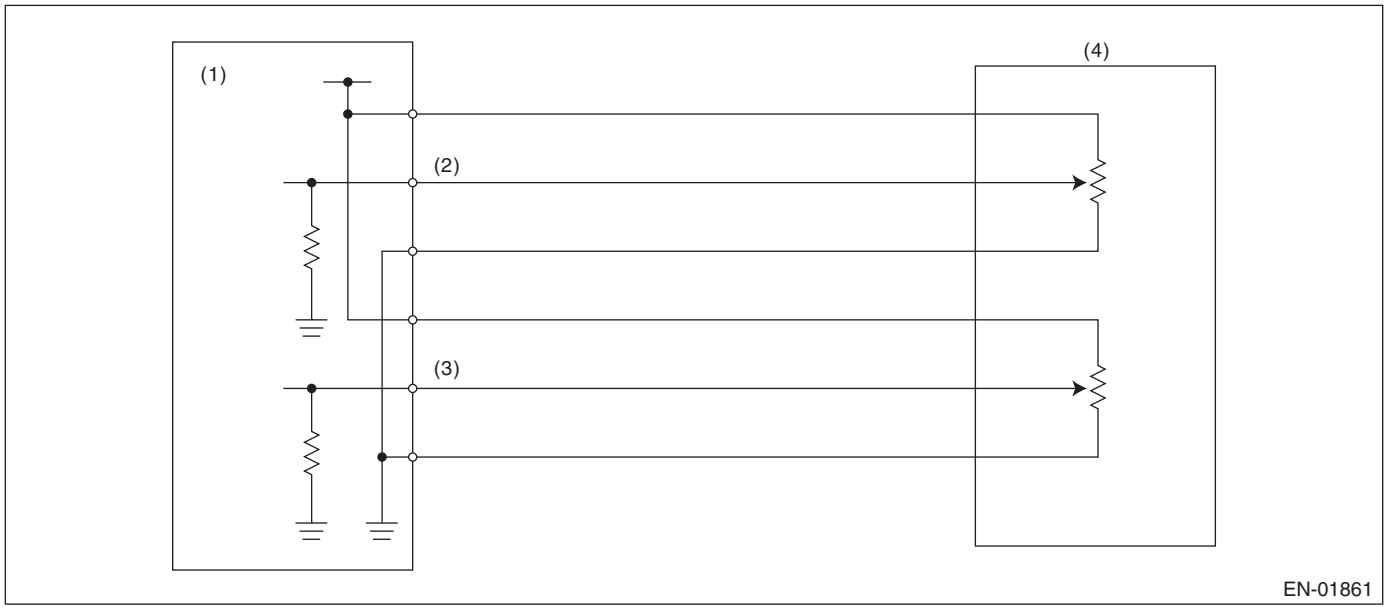
Memorize the freeze frame data. (For test mode $02)

EJ: 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 it is out of specification.

2. COMPONENT DESCRIPTION



(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 CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

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
Sensor 2 input voltage	≤ 4.781 V

Time Needed for Diagnosis: 100 milliseconds
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

- Single malfunction: Control with normal sensor
- Simultaneous failure: Throttle opening is fixed to 6.375°.

9. ECM OPERATION AT DTC SETTING

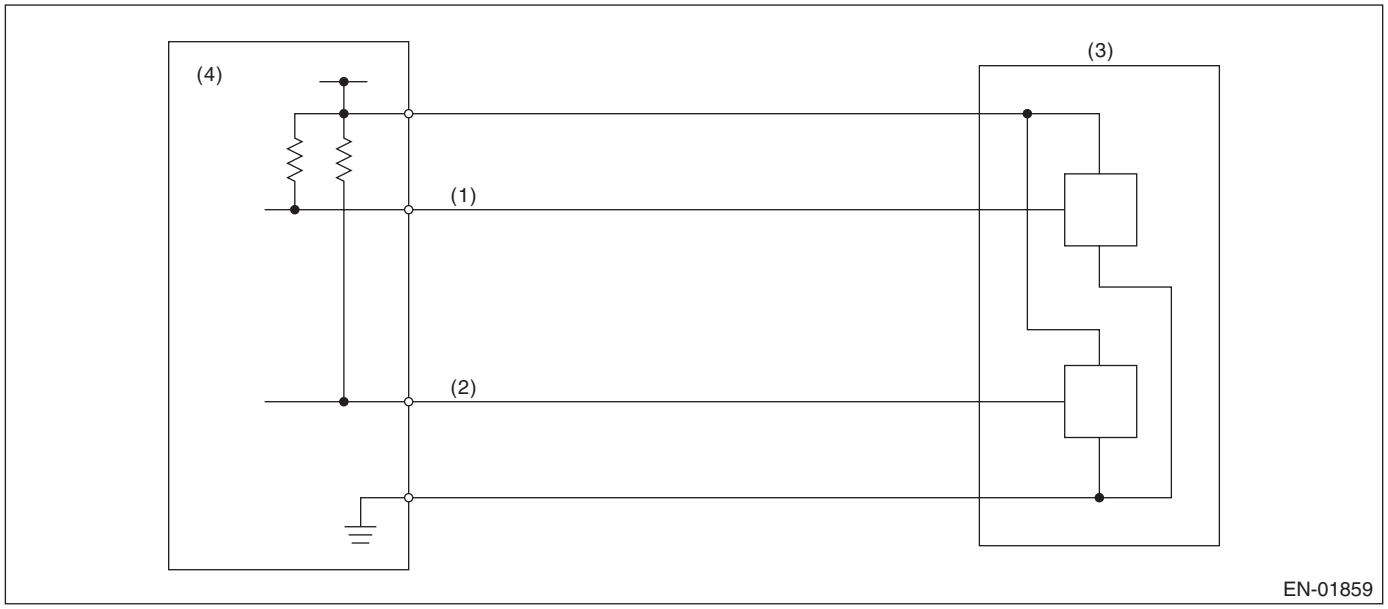
Memorize the freeze frame data. (For test mode $02)

EK:DTC P2135 THROTTLE/PEDAL POSITION SENSOR/ SWITCH “A”/“B” VOLTAGE RATIONALITY

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 CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

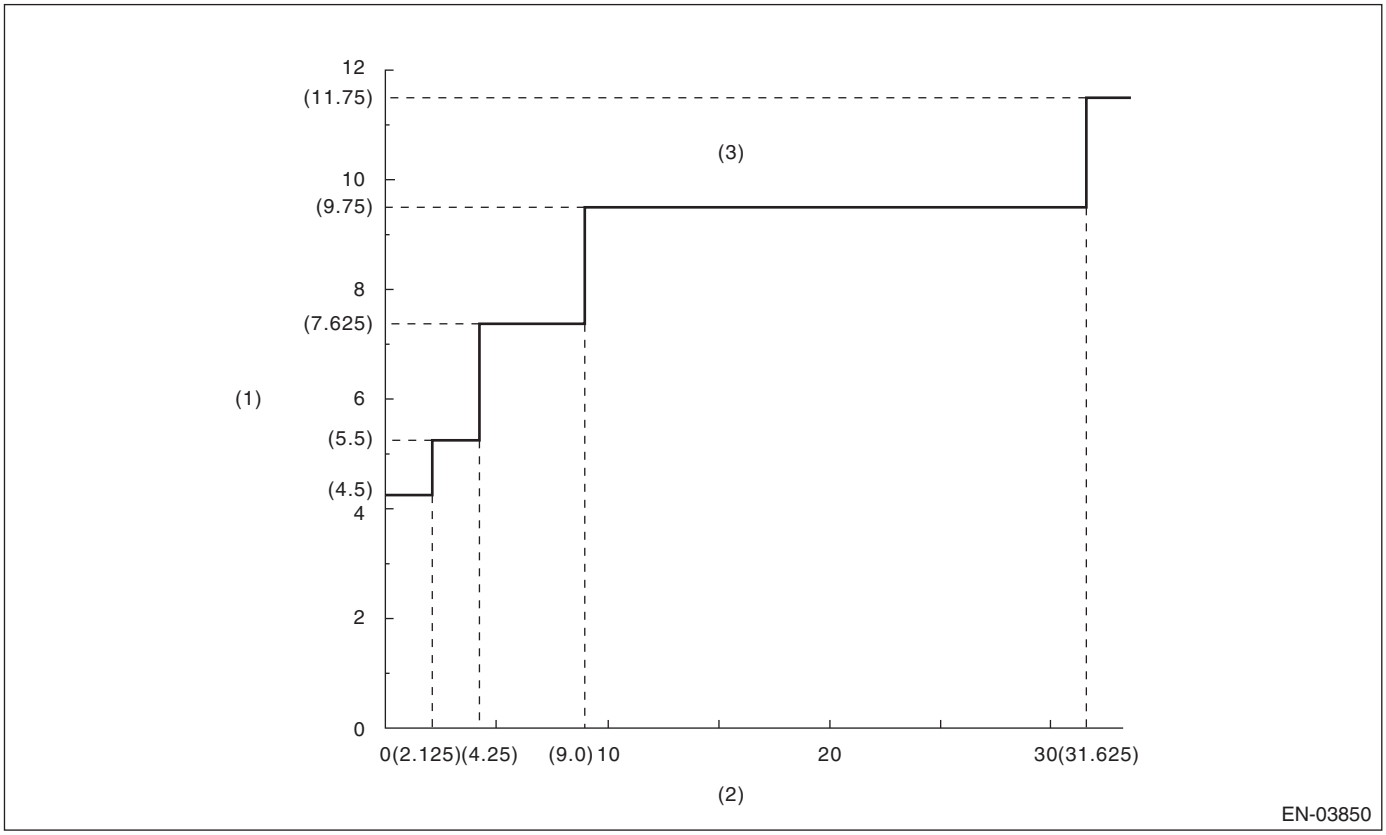
5. DIAGNOSTIC METHOD

Judge as OK and clear the NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Signal difference between two sensors	≤ 4.5°

Details of Judgment Value



(1) Sensor output difference (°)
(2) Throttle position sensor 1 opening angle (°)
(3) NG area

Time Needed for Diagnosis: 24 milliseconds (For NG), 24 milliseconds (For OK)
Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed (Only engine stop)

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed (Only engine stop)

8. FAIL SAFE

Stop the continuity to the electronic control throttle motor. (Throttle opening is fixed to 6.375°.)

9. ECM OPERATION AT DTC SETTING

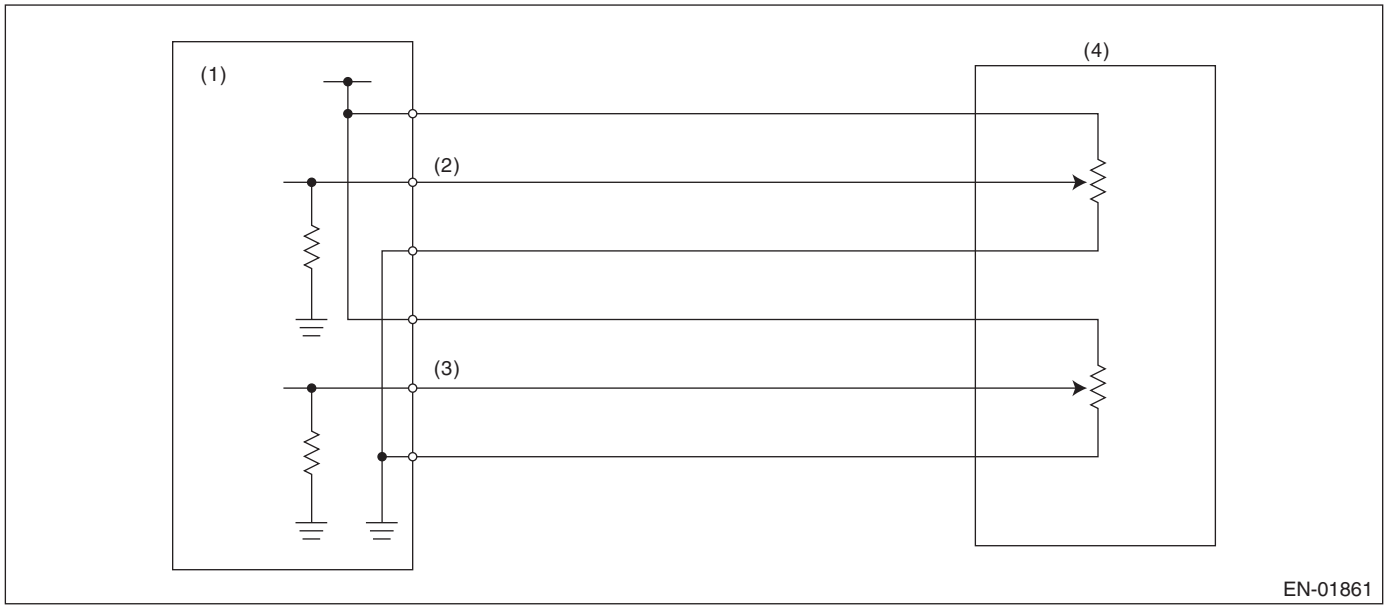
Memorize the freeze frame data. (For test mode $02)

EL:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/ SWITCH “D”/“E” VOLTAGE RATIONALITY

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)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal.
(4) Accelerator pedal position sensor

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Ignition switch	ON

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

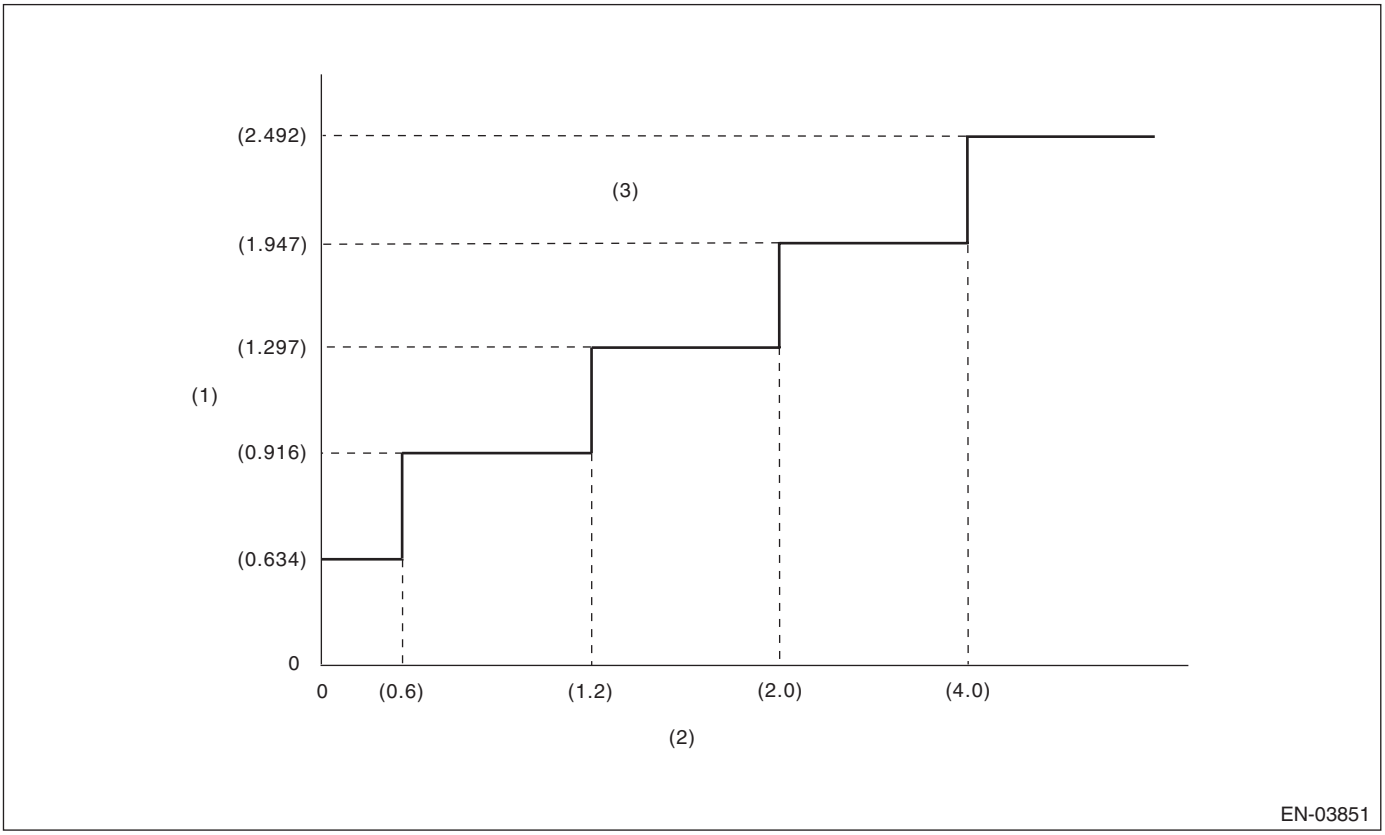
5. DIAGNOSTIC METHOD

Judge as OK and clear the NG when the malfunction criteria below are met.

Judgment Value

Malfunction Criteria	Threshold Value
Signal difference between two sensors	≤ 0.634°

Details of Judgment Value



(1) Sensor output difference (°)
(2) Throttle position sensor 2 opening angle (°)
(3) NG area

Time Needed for Diagnosis:
- 116 milliseconds (For NG)
- 1000 milliseconds (For OK)

Malfunction Indicator Light: Illuminates as soon as a malfunction occurs.

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Throttle opening is fixed to 6.375°.

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

EM:DTC P2227 BAROMETRIC PRESSURE CIRCUIT RANGE/ PERFORMANCE

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of atmospheric pressure sensor output property.
Judge as NG when the atmospheric pressure sensor output is largely different from the intake manifold pressure at engine starting.

2. COMPONENT DESCRIPTION

The barometric pressure sensor is built into the ECM.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
Engine RPM at engine starting	< 300 rpm
Vehicle Speed	< 1 km/h (0.62 MPH)
Diagnosis for atmospheric pressure sensor property	Incomplete

4. GENERAL DRIVING CYCLE

Perform the diagnosis once at ignition switch ON.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 0.3 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
|Atmospheric pressure – Manifold pressure|	≥ 26.7 kPa (200 mmHg, 7.88 inHg)
|Intake manifold pressure at engine startup – Manifold pressure|	< 1.33 kPa (10 mmHg, 2.95 inHg)

Time Needed for Diagnosis: 0.3 second
Malfunction Indicator Light Illumination: Illuminates when malfunctions occur in 2 continuous driving cycles.

Normality Judgment

Judge as OK and clear the NG when the continuous time of completing the malfunction criteria below becomes more than 0.262 second.

Judgment Value

Malfunction Criteria	Threshold Value
|Atmospheric pressure – Manifold pressure|	< 26.7 kPa (200 mmHg, 7.88 inHg)

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Atmospheric pressure sensor process: Atmospheric pressure fixed at 101 kPa (760 mmHg, 29.8 inHg).

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

EN:DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open/short circuit of the atmospheric pressure sensor.
Judge as NG if it is out of specification.

2. COMPONENT DESCRIPTION

The barometric pressure sensor is built into the ECM.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 0.5 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Ignition switch	ON
Output voltage	< 0.118 V

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: 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
Ignition switch	ON
Output voltage	≥ 0.118 V

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Atmospheric pressure sensor process: Atmospheric pressure fixed at 101 kPa (760 mmHg, 29.8 inHg).

9. ECM OPERATION AT DTC SETTING

Memorize the freeze frame data. (For test mode $02)

EO:DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

1. OUTLINE OF DIAGNOSIS

Detect the open/short circuit of the atmospheric pressure sensor.
Judge as NG if it is out of specification.

2. COMPONENT DESCRIPTION

The barometric pressure sensor is built into the ECM.

3. ENABLE CONDITIONS

Secondary Parameters	Enable Conditions
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Abnormality Judgment

Judge as NG when the continuous time until completing the malfunction criteria below becomes 0.5 second or more.

Judgment Value

Malfunction Criteria	Threshold Value
Ignition switch	ON
Output voltage	≥ 4.936 V

Time Needed for Diagnosis: 0.5 second
Malfunction Indicator Light: 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
Ignition switch	ON
Output voltage	< 4.936 V

6. DTC CLEAR CONDITION

- When the OK idling cycle is completed 40 times in a row
- When “Clear Memory” is performed

7. MALFUNCTION INDICATOR LIGHT CLEAR CONDITIONS

- When the OK driving cycle is completed 3 times in a row
- When “Clear Memory” is performed

8. FAIL SAFE

Atmospheric pressure sensor process: Atmospheric pressure fixed at 101 kPa (760 mmHg, 29.8 inHg).

9. ECM OPERATION AT DTC SETTING

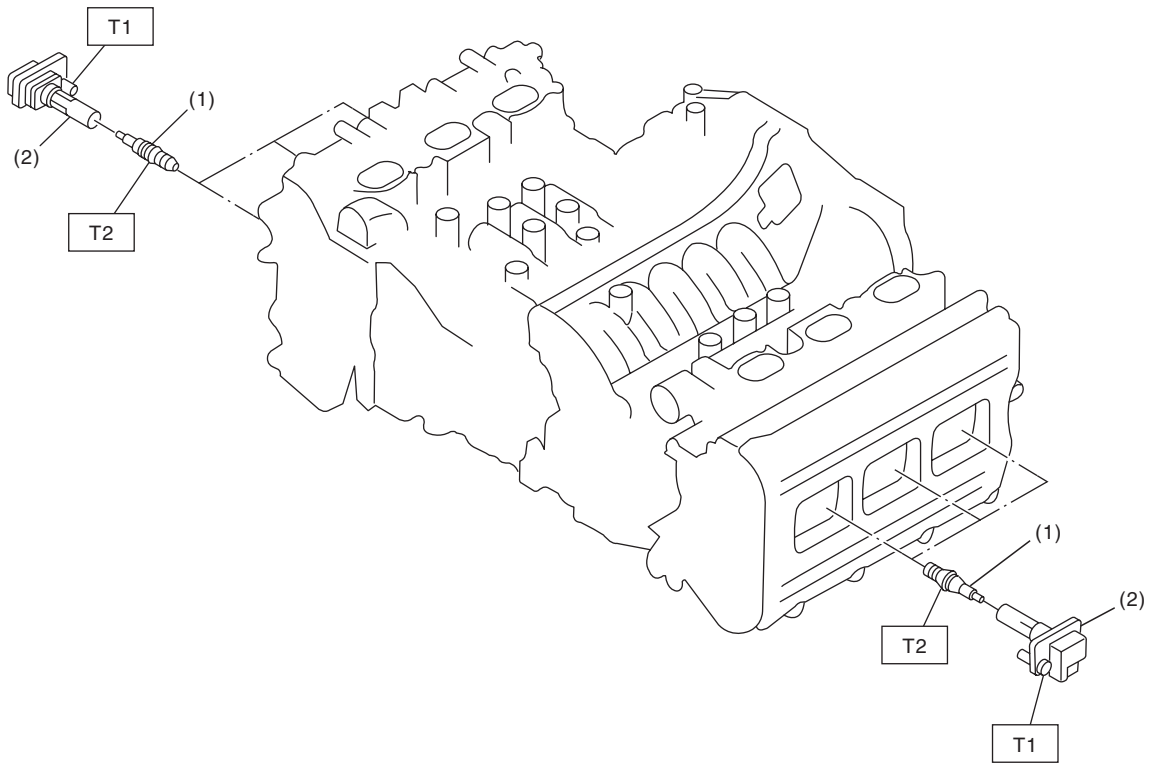
Memorize the freeze frame data. (For test mode $02)

1. General Description

A: SPECIFICATION

Item		Specification
Ignition coil & ignitor ASSY	Type	FK0140
	Ignition system	Independent ignition coil
	Manufacturer	Diamond Electric
Spark plug	Manufacturer and type	NGK: ILFR6B
	Thread size (diameter, pitch, length) mm	14, 1.25, 26.5
	Spark plug gap mm (in)	0.7 — 0.8 (0.028 — 0.031)
	Electrode	Iridium

B: COMPONENT



IG-00052

(1) Spark plug
(2) Ignition coil & ignitor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.7)
T2: 21 (2.1, 15.2)

C: CAUTION

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

2. Spark Plug

A: REMOVAL

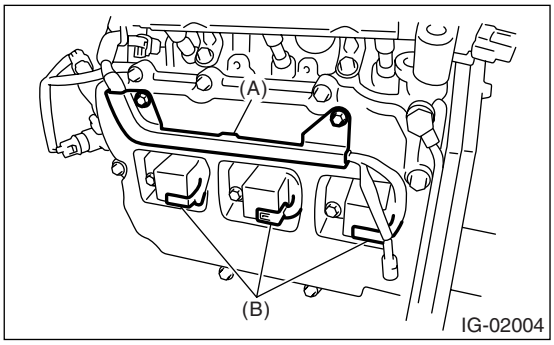
CAUTION:
All spark plugs installed on an engine must be of the same heat range.

Spark plug:
<Ref. to IG(H6DO)-2, SPECIFICATION, General Description.>

1. RH SIDE

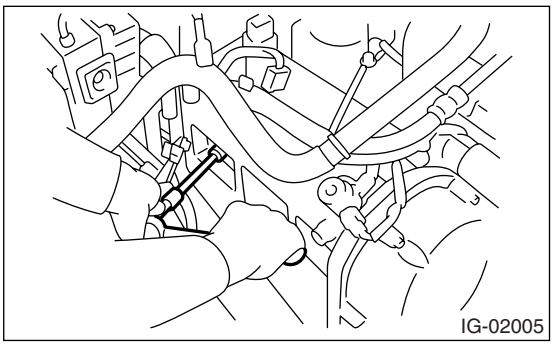
1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Remove the air cleaner case.
<Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.>
4) Remove the bracket.
5) Disconnect the connector from ignition coil.
6) Remove the ignition coil.

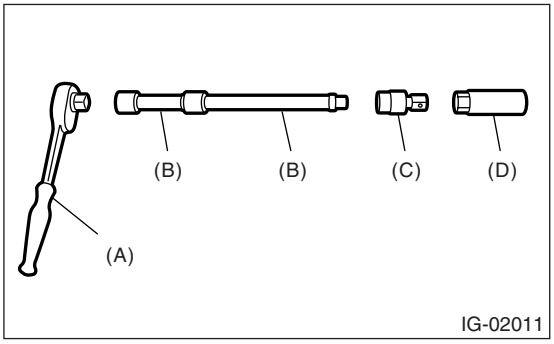
NOTE:
Turn the #5 ignition coil to remove it.



(A) Bracket
(B) Connector

7) Remove the spark plug with a spark plug socket.



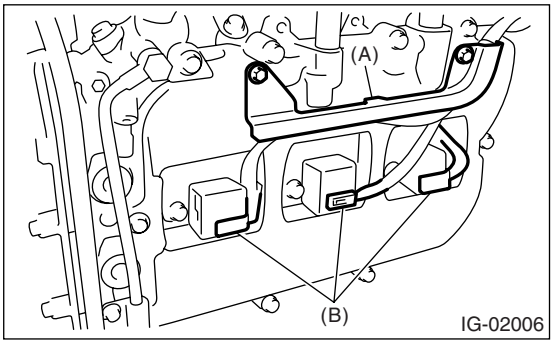


(A) Ratchet handle
(B) Extension bar
(C) Universal joint
(D) Spark plug socket

2. LH SIDE

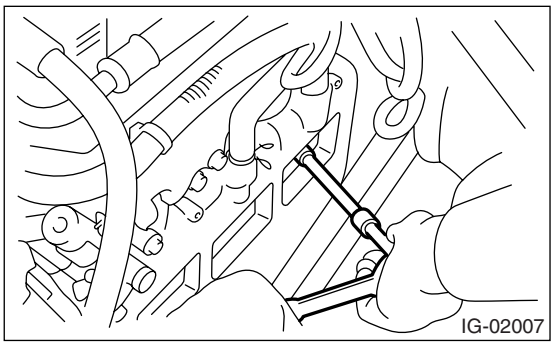
1) Remove the collector cover.
2) Remove the battery and battery carrier.
3) Remove the bracket.
4) Disconnect the connector from ignition coil.
5) Remove the ignition coil.

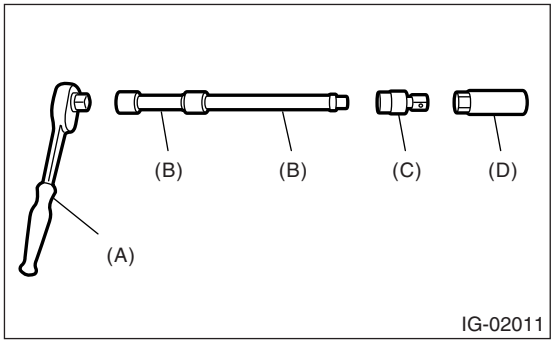
NOTE:
Turn the #6 ignition coil to remove it.



(A) Bracket
(B) Connector

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, 15.2 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.6 kgf-m, 11.7 ft-lb)

NOTE:
The tightening torque described above should be applied to only new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

2. LH SIDE

Install in the reverse order of removal.

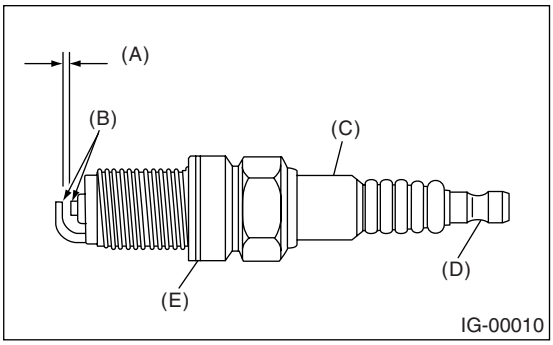
Tightening torque (Spark plug):
21 N·m (2.1 kgf-m, 15.2 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.6 kgf-m, 11.7 ft-lb)

NOTE:
The tightening torque described above should be applied to only new spark plugs without oil on their threads. In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

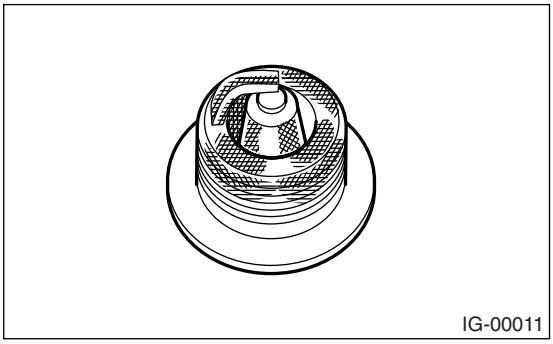
C: INSPECTION

Check the electrodes and inner and outer ceramic insulator of plugs, noting the type of deposits and the degree of electrode erosion.

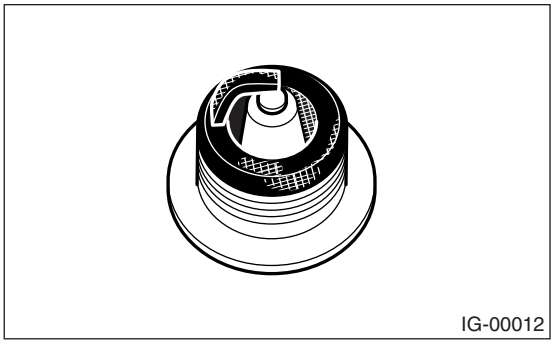


(A) Spark plug gap
(B) Carbon accumulation or wear
(C) Cracks
(D) Damage
(E) Damaged gasket

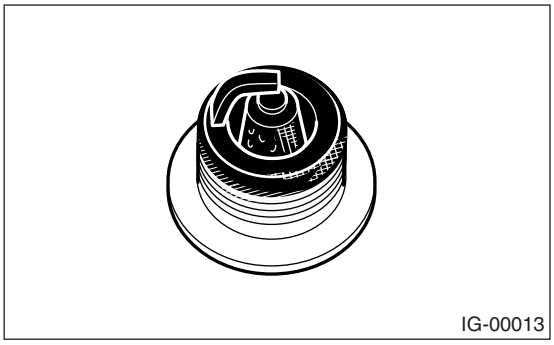
1) Normal:
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



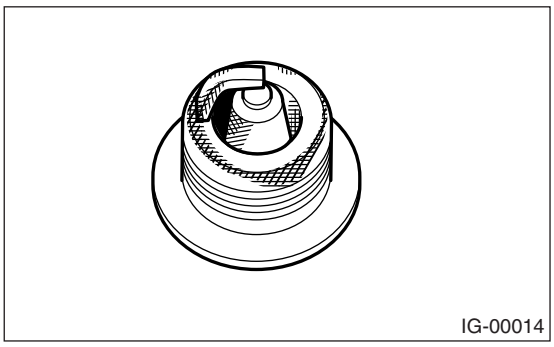
2) Carbon fouled:
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in the city, weak ignition, too rich fuel mixture and dirty air cleaner.


IG-00012

3) Oil fouled:
Wet black deposits show oil entrance into the combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems.


IG-00013

4) Overheating:
White or light gray insulator with black or brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc.

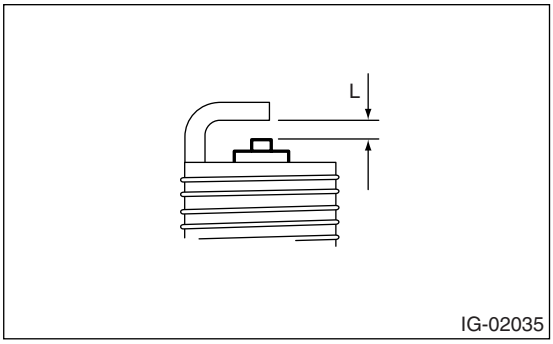

IG-00014

D: ADJUSTMENT

Clean the spark plugs using a wire brush. Clean and remove the carbon or oxide deposits. But do not wear away ceramic insulator at this time. If deposits are too stubborn, replace the spark plugs. After cleaning the spark plugs, measure the spark plug gap using a gap gauge.

NOTE:
Do not use a plug cleaner because the spark plugs are applied with iridium tip.

Spark plug gap L:
0.7 — 0.8 mm (0.028 — 0.031 in)



IG-02035

3. Ignition Coil & Ignitor Assembly

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.

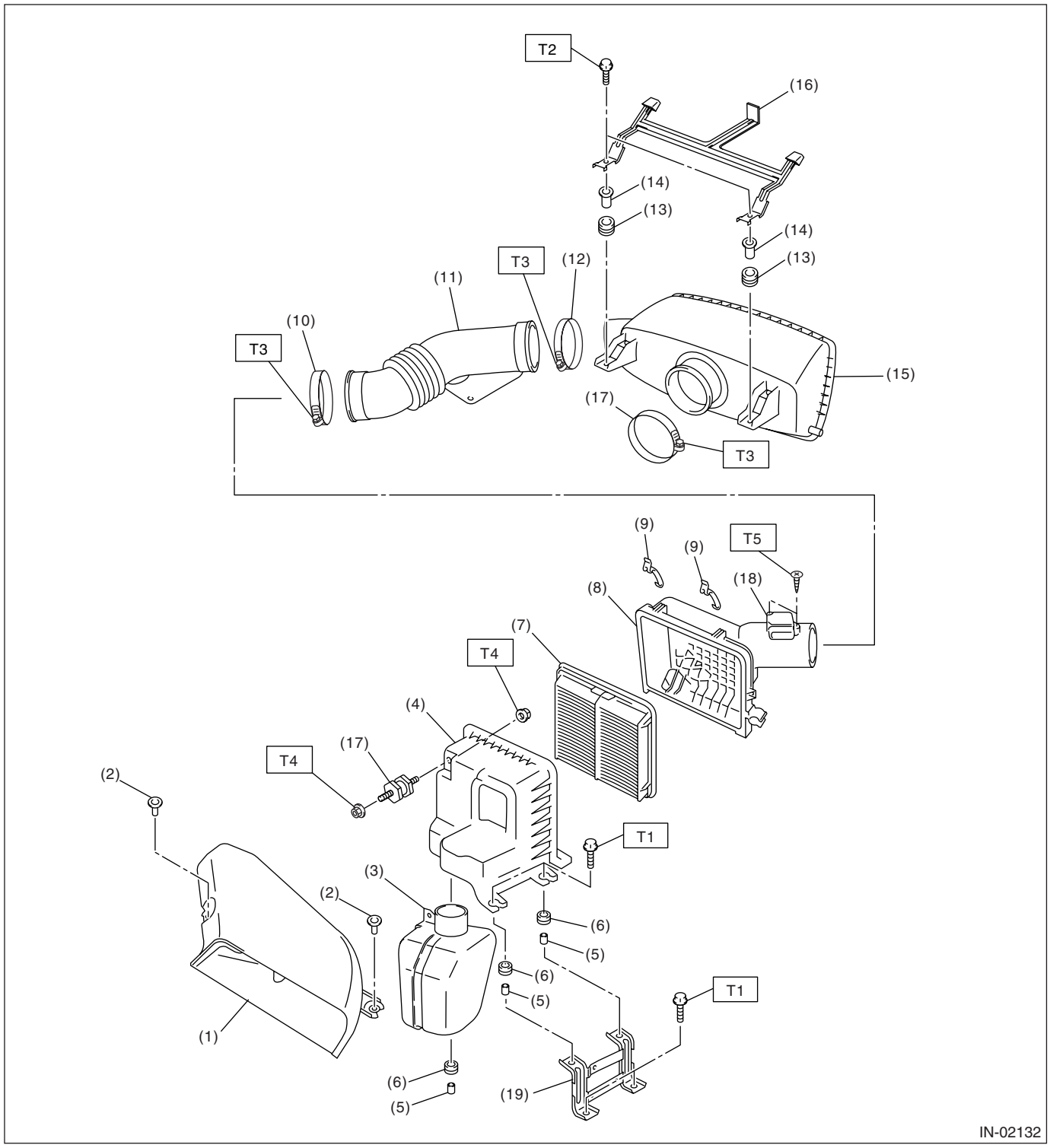
Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)

C: INSPECTION

For inspection procedure, refer to “Diagnostics for Engine Starting Failure.” <Ref. to EN(H6DO)(diag)-63, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>

1. General Description

A: COMPONENT



(1) Air intake duct
(2) Clip
(3) Resonator chamber
(4) Air cleaner case (front)
(5) Spacer
(6) Cushion
(7) Air cleaner element
(8) Air cleaner case (rear)
(9) Clip
(10) Clamp
(11) Intake duct
(12) Clamp
(13) Cushion
(14) Spacer
(15) Air intake chamber
(16) Collector cover bracket
(17) Cushion
(18) Mass air flow and intake air temperature sensor
(19) Air cleaner bracket

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*6.0 (0.6, 4.4)*
T2:	*6.4 (0.65, 4.7)*
T3:	*3.0 (0.3, 2.2)*
T4:	*7.5 (0.76, 5.5)*
T5:	*1.0 (0.10, 0.7)*

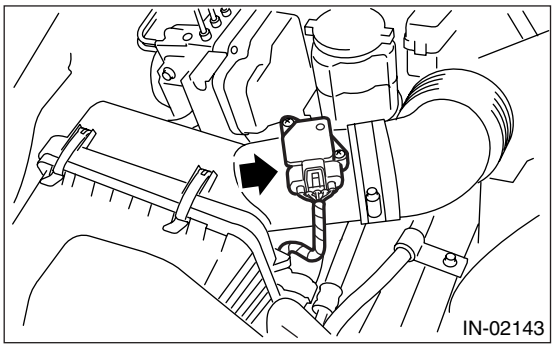
B: CAUTION

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

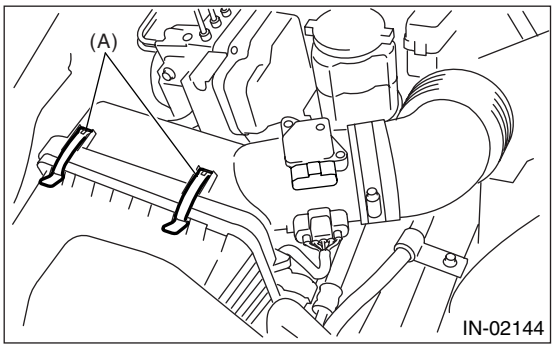
2. Air Cleaner Element

A: REMOVAL

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



3) Remove the clip (A) securing upper side of air cleaner case.

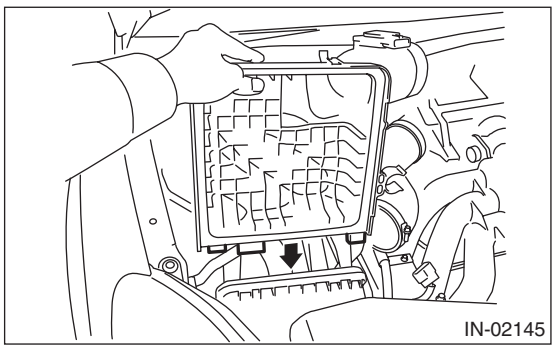


4) Pull the air cleaner case (rear) backward of the vehicle, and remove the air cleaner element.

B: INSTALLATION

Install in the reverse order of removal.

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



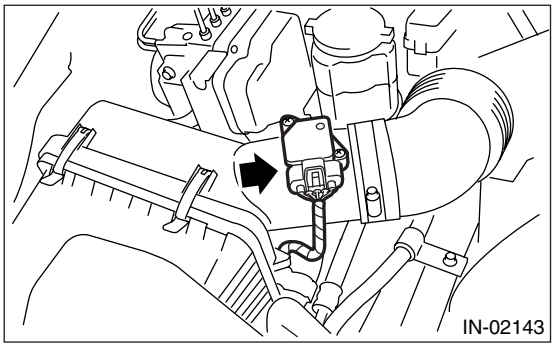
C: INSPECTION

Replace if excessively damaged or dirty.

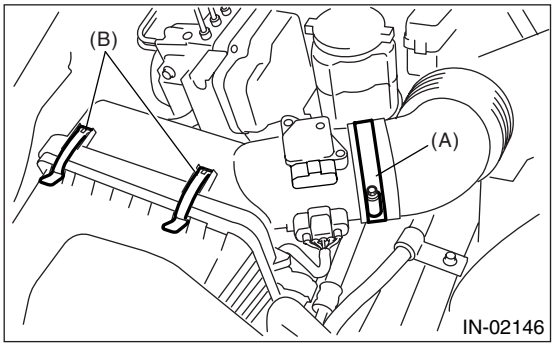
3. Air Cleaner Case

A: REMOVAL

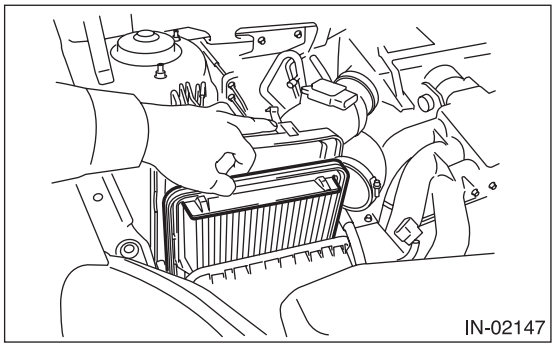
1) Disconnect the ground cable from battery.
2) Remove the air intake duct. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
3) Disconnect the connector from mass air flow and intake air temperature sensor.



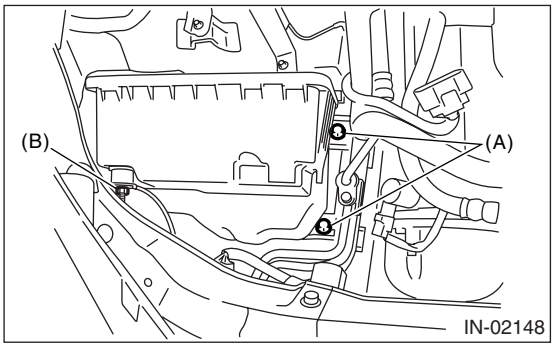
4) Loosen the clamps (A) which connect the air cleaner case to intake duct.
5) Remove the clip (B) securing the upper side of air cleaner case.



6) Remove the air cleaner case (rear) and air cleaner element.



7) Remove the bolts (A) and nut (B) which secure the air cleaner case to body.

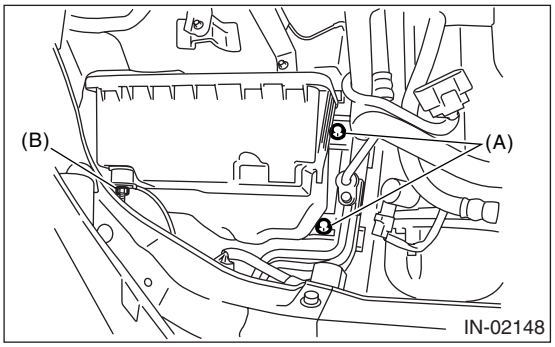


8) Remove the air cleaner case (front).

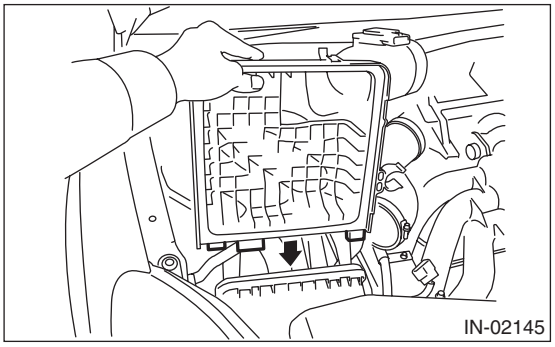
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Bolt (A): 6.0 N·m (0.6 kgf-m, 4.4 ft-lb)
Nut (B): 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



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



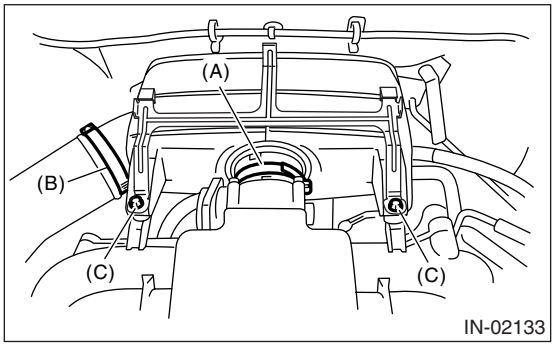
C: INSPECTION

Check for cracks or loose connections.

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 duct to air intake chamber.
4) Remove the bolt (C) which secures air intake chamber to the collector cover bracket.

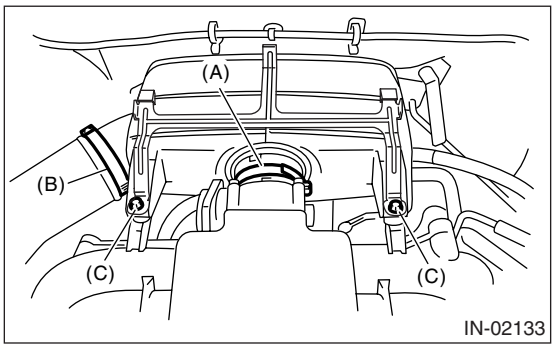


5) Disconnect the blow-by hoses, and then remove air intake chamber.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Clamp (A), (B)
3.0 N·m (0.3 kgf-m, 2.2 ft-lb)
Bolt (C)
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



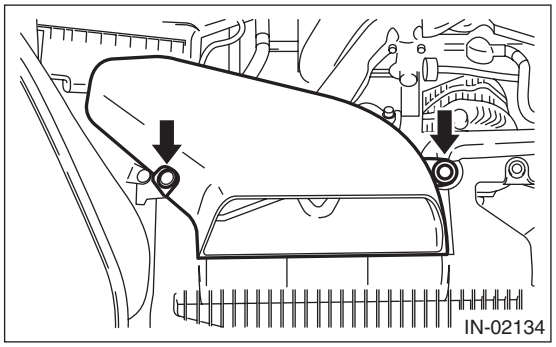
C: INSPECTION

1) Check for cracks or loose connections.
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 for cracks or loose connections.
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 removal procedure. <Ref. to IN(H6DO)-5, 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)-5, INSTALLATION, Air Cleaner Case.>

C: INSPECTION

Check for cracks or loose connections.

1. General Description

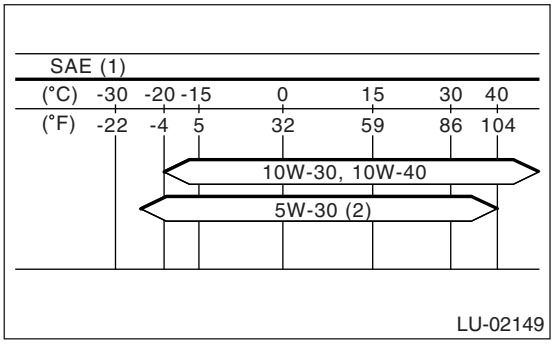
A: SPECIFICATION

Lubrication method			Forced lubrication
Oil pump	Pump type		Trochoid type
	Number of teeth	Inner rotor	7
		Outer rotor	8
	Outer rotor diameter × thickness	mm (in)	86 × 13 (3.39 × 0.51)
	Tip clearance between inner and outer rotors	mm (in)	0.04 — 0.14 (0.0016 — 0.0055)
	Side clearance between inner rotor and pump case	mm (in)	0.020 — 0.046 (0.0008 — 0.0018)
	Case clearance between outer rotor and pump case	mm (in)	0.110 — 0.175 (0.0043 — 0.0069)
Oil filter	Filter type		Full-flow filter type
	Filtration area	cm^2 (sq in)	1,300 (201.5)
	By-pass valve opening pressure	kPa (kg/cm^2, psi)	160 (1.63, 23.2)
	Outer diameter × width	mm (in)	80 × 75 (3.15 × 2.95)
	Installation screw specifications		M 20 × 1.5
Relief valve working pressure		kPa (kg/cm^2, psi)	708 (7.2, 102.7)
Oil pressure switch	Type		Immersed contact point type
	Operating voltage — Power consumption		12 V — 3.4 W or less
	Warning light operating pressure	kPa (kg/cm^2, psi)	15 (0.15, 2.2)
	Proof pressure	kPa (kg/cm^2, psi)	980 (10.0, 142) or more
Engine oil	Capacity (at overhaul)	ℓ (US qt, Imp qt)	7.2 (7.6, 6.3)
	When replacing engine oil and oil filter	ℓ (US qt, Imp qt)	5.7 (6.0, 5.0)
	When replacing engine oil only	ℓ (US qt, Imp qt)	5.5 (5.8, 4.8)

Recommended oil:

Those with an API standard SM "Energy Conserving" logo.

ILSAC standard GF-4 "Star burst mark" label on the container



(1) SAE viscosity No. and applicable temperature

(2) Recommended

CAUTION:

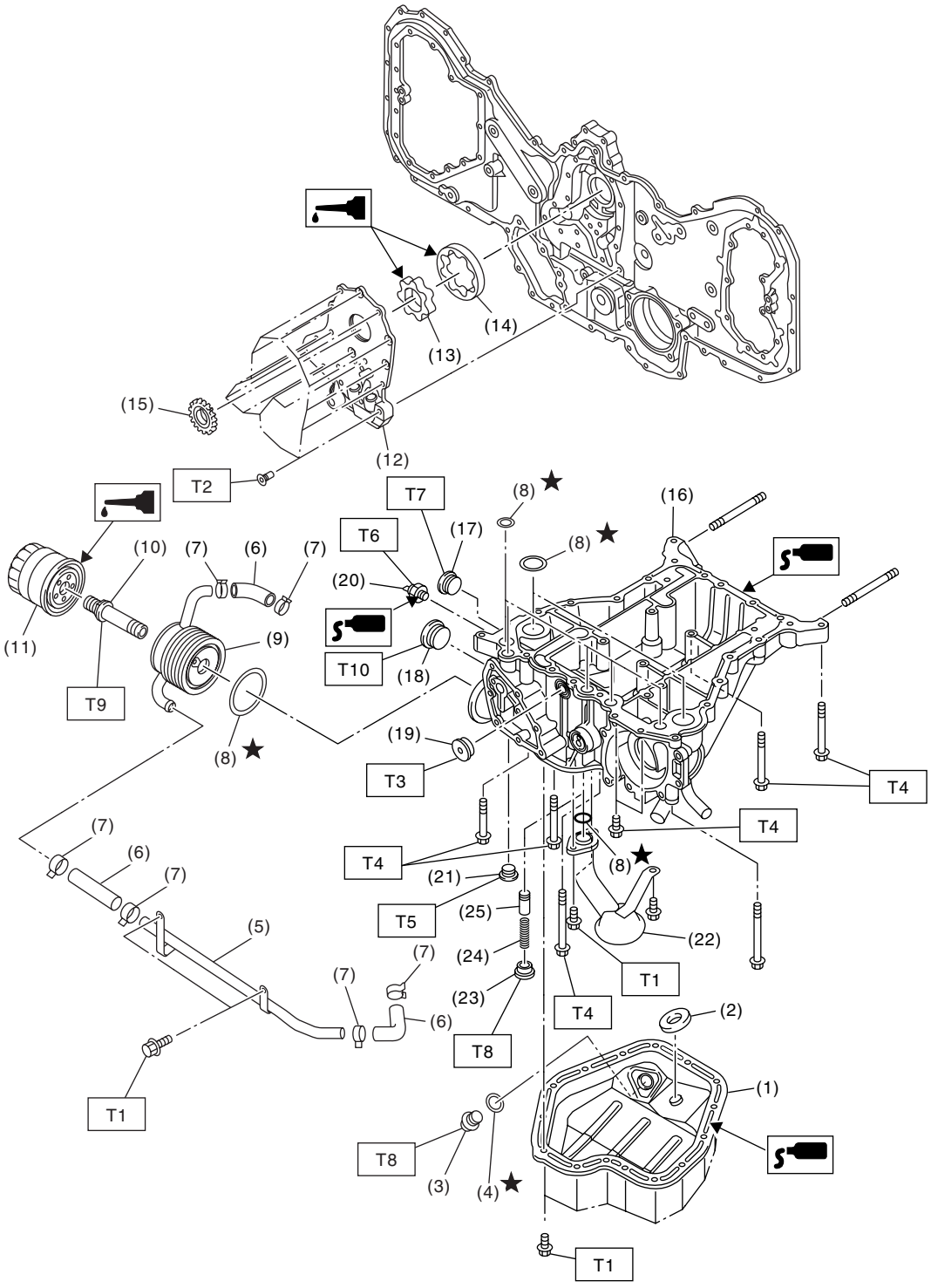
When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API standard and SAE viscosity No. designated by SUBARU.

NOTE:

If the vehicle is used in areas with very high temperatures or for other heavy duty applications, the following viscosity oils must be used: API standard: SM or SL

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

B: COMPONENT


(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)
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
LU-02097

(1) Oil pan lower
(2) Magnet
(3) Drain plug
(4) Gasket
(5) Oil cooler pipe
(6) Hose
(7) Clamp
(8) O-ring
(9) Oil cooler
(10) Oil cooler connector
(11) Oil filter
(12) Oil pump cover
(13) Inner rotor
(14) Outer rotor
(15) Crank sprocket
(16) Oil pan upper
(17) Plug
(18) Plug
(19) Plug
(20) Oil pressure switch
(21) Plug
(22) Oil strainer
(23) Plug
(24) Relief valve spring
(25) Relief valve

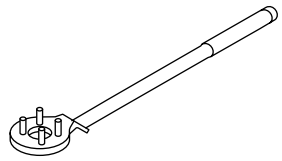
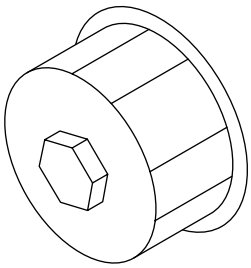
Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: <Ref. to LU(H6DO)-8, INSTALLATION, Oil Pump.>
T3: 16 (1.6, 12)
T4: 18 (1.8, 13)
T5: 23 (2.3, 17)
T6: 25 (2.5, 18)
T7: 37 (3.8, 27)
T8: 44 (4.5, 33)
T9: 54 (5.5, 40)
T10: 90 (9.2, 66)

C: CAUTION

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

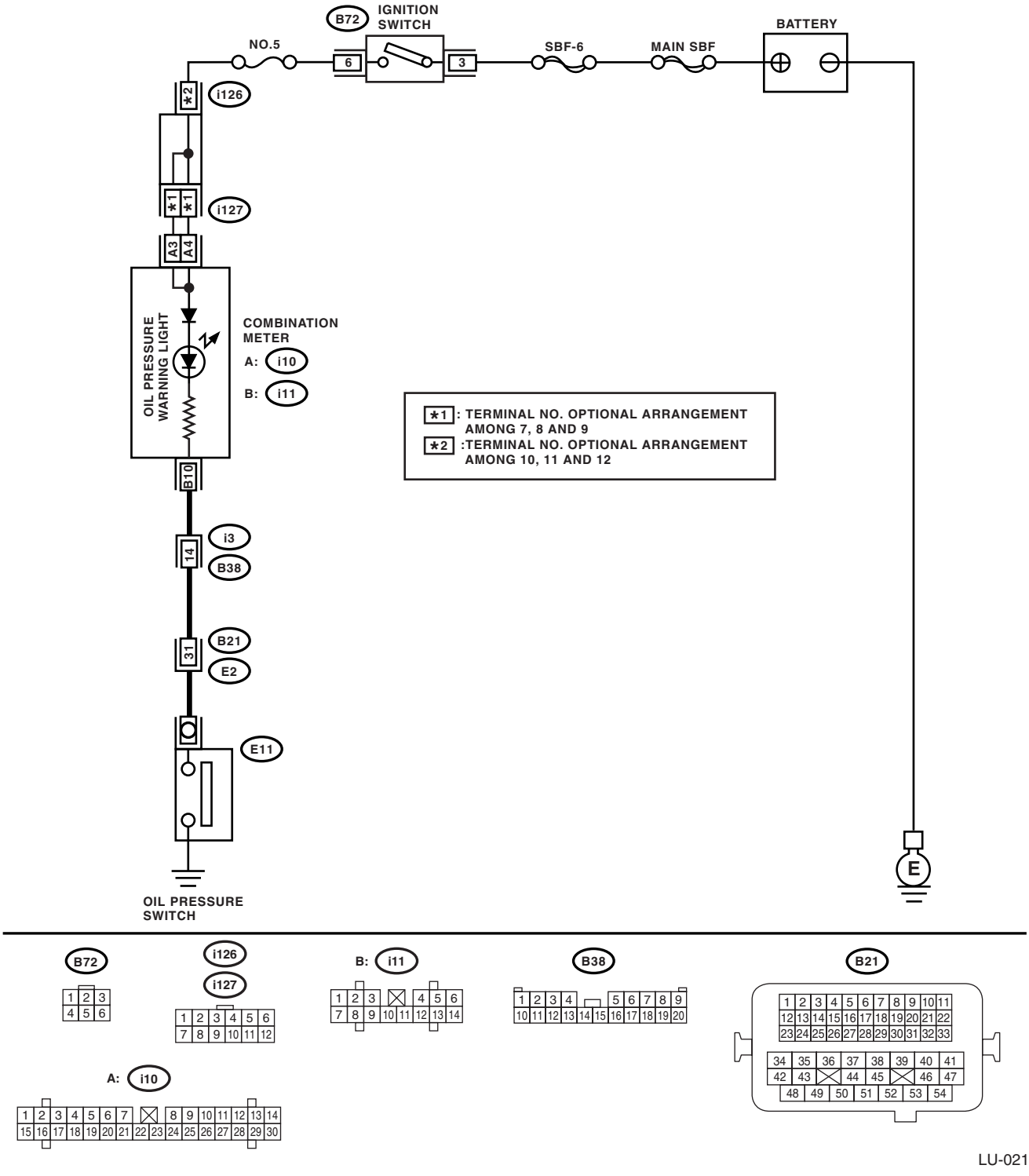
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when removing and tightening crank pulley bolt.
 ST-498547000	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.

2. Oil Pressure System

A: WIRING DIAGRAM



LU-02159

B: INSPECTION

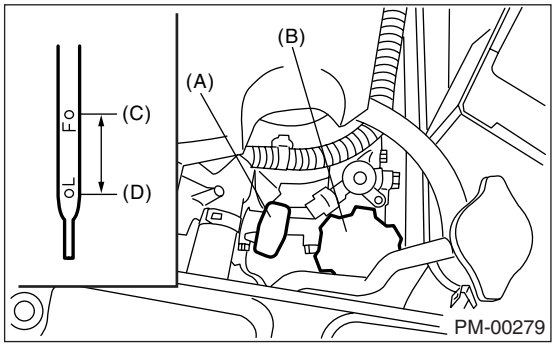
	Step	Check	Yes	No
1	**CHECK COMBINATION METER.** 1) Turn the ignition switch ON. (Engine OFF) 2) Check the warning light of combination meter.	Does the warning light illuminate?	Go to step **2**.	Repair or replace the combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>
2	**CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND OIL PRESSURE SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from oil pressure switch. 3) Turn the ignition switch ON. 4) Measure the voltage of harness between oil pressure switch connector and chassis ground. ***Connector & terminal*** ***(E11) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the oil pressure switch.	Go to step **3**.
3	**CHECK COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Measure the resistance of combination meter. ***Terminals*** ***(i10) No. 4 — (i77) No. 10:*** ***(i10) No. 3 — (i77) No. 10:***	Is the resistance less than 10 Ω?	Replace the harness connector between combination meter and oil pressure switch.	Repair or replace the combination meter. <Ref. to IDI-4, INSPECTION, Combination Meter System.>

3. Engine Oil

A: 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.

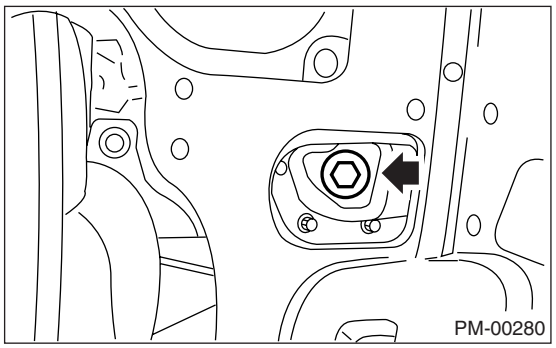


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level

B: REPLACEMENT

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, 33 ft-lb)

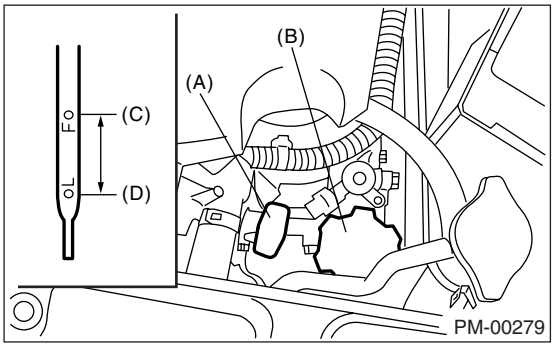
5) Using engine oil of proper quality and viscosity, fill engine oil through the oil filler duct to the upper level on level gauge. Make sure that the vehicle is parked on a level surface when checking oil level.

Recommended oil:
Refer to “SPECIFICATION” for the recommended oil. <Ref. to LU(H6DO)-2, SPECIFICATION, General Description.>

Engine oil capacity

Refer to “SPECIFICATION” for the engine oil capacity. <Ref. to LU(H6DO)-2, SPECIFICATION, General Description.>

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

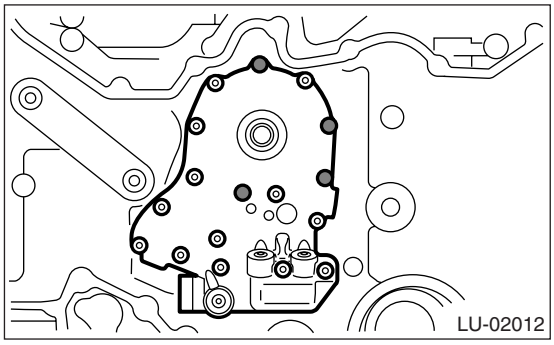


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level

4. Oil Pump

A: REMOVAL

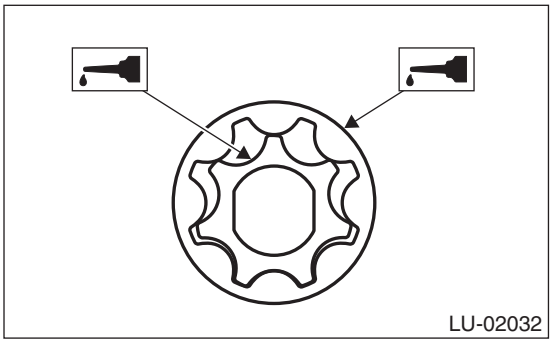
1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Lift-up the vehicle.
4) Remove the under cover.
5) Drain engine coolant. <Ref. to CO(H6DO)-10, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
6) Lower the vehicle.
7) Remove the radiator. <Ref. to CO(H6DO)-15, REMOVAL, Radiator.>
8) Remove the V-belts. <Ref. to ME(H6DO)-31, REMOVAL, V-belt.>
9) Remove the front chain cover. <Ref. to ME(H6DO)-42, REMOVAL, Front Chain Cover.>
10) Remove the timing chain. <Ref. to ME(H6DO)-44, REMOVAL, Timing Chain Assembly.>
11) Remove the crank sprocket.
12) Remove the oil pump cover.



13) Remove the inner rotor and outer rotor.

B: INSTALLATION

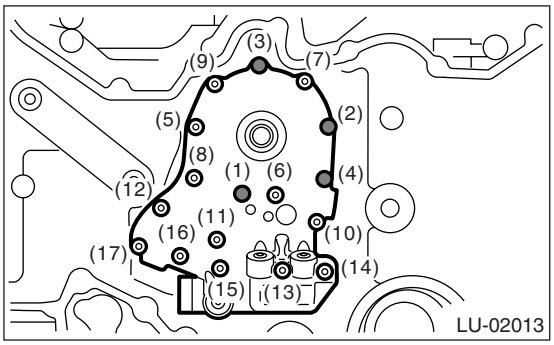
1) Apply a coat of engine oil to the whole area of inner rotor and outer rotor.



2) Set the inner rotor onto opening edge of crank shaft, and install the inner rotor, and then assemble the outer rotor.
3) Install the oil pump cover.
4) Tighten the bolts in the numerical order as shown in the figure.

CAUTION:
Make sure that the bolt is installed in correct position.

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



Bolt installing position	Bolt dimension
(1) and (3)	6 × 14 × 14
(2) and (4)	6 × 35 × 18
(5), (6), (7), (8), (9), (10) and (11)	6 × 35 × 15
(12), (15), (16) and (17)	6 × 16 × 16
(13) and (14)	6 × 26 × 15

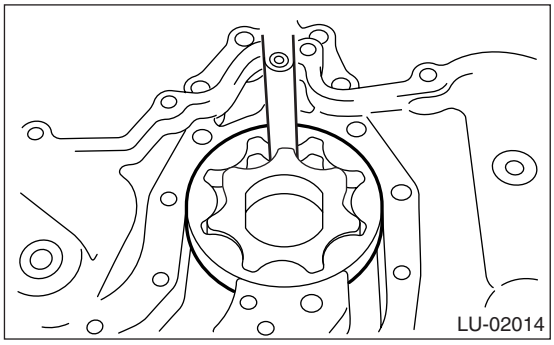
5) Install the crank sprocket.
6) Install the timing chain. <Ref. to ME(H6DO)-45, INSTALLATION, Timing Chain Assembly.>
7) Install the front chain cover.
<Ref. to ME(H6DO)-42, INSTALLATION, Front Chain Cover.>
8) Install the V-belts. <Ref. to ME(H6DO)-31, INSTALLATION, V-belt.>
9) Install the radiator. <Ref. to CO(H6DO)-17, INSTALLATION, Radiator.>
10) Install the under cover.
11) Fill engine coolant.
<Ref. to CO(H6DO)-10, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

1. TIP CLEARANCE

Measure the tip clearance of rotors. If the clearance exceeds specification, replace the rotors as a matched set.

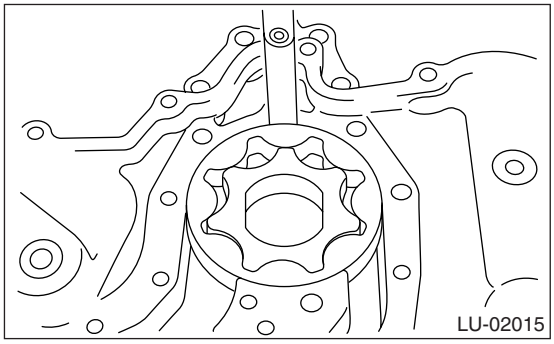
Tip clearance:
Specification
0.04 — 0.14 mm (0.0016 — 0.0055 in)



2. CASE CLEARANCE

Measure the clearance between the outer rotor and rear chain cover rotor housing. If the clearance exceeds the standard value, replace the outer rotor.

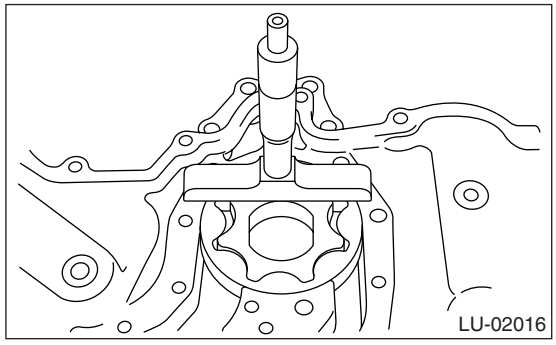
Case clearance:
Specification
0.110 — 0.175 mm (0.0043 — 0.0069 in)



3. SIDE CLEARANCE

Measure the clearance between oil pump inner rotor and rear chain cover. If the clearance exceeds specification, replace the rotors as a matched set.

Side clearance:
Specification
0.020 — 0.046 mm (0.0008 — 0.0018 in)



4. OIL PUMP CASE

Check the worn shaft hole, clogged oil passage, crank and other parts for faults.

5. Oil Pump Relief Valve

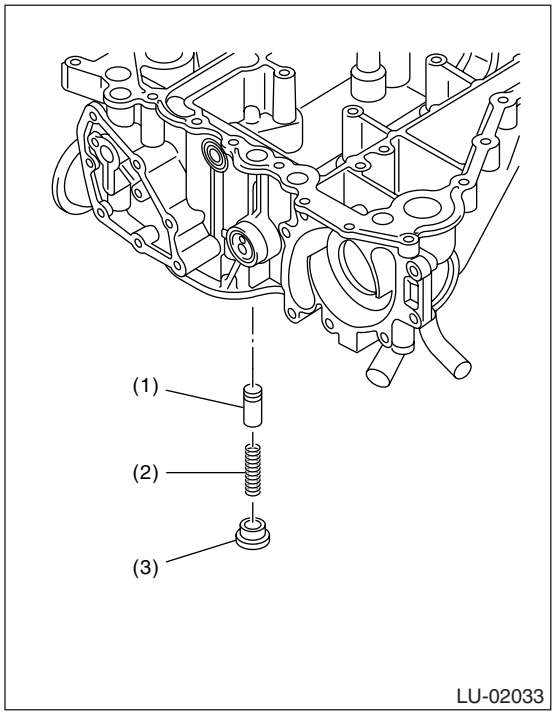
A: REMOVAL

1. REAR CHAIN COVER SIDE

Oil pump relief valve is integrated into oil pump cover as one unit; therefore, refer to “Oil Pump” for removal procedure. <Ref. to LU(H6DO)-8, REMOVAL, Oil Pump.>

2. OIL PAN UPPER SIDE

1) Remove the oil pan. <Ref. to LU(H6DO)-11, REMOVAL, Oil Pan and Strainer.>
2) Remove the plug, relief valve spring and relief valve.



(1) Relief valve
(2) Relief valve spring
(3) Plug

B: INSTALLATION

1. REAR CHAIN COVER SIDE

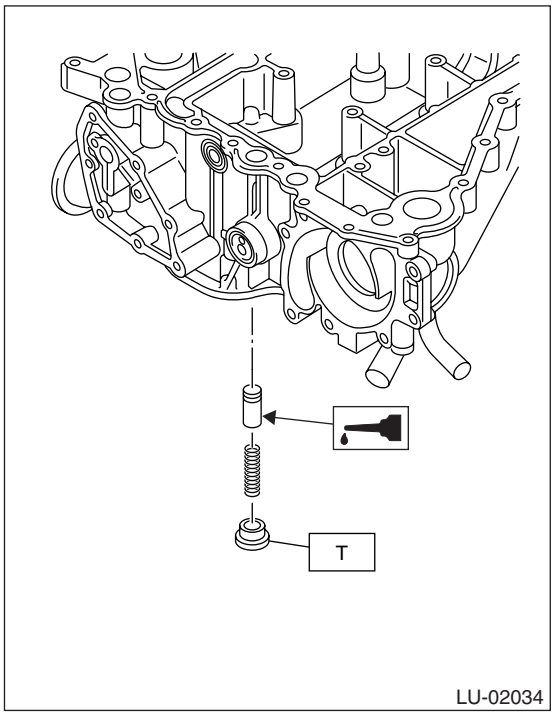
Oil pump relief valve is integrated into oil pump cover as one unit; therefore, refer to “Oil Pump” for installation procedure. <Ref. to LU(H6DO)-8, INSTALLATION, Oil Pump.>

2. OIL PAN UPPER SIDE

1) Install the relief valve, relief valve spring and plug.

NOTE:
Apply engine oil to the relief valve.

Tightening torque:
T: 44 N·m (4.5 kgf-m, 33 ft-lb)



2) Install the oil pan. <Ref. to LU(H6DO)-11, INSTALLATION, Oil Pan and Strainer.>

C: INSPECTION

Check the worn shaft hole of oil pump relief valve case, clogged oil passage, crank and other parts for faults.

6. Oil Pan and Strainer

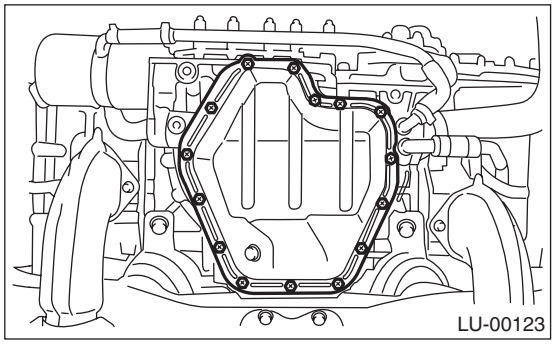
A: REMOVAL

NOTE:
Before removing the oil pan upper, remove the engine from vehicle. <Ref. to ME(H6DO)-32, REMOVAL, Engine Assembly.> <Ref. to ME(H6DO)-62, REMOVAL, Cylinder Block.>

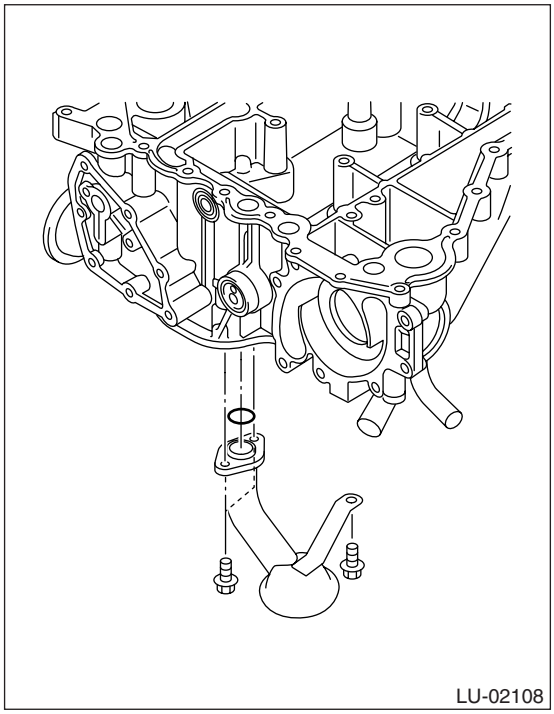
1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Drain the engine oil. <Ref. to LU(H6DO)-7, REPLACEMENT, Engine Oil.>
5) Insert the oil pan cutter blade between oil pan upper and oil pan lower.

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

6) Remove the oil pan lower.


LU-00123

7) Remove the oil strainer.


LU-02108

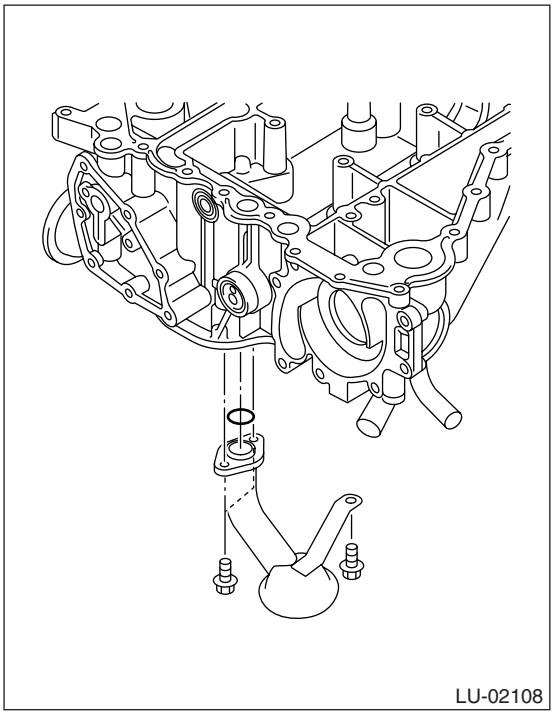
B: INSTALLATION

CAUTION:
Before installing the oil pan, wipe clean the mating surface of oil pan lower and oil pan upper.

1) Install the oil strainer onto oil pan upper.

NOTE:
Replace the O-ring with a new one.

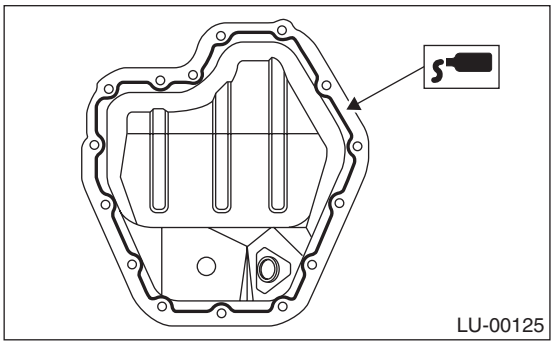
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


LU-02108

2) Apply liquid gasket to the mating surfaces, and install the oil pan.

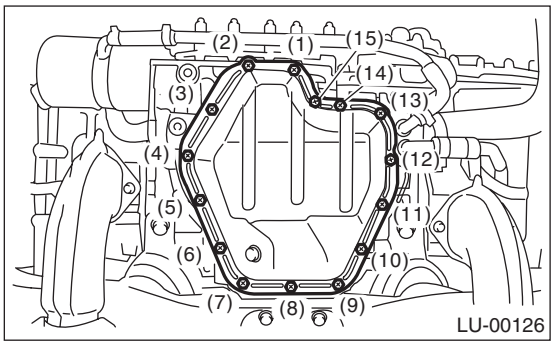
Liquid gasket
THREE BOND 1280B (Part No. K0877YA018)

Applying liquid gasket diameter
5.0±1.0 mm (0.197 ± 0.039 in)


LU-00125

3) Tighten the oil pan lower installing bolts in the numerical order as shown in the figure.

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



4) Install the under cover.
5) Refill the engine oil. <Ref. to LU(H6DO)-7, INSPECTION, Engine Oil.>

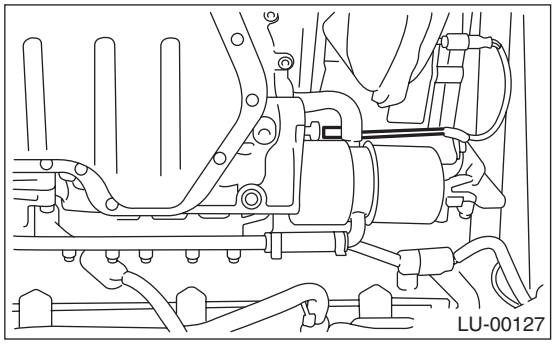
C: INSPECTION

Visually check that the oil pan, oil strainer and oil strainer stay are not damaged.

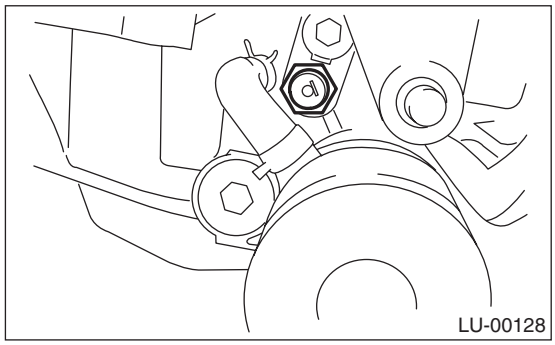
7. Oil Pressure Switch

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) Disconnect the terminal from oil pressure switch.



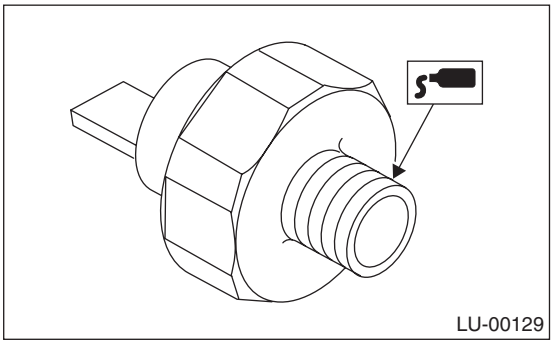
6) Remove the oil pressure switch.



B: INSTALLATION

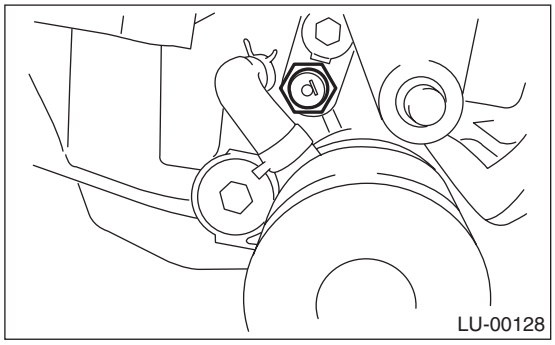
1) Apply liquid gasket to the oil pressure switch threads.

Liquid gasket
THREE BOND 1324 (Part No. 004403042) or equivalent

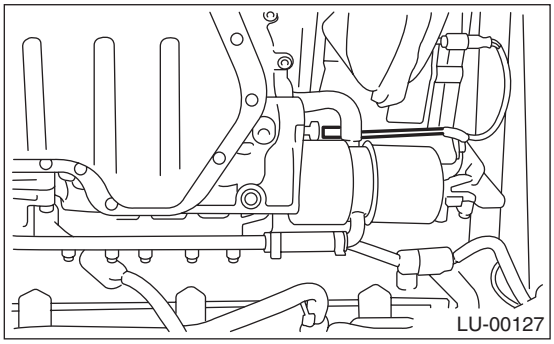


2) Install the oil pressure switch.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



3) Connect the terminal of the oil pressure switch.



4) Install the under cover.

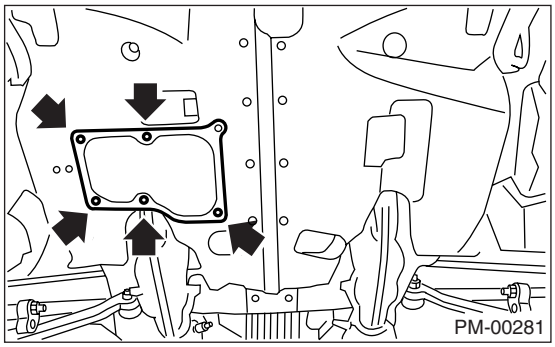
C: INSPECTION

Make sure oil does not leak or seep from where the oil pressure switch is installed.

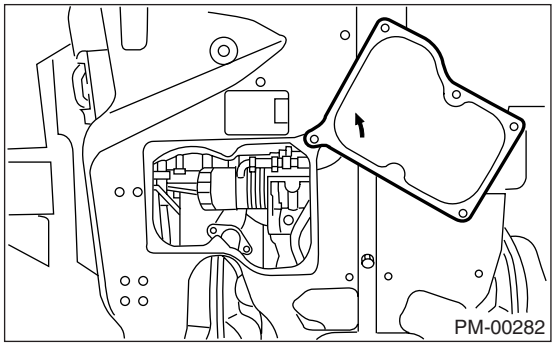
8. Engine Oil Filter

A: REMOVAL

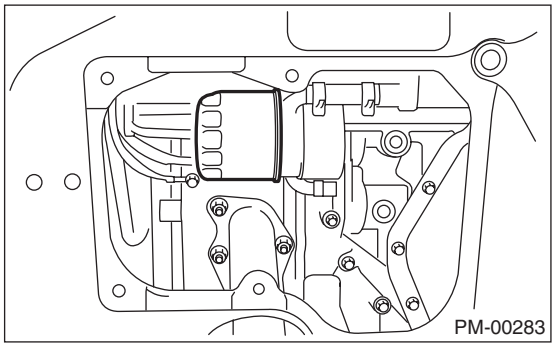
1) Lift-up the vehicle.
2) Drain the engine oil. <Ref. to LU(H6DO)-7, REPLACEMENT, Engine Oil.>
3) Remove the service hole cover clip.



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



5) Remove the oil filter using ST.
ST 4985447000 OIL FILTER WRENCH



B: INSTALLATION

CAUTION:
Do not tighten excessively, or oil may leak.

1) Clean the oil filter installing surface of 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)-7, 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.

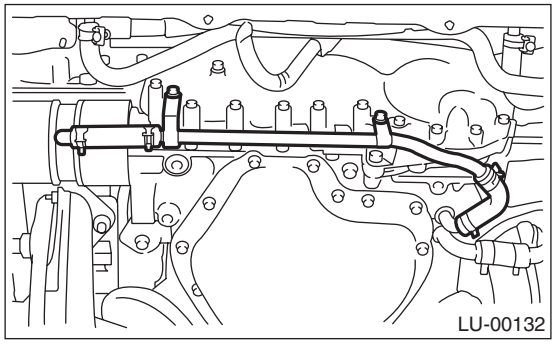
NOTE:
The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

2) Check the engine oil level. <Ref. to LU(H6DO)-7, INSPECTION, Engine Oil.>

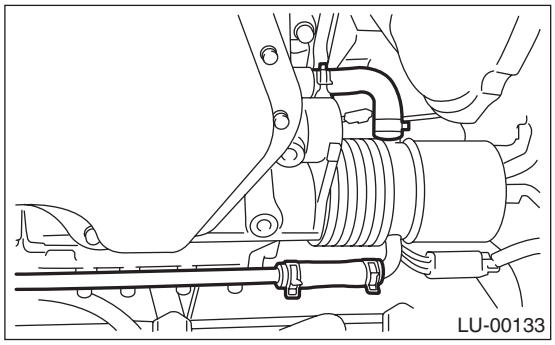
9. Oil Cooler

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the under cover.
3) Drain engine coolant.
<Ref. to CO(H6DO)-10, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
4) Drain the engine oil. <Ref. to LU(H6DO)-7, REPLACEMENT, Engine Oil.>
5) Remove the bolts which hold the water pipe to engine.

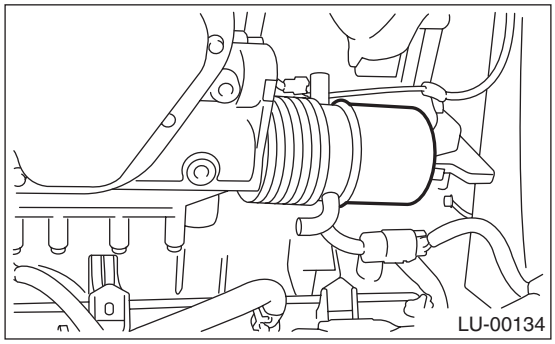


6) Disconnect the water hose from oil cooler.

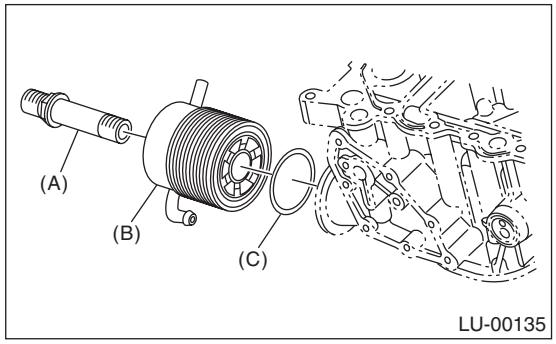


7) Remove the oil filter using the ST. <Ref. to LU(H6DO)-14, REMOVAL, Engine Oil Filter.>
ST 498547000 OIL FILTER WRENCH

NOTE:
Set a container under the vehicle.



8) Remove the oil cooler connector and remove oil cooler.



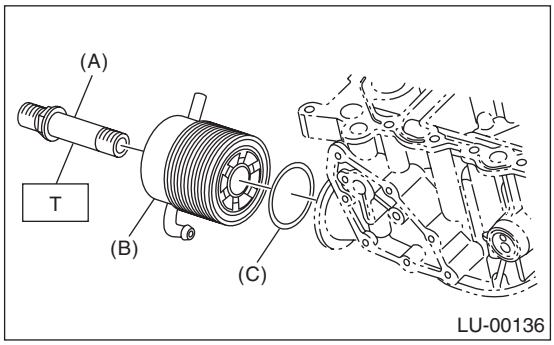
(A) Oil cooler connector
(B) Oil cooler
(C) O-ring

B: INSTALLATION

1) Install the oil cooler to oil pan upper with oil cooler connector.

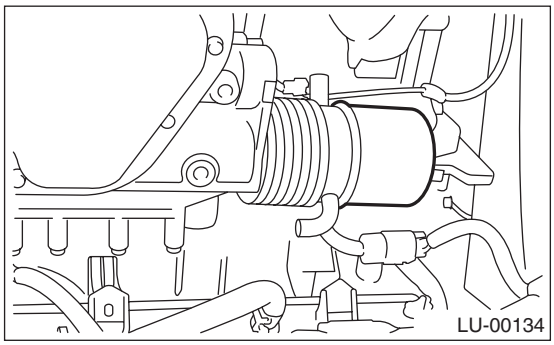
Tightening torque:
T: 54 N·m (5.5 kgf-m, 40 ft-lb)

NOTE:
Use new O-rings.

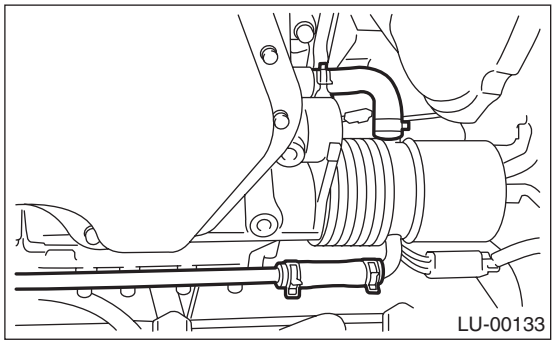


(A) Oil cooler connector
(B) Oil cooler
(C) O-ring

2) Install the oil filter. <Ref. to LU(H6DO)-14, INSTALLATION, Engine Oil Filter.>

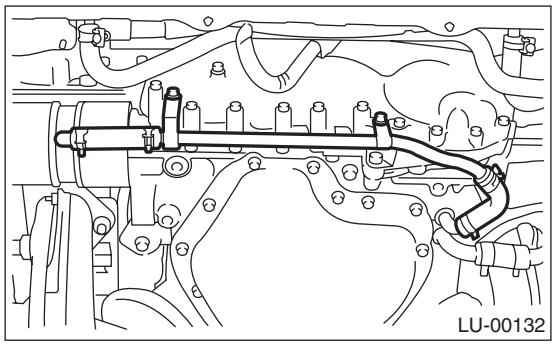


3) Connect the water hose.



4) Install the water pipe onto engine.

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



5) Refill the engine oil. <Ref. to LU(H6DO)-7, REPLACEMENT, Engine Oil.>
6) Fill engine coolant. <Ref. to CO(H6DO)-10, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
7) Check the engine oil level. <Ref. to LU(H6DO)-7, INSPECTION, Engine Oil.>

C: INSPECTION

1) Check that coolant passages are not clogged using an compressed air.
2) Check that the oil pan upper and O-ring installing surface of oil filter are not damaged.

10.General Diagnostics Table

A: INSPECTION

Before performing diagnostics, make sure that the engine oil level is correct and no oil leakage exists.

Symptom	Possible cause		Corrective action
1. Warning light remains on.	1) Oil pressure switch failure	Cracked diaphragm or oil leakage within switch	Replace.
		Broken spring or seized contacts	Replace.
	2) Low oil pressure	Clogging of oil filter	Replace.
		Malfunction of oil by-pass valve in oil filter	Clean or replace.
		Malfunction of oil relief valve in oil pump	Clean or replace.
		Clogged oil passage	Clean.
		Excessive tip clearance and side clearance of oil pump rotor and gear	Replace.
		Clogged oil strainer or broken pipe	Clean or replace.
	3) No oil pressure	Insufficient engine oil	Replenish.
		Broken pipe of oil strainer	Replace.
		Stuck oil pump rotor	Replace.
2. Warning light does not turn on.	1) Malfunction of combination meter		Replace.
	2) Poor contact of switch contact points		Replace.
	3) Disconnection of wiring		Repair.
3. Warning light flickers momentarily.	1) Poor contact of terminals		Repair.
	2) Defective wiring harness		Repair.
	3) Low oil pressure		Check for the same possible causes as listed 1) — 2).

1. General Description

A: SPECIFICATION

Engine	Cylinder arrangement			Horizontally opposed, liquid cooled, 6-cylinder, 4-stroke gasoline engine
	Valve system mechanism			Chain driven, double overhead camshaft, 4-valve/cylinder
	Inside diameter×stroke mm (in)			89.2 × 80 (3.512 × 3.150)
	Displacement cm^3 (cu in)			3,000 (183)
	Compression ratio			10.7
	Compression pressure (350 rpm and fully open throttle): kPa (kgf/cm^2, psi)			1,275 — 1,471 (13.0 — 15.0, 185 — 213)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Min. advance	Open	BTDC 47°
			Close	ABDC 23°
		Max. retard	Open	ATDC 3°
			Close	ABDC 73°
	Exhaust valve timing		Open	BBDC 60°
			Close	ATDC 6°
	Valve clearance mm (in)	Intake		$0.20\ ^{+0.04}_{-0.06}$ ($0.0079\ ^{+0.0016}_{-0.0024}$)
		EXHAUST		0.35±0.05 (0.0138±0.020)
	Idle rpm [“P” or “N” range] rpm		No load	650±50
			A/C ON	770±50
	Ignition order			1 → 6 →3 → 2 → 5 → 4
	Ignition timing BTDC/rpm			15°±8°/650

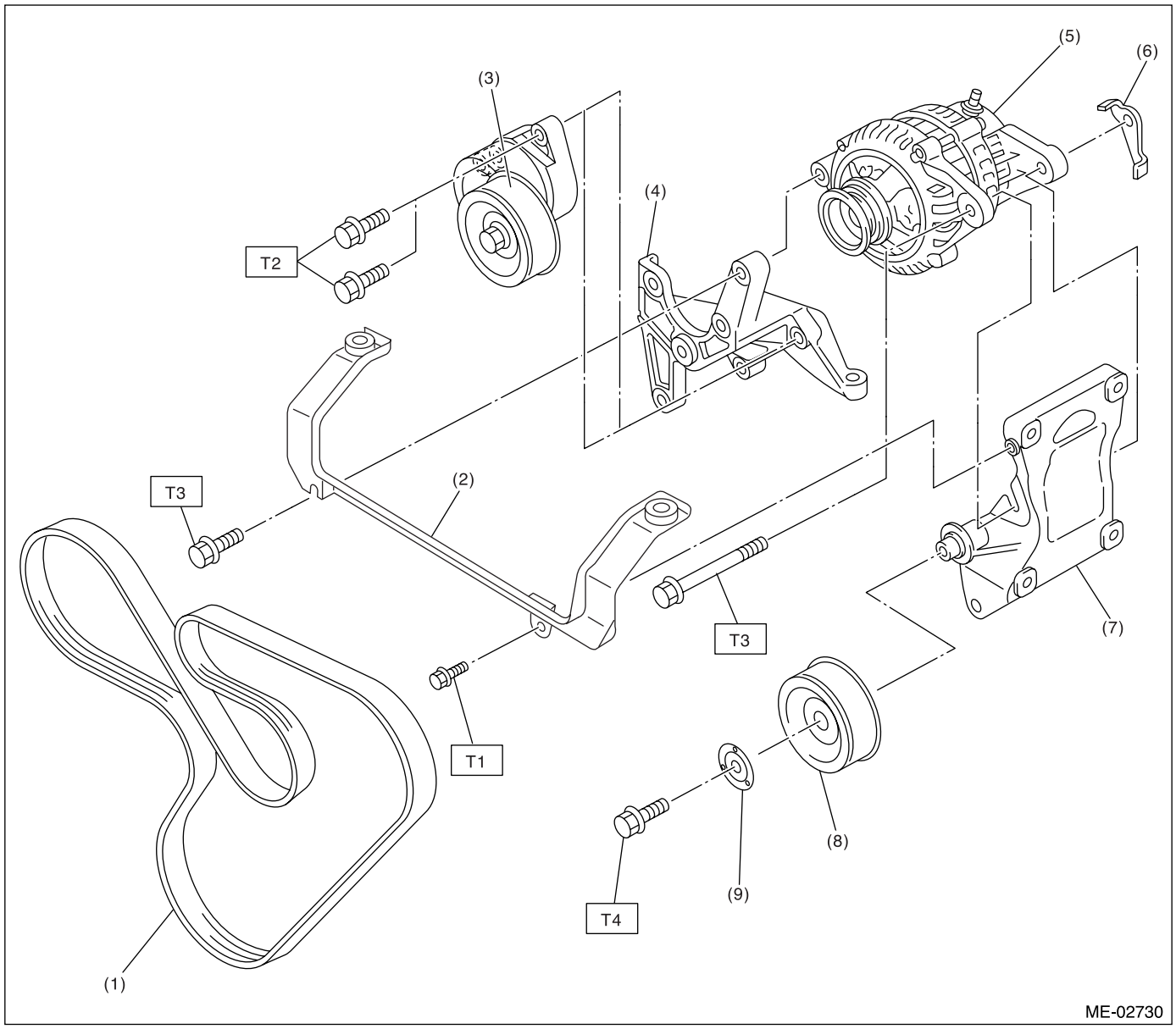
NOTE:
OS: Oversize US: undersize

Camshaft	Thrust clearance mm (in)	Intake			Standard	0.075 — 0.135 (0.0030 — 0.0053)
		Exhaust			Standard	0.030 — 0.090 (0.0012 — 0.0035)
	Cam lobe height mm (in)	Intake	HIGH		Standard	42.09 — 42.19 (1.6571 — 1.6610)
			LOW1		Standard	38.14 — 38.24 (1.5016 — 1.5055)
			LOW2		Standard	35.44 — 35.54 (1.3953 — 1.3992)
		Exhaust			Standard	41.65 — 41.75 (1.6398 — 1.6437)
	Cam base circle diameter mm (in)	Intake	HIGH		Standard	32.00 (1.2598)
			LOW1		Standard	31.84 (1.2535)
			LOW2		Standard	31.84 (1.2535)
		Exhaust			Standard	32.00 (1.2598)
	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)
Cylinder head	Flatness mm (in)				Standard	0.02 (0.0008)
	Inner diameter of valve lifter hole mm (in)					32.994 — 33.016 (1.2990 — 1.2998)
	Standard height mm (in)					124±0.05 (4.88±0.0020)
Valve seat	Refacing angle					90°
	Contacting width mm (in)	Intake			Standard	1.0 (0.039)
		Exhaust			Standard	1.5 (0.059)
Valve guide	Inside diameter mm (in)					5.500 — 5.512 (0.2165 — 0.2170)
	Protrusion above head mm (in)					11.4 — 11.8 (0.449 — 0.465)
Valve	Head edge thickness mm (in)	Intake			Standard	1.0 (0.039)
		Exhaust			Standard	1.2 (0.047)
	Stem outer diameter mm (in)	Intake				5.455 — 5.470 (0.2148 — 0.2154)
		Exhaust				5.445 — 5.460 (0.2144 — 0.2150)
	Stem oil clearance mm (in)	Intake			Standard	0.030 — 0.057 (0.0012 — 0.0022)
		Exhaust			Standard	0.040 — 0.067 (0.0016 — 0.0026)
	Overall length mm (in)	Intake				99.7 (3.925)
		Exhaust				105.2 (4.142)
	Outer diameter of valve lifter mm (in)					32.959 — 32.975 (1.2976 — 1.2982)
Valve spring	Free length mm (in)	Intake			Inner	39.55 (1.5571)
					Outer	41.18 (1.6213)
		Exhaust				46.32 (1.8236)
	Squareness	Intake			Inner	2.5°1.7 mm (0.067 in)
					Outer	2.5°1.8 mm (0.071 in)
		Exhaust				2.5°2.0 mm (0.079 in)
Cylinder block	Standard height mm (in)					202 (7.95)
	Cylinder inner diameter mm (in)	Standard			A	89.205 — 89.215 (3.5120 — 3.5124)
					B	89.195 — 89.205 (3.5116 — 3.5120)
	Cylindricality mm (in)				Standard	0.030 (0.0012)
	Out-of-roundness mm (in)				Standard	0.010 (0.0004)
	Piston clearance mm (in)				Standard	–0.010 — 0.010 (–0.0004 — 0.0004)
Piston	Outer diameter mm (in)	Standard			A	89.205 — 89.215 (3.5120 — 3.5124)
					B	89.195 — 89.205 (3.5116 — 3.5120)
		0.25 (0.0098) OS				89.445 — 89.465 (3.5215 — 3.5222)
		0.50 (0.0197) OS				89.695 — 89.715 (3.5313 — 3.5321)
	Inner diameter of piston pin hole				Standard	22.000 — 22.006 (0.8661 — 0.8664)
Piston pin	Outer diameter mm (in)				Standard	21.994 — 22.000 (0.8659 — 0.8661)
	Standard clearance between piston and piston pin mm (in)				Standard	0.004 — 0.008 (0.0002 — 0.0003)

Piston ring	Ring closed gap mm (in)	Top ring		Standard	0.20 — 0.35 (0.0079 — 0.0138)
		Second ring		Standard	0.35 — 0.50 (0.0138 — 0.0197)
		Oil ring		Standard	0.20 — 0.60 (0.0079 — 0.0236)
	Ring groove gap 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	0.045 — 0.125 (0.0018 — 0.0049)
Connecting rod	Thrust clearance mm (in)			Standard	0.070 — 0.330 (0.0028 — 0.0130)
Bearing of large end	Oil clearance mm (in)			Standard	0.016 — 0.043 (0.0006 — 0.0017)
	Bearing size (Thickness at center) mm (in)		Standard		1.490 — 1.506 (0.0587 — 0.0593)
			0.03 (0.0012) US		1.509 — 1.513 (0.0594 — 0.0596)
			0.05 (0.0020) US		1.519 — 1.523 (0.0598 — 0.0600)
			0.25 (0.0098) US		1.619 — 1.623 (0.0637 — 0.0639)
Bushing of small end	Clearance between piston pin and bushing mm (in)			Standard	0 — 0.022 (0 — 0.0009)
Crankshaft	Crank pin and crank journal	Out-of-roundness mm (in)			0.005 (0.0002)
		Cylindricality mm (in)			0.006 (0.0002)
	Crank pin outer diameter mm (in)		Standard		51.984 — 52.000 (2.0466 — 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 mm (in)	#1, #3, #5, #7	Standard		63.992 — 64.008 (2.5194 — 2.5200)
			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 — 64.008 (2.5194 — 2.5200)
			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)
	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)
Main bearing	Bearing size (Thickness at center) mm (in)	#1, #3, #5, #7	Standard		1.992 — 2.005 (0.0784 — 0.0789)
			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 — 2.009 (0.0786 — 0.0791)
			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)

B: COMPONENT

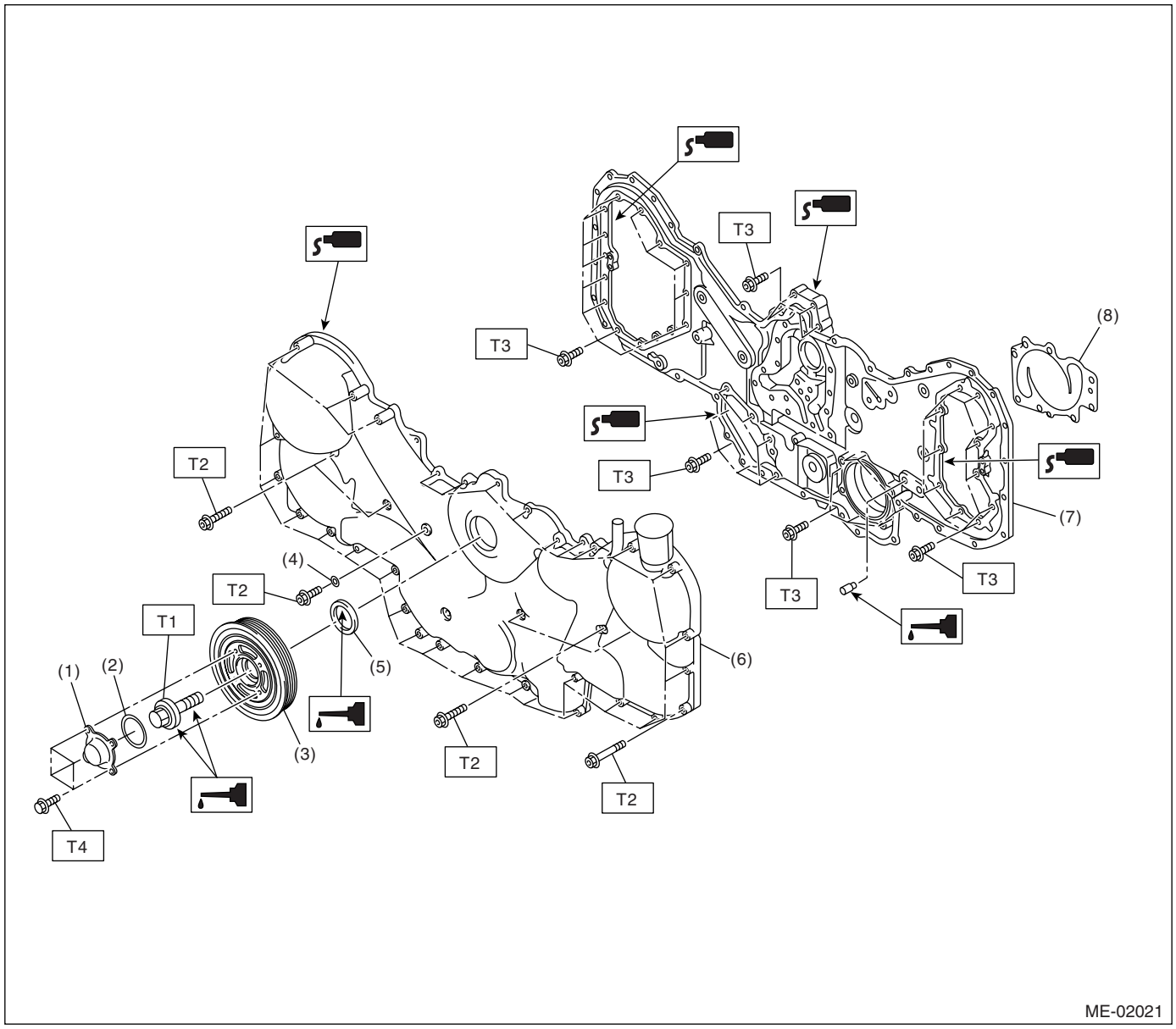
1. V-BELT



(1) V-belt
(2) Collector cover bracket
(3) Belt tension adjuster ASSY
(4) Power steering pump bracket
(5) Generator
(6) Generator plate
(7) A/C compressor stay
(8) Idler pulley
(9) Idler pulley cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 20 (2.0, 14)
T3: 25 (2.5, 18)
T4: 33 (3.4, 24.3)

2. TIMING CHAIN COVER



(1) Crank pulley cover
(2) O-ring
(3) Crank pulley
(4) Sealing washer
(5) Oil seal
(6) Front chain cover
(7) Rear chain cover
(8) Water pump gasket

Tightening torque: N·m (kgf-m, ft-lb)

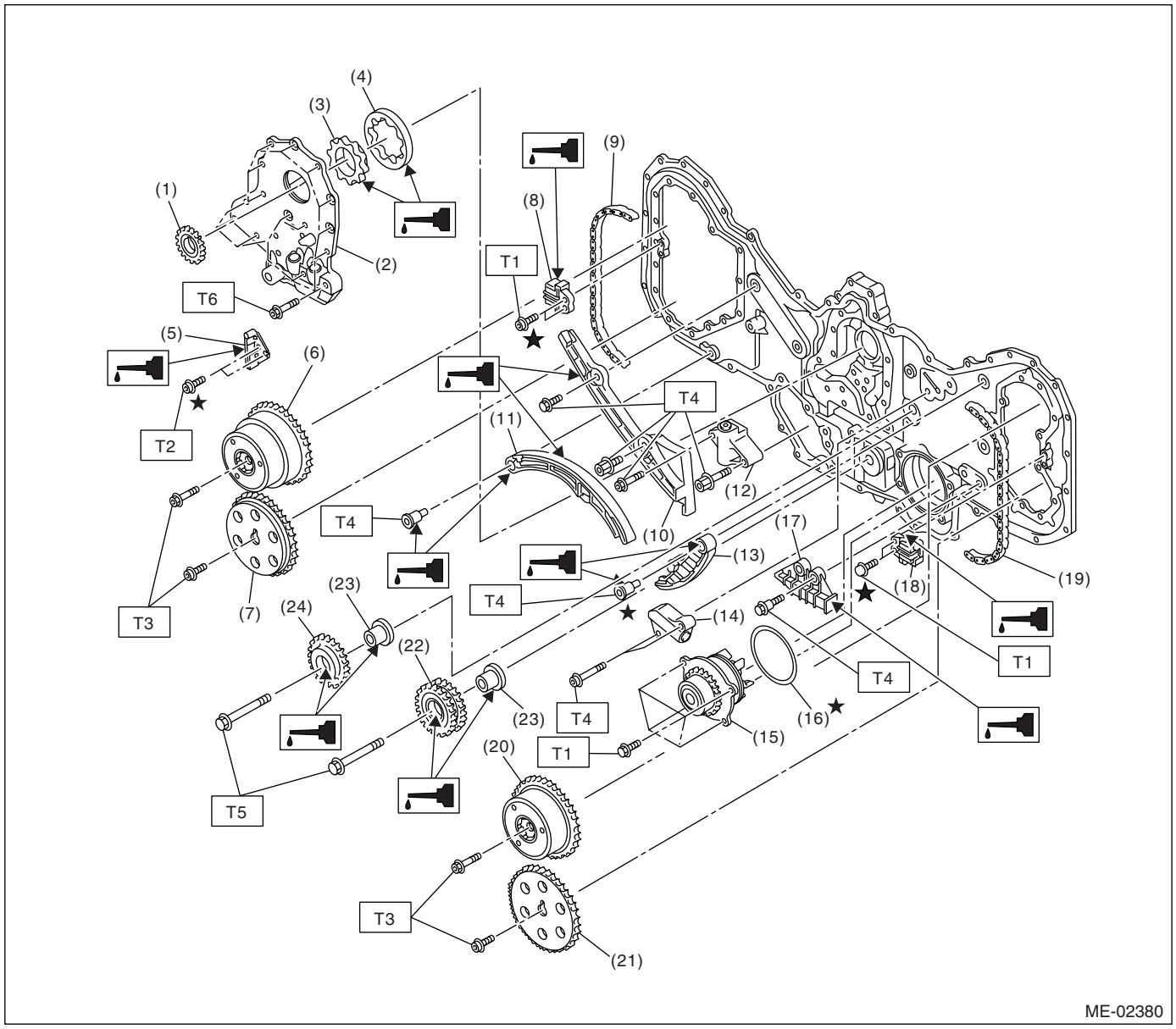
T1: <Ref. to ME(H6DO)-41, Crank Pulley.>

T2: <Ref. to ME(H6DO)-42, Front Chain Cover.>

T3: <Ref. to ME(H6DO)-51, Rear Chain Cover.>

T4: 6.4 (0.65, 4.7)

3. TIMING CHAIN

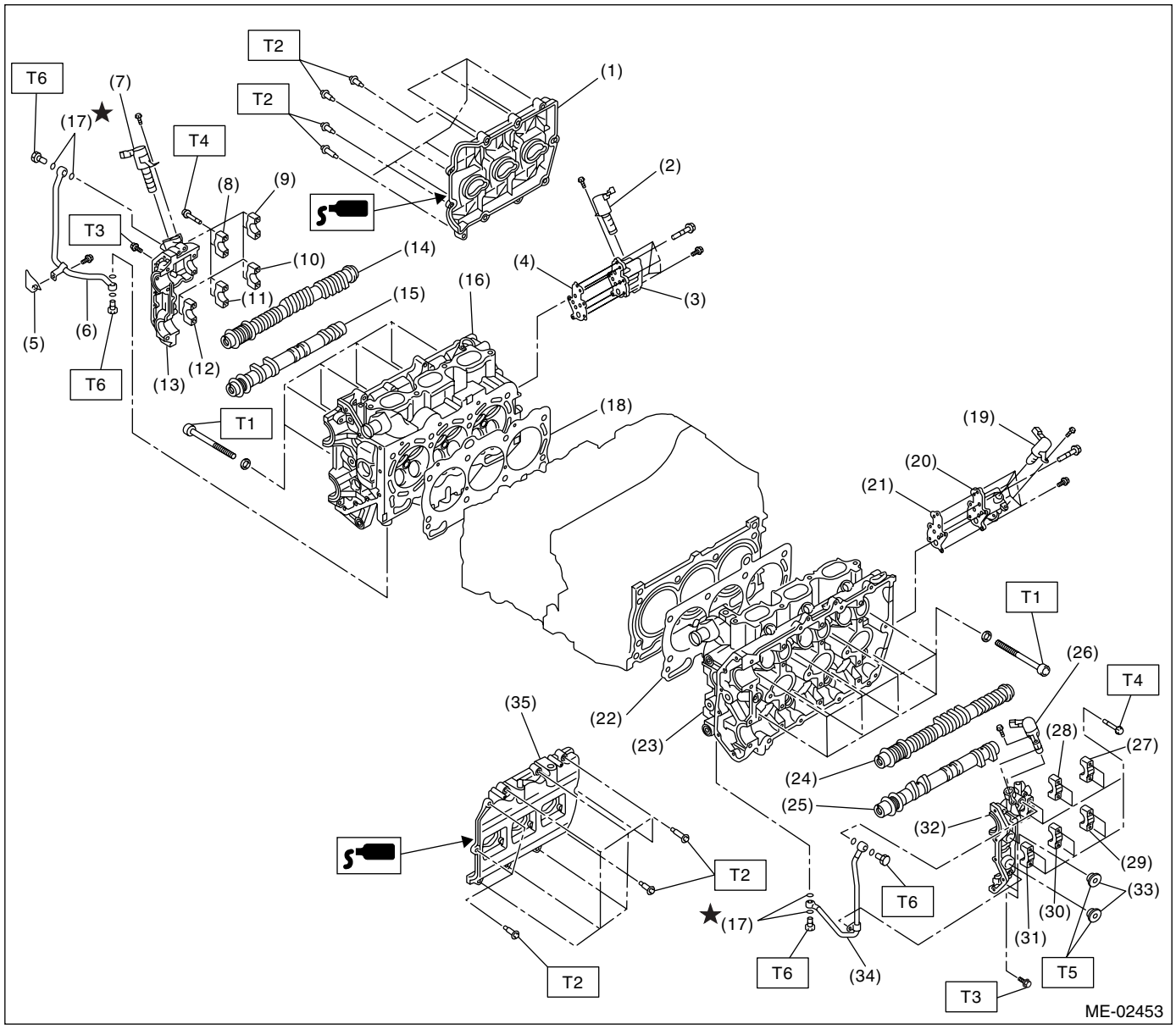


(1) Crank sprocket
(2) Oil relief case
(3) Inner rotor
(4) Outer rotor
(5) Chain guide (center)
(6) Intake cam sprocket (RH)
(7) Exhaust cam sprocket (RH)
(8) Chain guide (RH: between cams)
(9) Timing chain (RH)
(10) Chain guide (RH)
(11) Chain tensioner lever (RH)
(12) Chain tensioner (RH)
(13) Chain tensioner lever (LH)
(14) Chain tensioner (LH)
(15) Water pump
(16) O-ring
(17) Chain guide (LH)
(18) Chain guide (LH: between cams)
(19) Timing chain (LH)
(20) Intake cam sprocket (LH)
(21) Exhaust cam sprocket (LH)
(22) Idler sprocket (lower)
(23) Idler sprocket collar
(24) Idler sprocket (upper)

Tightening torque: N·m (kgf-m, ft-lb)

T1*: *6.4 (0.65, 4.7)
T2: 7.8 (0.8, 5.8)
T3: <Ref. to ME(H6DO)-49, Cam Sprocket.>
T4: 16 (1.6, 12)
T5: 69 (7.0, 50.6)
T6: <Ref. to LU(H6DO)-8, Oil Pump.>

4. CYLINDER HEAD AND CAMSHAFT

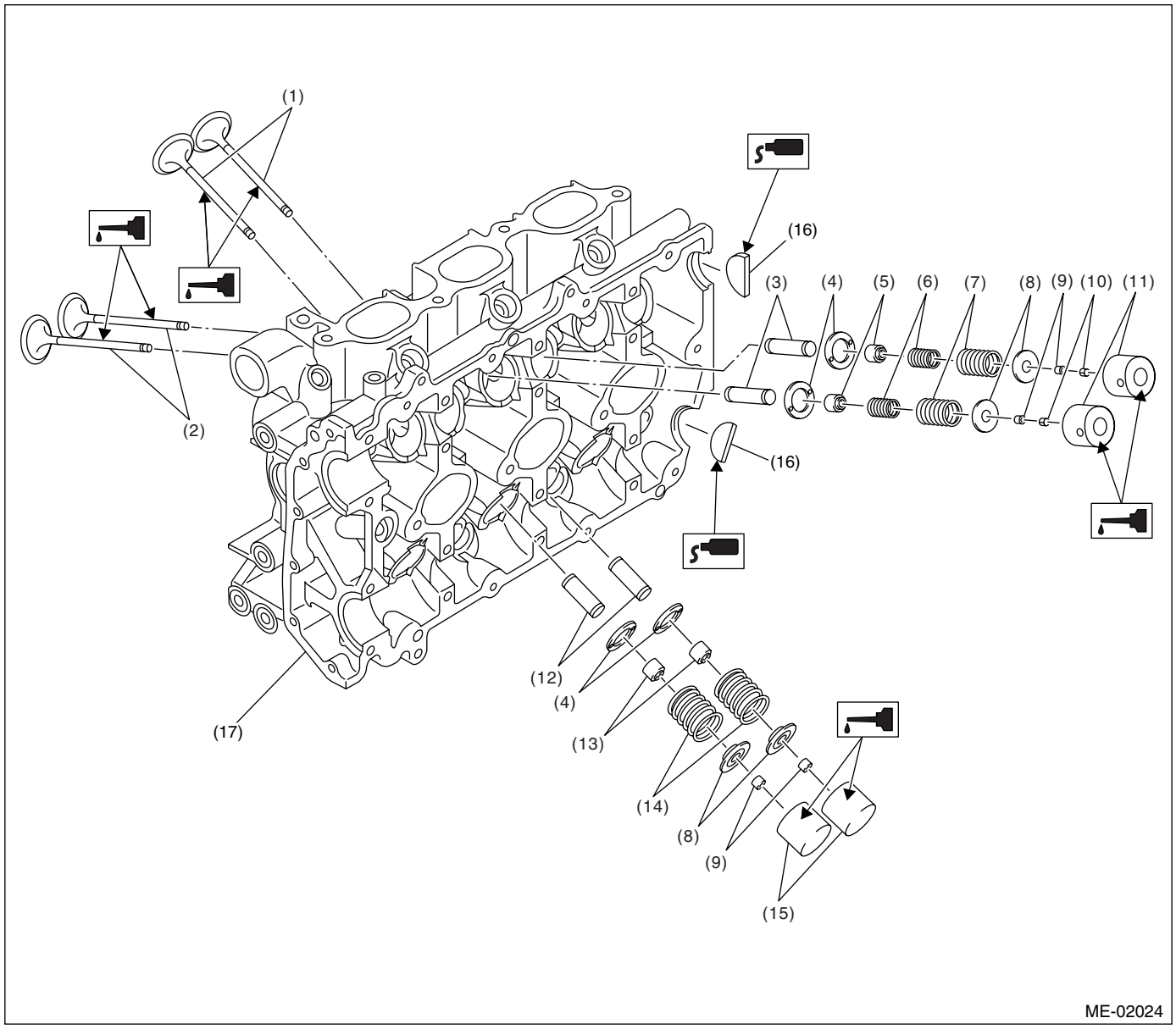


(1) Rocker cover (RH)
(2) Oil switching solenoid valve (RH)
(3) Oil switching solenoid valve holder (RH)
(4) Oil switching solenoid valve gasket
(5) Rear chain cover
(6) Oil pipe (RH)
(7) Oil flow control solenoid valve (RH)
(8) Intake camshaft cap (Center RH)
(9) Intake camshaft cap (Rear RH)
(10) Exhaust camshaft cap (Rear RH)
(11) Exhaust camshaft cap (Center RH)
(12) Exhaust camshaft cap (Front RH)
(13) Front camshaft cap (RH)
(14) Intake camshaft (RH)
(15) Exhaust camshaft (RH)
(16) Cylinder head (RH)
(17) Gasket
(18) Cylinder head gasket (RH)
(19) Oil switching solenoid valve (LH)
(20) Oil switching solenoid valve holder (LH)
(21) Oil switching solenoid valve gasket
(22) Cylinder head gasket (LH)
(23) Cylinder head (LH)
(24) Intake camshaft (LH)
(25) Exhaust camshaft (LH)
(26) Oil flow control solenoid valve (LH)
(27) Intake camshaft cap (Rear LH)
(28) Intake camshaft cap (Center LH)
(29) Exhaust camshaft cap (Rear LH)
(30) Exhaust camshaft cap (Center LH)
(31) Exhaust camshaft cap (Front LH)
(32) Front camshaft cap (LH)
(33) Plug
(34) Oil pipe (LH)
(35) Rocker cover (LH)

Tightening torque: N·m (kgf-m, ft-lb)

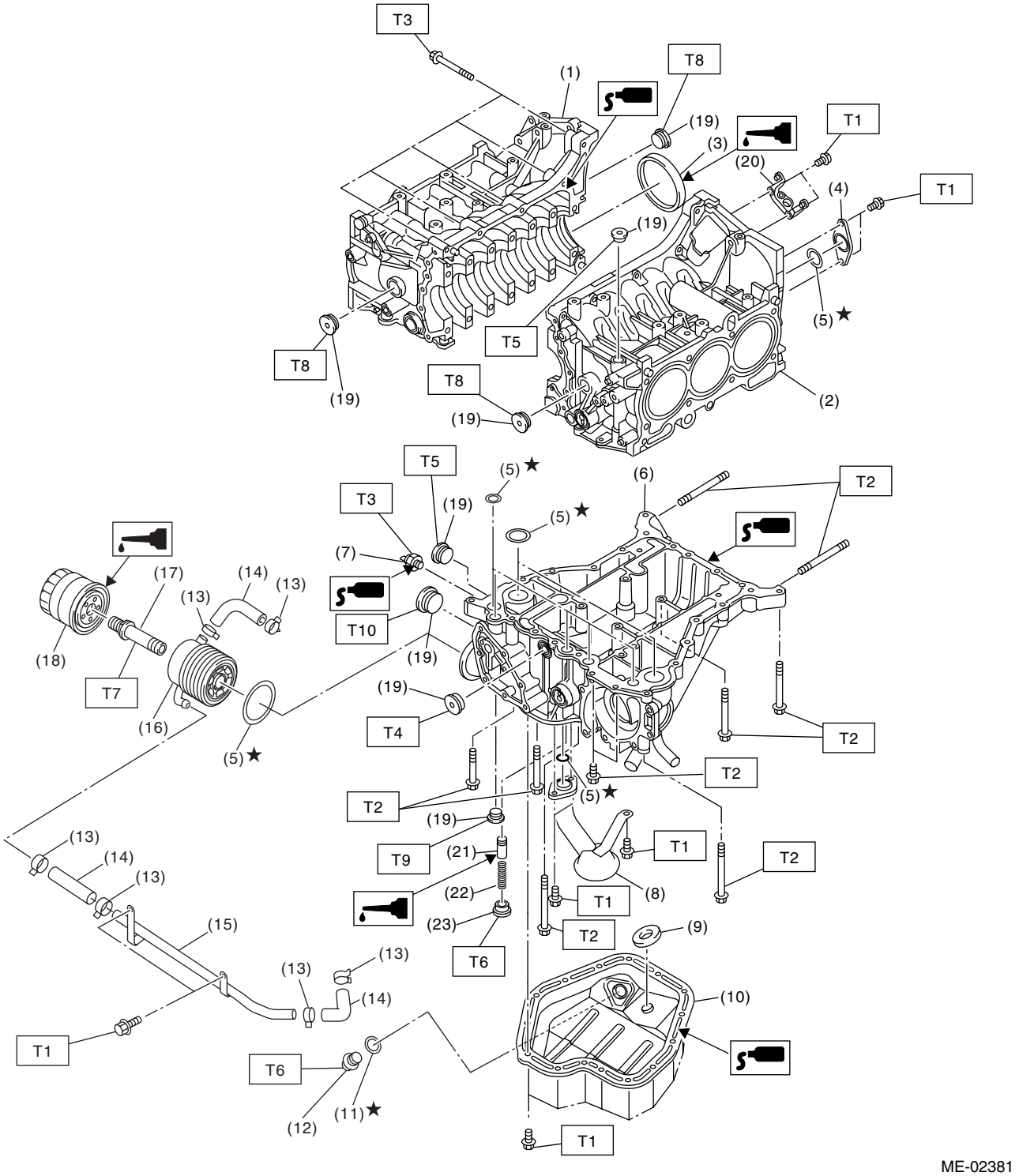
T1: ***<Ref. to ME(H6DO)-57, Cylinder Head.>***
T2: ***<Ref. to ME(H6DO)-53, Camshaft.>***
T3: ***<Ref. to ME(H6DO)-78, Oil Switching Solenoid Valve.>***
T4: ***6.4 (0.65, 4.7)***
T5: ***9.75 (1.0, 7.2)***
T6: ***16 (1.6, 12)***
T7: ***60 (6.1, 44)***
T8: ***29 (3.0, 21.4)***

5. CYLINDER HEAD AND VALVE ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Intake valve guide
(4) Valve spring seat
(5) Intake valve stem seal
(6) Valve spring (Inner)
(7) Valve spring (Outer)
(8) Retainer
(9) Retainer key
(10) Shim
(11) Valve lifter (Intake)
(12) Exhaust valve guide
(13) Exhaust valve stem seal
(14) Valve spring
(15) Valve lifter (Exhaust)
(16) Cylinder head plug
(17) Cylinder head

6. CYLINDER BLOCK

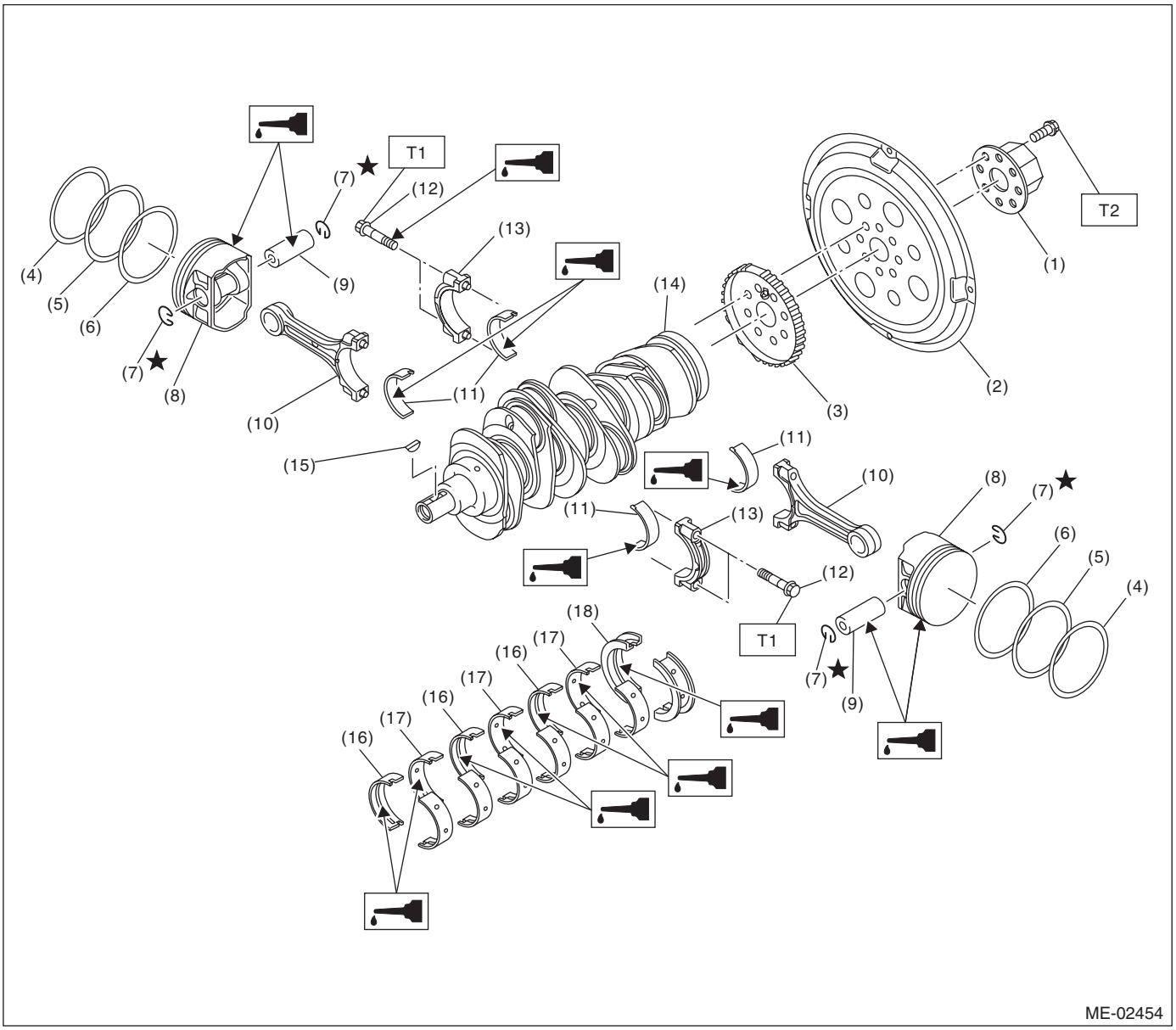


ME-02381

(1) Cylinder block (RH)
(2) Cylinder block (LH)
(3) Rear oil seal
(4) Service hole cover
(5) O-ring
(6) Oil pan upper
(7) Oil pressure switch
(8) Oil strainer
(9) Magnet
(10) Oil pan lower
(11) Metal gasket
(12) Drain plug
(13) Clamp
(14) Hose
(15) Oil cooler pipe
(16) Oil cooler
(17) Connector
(18) Oil filter
(19) Plug
(20) Crankshaft position sensor holder
(21) Relief valve
(22) Relief valve spring
(23) Plug

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*6.4 (0.65, 4.7)*
T2:	*18 (1.8, 13.3)*
T3:	*25 (2.5, 18)*
T4:	*16 (1.6, 12)*
T5:	*37 (3.8, 27)*
T6:	*44 (4.5, 33)*
T7:	*54 (5.5, 40)*
T8:	*70 (7.1, 52)*
T9:	*23 (2.3, 17)*
T10:	*90 (9.2, 67)*

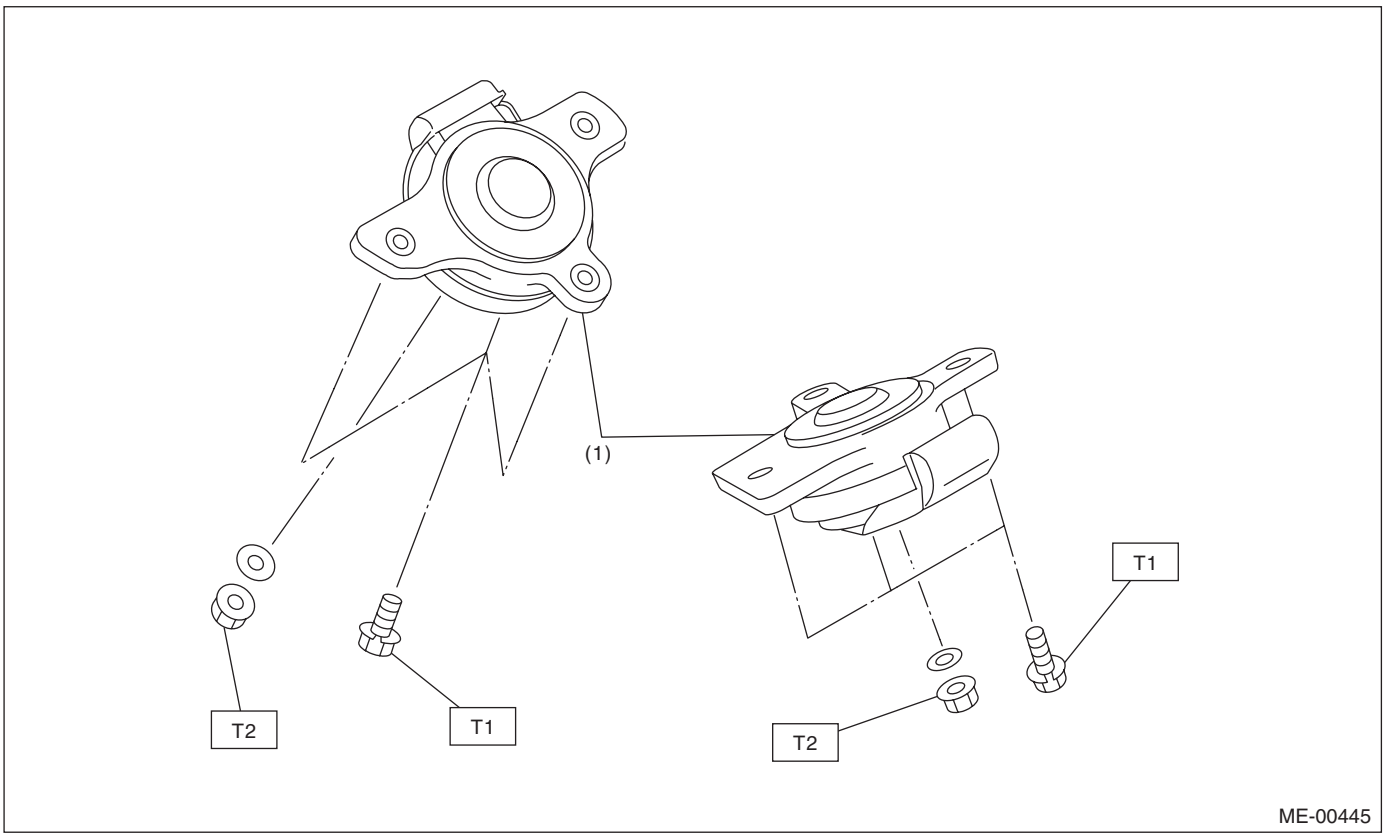
7. CRANKSHAFT AND PISTON



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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 53 (5.4, 39)
T2: 81 (8.3, 60)

8. ENGINE MOUNTING



(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 work clothing, including a cap, protective goggles and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- Be careful not to burn yourself, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or 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.
- Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
- Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
- All removed parts, if to be reused, should be reinstalled in the original positions and directions.
- Bolts, nuts and washers should be replaced with new ones as required.
- Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
- Remove or install 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.

D: PREPARATION TOOL

1. SPECIAL TOOL

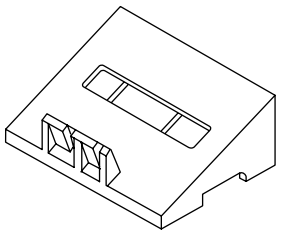
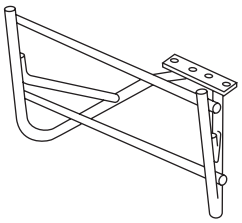
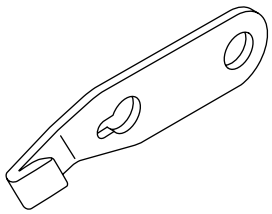
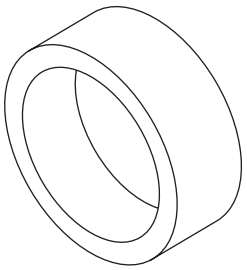
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18250AA010	18250AA010	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve spring.
 ST18232AA000	18232AA000	ENGINE STAND	Used for disassembling and assembling engine.
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel or drive plate when loosening / tightening crank pulley bolt.
 ST18254AA000	18254AA000	PISTON GUIDE	Used for installing piston in cylinder.

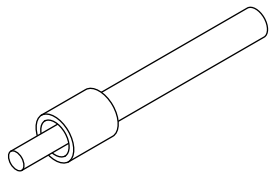
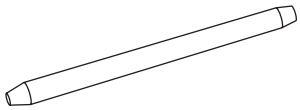
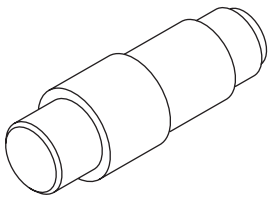
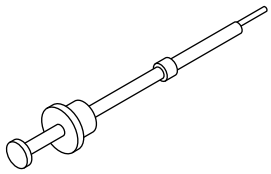
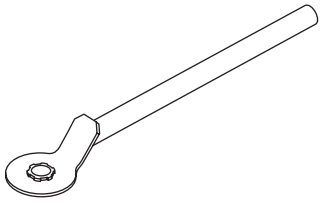
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499585500	499585500	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 ST18253AA000	18253AA000	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 ST18350AA000	18350AA000	CONNECTING ROD BUSHING REMOVER & INSTALLER	Used for removing and installing connecting rod bushing.
 ST-499097700	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 ST-499977500	499977500	CAM SPROCKET WRENCH	Used for removing and installing intake cam sprocket.

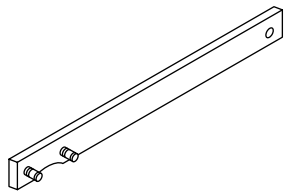
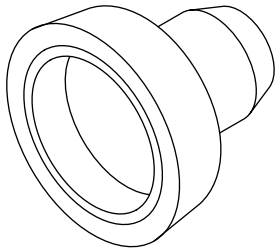
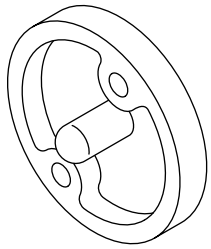
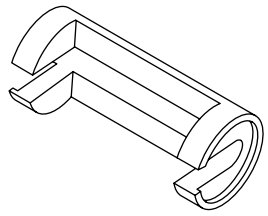
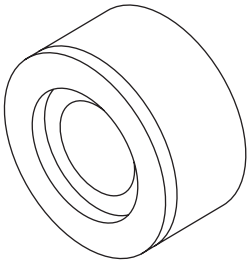
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18231AA020	18231AA020	CAM SPROCKET WRENCH	Used for removing and installing exhaust cam sprocket.
 ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 ST-499597100	499597100	CRANKSHAFT OIL SEAL GUIDE	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).
 ST-499718000	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 ST18251AA040	18251AA040	VALVE GUIDE ADJUSTER	Used for installing valve guides.

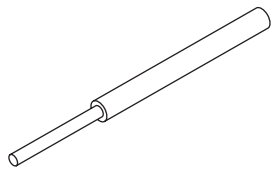
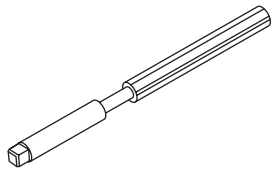
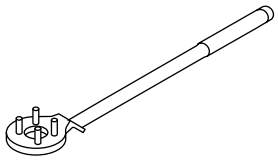
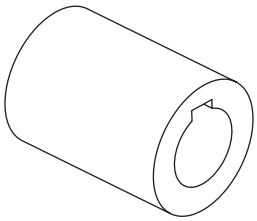
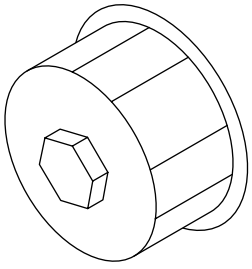
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499765700	499765700	VALVE GUIDE REMOVER	Used for removing valve guides.
 ST-499765900	499765900	VALVE GUIDE REAMER	Used for reaming valve guides.
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening/tightening crank pulley bolt.
 ST18252AA000	18252AA000	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 ST-498547000	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.

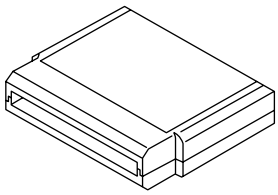
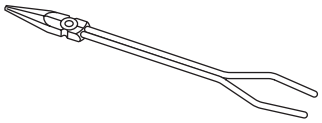
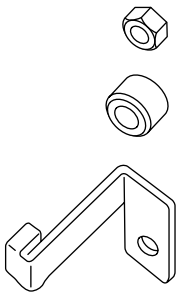
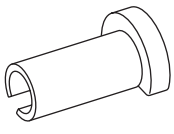
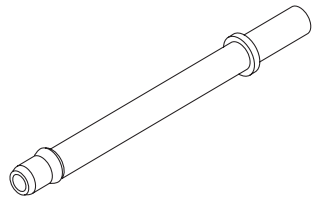
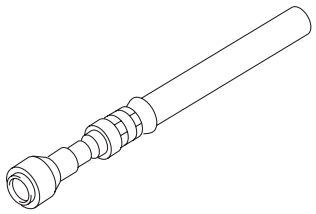
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.
 ST18233AA000	18233AA000	PISTON PIN SNAP RING PLIERS	Used for removing and installing snap ring of piston pin.
 ST-498277200	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
 ST42099AE000	42099AE000	CONNECTOR REMOVER	Used for disconnecting quick connector of the engine compartment.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18471AA000	18471AA000	FUEL PIPE ADAPTER	Used for measuring fuel pressure.
 ST42075AG690	42075AG690	FUEL HOSE	Used for measuring fuel pressure. This is a genuine Subaru part.

2. GENERAL TOOL

TOOL NAME	REMARKS
Compression gauge	Used for measuring compression.

E: PROCEDURE

It is possible to conduct the following service procedures with engine on vehicle, however, the procedures described in this section are based on the condition that the engine is removed from vehicle.

- Camshaft
- Cylinder head

2. Compression

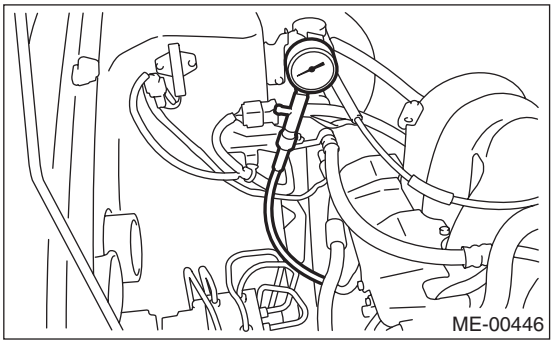
A: INSPECTION

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

1) After warming-up the engine, turn the ignition switch to OFF.
2) Make sure that the battery is fully charged.
3) Release the fuel pressure.
<Ref. to FU(H6DO)-37, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
4) Remove all the spark plugs. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.>
5) Check the starter motor for satisfactory performance and operation.
6) Hold the compression gauge tightly against the spark plug hole.

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

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



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

Compression (350 rpm and fully open throttle):
Standard:
1,275 — 1,471 kPa (13.0 — 1.50 kgf/cm^2, 185 — 213 psi)
Service limit:
1,128 kPa (11.5 kgf/cm^2, 164 psi)

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) Idle the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) Insert the cartridge to Subaru Select Monitor.
5) Connect the Subaru Select Monitor to data link connector.
6) Turn the ignition switch to ON and Subaru Select Monitor switch to ON.
7) Select {Each System Check} in Main Menu.
8) Select {Engine} in Selection Menu.
9) Select {Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {Data Display} in Data Display Menu.
11) Start the engine, and read the engine idle speed.
12) 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 neutral]:
650±50 rpm

13) 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 gears in neutral]:
770±50 rpm

NOTE:
Idle speed cannot be adjusted manually, because the idle speed is automatically adjusted. If the prescribed idle speed cannot be maintained, refer to General On-board Diagnosis Table under “Engine Control System”. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>

4. Ignition Timing

A: INSPECTION

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

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) Idle the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) Insert the cartridge to Subaru Select Monitor.
5) Connect the Subaru Select Monitor to data link connector.
6) Turn the ignition switch to ON and Subaru Select Monitor switch to ON.
7) Select {Each System Check} in Main Menu.
8) Select {Engine} in Selection Menu.
9) Select {Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {Data Display} in Data Display Menu.
11) Start the engine and check the ignition timing at idle speed.

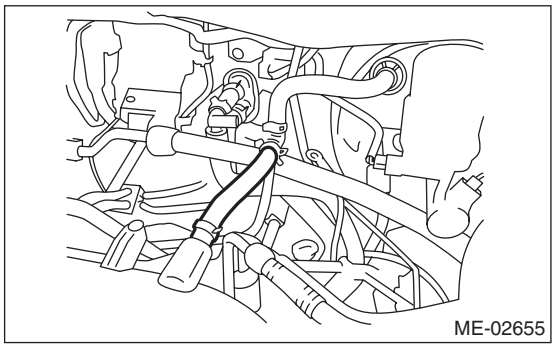
Ignition timing [BTDC/rpm]:
15°±8°/650

If the timing is not correct, check the ignition control system. Refer to Engine Control System. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum

A: INSPECTION

1) Idle the engine.
2) Disconnect the brake vacuum hose from intake manifold, and then install the vacuum gauge.
3) Keep the engine at idle speed and read the vacuum gauge indication.
By observing the gauge needle movement, internal condition of the engine can be diagnosed as described below.



Vacuum pressure (at idling, A/C OFF):
–60.0 kPa (–450 mmHg, –17.72 inHg) or less

Diagnosis of engine condition by measurement of intake manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Air leakage around intake manifold gasket, disconnection or damage of vacuum hose
2. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
3. Needle drops suddenly and intermittently from normal position.	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 normal position in narrow range.	Defective ignition system or throttle chamber idle adjustment

6. Engine Oil Pressure

A: INSPECTION

1) Remove the oil pressure switch from cylinder block. <Ref. to LU(H6DO)-13, REMOVAL, Oil Pressure Switch.>
2) Connect the oil pressure gauge hose to cylinder block.
3) Connect the ground cable to the battery.
4) Start the engine, and measure the oil pressure.

OIL PRESSURE (at oil temperature of 80°C (176°F)):

Standard:

135 kPa (1.4 kgf/cm^2, 20 psi) or more (at 600 rpm)
500 kPa (5.1 kgf/cm^2, 73 psi) or more (at 5,000 rpm)

CAUTION:
• If the oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU(H6DO)-17, INSPECTION, General Diagnostics Table.>
• If the oil pressure warning light is turned ON and oil pressure is in specification, replace the oil pressure switch. <Ref. to LU(H6DO)-17, INSPECTION, General Diagnostics Table.>

5) After measuring the oil pressure, install the oil pressure switch. <Ref. to LU(H6DO)-13, INSTALLATION, Oil Pressure Switch.>

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

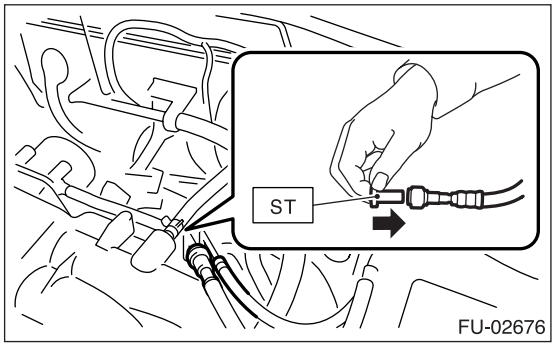
7. Fuel Pressure

A: INSPECTION

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

1) Release the fuel pressure.
<Ref. to FU(H6DO)-37, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Disconnect the fuel delivery hose and connect fuel pressure gauge.
(1) Disconnect the fuel delivery hose using the ST1.

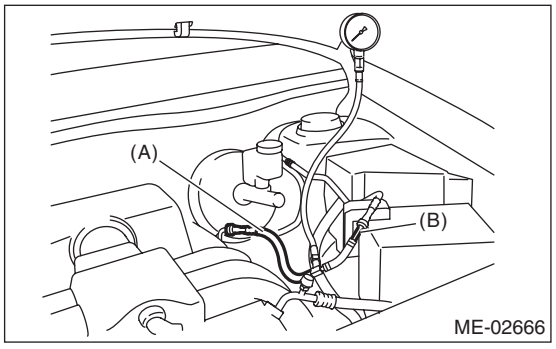
ST1 42099AE000 CONNECTOR REMOVER



(2) Connect the fuel pressure meter using the ST2 and ST3.

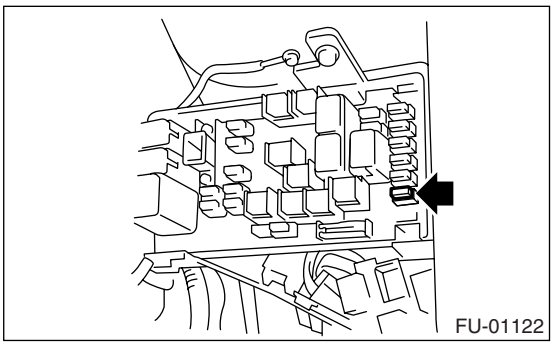
NOTE:
ST2 is a genuine Subaru part.

ST2 42075AG690 FUEL HOSE
ST3 18471AA000 FUEL PIPE ADAPTER



(A) ST 2
(B) ST 3

3) Install the fuse of fuel pump to main fuse box.



4) Start the engine.
5) Measure the fuel pressure after warming up the engine.

Fuel pressure:
Standard: 338 — 348 kPa (3.4 — 3.5 kgf/cm^2, 49 — 50.5 psi)

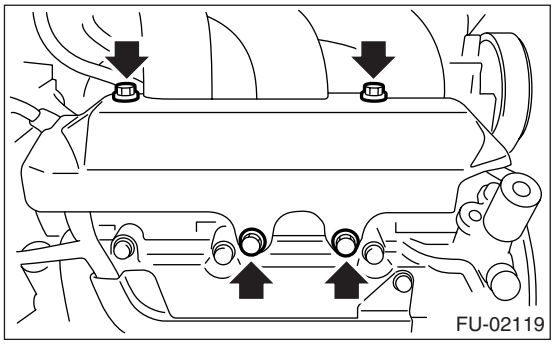
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kgf/cm^2, 1 to 3 psi) higher than standard values during high-altitude operations.

8. Valve Clearance

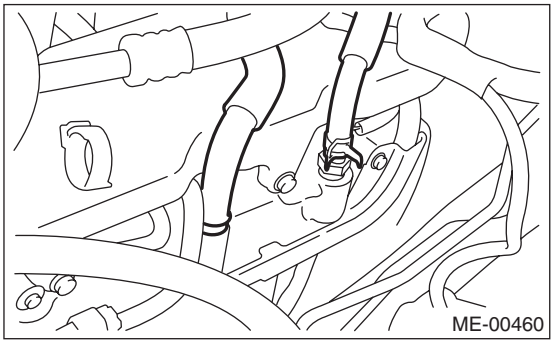
A: INSPECTION

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

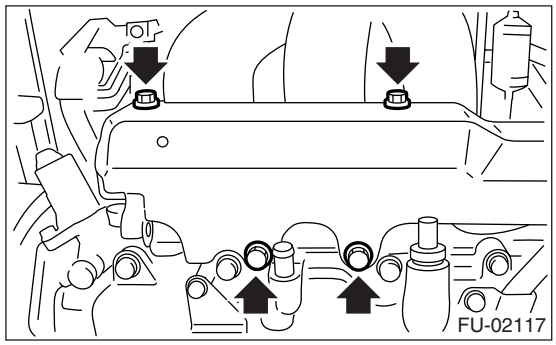
1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.
4) Lift-up the vehicle.
5) Remove the under cover.
6) Lower the vehicle.
7) When inspecting RH side cylinders:
   (1) Remove the air intake duct and air cleaner case. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.> <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.>
   (2) Remove the fuel tank protector (RH).



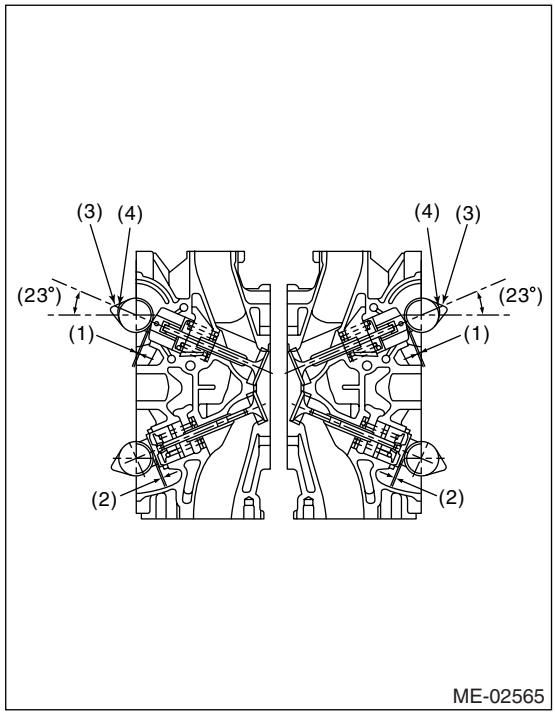
   (3) Disconnect the connector of oil pressure switch.
   (4) Remove the ignition coil. <Ref. to IG(H6DO)-7, REMOVAL, Ignition Coil & Ignitor Assembly.>
   (5) Remove the rocker cover (RH).
8) When inspecting LH side cylinders:
   (1) Disconnect the battery cable, and then remove the battery and battery carrier.
   (2) Disconnect the PCV hose and blow-by hose from rocker cover (LH).



   (3) Remove the fuel pipe protector (LH).



   (4) Remove the ignition coil. <Ref. to IG(H6DO)-7, REMOVAL, Ignition Coil & Ignitor Assembly.>
   (5) Remove the rocker cover (LH).
9) Turn the crankshaft clockwise until the cam is set to position shown in the figure.



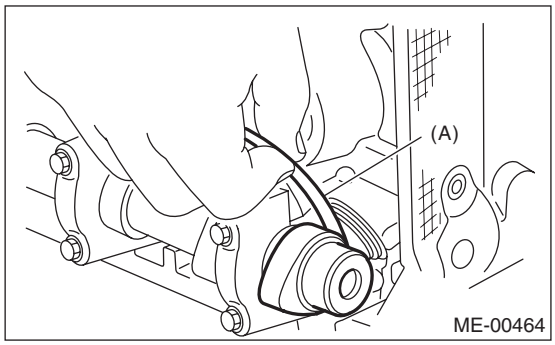
(1) Valve clearance (Intake side)
(2) Valve clearance (Exhaust side)
(3) High lift cam
(4) Low lift cam

10) Measure the clearance of intake valve and exhaust valve using thickness gauge (A).

NOTE:
• Measure it within the range of ±30° from specified position shown in the figure.
• Measure it in low lift cam for intake side.
• Insert a thickness gauge in a direction as horizontal as possible with respect to the valve lifter.

Valve clearance
Intake:
$0.20\ ^{+0.04}_{-0.06}$ mm ($0.0079\ ^{+0.0016}_{-0.0024}$ in)
Exhaust:
0.35±0.05 mm (0.0138±0.0020 in)

• If the measured value is not within specification, take notes of the value in order to adjust the valve clearance later on.



11) If necessary, adjust the valve clearance. <Ref. to ME(H6DO)-28, ADJUSTMENT, Valve Clearance.>
12) Further turn the crank pulley clockwise and then measure the valve clearances again.
13) After inspection, install the related parts in the reverse order of removal.

B: ADJUSTMENT

1. INTAKE SIDE

CAUTION:
• Adjustment of valve clearance should be performed while engine is cold.
• Do not wear gloves during removal and installation of valve lifter.
• Do not use the valve lifter which got high impact due to drop etc.
• When installing the valve lifter, align the anti-rotation of valve lifter with groove on cylinder head, and then insert the valve lifter.

1) Measure all the valve clearances.
<Ref. to ME(H6DO)-27, INSPECTION, Valve Clearance.>

NOTE:
Record each valve clearance after measurement.

2) Remove the camshaft. <Ref. to ME(H6DO)-53, REMOVAL, Camshaft.>
3) Remove the valve lifter.
4) Remove the shim from valve lifter.
5) Check the thickness of the shim from the markings on the side of the shim that was removed.
6) Select a shim of suitable thickness from the following table using the measured valve clearance and shim thickness.

Unit: (mm)
S = (V + T) – 0.20
S: Required shim thickness V: Measured valve clearance T: Shim thickness to be used

Part No.	Thickness mm (in)
13218AK890	1.92 (0.0756)
13218AK900	1.94 (0.0764)
13218AK910	1.96 (0.0772)
13218AK920	1.98 (0.0780)
13218AK930	2.00 (0.0787)
13218AK940	2.02 (0.0795)
13218AK950	2.04 (0.0803)
13218AK960	2.06 (0.0811)
13218AK970	2.07 (0.0815)
13218AK980	2.08 (0.0819)
13218AK990	2.09 (0.0823)
13218AL000	2.10 (0.0827)
13218AL010	2.11 (0.0831)
13218AL020	2.12 (0.0835)
13218AL030	2.13 (0.0839)
13218AL040	2.14 (0.0843)
13218AL050	2.15 (0.0846)
13218AL060	2.16 (0.0850)
13218AL070	2.17 (0.0854)
13218AL080	2.18 (0.0858)
13218AL090	2.19 (0.0862)
13218AL100	2.20 (0.0866)
13218AL110	2.21 (0.0870)
13218AL120	2.22 (0.0874)
13218AL130	2.23 (0.0878)
13218AL140	2.24 (0.0882)
13218AL150	2.25 (0.0886)
13218AL160	2.26 (0.0890)
13218AL170	2.27 (0.0894)
13218AL180	2.28 (0.0898)
13218AL190	2.29 (0.0902)
13218AL200	2.30 (0.0906)
13218AL210	2.31 (0.0909)
13218AL220	2.32 (0.0913)
13218AL230	2.33 (0.0917)
13218AL240	2.34 (0.0921)
13218AL250	2.35 (0.0925)
13218AL260	2.36 (0.0929)
13218AL270	2.37 (0.0933)
13218AL280	2.38 (0.0937)
13218AL290	2.39 (0.0941)
13218AL300	2.40 (0.0945)
13218AL310	2.41 (0.0949)
13218AL320	2.42 (0.0953)
13218AL330	2.43 (0.0957)
13218AL340	2.44 (0.0961)
13218AL350	2.45 (0.0965)
13218AL360	2.46 (0.0969)
13218AL370	2.47 (0.0972)
13218AL380	2.48 (0.0976)
13218AL390	2.49 (0.0980)
13218AL400	2.50 (0.0984)

Part No.	Thickness mm (in)
13218AL410	2.51 (0.0988)
13218AL420	2.52 (0.0992)
13218AL430	2.53 (0.0996)
13218AL440	2.54 (0.1000)
13218AL450	2.55 (0.1004)
13218AL460	2.56 (0.1008)
13218AL470	2.57 (0.1012)
13218AL480	2.58 (0.1016)
13218AL490	2.59 (0.1020)
13218AL500	2.60 (0.1024)
13218AL510	2.61 (0.1028)
13218AL520	2.62 (0.1032)
13218AL530	2.64 (0.1039)
13218AL540	2.66 (0.1047)
13218AL550	2.68 (0.1055)
13218AL560	2.70 (0.1063)
13218AL570	2.72 (0.1071)
13218AL580	2.74 (0.1079)
13218AL590	2.76 (0.1087)

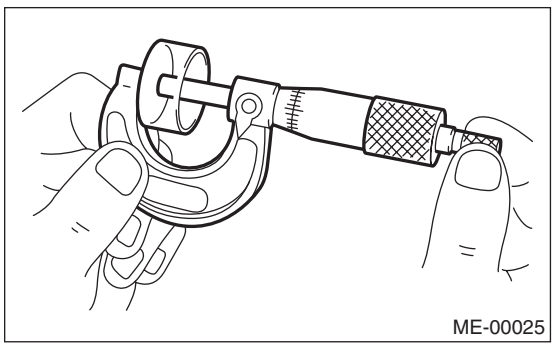
2. EXHAUST SIDE

CAUTION:
• Adjustment of valve clearance should be performed while engine is cold.
• Do not wear gloves during removal and installation of valve lifter.
• Do not use the valve lifter which got high impact due to drop etc.

1) Measure all the valve clearances.
<Ref. to ME(H6DO)-27, INSPECTION, Valve Clearance.>

NOTE:
Record each valve clearance after measurement.

2) Remove the camshaft. <Ref. to ME(H6DO)-53, REMOVAL, Camshaft.>
3) Remove the valve lifter.
4) Measure the thickness of valve lifter using micrometer.



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

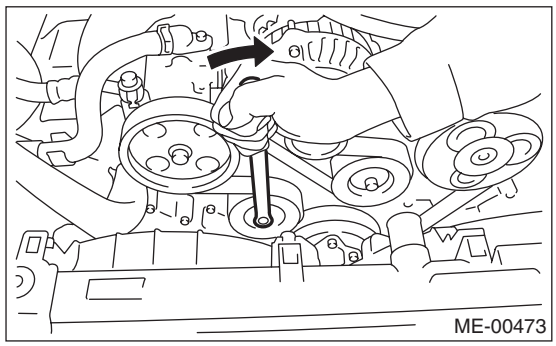
Unit: (mm)
S = (V + T) – 0.35
S: Valve lifter thickness required V: Measured valve clearance T: Valve lifter thickness to be used

Part No.	Thickness mm (in)
13228AD180	4.32 (0.1701)
13228AD190	4.34 (0.1709)
13228AD200	4.36 (0.1717)
13228AD210	4.38 (0.1724)
13228AD220	4.40 (0.1732)
13228AD230	4.42 (0.1740)
13228AD240	4.44 (0.1748)
13228AD250	4.46 (0.1756)
13228AD260	4.48 (0.1764)
13228AD270	4.50 (0.1772)
13228AD280	4.52 (0.1780)
13228AD290	4.54 (0.1787)
13228AD300	4.56 (0.1795)
13228AD310	4.58 (0.1803)
13228AD320	4.60 (0.1811)
13228AC580	4.62 (0.1819)
13228AC590	4.63 (0.1823)
13228AC600	4.64 (0.1827)
13228AC610	4.65 (0.1831)
13228AC620	4.66 (0.1835)
13228AC630	4.67 (0.1839)
13228AC640	4.68 (0.1843)
13228AC650	4.69 (0.1846)
13228AC660	4.70 (0.1850)
13228AC670	4.71 (0.1854)
13228AC680	4.72 (0.1858)
13228AC690	4.73 (0.1862)
13228AC700	4.74 (0.1866)
13228AC710	4.75 (0.1870)
13228AC720	4.76 (0.1874)
13228AC730	4.77 (0.1878)
13228AC740	4.78 (0.1882)
13228AC750	4.79 (0.1886)
13228AC760	4.80 (0.1890)
13228AC770	4.81 (0.1894)
13228AC780	4.82 (0.1898)
13228AC790	4.83 (0.1902)
13228AC800	4.84 (0.1906)
13228AC810	4.85 (0.1909)
13228AC820	4.86 (0.1913)
13228AC830	4.87 (0.1917)
13228AC840	4.88 (0.1921)
13228AC850	4.89 (0.1925)
13228AC860	4.90 (0.1929)
13228AC870	4.91 (0.1933)
13228AC880	4.92 (0.1937)
13228AC890	4.93 (0.1941)
13228AC900	4.94 (0.1945)
13228AC910	4.95 (0.1949)
13228AC920	4.96 (0.1953)
13228AC930	4.97 (0.1957)
13228AC940	4.98 (0.1961)
13228AC950	4.99 (0.1965)
13228AC960	5.00 (0.1969)
13228AC970	5.01 (0.1972)
13228AC980	5.02 (0.1976)
13228AC990	5.03 (0.1980)
13228AD000	5.04 (0.1984)
13228AD010	5.05 (0.1988)
13228AD020	5.06 (0.1992)
13228AD030	5.07 (0.1996)
13228AD040	5.08 (0.2000)
13228AD050	5.09 (0.2004)
13228AD060	5.10 (0.2008)
13228AD070	5.11 (0.2012)
13228AD080	5.12 (0.2016)
13228AD090	5.13 (0.2020)
13228AD100	5.14 (0.2024)
13228AD110	5.15 (0.2028)
13228AD120	5.16 (0.2032)
13228AD130	5.17 (0.2035)
13228AD140	5.18 (0.2039)
13228AD150	5.19 (0.2043)
13228AD160	5.20 (0.2047)
13228AD170	5.21 (0.2051)
13228AD330	5.23 (0.2059)
13228AD340	5.25 (0.2067)
13228AD350	5.27 (0.2075)
13228AD360	5.29 (0.2083)
13228AD370	5.31 (0.2091)
13228AD380	5.33 (0.2098)
13228AD390	5.35 (0.2106)
13228AD400	5.37 (0.2114)
13228AD410	5.39 (0.2122)
13228AD420	5.41 (0.2130)
13228AD430	5.43 (0.2138)
13228AD440	5.45 (0.2146)
13228AD450	5.47 (0.2154)
13228AD460	5.49 (0.2161)
13228AD470	5.51 (0.2169)
13228AD480	5.53 (0.2177)
13228AD490	5.55 (0.2185)
13228AD500	5.57 (0.2193)
13228AD510	5.59 (0.2201)

9. V-belt

A: REMOVAL

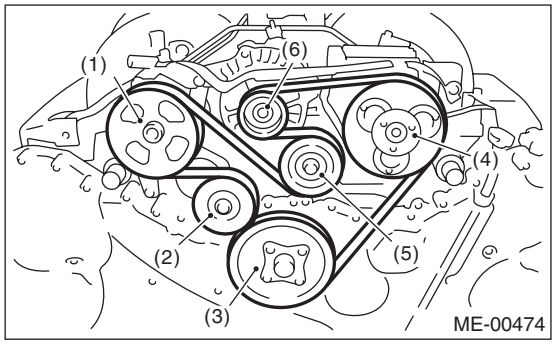
1) Install the tool to belt tension adjuster assembly installation bolt.
2) Rotate the tool clockwise and loosen the V-belt to remove.



3) Remove the V-belt cover.

B: INSTALLATION

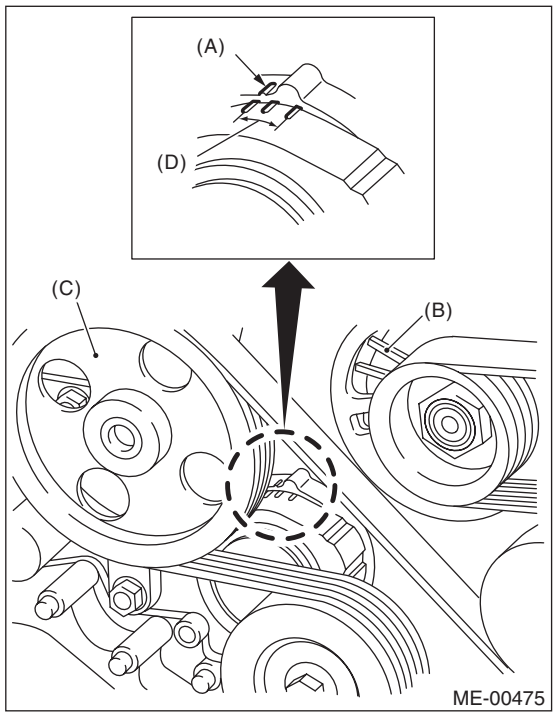
Install in the reverse order of removal.



(1) Power steering oil pump pulley
(2) Belt tension adjuster ASSY
(3) Crank pulley
(4) A/C compressor
(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).

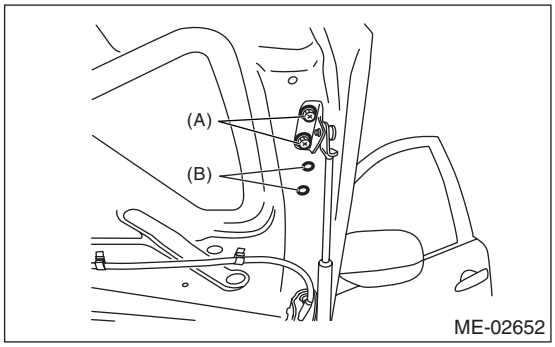


(A) Indicator
(B) Generator
(C) Power steering oil pump pulley
(D) Service limit

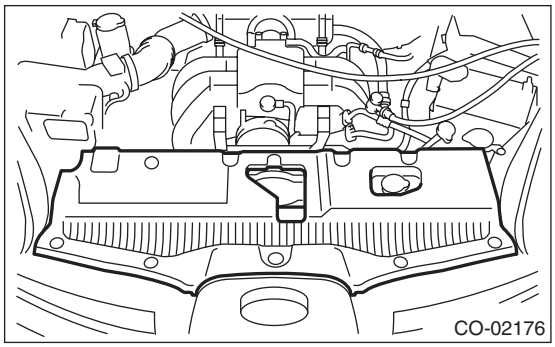
10.Engine Assembly

A: REMOVAL

1) Set the vehicle on a lift.
2) Change the bolt mounting position from (A) to (B), then completely open the front hood.



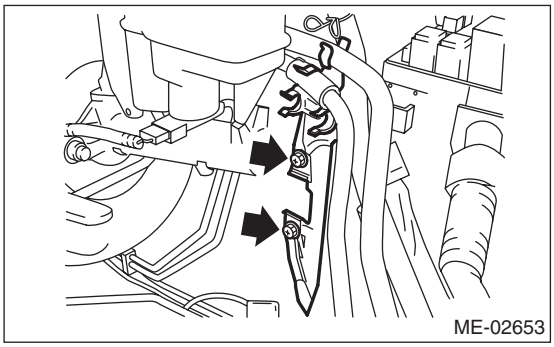
3) Remove the collector cover.
4) Collect the refrigerant from A/C system. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
5) Release the fuel pressure.
<Ref. to FU(H6DO)-37, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
6) Remove the battery from vehicle. <Ref. to SC(H6DO)-25, REMOVAL, Battery.>
7) Remove the air intake duct, air cleaner case and air intake chamber.
<Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.> <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
8) Remove the engine front cover.



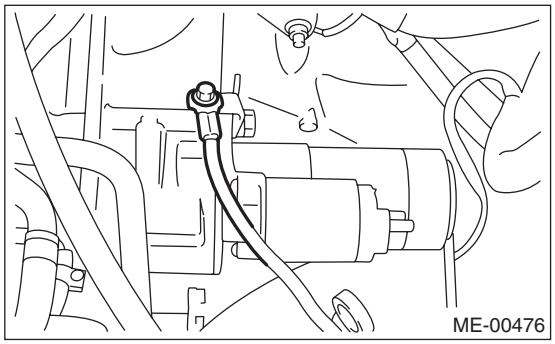
9) Remove the radiator from the vehicle. <Ref. to CO(H6DO)-15, REMOVAL, Radiator.>

NOTE:
Protect the condenser so that it will not be damaged.

10) Remove the fuel hose bracket.



11) Remove the V-belts. <Ref. to ME(H6DO)-31, REMOVAL, V-belt.>
12) Disconnect the A/C pressure hoses from A/C compressor. <Ref. to AC-38, REMOVAL, Hose and Tube.>
13) Remove the engine ground terminal.

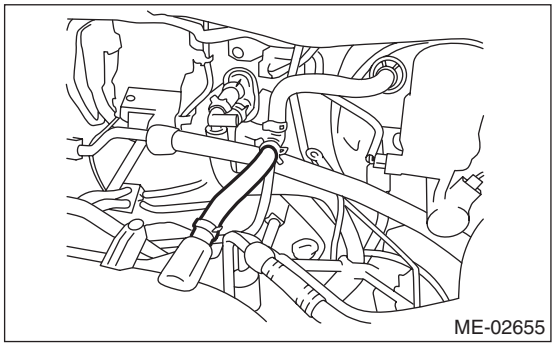


14) Disconnect the following connector.
(1) Engine harness connectors



(2) Generator connector, terminal and A/C compressor connector
(3) Power steering switch connector

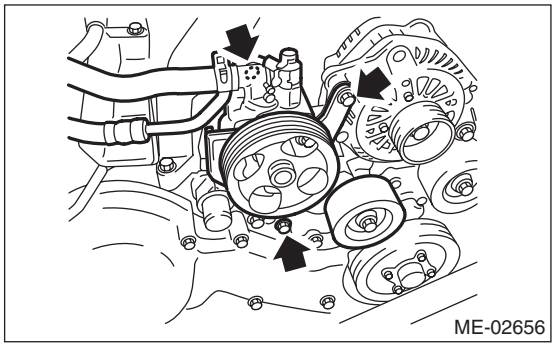
15) Disconnect the following hoses.
(1) Brake booster vacuum hose


ME-02655

(2) Heater inlet and outlet hoses

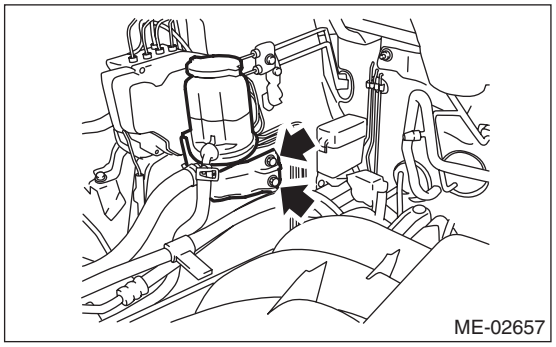
16) Remove the power steering pump with the bracket.

NOTE:
Do not disconnect the hose and pipe from the power steering pump body.

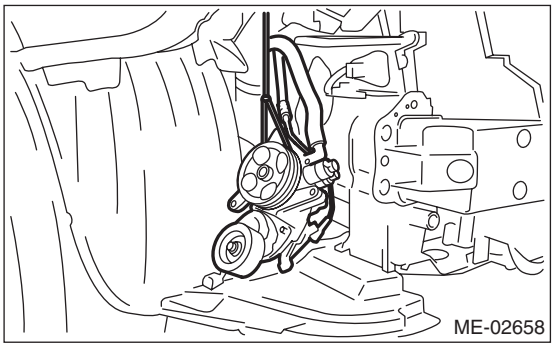

ME-02656

17) Remove the reservoir tank with the bracket.

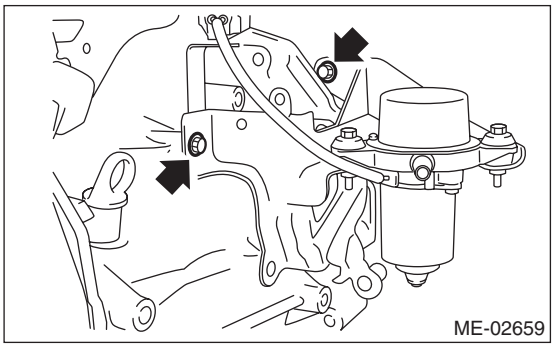
NOTE:
Do not disconnect the hose from the reservoir tank body.


ME-02657

18) Suspend the power steering pump using wire, etc.


ME-02658

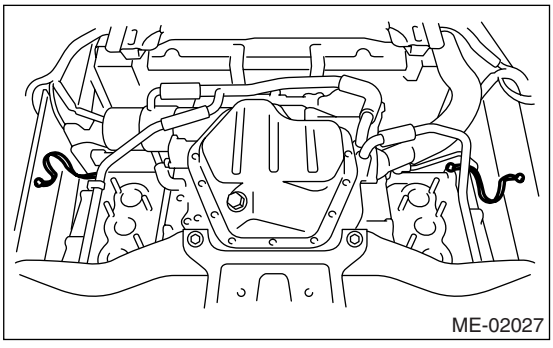
19) Remove the bolts which hold the vacuum pump bracket to the engine and transmission.


ME-02659

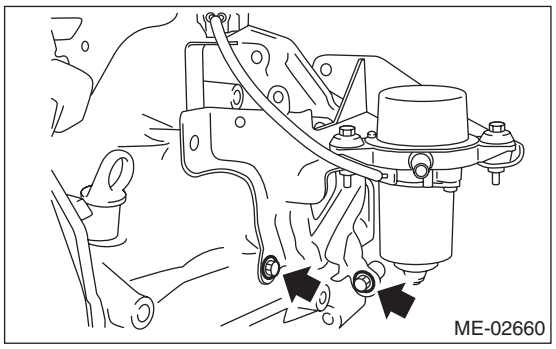
20) Lift-up the vehicle.
21) Remove the front exhaust pipe.
<Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.>

NOTE:
Be careful not to let the front exhaust pipe interfere with water pipes on engine side.

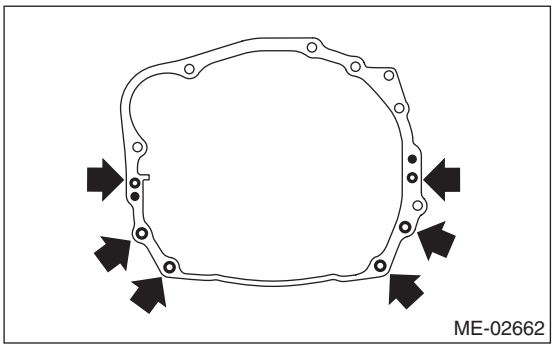
22) Remove the ground cable.


ME-02027

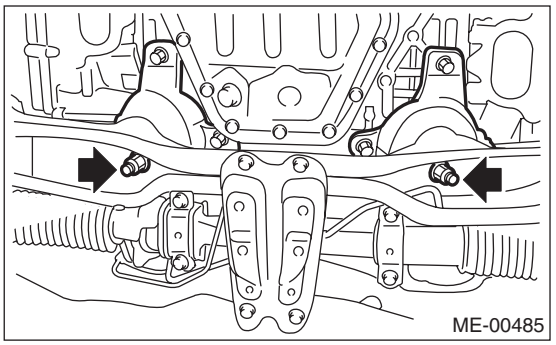
23) Remove the bolts which hold the vacuum pump bracket to the engine and transmission, then remove the vacuum pump with the bracket.



24) Remove the bolts and nuts which hold lower side of transmission to engine.

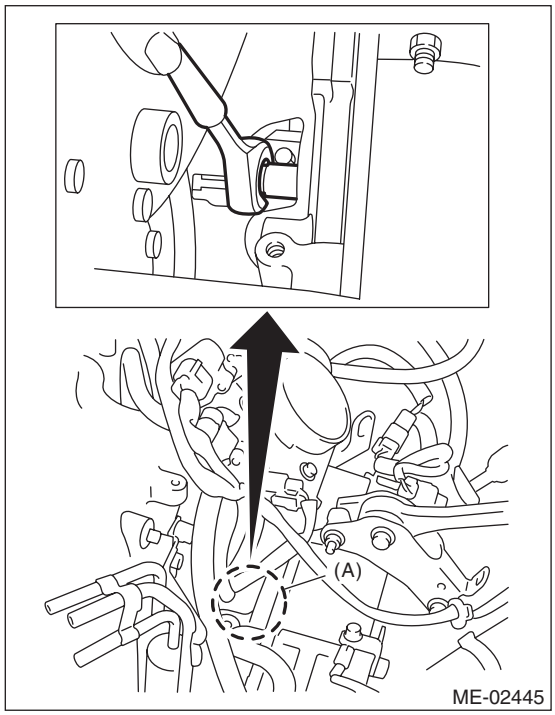


25) Remove the nuts which install front cushion rubber onto front crossmember.



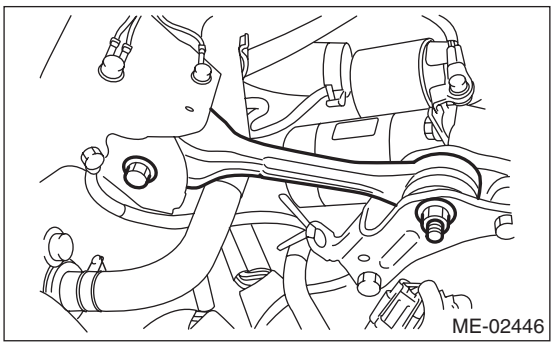
26) Lower the vehicle.

27) Separate the torque converter clutch from drive plate.
(1) Remove the service hole plug.
(2) Remove the bolts which hold torque converter clutch to drive plate.
(3) Remove other bolts while rotating the engine using socket wrench.



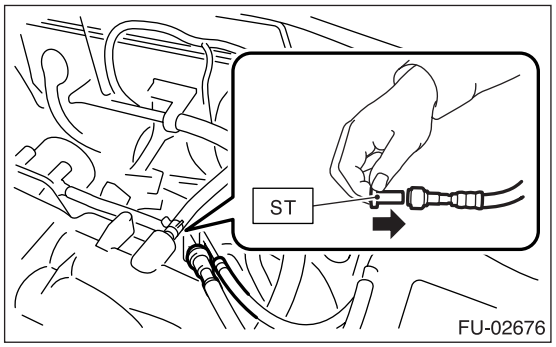
(A) Service hole plug

28) Remove the pitching stopper.



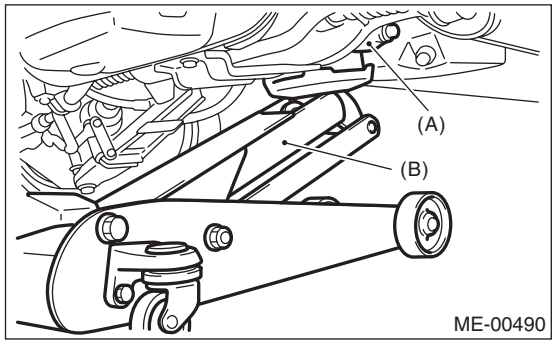
29) Disconnect the fuel delivery hose and evaporation hose.
(1) Disconnect the connector of fuel pipe by pushing the ST in the direction of arrow.
ST 42099AE000 CONNECTOR REMOVER
(2) Remove the clamp, and disconnect the evaporation hose from the pipe.

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



30) Support the engine with a lifting device and wire ropes.
31) Support the transmission with a garage jack.

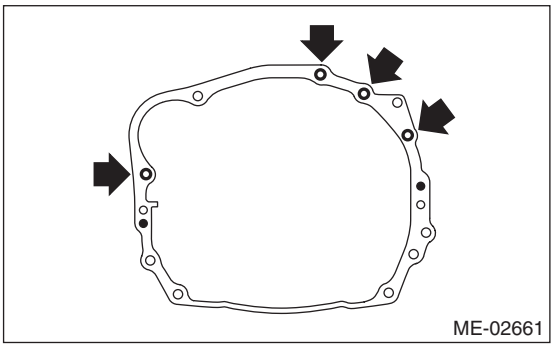
CAUTION:
Doing this is very important because the transmission lowers for its own weight. This work is also of great importance for facilitating reinstallation.



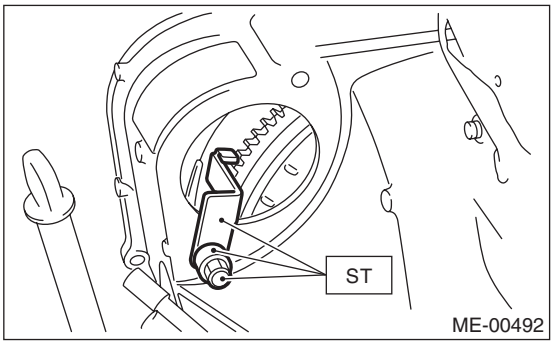
(A) Transmission
(B) Garage jack

CAUTION:
Before removing the engine away from transmission, check to be sure no work has been overlooked.

32) Separation of engine and transmission:
(1) Remove the starter. <Ref. to SC(H6DO)-6, REMOVAL, Starter.>
(2) Remove the bolts which hold upper side of transmission to engine.



33) Install the ST to converter case.
ST 498277200 STOPPER SET



34) 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.

35) Remove the front cushion rubbers.

B: INSTALLATION

1) Install the front cushion rubbers.

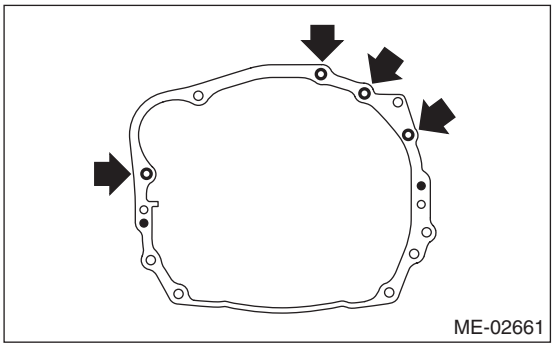
Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

2) 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.

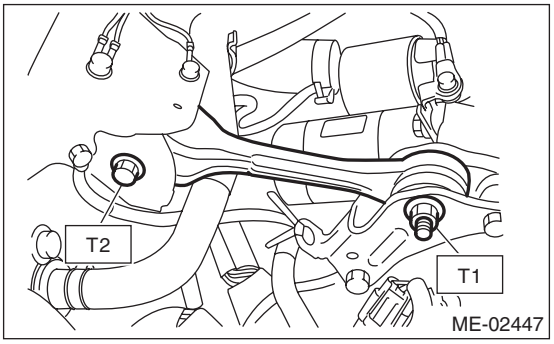
3) Tighten the bolts which hold upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)



4) Remove the lifting device and wire ropes.
5) Remove the garage jack.
6) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



7) Remove the ST from converter case.

NOTE:
Be careful not to drop the ST into the converter case when removing the ST.

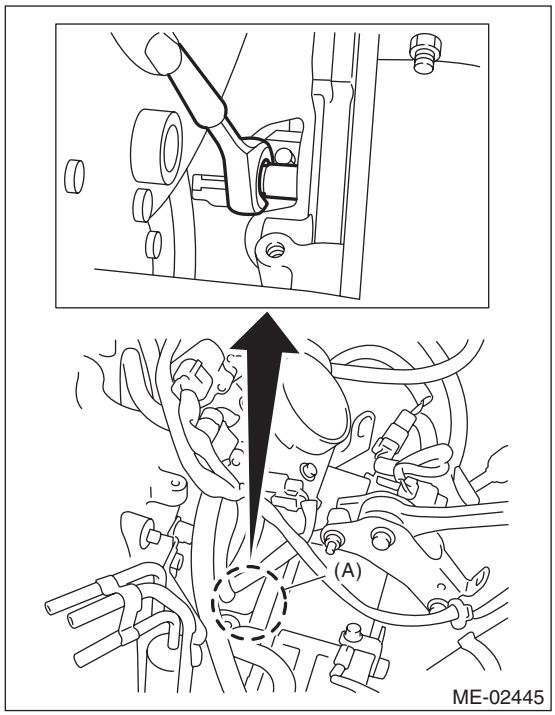
ST 498277200 STOPPER SET

8) Install the starter. <Ref. to SC(H6DO)-6, INSTALLATION, Starter.>

9) Install the torque converter clutch to drive plate.
(1) Tighten the bolts which hold torque converter clutch to drive plate.
(2) Tighten other bolts while rotating the engine using socket wrench.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

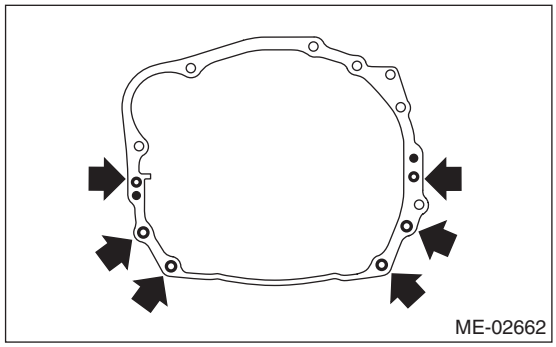
(3) Install the service hole plug to prevent foreign matter from being mixed.



(A) Service hole plug

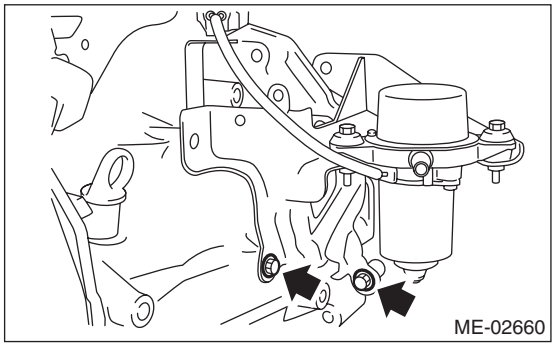
10) Lift-up the vehicle.
11) Tighten the bolts and nuts which hold lower side of the transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)



12) Fasten the vacuum pump bracket to the engine and transmission using the bolts.

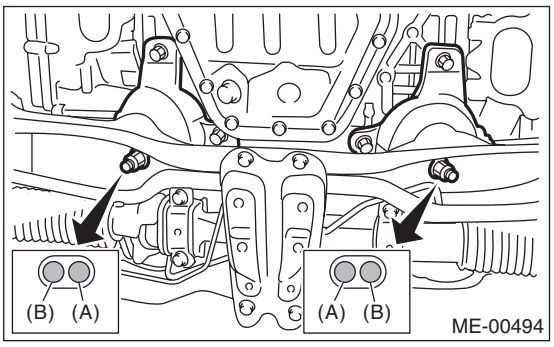
Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



13) Tighten the nuts which install the front cushion rubber onto crossmember.

Tightening torque:
75 N·m (7.6 kgf-m, 55.3 ft-lb)

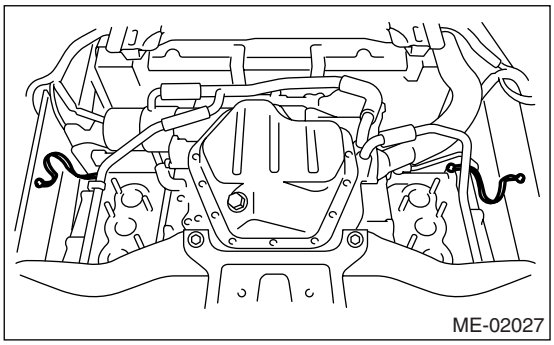
NOTE:
Make sure the front cushion rubber mounting bolts (A) and locator (B) are securely installed.



14) Install the front exhaust pipe.
<Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.>

NOTE:
• Be care not to let the front exhaust pipe interfere with water pipes and crossmember on engine side.
• Be care not to scratch the flange surface of front exhaust pipe with stud bolt on engine.

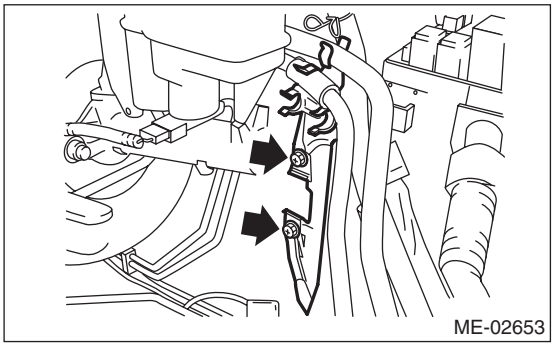
15) Connect the ground cable.



16) Lower the vehicle.

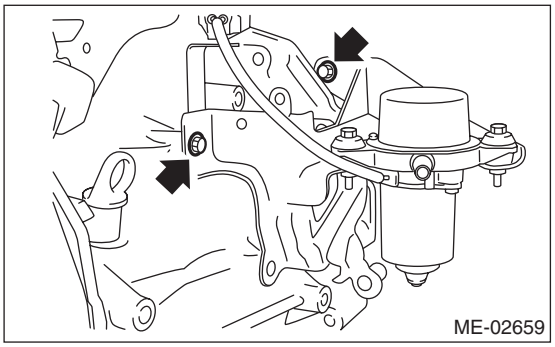
17) Install the fuel hose bracket.

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



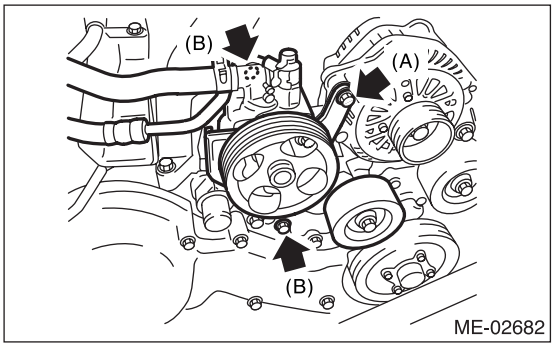
18) Fasten the vacuum pump bracket to the engine and transmission using the bolts.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)



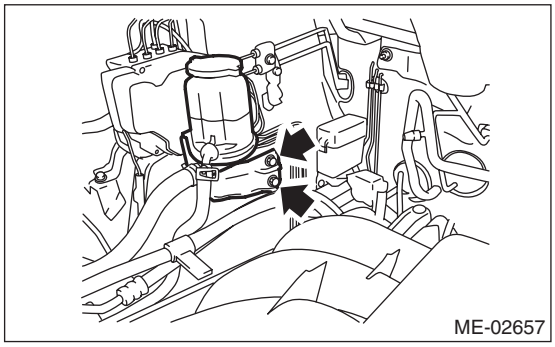
19) Install the power steering pump.

Tightening torque:
(A) 15.7 N·m (1.6 kgf-m, 11.6 ft-lb)
(B) 33 N·m (3.4 kgf-m, 24.3 ft-lb)



20) Install the reservoir tank.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

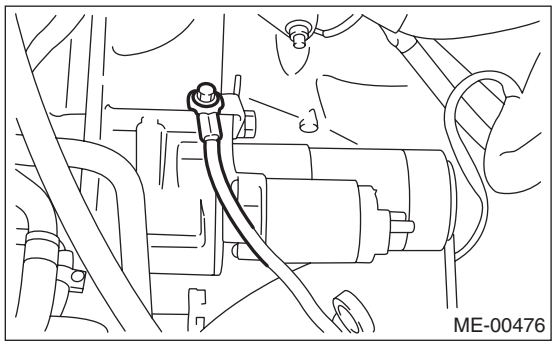


21) Connect the following hoses.
(1) Fuel delivery hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose
22) Connect the following connectors.
(1) Engine harness connectors

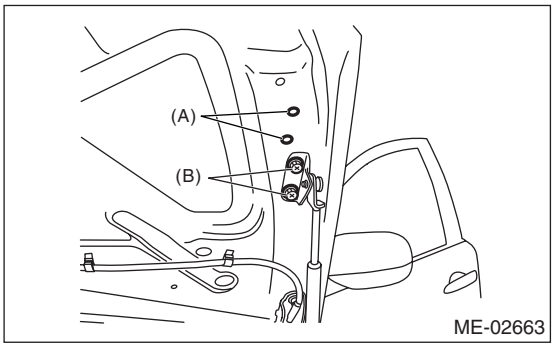


(2) Generator connector and terminal
(3) A/C compressor connector
(4) Power steering switch connector
23) Connect the engine ground terminal.

Tightening torque:
14 N·m (1.4 kgf-m, 10.1 ft-lb)



24) Install the A/C pressure hoses.
<Ref. to AC-39, INSTALLATION, Hose and Tube.>
25) Install the V-belts. <Ref. to ME(H6DO)-31, INSTALLATION, V-belt.>
26) Install the radiator to vehicle. <Ref. to CO(H6DO)-17, INSTALLATION, Radiator.>
27) Install the battery to vehicle. <Ref. to SC(H6DO)-25, REMOVAL, Battery.>
28) Fill engine coolant.
<Ref. to CO(H6DO)-10, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
29) Check the ATF level and replenish it if necessary.
<Ref. to 5AT-26, INSPECTION, Automatic Transmission Fluid.>
30) Charge the A/C system with refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Charging Procedure.>
31) Install the engine front cover.
32) Install the air intake duct, air cleaner case and air intake chamber. <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Duct.> <Ref. to IN(H6DO)-5, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>
33) Install the collector cover.
34) Change the bolt mounting position from (B) to (A), then close the front hood.



35) Lower the vehicle from the lift.

C: INSPECTION

1) Check the pipes and hoses are installed firmly.
2) Check the engine coolant and ATF are at specified levels.
3) Start the engine and check for leaks of fuel, exhaust gas, engine coolant, etc. Also check for noise and vibrations.

11.Engine Mounting

A: REMOVAL

1) Remove the engine unit. <Ref. to ME(H6DO)-32, REMOVAL, Engine Assembly.>
2) Remove the engine mounting from engine assembly.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Engine mounting:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

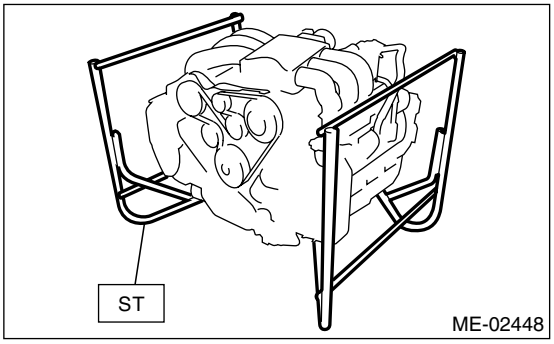
C: INSPECTION

Make sure that there are no cracks or other damages.

12.Preparation for Overhaul

A: REMOVAL

1) Remove the engine assembly from the body. <Ref. to ME(H6DO)-32, REMOVAL, Engine Assembly.>
2) Set the engine on ST.
ST 18232AA000 ENGINE STAND

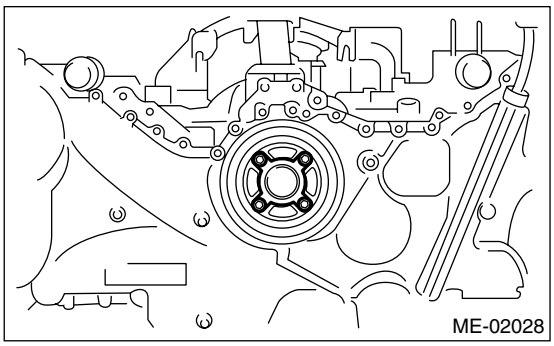


3) Before servicing overhaul, remove the sensor, pipe and hose that installed to engine.
(1) Remove the intake manifold. <Ref. to FU(H6DO)-12, REMOVAL, Intake Manifold.>
(2) Remove the generator. <Ref. to SC(H6DO)-19, REMOVAL, Generator.>
(3) Remove the A/C compressor. <Ref. to AC-33, REMOVAL, Compressor.>
(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)-19, REMOVAL, Camshaft Position Sensor.>
(8) Remove the crankshaft position sensor. <Ref. to FU(H6DO)-18, REMOVAL, Crankshaft Position Sensor.>
(9) Remove the knock sensor. <Ref. to FU(H6DO)-20, REMOVAL, Knock Sensor.>
(10) Remove the engine coolant temperature sensor. <Ref. to FU(H6DO)-17, REMOVAL, Engine Coolant Temperature Sensor.>
(11) Remove the oil pressure switch. <Ref. to LU(H6DO)-13, REMOVAL, Oil Pressure Switch.>
(12) Remove the oil filter. <Ref. to LU(H6DO)-14, REMOVAL, Engine Oil Filter.>
(13) Remove the oil cooler. <Ref. to LU(H6DO)-15, REMOVAL, Oil Cooler.>

13.Crank Pulley

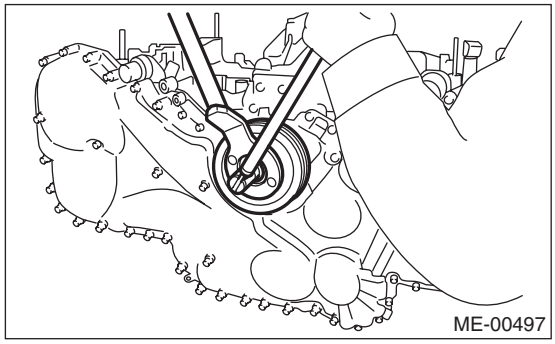
A: REMOVAL

1) Remove the crank pulley cover.



2) Remove the crank pulley bolt. To lock the crankshaft, use ST.

ST 499977100 CRANK PULLEY WRENCH



3) Remove the crank pulley.

B: INSTALLATION

1) Install the crank pulley.

2) Install the crank pulley bolt. To lock the crankshaft, use ST.

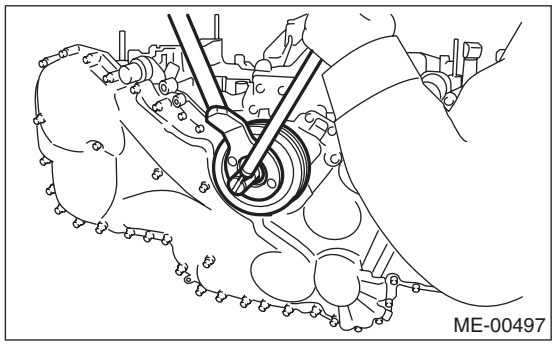
ST 499977100 CRANK PULLEY WRENCH

(1) Clean the crank pulley thread using compressed air.

(2) Apply engine oil to the crank pulley bolt seat and thread.

(3) Tighten the crank pulley bolts.

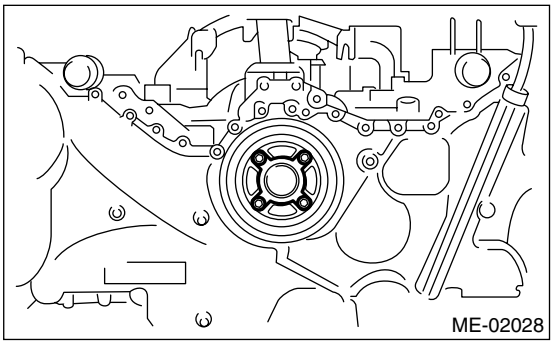
Tightening torque:
178 N·m (18.1 kgf-m, 131 ft-lb)



3) Install the crank pulley cover.

NOTE:
Assemble the O-ring to crank pulley cover.

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



C: INSPECTION

1) Check the crank pulley cover for oil and air leakage.

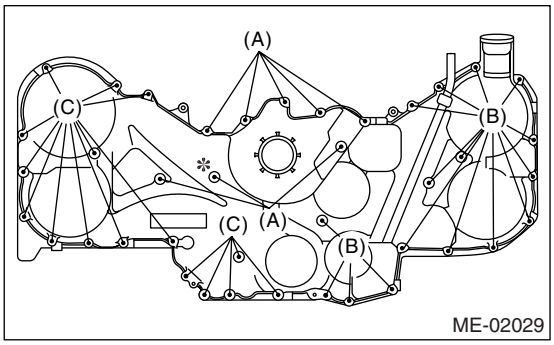
2) Check the crank pulley for looseness.

14.Front Chain Cover

A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-41, REMOVAL, Crank Pulley.>
2) Remove the front chain cover.

NOTE:
Chain cover installation bolt has three different sizes. To prevent the confusion in installation, keep these bolts on container individually.



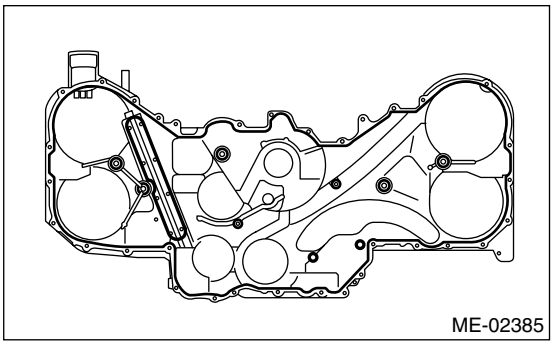
(A) M6 × 16
(B) M6 × 30
(C) M6 × 45
*: Sealing washer

B: INSTALLATION

1) Remove the used liquid gasket from mating surface, and degrease it.
2) Apply liquid gasket to the mating surface of front chain cover.

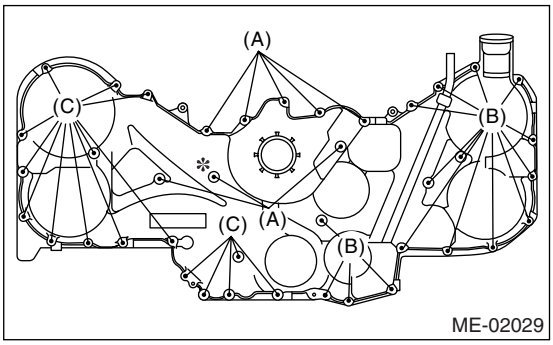
Liquid gasket
THREE BOND 1280B (Part No. K0877YA018)

Applying liquid gasket diameter
2.5±0.5 mm (0.098±0.020 in)



3) Install the front chain cover. Temporarily tighten the bolts.

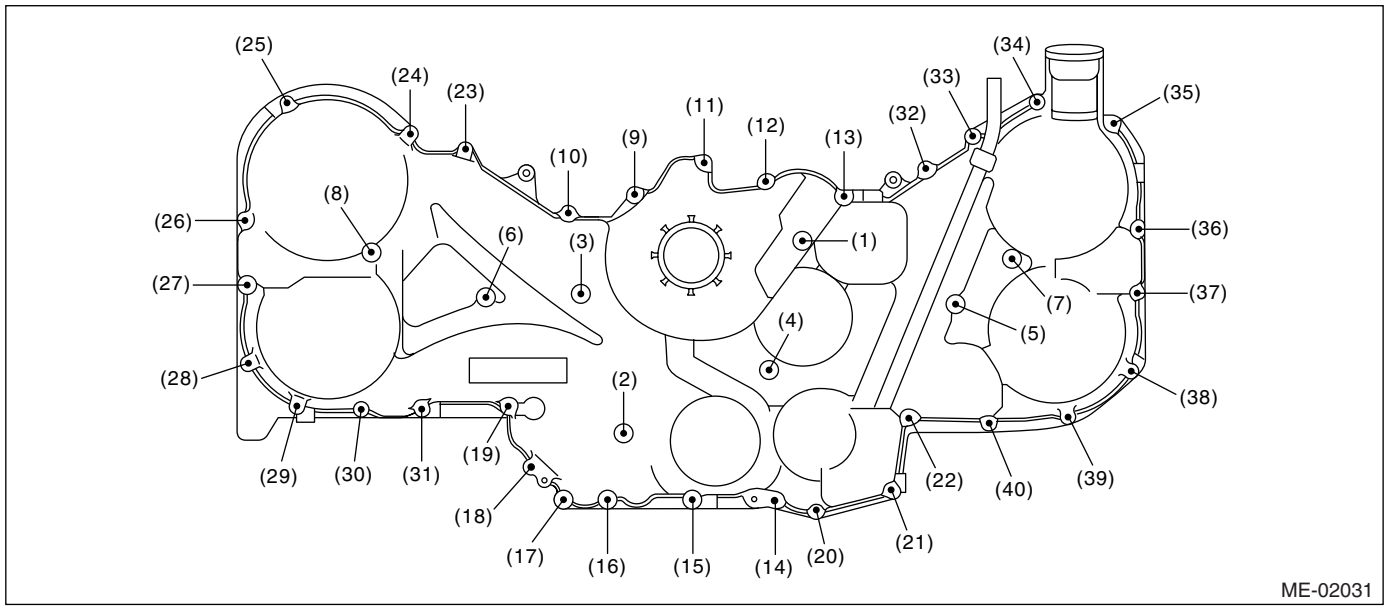
CAUTION:
Do not install the bolts in wrong place.



(A) M6 × 16
(B) M6 × 30
(C) M6 × 45
*: Sealing washer

4) Tighten the bolts in the numerical order as shown in the figure.

Tightening torque:
6.6 N·m (0.67 kgf-m, 4.8 ft-lb)



5) Install the crank pulley. <Ref. to ME(H6DO)-41, INSTALLATION, Crank Pulley.>

C: INSPECTION

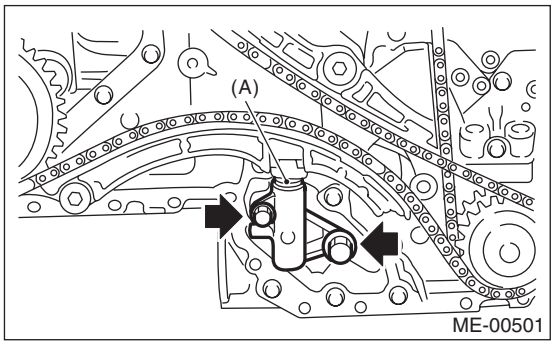
Check the cover surface for scratch and damage.
Check for oil leakage on cover mating surface and installation part of crank pulley.

15.Timing Chain Assembly

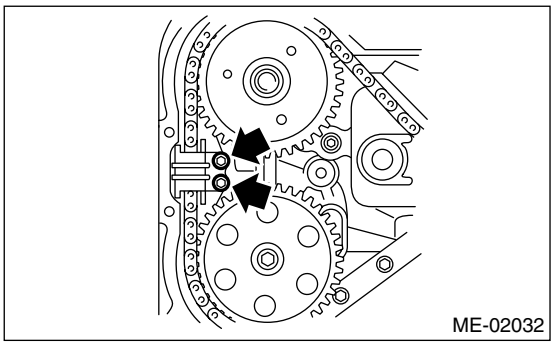
A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-41, REMOVAL, Crank Pulley.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-42, REMOVAL, Front Chain Cover.>
3) Remove the chain tensioner (RH).

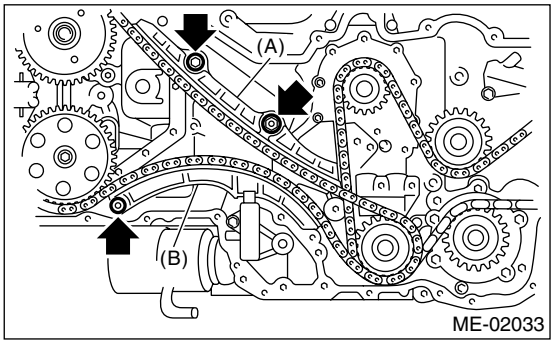
NOTE:
Be careful not to come out the plunger (A).



4) Remove the chain guide (RH: between cams).



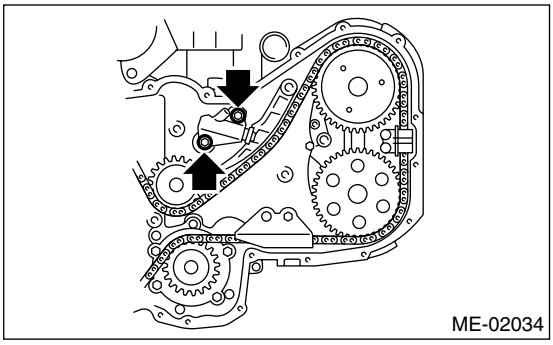
5) Remove the chain guide (RH).
6) Remove the chain tensioner lever (RH).



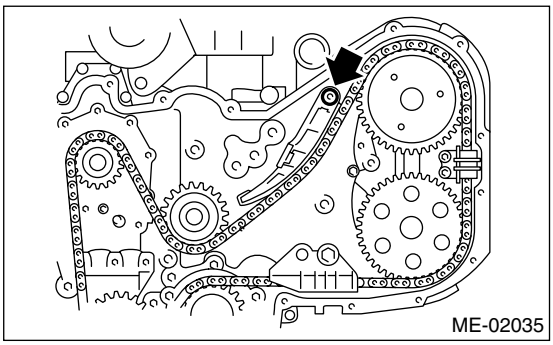
(A) Chain guide (RH)
(B) Chain tensioner lever (RH)

7) Remove the timing chain (RH).
12) Remove the chain guide (center).
8) Remove the chain tensioner (LH).

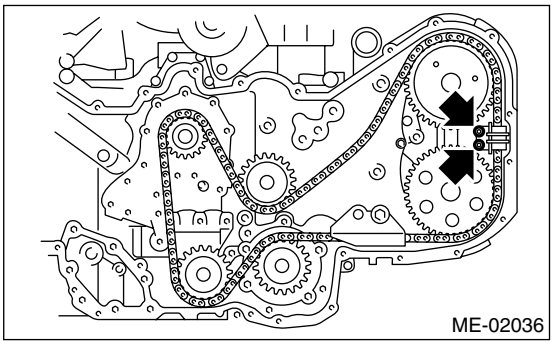
NOTE:
Be careful not to come out the plunger.



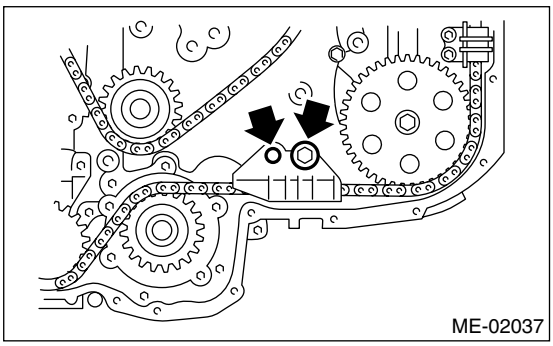
9) Remove the chain tensioner lever (LH).

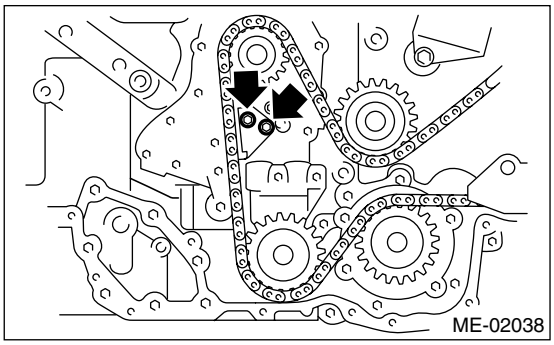


10) Remove the chain guide (LH: between cams).

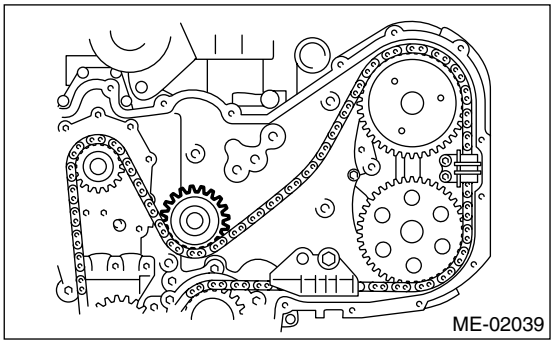


11) Remove the chain guide (LH).

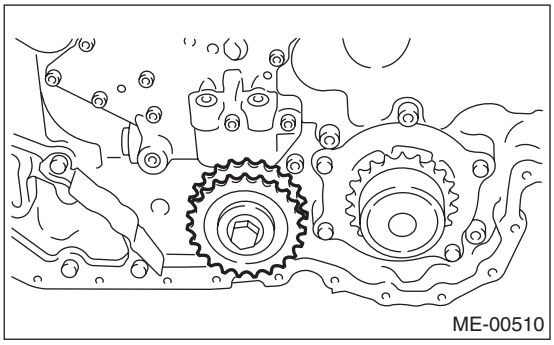




13) Remove the idler sprocket (upper).



14) Remove the timing chain (LH).
15) Remove the idler sprocket (lower).

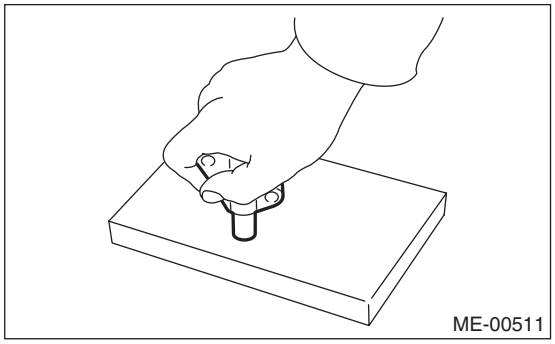


B: INSTALLATION

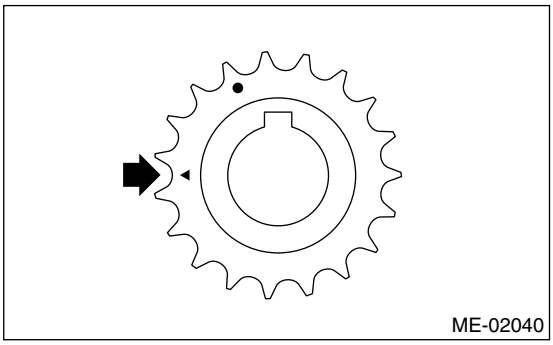
NOTE:
• Be careful that the foreign matter is not into or onto assembled component during installation.
• Apply engine oil to the chain guide, chain tensioner lever and idler sprocket when installing.

1) Preparation for chain tensioner installation
   (1) Insert the screw, spring pin and tension rod into tensioner body.
   (2) While depressing the tensioner onto rubber mat, twist it to shorten tension rod. Then insert the thin pin into the hole between tension rod and tension body to keep it.

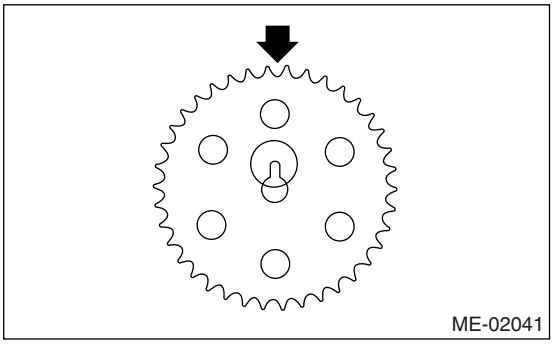
NOTE:
Work on the rubber mat or other anti-skid materials.



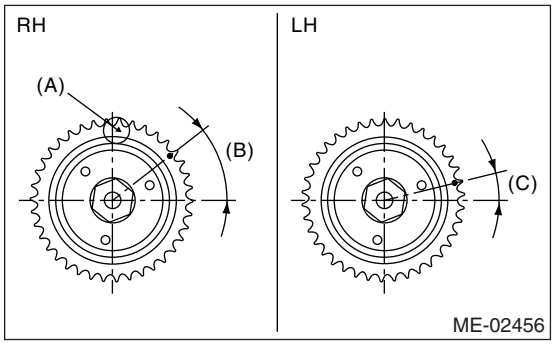
2) Using the ST, align the “Top mark” on crank sprocket to 9 o’clock position as shown in the figure
ST 18252AA000 CRANKSHAFT SOCKET



3) Align the key groove on exhaust cam sprocket to 12 o’clock position as shown in the figure.



4) Align the intake cam sprocket as shown in the figure.



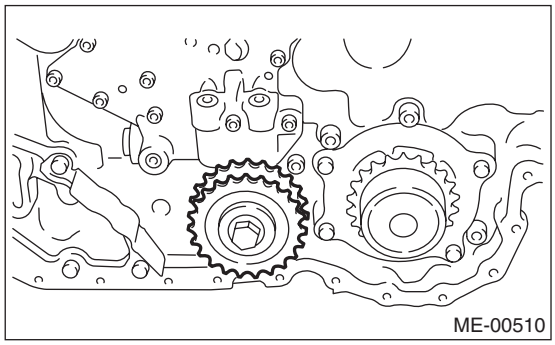
(A) Top mark
(B) 40°
(C) 15°

5) Turn the crank sprocket clockwise, align the "Top mark" to 12 o'clock position. (Piston #1 is in TDC position)

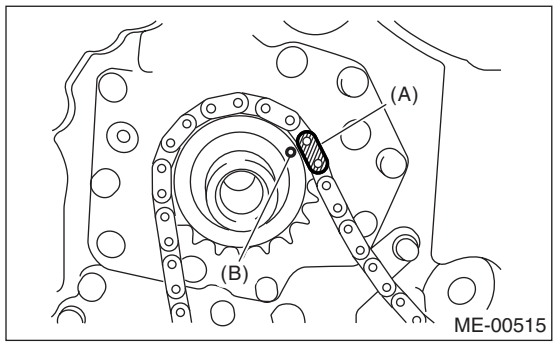
NOTE:
Do not rotate the crank shaft and cam sprocket before completing timing chain installation.

6) Install the idler sprocket (lower).

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



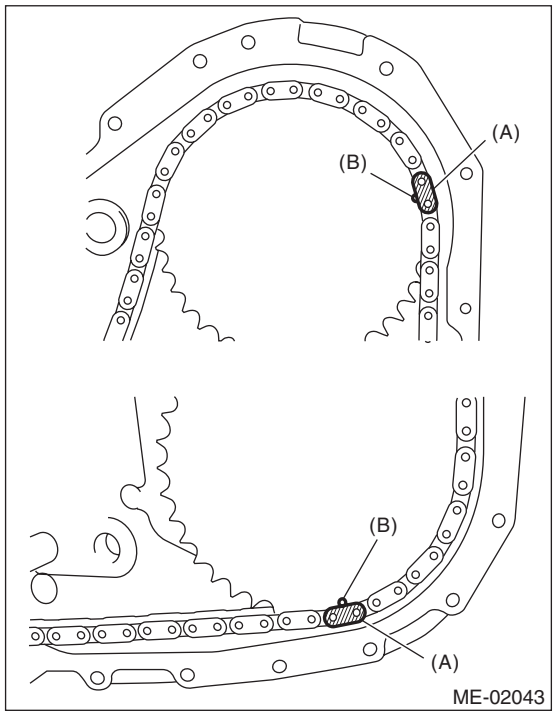
7) Install the timing chain (LH).
(1) Align the timing mark (B) on the crank sprocket with mark (A) on the timing chain (LH).



(A) Gold
(B) Mark

(2) Install the timing chain (LH) to the idler sprocket (lower), water pump, exhaust cam sprocket (LH) and intake cam sprocket (LH) in this order.

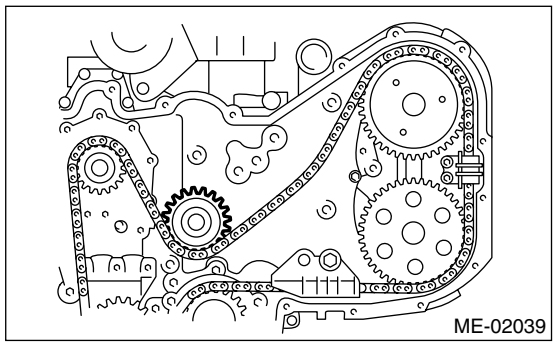
NOTE:
Check that the mark on timing chain (A) and cam sprocket (B) is aligned as same as aligned on crank sprocket.



(A) Blue
(B) Mark

(3) Install the chain idler (upper).

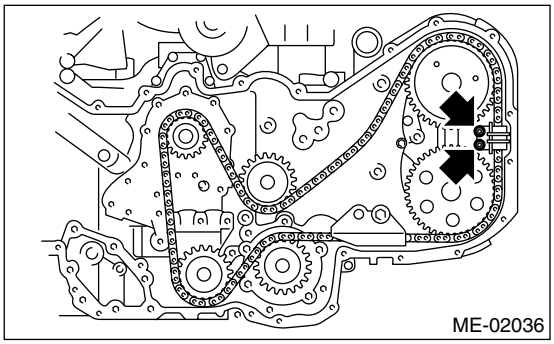
Tightening torque:
69 N·m (7.0 kgf-m, 50.6 ft-lb)



(4) Install the chain guide (LH: between cams).

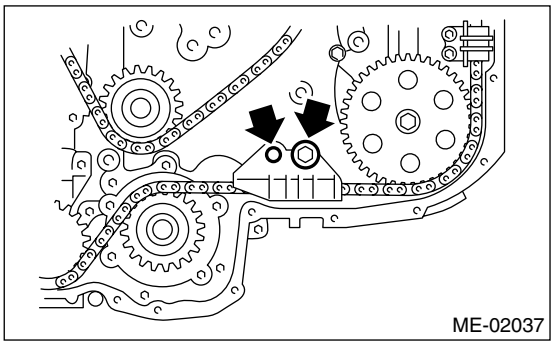
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

NOTE:
Use a new installing bolt.



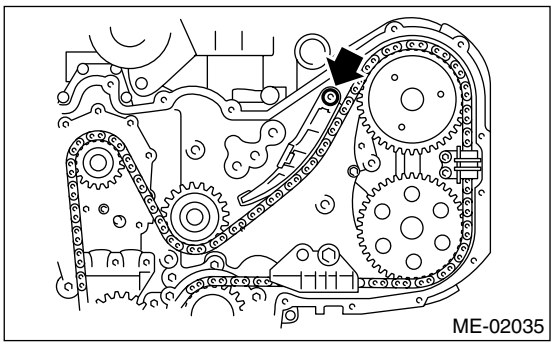
(5) Install the chain guide (LH).

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



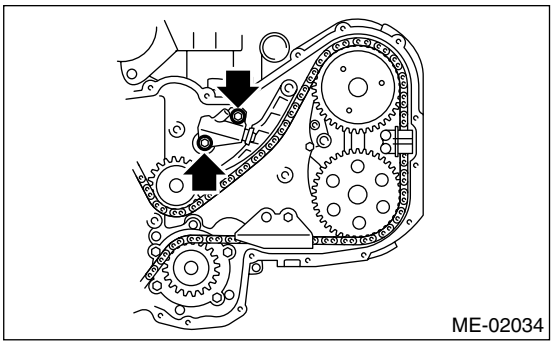
(6) Install the chain tensioner lever (LH).

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

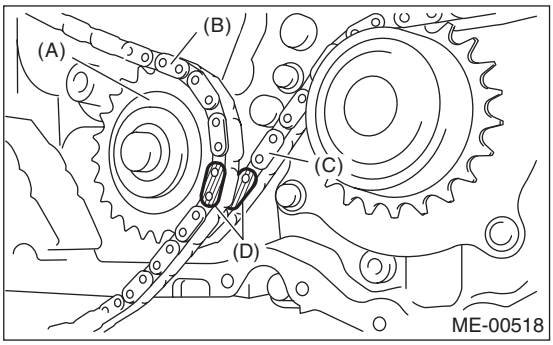


(7) Install the chain tensioner (LH).

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



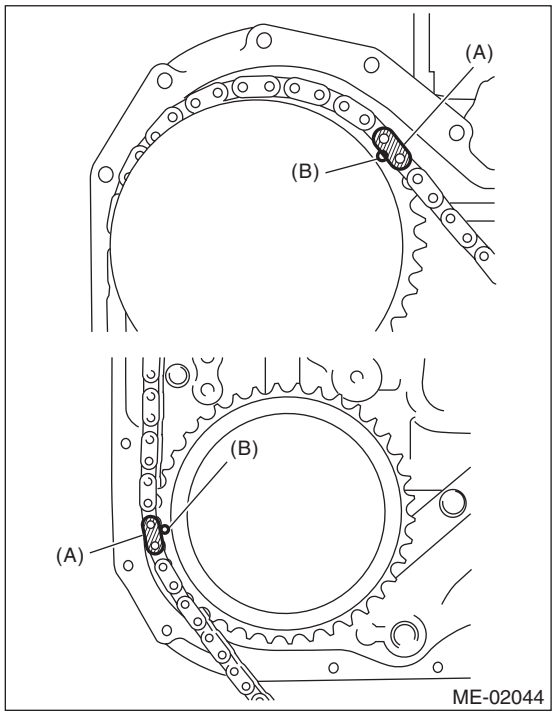
8) Install the timing chain (RH).
(1) Align the marks of timing chain LH and RH on the idler sprocket (lower).



(A) Idler sprocket (lower)
(B) Timing chain (RH)
(C) Timing chain (LH)
(D) Blue

(2) Install the timing chain (RH) to the intake cam sprocket (RH) and exhaust cam sprocket (RH) in this order.

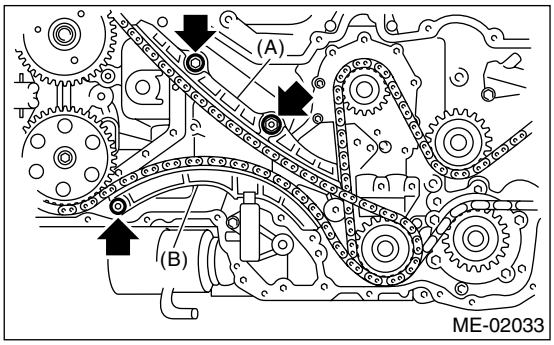
NOTE:
Check that the mark on timing chain (A) and cam sprocket (B) is aligned as same as aligned on crank sprocket.



(A) Gold
(B) Mark

(3) Install the chain guide (RH).
(4) Install the chain tensioner lever (RH).

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

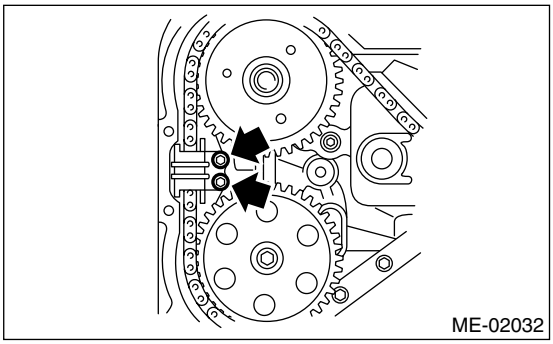


(A) Chain guide (RH)
(B) Chain tensioner lever (RH)

(5) Install the chain guide (RH: between cams).

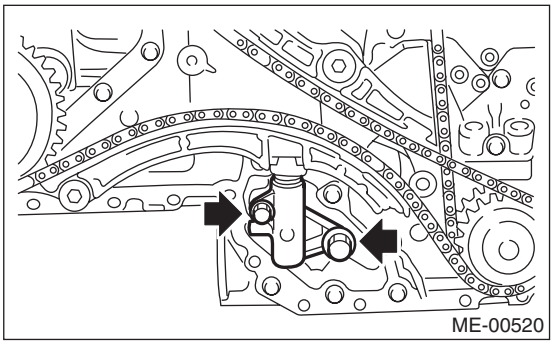
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

NOTE:
Use a new installing bolt.



(6) Install the chain tensioner (RH).

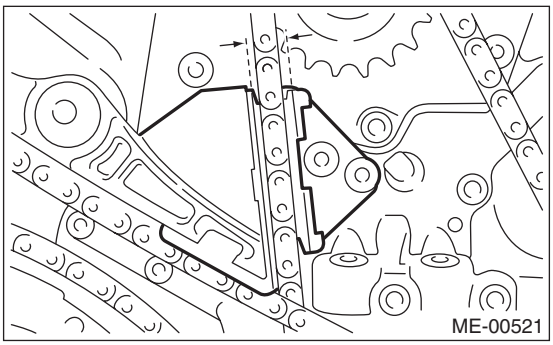
Tightening torque:
16 N·m (1.6 kgf-m, 12 ft-lb)



(7) Adjust the clearance between chain guide (RH) and chain guide (center) within 8.4 — 8.6 mm (0.331 — 0.339 in). Install the chain guide (center).

Tightening torque:
7.8 N·m (0.8 kgf-m, 5.8 ft-lb)

NOTE:
Use a new installing bolt.

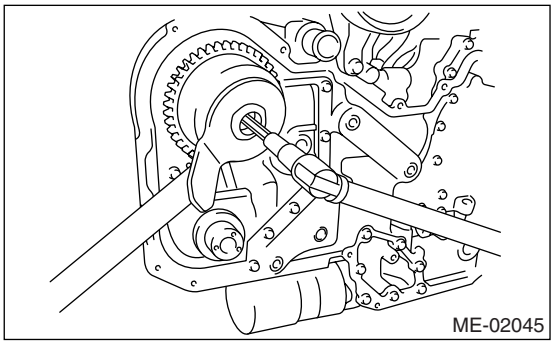


(8) Check that each mark on the sprocket and timing chain is matched, and then draw out the stopper pin from chain tensioner.

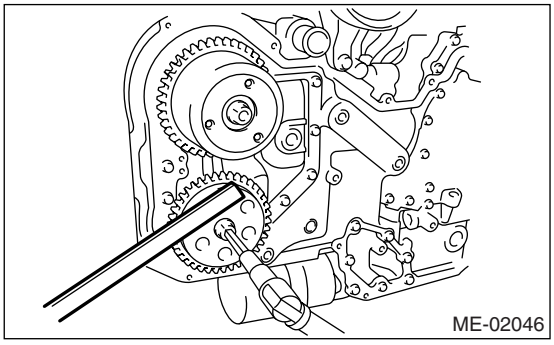
16.Cam Sprocket

A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-41, REMOVAL, Crank Pulley.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-42, REMOVAL, Front Chain Cover.>
3) Remove the timing chain assembly.
<Ref. to ME(H6DO)-44, REMOVAL, Timing Chain Assembly.>
4) Remove the cam sprocket. To lock the camshaft, use the ST.
ST 499977500 CAM SPROCKET WRENCH



ST 18231AA020 CAM SPROCKET WRENCH



B: INSTALLATION

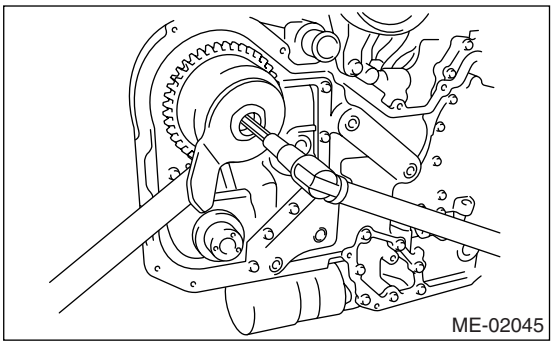
1) Install the cam sprocket. To lock the camshaft, use the ST.

Tightening torque:
29.5 N·m (3.0 kgf-m, 21.8 ft-lb)

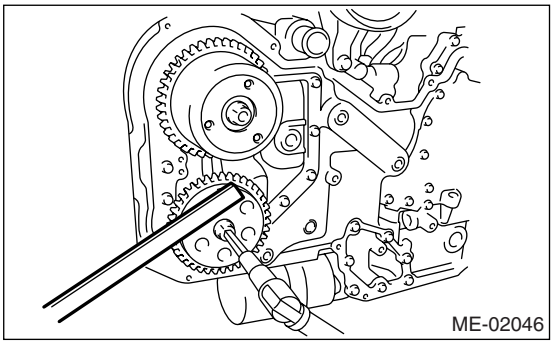
2) Further tighten the bolt.

Tightening angle:
Intake
45°±5°
Exhaust
25°±5°

ST 499977500 CAM SPROCKET WRENCH



ST 18231AA020 CAM SPROCKET WRENCH



3) Install the timing chain assembly.
<Ref. to ME(H6DO)-45, INSTALLATION, Timing Chain Assembly.>
4) Install the front chain cover.
<Ref. to ME(H6DO)-42, INSTALLATION, Front Chain Cover.>
5) Install the crank pulley. <Ref. to ME(H6DO)-41, INSTALLATION, Crank Pulley.>

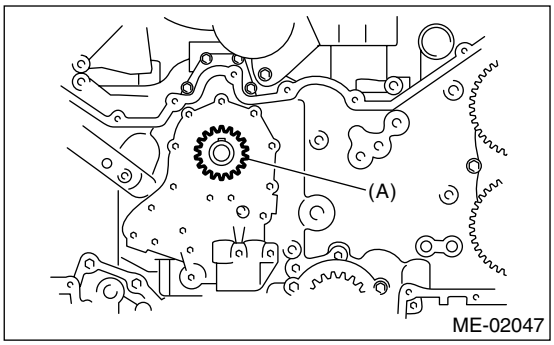
C: INSPECTION

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

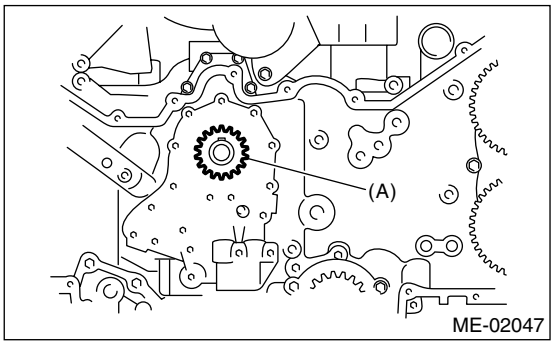
A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-41, REMOVAL, Crank Pulley.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-42, REMOVAL, Front Chain Cover.>
3) Remove the timing chain assembly.
<Ref. to ME(H6DO)-44, REMOVAL, Timing Chain Assembly.>
4) Remove the crank sprocket (A).



B: INSTALLATION

1) Install the crank sprocket (A).



2) Install the timing chain assembly.
<Ref. to ME(H6DO)-45, INSTALLATION, Timing Chain Assembly.>
3) Install the front chain cover.
<Ref. to ME(H6DO)-42, INSTALLATION, Front Chain Cover.>
4) Install the crank pulley. <Ref. to ME(H6DO)-41, INSTALLATION, Crank Pulley.>

C: INSPECTION

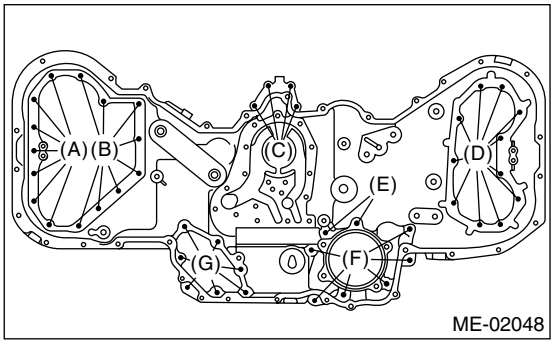
1) Check the crank sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between crank sprocket and key.

18.Rear Chain Cover

A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-41, REMOVAL, Crank Pulley.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-42, REMOVAL, Front Chain Cover.>
3) Remove the timing chain. <Ref. to ME(H6DO)-44, REMOVAL, Timing Chain Assembly.>
4) Remove the cam sprocket. <Ref. to ME(H6DO)-49, REMOVAL, Cam Sprocket.>
5) Remove the crank sprocket.
6) Remove the oil pump. <Ref. to LU(H6DO)-8, REMOVAL, Oil Pump.>
7) Remove the water pump. <Ref. to CO(H6DO)-13, REMOVAL, Water Pump.>
8) Remove the rear chain cover.

NOTE:
Installation bolt has seven different sizes. To prevent the confusion in installation, keep these bolts on container individually.



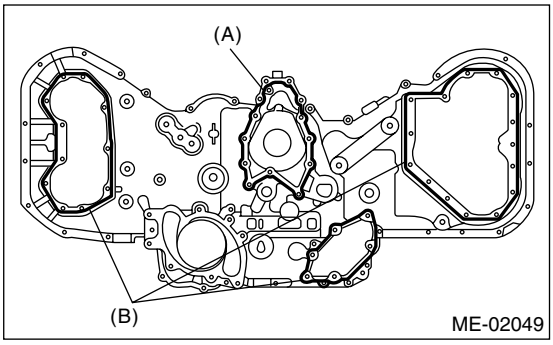
(A) M6 × 14
(B) M6 × 18 (Silver)
(C) M6 × 30
(D) M6 × 18
(E) M8 × 43
(F) M8 × 30
(G) M6 × 22

B: INSTALLATION

1) Remove the used liquid gasket from mating surface, and degrease it.
2) Apply liquid gasket to the mating surface of rear chain cover.

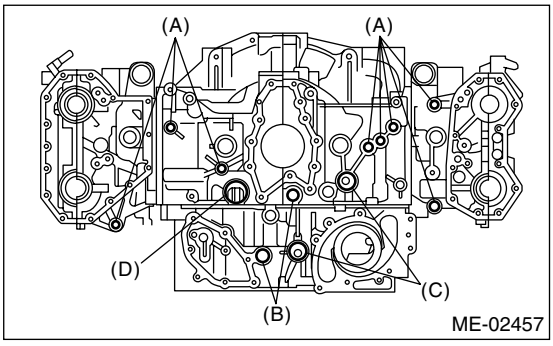
Liquid gasket
THREE BOND 1280B (Part No. K0877 A018)

Applying liquid gasket diameter
(A) 1.0±0.5 mm (0.039±0.020 in)
(B) 3.0±1.0 mm (0.118±0.039 in)



3) Install the O-ring.

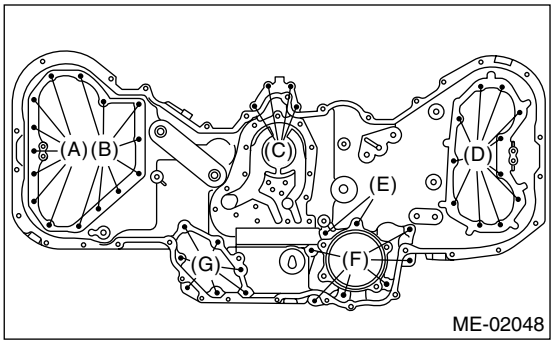
NOTE:
- Do not reuse the O-ring.
- Do not install the O-ring in wrong place.



(A) 14.2 × 1.9
(B) 19.2 × 2.4
(C) 25 × 2
(D) 31.2 × 1.9

4) Temporarily tighten the rear chain cover.

NOTE:
Do not install the bolts in wrong place.

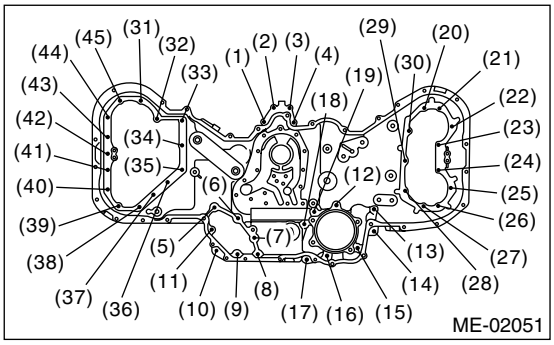


(A) M6 × 14
(B) M6 × 18 (Silver)
(C) M6 × 30
(D) M6 × 18
(E) M8 × 43
(F) M8 × 30
(G) M6 × 22

5) Tighten the bolts in the numerical order as shown in the figure.

Tightening torque:

(1) — (11)	9 N·m (0.9 kgf-m, 6.5 ft-lb)
(12) — (19)	20 N·m (2.0 kgf-m, 14 ft-lb)
(20) — (30)	9 N·m (0.9 kgf-m, 6.5 ft-lb)
(31) — (38)	12 N·m (1.2 kgf-m, 8.7 ft-lb)
(39) — (45)	9 N·m (0.9 kgf-m, 6.5 ft-lb)

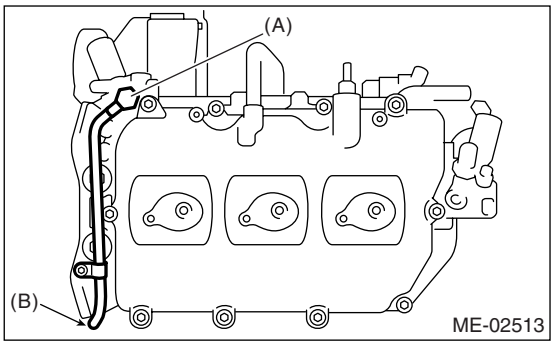


6) Install the water pump. <Ref. to CO(H6DO)-13, INSTALLATION, Water Pump.>
7) Install the oil pump. <Ref. to LU(H6DO)-8, INSTALLATION, Oil Pump.>
8) Install the crank sprocket.
9) Install the cam sprocket. <Ref. to ME(H6DO)-49, INSTALLATION, Cam Sprocket.>
10) Install the timing chain. <Ref. to ME(H6DO)-45, INSTALLATION, Timing Chain Assembly.>
11) Install the front chain cover.
<Ref. to ME(H6DO)-42, INSTALLATION, Front Chain Cover.>
12) Install the crank pulley. <Ref. to ME(H6DO)-41, INSTALLATION, Crank Pulley.>

19.Camshaft

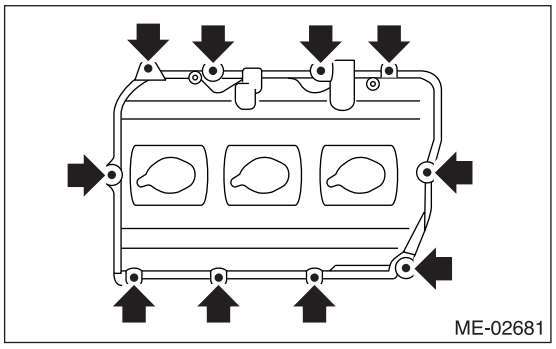
A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-41, REMOVAL, Crank Pulley.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-42, REMOVAL, Front Chain Cover.>
3) Remove the timing chain assembly.
<Ref. to ME(H6DO)-44, REMOVAL, Timing Chain Assembly.>
4) Remove the cam sprocket.
<Ref. to ME(H6DO)-49, REMOVAL, Cam Sprocket.>
5) Remove the crank sprocket.
<Ref. to ME(H6DO)-50, REMOVAL, Crank Sprocket.>
6) Remove the rear chain cover.
<Ref. to ME(H6DO)-51, REMOVAL, Rear Chain Cover.>
7) Disconnect the oil pipe.

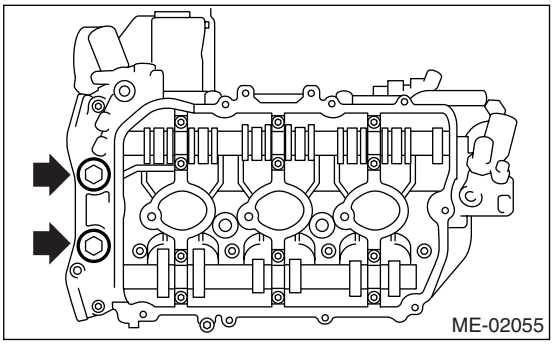


(A) Bolt without filter (with white mark)
(B) Bolt with filter (without white mark)

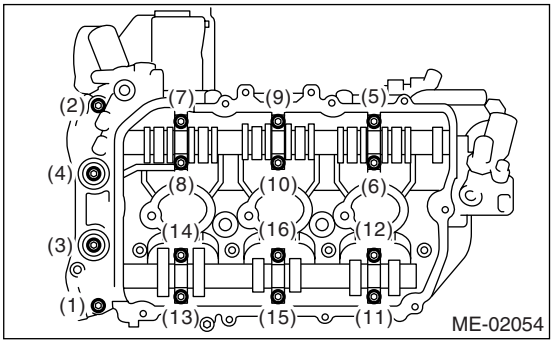
8) Remove the rocker cover (LH).



9) Remove the plugs (LH).



10) Loosen the camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



11) Remove the camshaft caps and camshaft (LH).

NOTE:
Arrange camshaft caps in order so that they can be installed in their original positions.

12) Similarly, remove the camshafts (RH) and related parts.

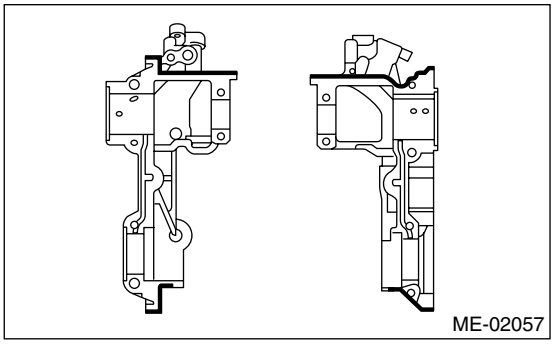
B: INSTALLATION

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 front camshaft cap as shown in the figure.

CAUTION:
Do not apply liquid gasket excessively. Applying excessively may cause excess gasket to flow toward cam journal, resulting in engine seizure.

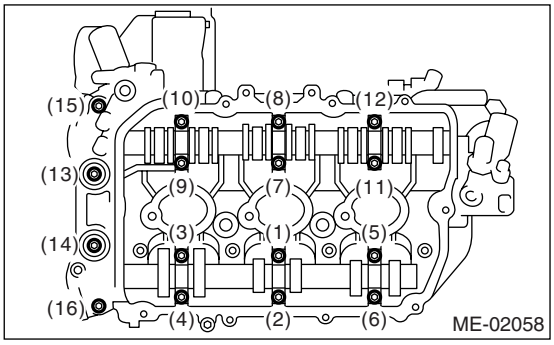
Liquid gasket:
THREE BOND 1280B (Part No. K0877YA018)

Applying liquid gasket diameter:
2.0±0.5 mm (0.079±0.020 in)



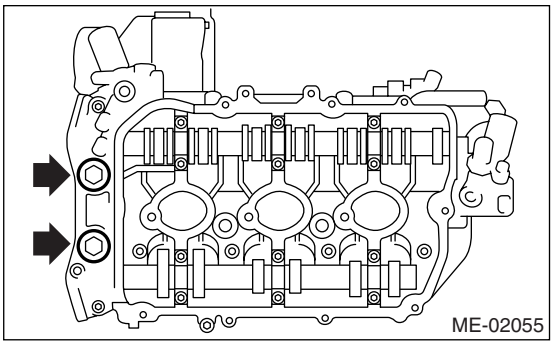
(2) Apply engine oil to cap bearing surface, and install the cap to camshaft.
(3) Tighten the rocker cover bolts in the numerical order as shown in the figure.

Tightening torque:
(1) — (12): 16 N·m (1.6 kgf-m, 12 ft-lb)
(13) — (16): 9.75 N·m (1.0 kgf-m, 7.2 ft-lb)



3) Install the plugs.

Tightening torque:
60 N·m (6.1 kgf-m, 44 ft-lb)

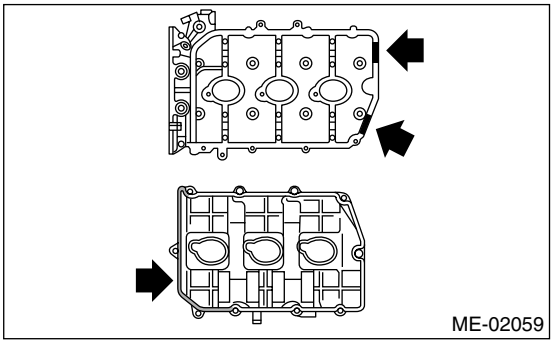


4) Install the rocker cover.
(1) Apply liquid gasket sparingly to the mating surface of cylinder head and rocker cover as shown in the figure.

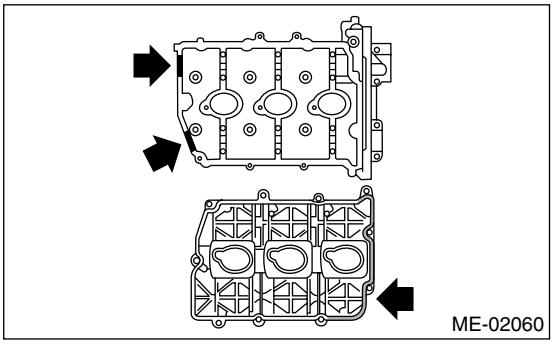
CAUTION:
Do not apply liquid gasket excessively. Applying excessively may cause excess gasket to flow toward cam journal, resulting in engine seizure.

Liquid gasket:
THREE BOND 1280B (Part No. K0877YA018)

- LH side



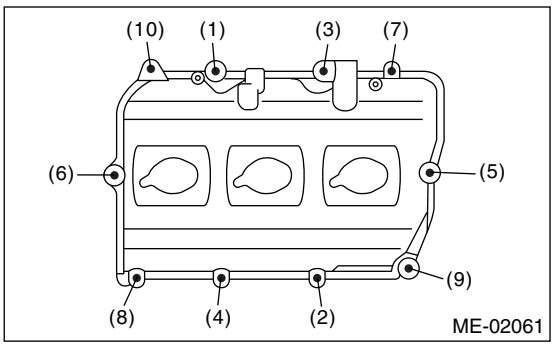
- RH side



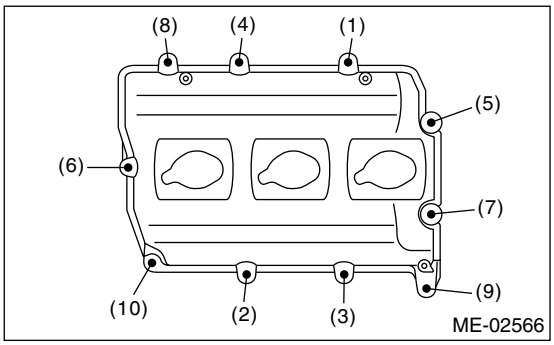
(2) Tighten the rocker cover bolts in the numerical order as shown in the figure.

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

- LH side



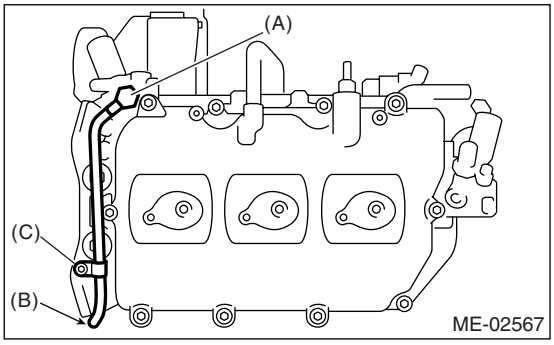
- RH side



5) Connect the oil pipe.

CAUTION:
• Be careful not to mistake the location of (A) and (B).
• Be sure to use a new gasket.

Tightening torque:
(A), (B)
29 N·m (3.0 kgf-m, 652.27 cm-lb)
(C)
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

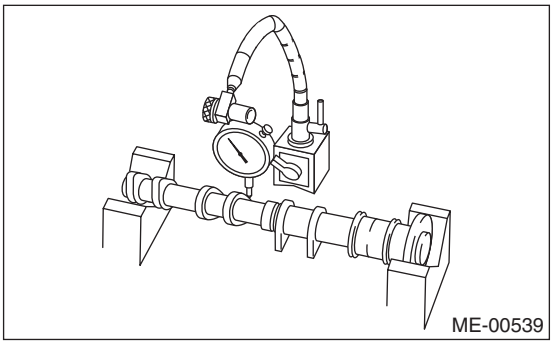


(A) Bolt without filter (with white mark)
(B) Bolt with filter (without white mark)
(C) Oil pipe bolt

6) Install the rear chain cover. <Ref. to ME(H6DO)-51, INSTALLATION, Rear Chain Cover.>
7) Install the crank sprocket.
<Ref. to ME(H6DO)-50, INSTALLATION, Crank Sprocket.>
8) Install the cam sprocket.
<Ref. to ME(H6DO)-49, INSTALLATION, Cam Sprocket.>
9) Install the timing chain assembly.
<Ref. to ME(H6DO)-45, INSTALLATION, Timing Chain Assembly.>
10) Install the front chain cover.
<Ref. to ME(H6DO)-42, INSTALLATION, Front Chain Cover.>
11) Install the crank pulley.
<Ref. to ME(H6DO)-41, INSTALLATION, Crank Pulley.>

C: INSPECTION

1) Measure the bend of camshaft. Repair or replace if bended.



2) Check the journal for damage and wear. Replace if faulty.
3) 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)

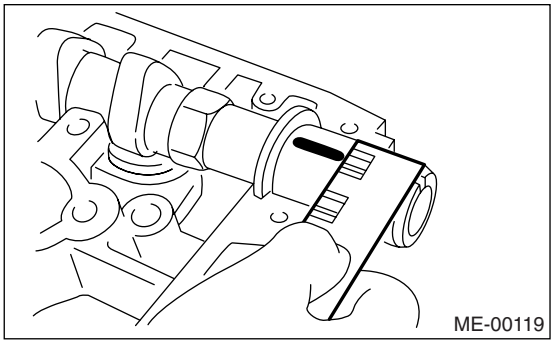
4) Measurement of the camshaft journal oil clearance:
(1) Clean the bearing caps and camshaft journals.
(2) Place the camshafts on cylinder head. (Without installing the valve rocker.)
(3) Place a plastigauge across each camshaft journals.
(4) Install the bearing cap.

NOTE:
Do not turn the camshaft.

(5) Remove the bearing caps.

(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.

Standard:
0.037 — 0.072 mm (0.0015 — 0.0028 in)



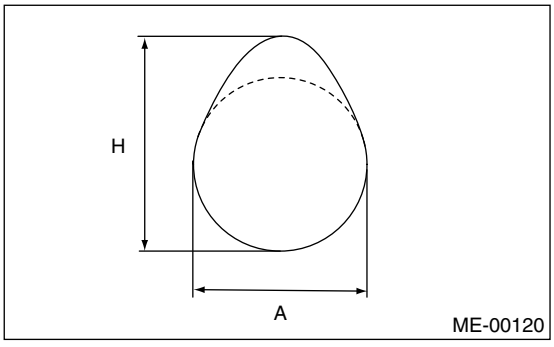
(7) Completely remove the plastigauge.

5) Check the cam face condition; remove the minor faults by grinding with oil stone. Measure the cam height H. If it exceeds the standard or offset wear occurs, replace it.

Cam height H:

Standard
Intake
HIGH 42.09 — 42.19 mm (1.6571 — 1.6610 in)
LOW1 38.14 — 38.24 mm (1.5016 — 1.5055 in)
LOW2 35.44 — 35.54 mm (1.3953 — 1.3992 in)
Exhaust
41.65 — 41.75 mm (1.6398 — 1.6437 in)

Cam base circle diameter A:
Intake
HIGH 32.0 mm (1.2598 in)
LOW1 31.84 mm (1.2535 in)
LOW2 31.84 mm (1.2535 in)
Exhaust
32.0 mm (1.2598 in)



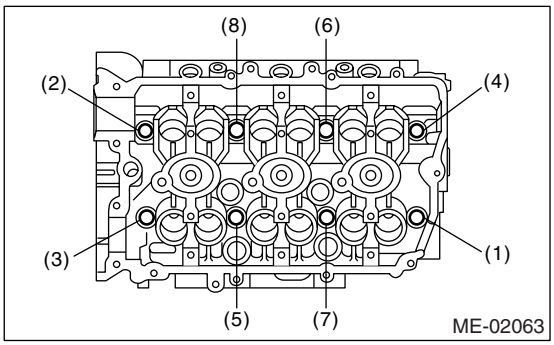
6) Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the standard or offset wear occurs, replace the caps and cylinder head as a set. If necessary replace the camshaft.

Standard
Intake
0.075 — 0.135 mm (0.0030 — 0.053 in)
Exhaust
0.030 — 0.090 mm (0.0012 — 0.035 in)

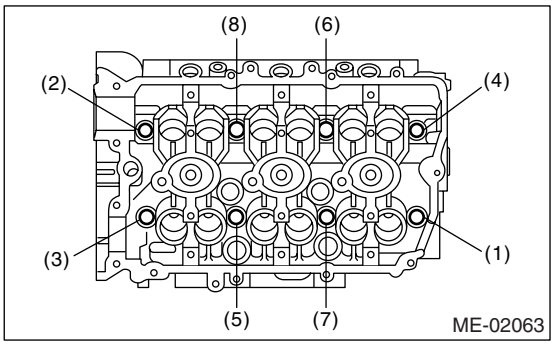
20.Cylinder Head

A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-41, REMOVAL, Crank Pulley.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-42, REMOVAL, Front Chain Cover.>
3) Remove the timing chain assembly.
<Ref. to ME(H6DO)-44, REMOVAL, Timing Chain Assembly.>
4) Remove the cam sprocket. <Ref. to ME(H6DO)-49, REMOVAL, Cam Sprocket.>
5) Remove the crank sprocket.
<Ref. to ME(H6DO)-50, REMOVAL, Crank Sprocket.>
6) Remove the rear chain cover.
<Ref. to ME(H6DO)-51, REMOVAL, Rear Chain Cover.>
7) Remove the camshaft. <Ref. to ME(H6DO)-53, REMOVAL, Camshaft.>
8) Remove the cylinder head bolts in the numerical order as shown in the figure.
Leave bolts (2) and (4) engaged by three or four threads to prevent the cylinder head from falling.



9) While tapping the cylinder head with a plastic hammer, separate it from cylinder block.
10) Remove the bolts (2) and (4) to remove cylinder head.



11) Remove the cylinder head gasket.

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

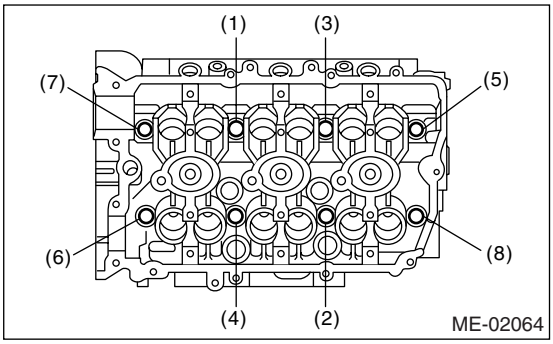
12) Similarly, remove the cylinder head (RH).

B: INSTALLATION

1) Install the cylinder head and gaskets on cylinder block.

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

2) Tighten the cylinder head bolts.
(1) Apply a coat of engine oil to washers and cylinder head bolt threads.
(2) Install the cylinder head to cylinder block, and then tighten the bolts with torque of 20 N·m (2.0 kgf-m, 14 ft-lb) in numerical sequence as shown in the figure.
(3) Tighten the bolts with torque of 50 N·m (5.1 kgf-m, 37 ft-lb) in numerical sequence as shown in the figure.
(4) Back off all the bolts by 180° in reverse order of installation, and back them off again by 180°.
(5) Tighten the bolts with torque of 20 N·m (2.0 kgf-m, 14 ft-lb) in numerical sequence as shown in the figure.
(6) Tighten the bolts (1) — (4) with torque of 48 N·m (4.9 kgf-m, 35.4 ft-lb) in numerical sequence.
(7) Tighten the bolts (5) — (8) with torque of 44 N·m (4.5 kgf-m, 33 ft-lb) in numerical sequence.
(8) Tighten all bolts 90° in the numerical order as shown in the figure.
(9) Tighten the bolt (1) — (4) by 45° in the numerical order.



3) Install the camshaft. <Ref. to ME(H6DO)-54, INSTALLATION, Camshaft.>
4) Install the rear chain cover. <Ref. to ME(H6DO)-51, INSTALLATION, Rear Chain Cover.>
5) Install the crank sprocket.
<Ref. to ME(H6DO)-50, INSTALLATION, Crank Sprocket.>
6) Install the cam sprocket.
<Ref. to ME(H6DO)-49, INSTALLATION, Cam Sprocket.>
7) Install the timing chain assembly.
<Ref. to ME(H6DO)-45, INSTALLATION, Timing Chain Assembly.>

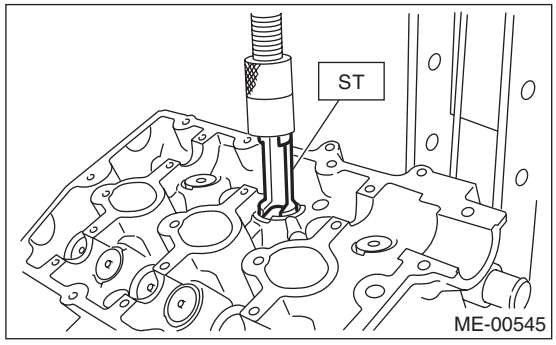
8) Install the front chain cover.
<Ref. to ME(H6DO)-42, INSTALLATION, Front Chain Cover.>
9) Install the crank pulley.
<Ref. to ME(H6DO)-41, INSTALLATION, Crank Pulley.>

C: DISASSEMBLY

1) Set the cylinder head on ST.
ST 18250AA010 CYLINDER HEAD TABLE
2) Remove the valve lifter.
3) Set the ST on valve spring retainer. Compress the valve spring and remove the valve spring retainer key. Remove each valve and valve spring.
ST 499718000 VALVE SPRING REMOVER

NOTE:
Keep all the removed parts in order for re-installing in their original positions.

CAUTION:
- **Mark each valve to prevent confusion.**
- **Pay careful attention not to damage the lips of intake valve oil seals and exhaust valve oil seals.**



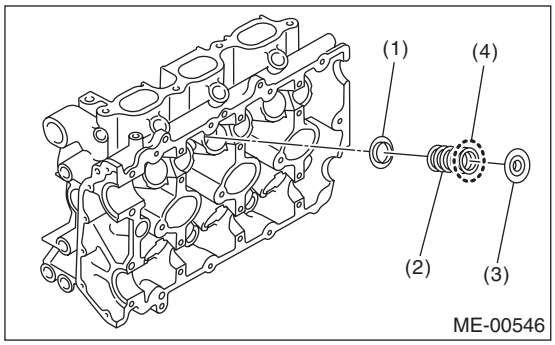
D: ASSEMBLY

1) Installation of 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.

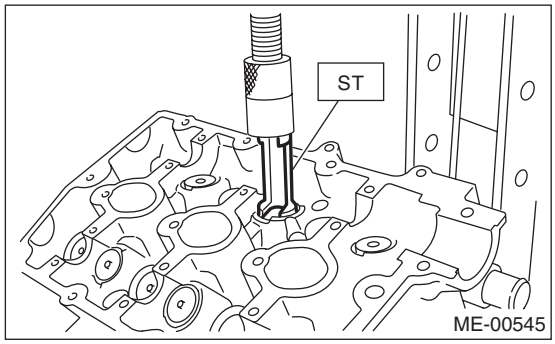
(3) Install the valve spring and retainer.

NOTE:
- Be sure to install the valve spring with its close-coiled end facing the seat on cylinder head.
- For the valve spring on intake side, install two of them (inner and outer).
- 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 and valve shim.
3) Install the valve lifter and valve shim.

E: INSPECTION

1. CYLINDER HEAD

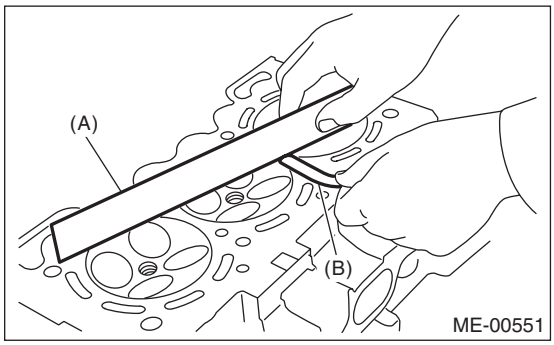
1) Make sure that no crack or other damages do not exist. In addition to visual inspection, inspect important areas using liquid penetrant tester. Check that there are no marks of gas leaking or water leaking on gasket installing surface.
2) Set the cylinder head on ST.
ST 18250AA010 CYLINDER HEAD TABLE

3) Measure the flatness of the cylinder head surface that mates with crankcase using a straight edge (A) and thickness gauge (B).

Flatness:
Standard
0.02 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 nuts can cause warping. When reinstalling, pay special attention to the torque so as to tighten evenly.



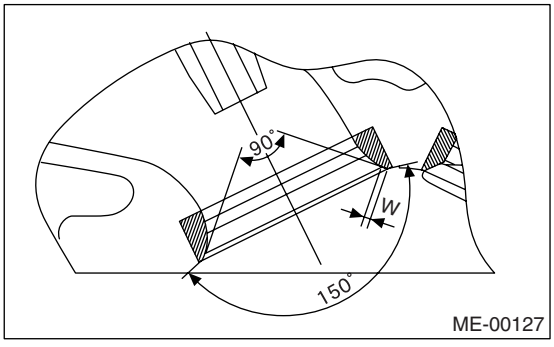
2. VALVE SEAT

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.

Valve seat width W:

Intake
Standard
1.0 mm (0.039 in)

Exhaust
Standard
1.5 mm (0.059 in)



3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring respectively the outer diameter of valve stem and inner diameter of valve guide with a micrometer.

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)

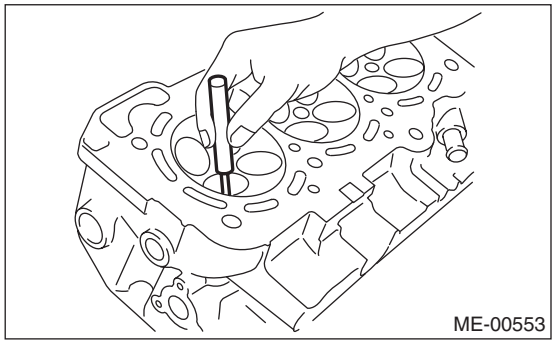
2) If the clearance between valve guide and stem exceeds the standard, replace the valve guide or valve itself whichever shows greater amount of wear or damaged and etc. See the following procedure for valve guide replacement.

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)

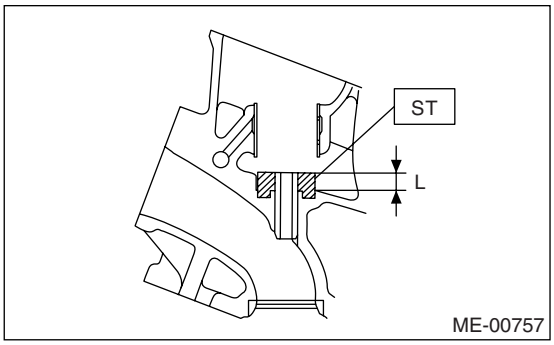
(1) Place the cylinder head on ST1 with the combustion chamber upward so that valve guides fit the holes in ST1.
(2) Insert the ST2 into valve guide and press it down to remove the valve guide.

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.

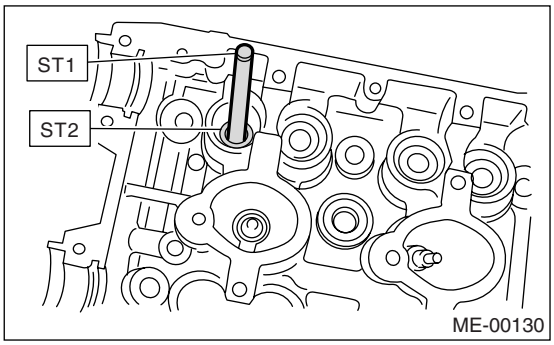
ST 18251AA040 VALVE GUIDE ADJUSTER



(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 cylinder, 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 18251AA040 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion L:
11.4 — 11.8 mm (0.449 — 0.465 in)

(7) Ream the inside of valve guide using ST. Put the reamer in valve guide, and rotate the reamer slowly clockwise while pushing it lightly. Bring the reamer back while rotating it clockwise. After reaming, clean the valve guide to remove chips.

ST 499765900 VALVE GUIDE REAMER

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

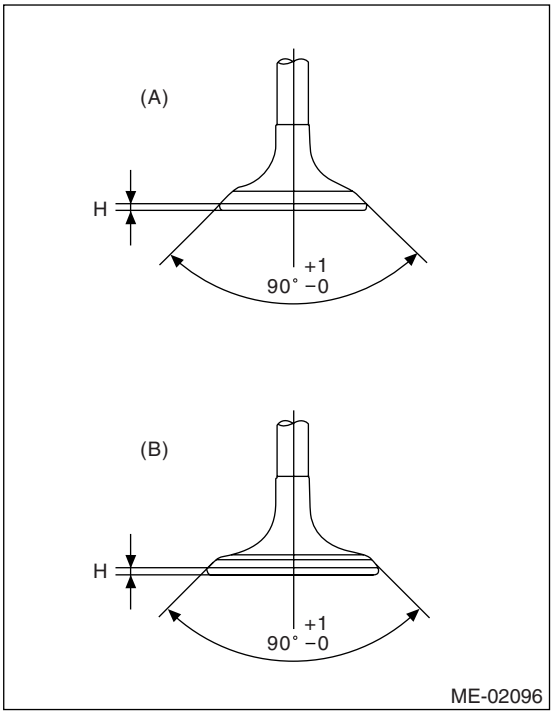
(8) Recheck the contact condition between valve and valve seat after replacing the valve guide.

4. INTAKE AND EXHAUST VALVE

1) Inspect the flange and stem of valve, and replace if damaged, worn or deformed, or if “H” exceeds the standard, or offset wear occurs.

H:
Intake (A)
Standard
1.0 mm (0.039 in)
Exhaust (B)
Standard
1.2 mm (0.047 in)

Valve overall length:
Intake (A)
99.7 mm (3.925 in)
Exhaust (B)
105.2 mm (4.142 in)



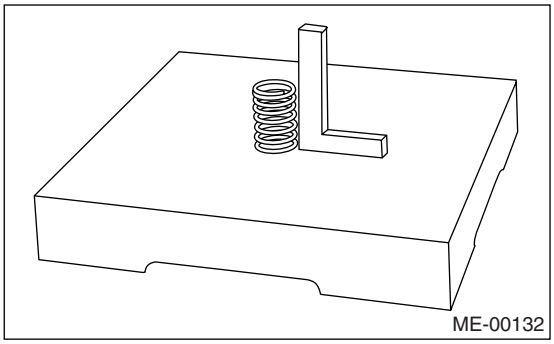
2) Put a small amount of grinding compound on the seat surface, and lap the valve and seat surface. Install a new intake valve oil seal after lapping.

5. VALVE 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.

Free length mm (in)	Intake	Inner	39.55 (1.5571)
		Outer	41.18 (1.6213)
	Exhaust		46.32 (1.8236)
Squareness	Intake	Inner	2.5°1.7 mm (0.067 in)
		Outer	2.5°1.8 mm (0.071 in)
	Exhaust		2.5°2.0 mm (0.079 in)

2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top of spring using a try square.


ME-00132

6. INTAKE AND EXHAUST VALVE OIL SEAL

In the following case, pinch and remove the oil seal from valve using pliers, and then replace it with a new one.

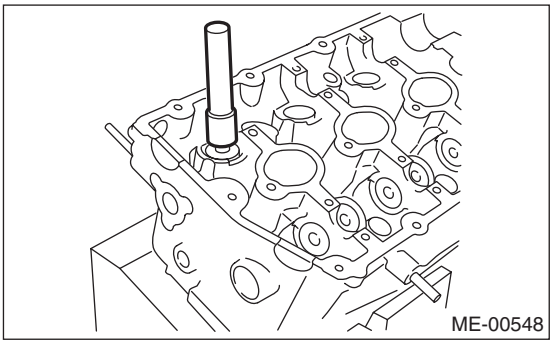
- When the lip is damaged.
- When the spring is out of the specified position.
- When readjusting the surfaces of intake valve and valve sheet.
- When replacing the intake valve guide.

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

ST1 18250AA010 CYLINDER HEAD TABLE
ST2 499585500 VALVE OIL SEAL GUIDE

NOTE:

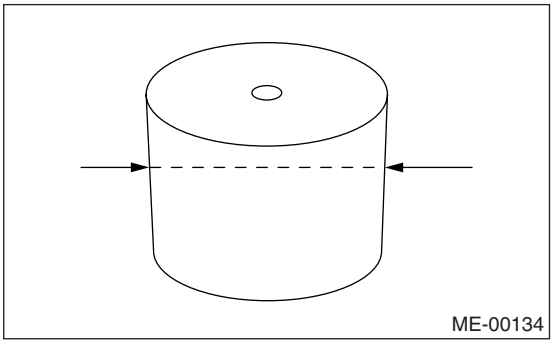
- Apply engine oil to oil seal before press-fitting.
- When press-fitting the oil seal, do not use a hammer or strike in.


ME-00548

7. VALVE LIFTER

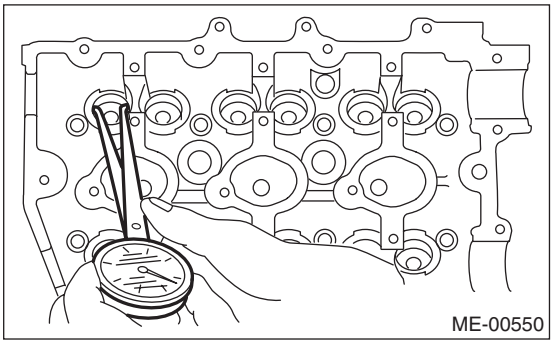
1) Check the valve lifter visually.
2) Measure the outer diameter of valve lifter.

Outer diameter:
32.959 — 32.975 mm (1.2976 — 1.2982 in)


ME-00134

3) Measure the inner diameter of valve lifter hole of cylinder head.

Inner diameter:
32.994 — 33.016 mm (1.2990 — 1.2998 in)


ME-00550

NOTE:
If difference between outer diameter of valve lifter and inner diameter of valve lifter hole is out of the standard or offset wearing is emitted, replace the cylinder head.

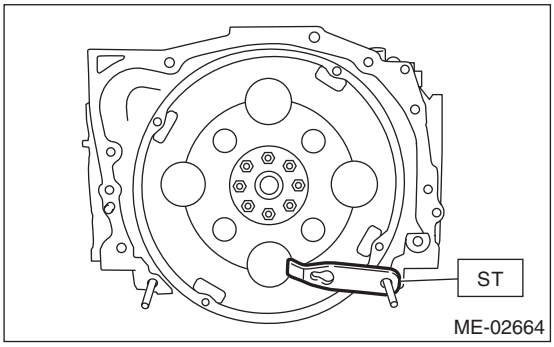
Standard:
0.019 — 0.057 mm (0.0007 — 0.0022 in)

21.Cylinder Block

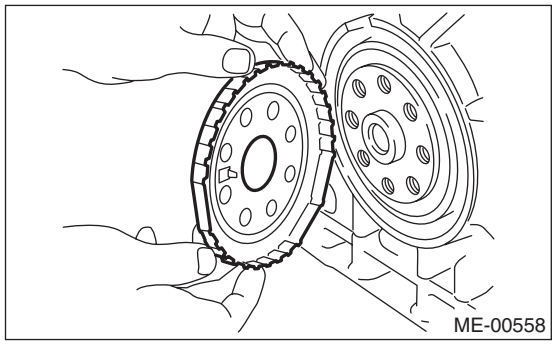
A: REMOVAL

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

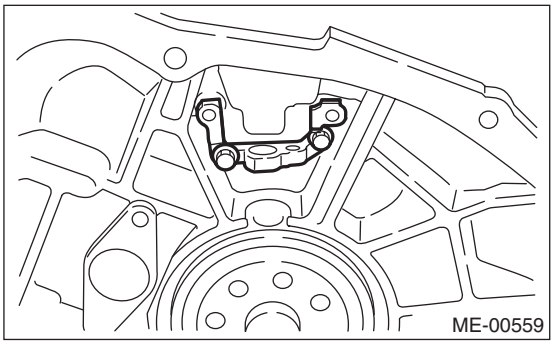
1) Remove the crank pulley. <Ref. to ME(H6DO)-41, REMOVAL, Crank Pulley.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-42, REMOVAL, Front Chain Cover.>
3) Remove the timing chain assembly.
<Ref. to ME(H6DO)-44, REMOVAL, Timing Chain Assembly.>
4) Remove the cam sprocket.
<Ref. to ME(H6DO)-49, REMOVAL, Cam Sprocket.>
5) Remove the crank sprocket.
<Ref. to ME(H6DO)-50, REMOVAL, Crank Sprocket.>
6) Remove the rear chain cover.
<Ref. to ME(H6DO)-51, REMOVAL, Rear Chain Cover.>
7) Remove the camshaft. <Ref. to ME(H6DO)-53, REMOVAL, Camshaft.>
8) Remove the cylinder head. <Ref. to ME(H6DO)-57, REMOVAL, Cylinder Head.>
9) Remove the drive plate.
Using the ST, lock the crankshaft.
ST 498497100 CRANKSHAFT STOPPER



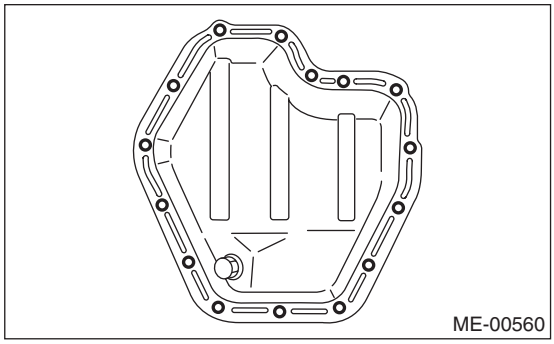
10) Remove the crankshaft position sensor plate.



11) Remove the crankshaft position sensor bracket.



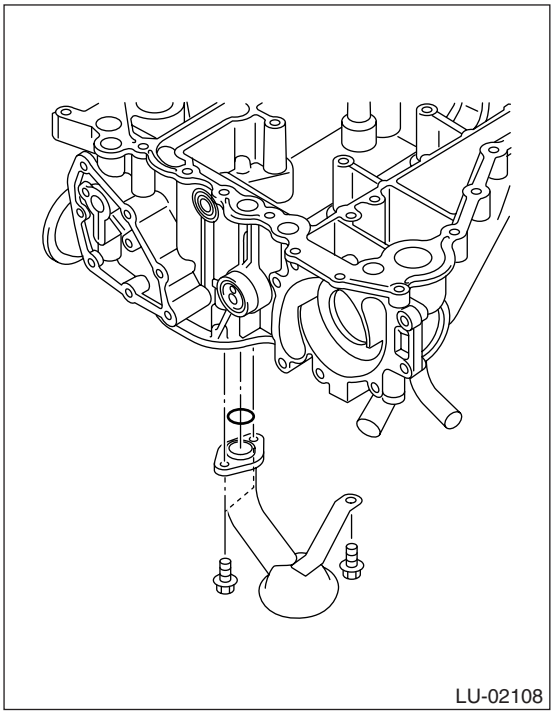
12) Rotate the engine to set oil pan upper.
13) Remove the bolts which secure oil pan lower to oil pan upper.



14) Insert an oil pan cutter blade between cylinder block-to-oil pan clearance and remove the oil pan.

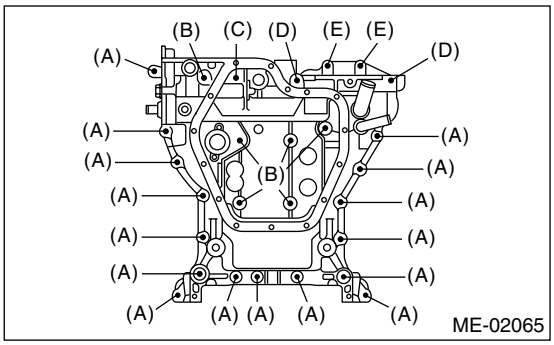
CAUTION:
Do not use a screwdriver or similar tools in place of oil pan cutter.

15) Remove the oil strainer.



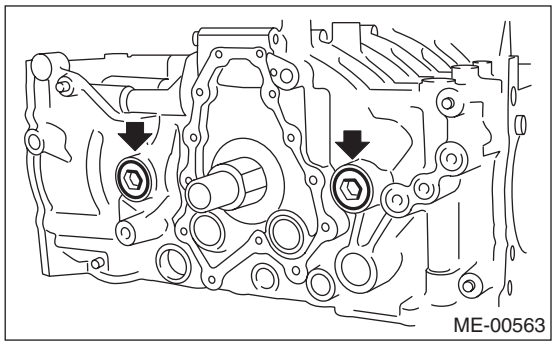
16) Remove the bolts which install oil pan upper onto cylinder block.

NOTE:
Installation bolt has five different sizes. To prevent the confusion in installation, keep these bolts on container individually.

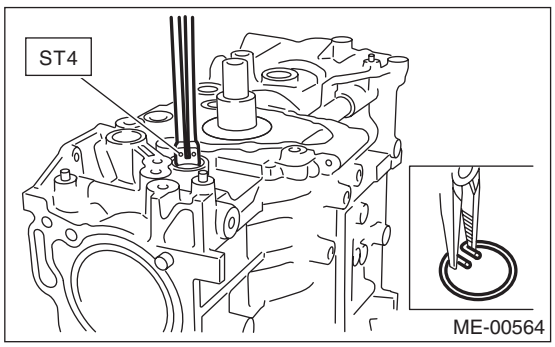


(A) M8 × 40
(B) M8 × 65
(C) M8 × 85
(D) M8 × 130
(E) M8 × 24

17) Remove the service hole cover and service hole plugs using a hexagon wrench.

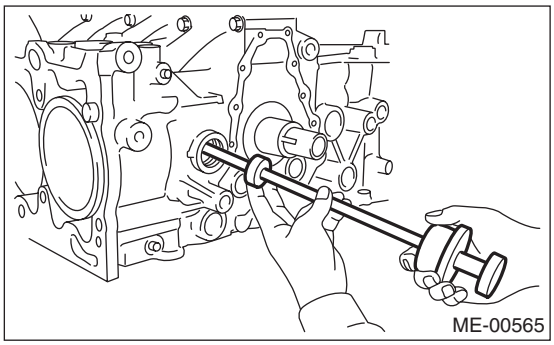


18) Rotate the crankshaft to bring #1 and #2 pistons to bottom dead center position, then, using the ST, remove the piston snap ring through service hole of #1 and #2 cylinders.
ST 18233AA000 PISTON PIN SNAP RING PLIERS

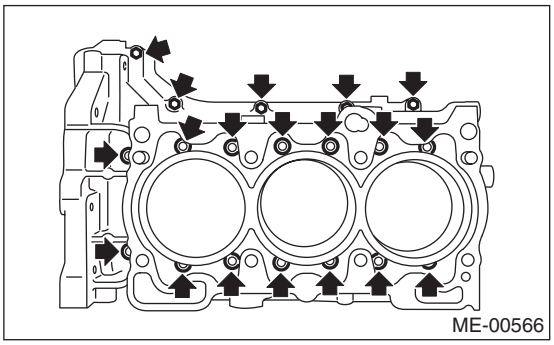


19) Draw out the piston pin from #1 and #2 pistons using ST.
ST 499097700 PISTON PIN REMOVER

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



20) Similarly remove the piston pins from #3, #4, #5, and #6 pistons.
21) Remove the bolts which secure cylinder block.



22) Separate the cylinder block (LH) and (RH).

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

23) Remove the rear oil seal.
24) Remove the crankshaft together with connecting rod.
25) 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.

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

NOTE:
Be careful not to confuse the original combination of piston and cylinder.

B: INSTALLATION

1) After setting the cylinder block to ST, install the crankshaft bearing.
ST 18232AA000 ENGINE STAND

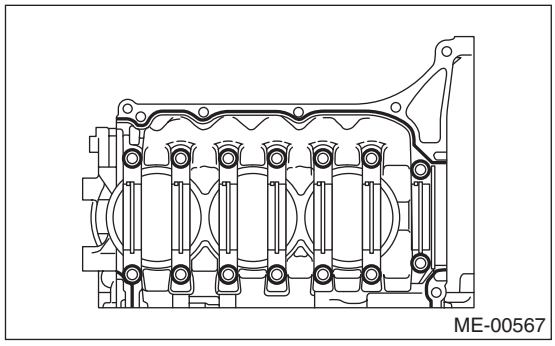
NOTE:
Remove oil on the mating surface of bearing and cylinder block before installation. Apply a coat of engine oil to crankshaft pins.

2) Position the crankshaft and connecting rod on #2, #4 and #6 cylinder block.
3) Apply liquid gasket to the mating surface of the #1, #3 and #5 cylinder blocks, and position it on #2, #4 and #6 cylinder blocks.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007)

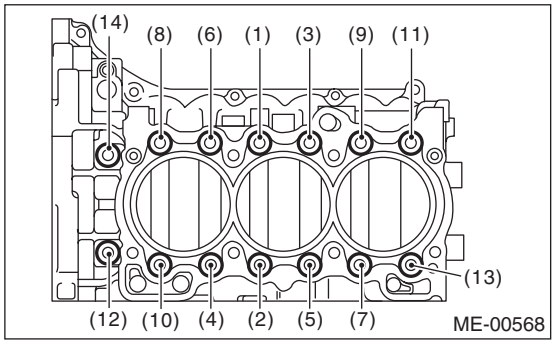
NOTE:
Do not allow liquid gasket to run over to O-ring grooves, oil passages, bearing grooves, etc.

Applying liquid gasket diameter:
1.0±0.2 mm (0.039±0.008 in)



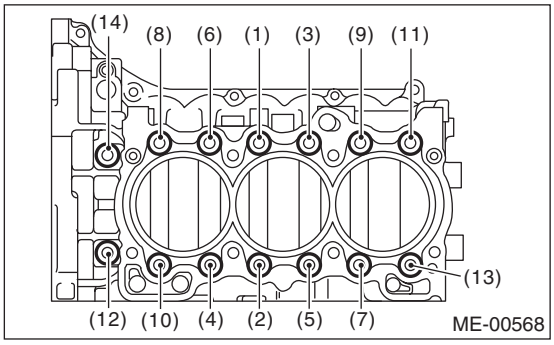
4) Apply a coat of engine oil to the washer and bolt thread.
5) Tighten all bolts in the numerical order as shown in the figure.

Tightening torque:
(1) — (11), (13): 25 N·m (2.5 kgf-m, 18 ft-lb)
(12), (14): 20 N·m (2.0 kgf-m, 14 ft-lb)

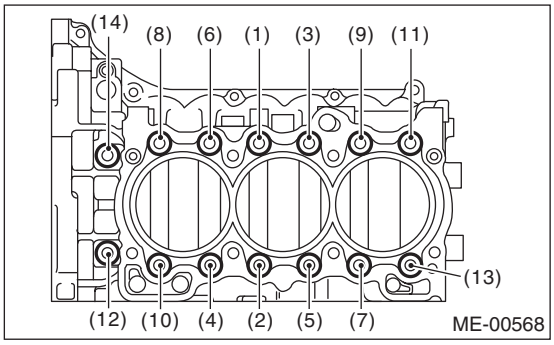


6) Retighten all bolts in the numerical order as shown in the figure.

Tightening torque:
(1) — (11), (13): 25 N·m (2.5 kgf-m, 18 ft-lb)
(12), (14): 20 N·m (2.0 kgf-m, 14 ft-lb)



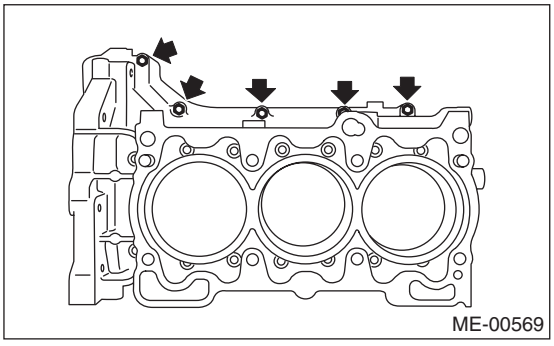
7) Tighten all bolts 90° in the numerical order as shown in the figure.



8) Install the upper bolt to cylinder block.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

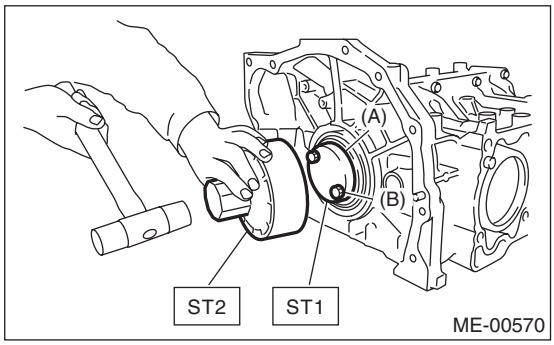
NOTE:
Remove the liquid gasket which is running over to sealing surface between cylinder block and rear chain cover, cylinder block and oil pan upper, after tightening the bolts which combine the cylinder block.



9) Install the rear oil seal using ST1 and ST2.

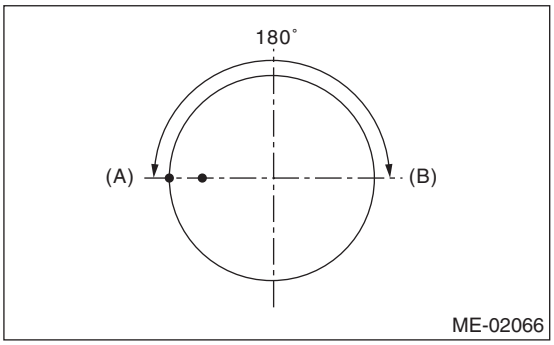
ST1 499597100 CRANKSHAFT OIL SEAL GUIDE
ST2 499587200 CRANKSHAFT OIL SEAL INSTALLER

NOTE:
Apply engine oil to the pressing-in portion.

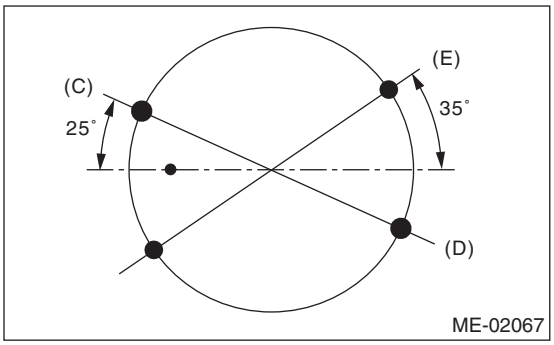


(A) Rear oil seal
(B) Drive plate installation bolt

10) Position the top ring gap at (A) in the figure.
11) Position the second ring gap at (B).



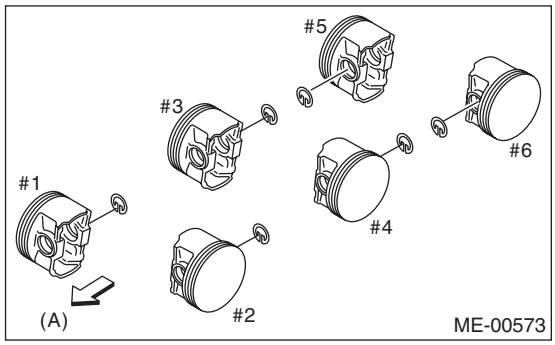
12) Position the upper rail gap at (C) in the figure.
13) Position the expander gap at (D) in the figure.
14) Position the lower rail gap at (E) in the figure.



CAUTION:
• Make sure ring gaps do not face the same direction.
• Make sure ring gaps are not within the piston skirt area.
• Assemble it so that R mark faces to top side of piston.

15) Install the snap ring.
Install the snap rings in the piston holes located opposite to the service holes in cylinder block when positioning all pistons in corresponding cylinders.

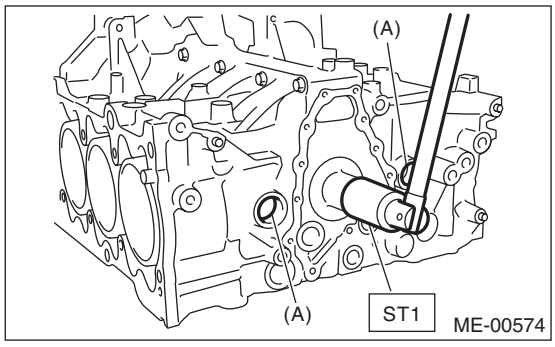
NOTE:
Use new snap rings.



(A) Front side of vehicle

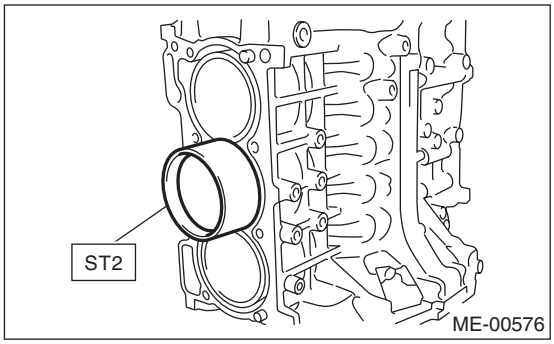
16) Installation of piston:
(1) Using the ST1, turn the crankshaft so that #3 and #4 connecting rod small ends are set on the service hole (A).

ST1 18252AA000 CRANKSHAFT SOCKET

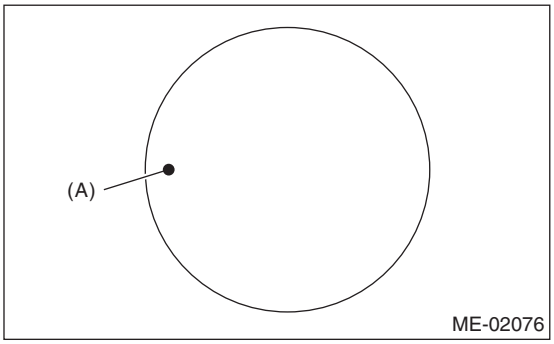


(2) Apply a thin coat of engine oil to piston and cylinder.
(3) Using the ST2, press-fit the piston into cylinder.

ST2 18254AA000 PISTON GUIDE

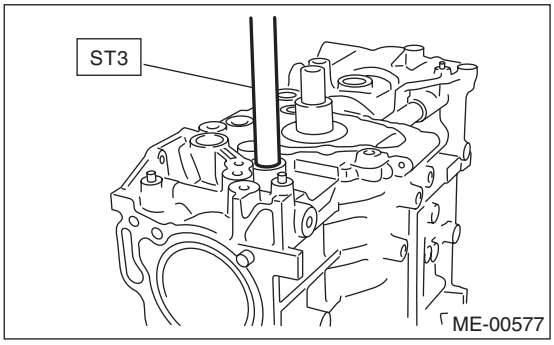


NOTE:
Let the piston front mark (A) face towards the front of engine.



17) Installing piston pin:
(1) Apply a coat of engine oil to ST3 before insertion, and then insert it into the service hole to align piston pin hole with connecting rod small end.

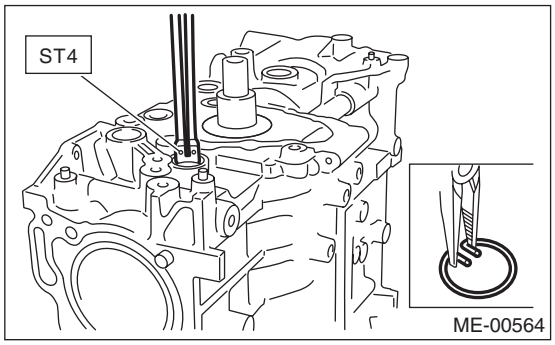
ST3 18253AA000 PISTON GUIDE



(2) Apply a coat of engine oil to piston pin, and insert the piston pin into piston and connecting rod through service hole.
(3) Using the ST4, install the snap ring.

ST4 18233AA000 PISTON PIN SNAP RING PLIERS

NOTE:
Use new snap rings.



(4) Similarly install the #1, #2, #5 and #6 pistons.

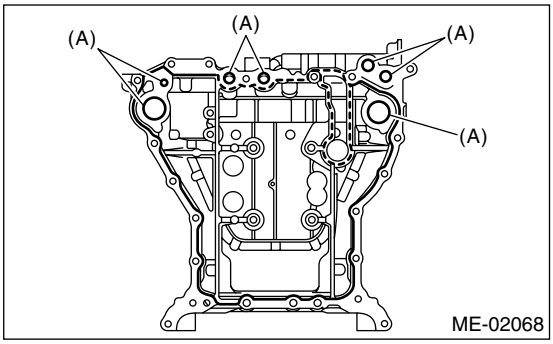
18) Install the service hole plug and O-ring.

NOTE:
Use new O-rings.

19) Apply liquid gasket to the mating surface of oil pan upper.

Liquid gasket:
THREE BOND 1280B (Part No. K0877YA018)

Applying liquid gasket diameter:
Full line part
3.0±1.0 mm (0.12±0.04 in)
Broken line part
1.0 mm (0.04 in)

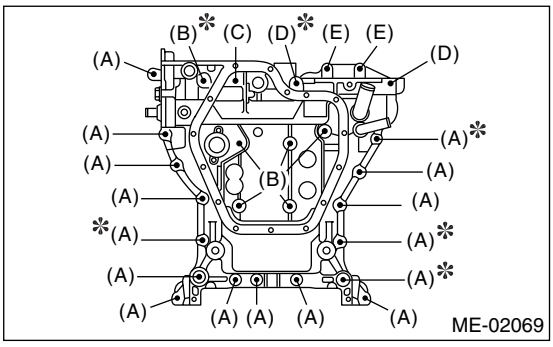


(A) O-ring

NOTE:
Use new O-rings.

20) Temporarily tighten the oil pan upper.

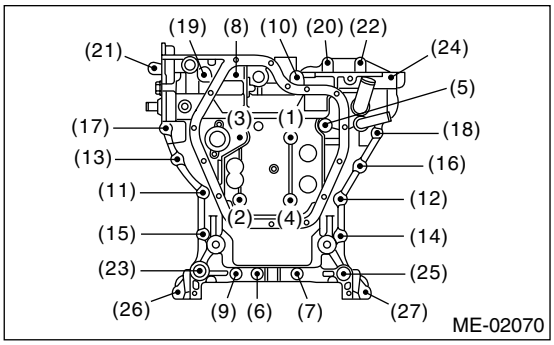
NOTE:
Do not install the bolts in wrong place.



(A) M8 × 40
(B) M8 × 65
(C) M8 × 85
(D) M8 × 130
(E) M8 × 24
*: Coating

21) Tighten the oil pan upper installing bolts in the numerical order as shown in the figure.

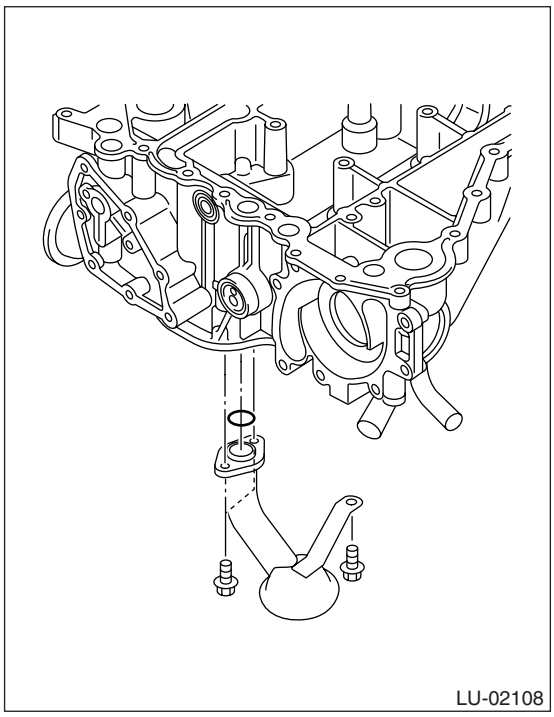
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



22) Install the oil strainer.

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

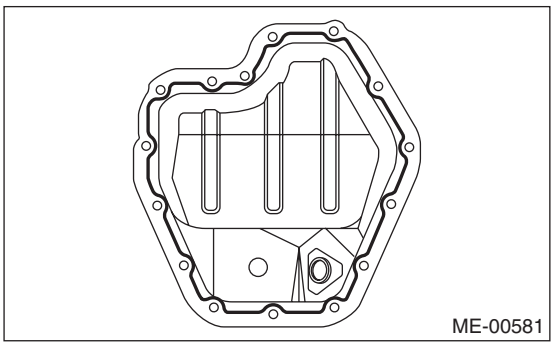
NOTE:
Use new O-rings.



23) Apply liquid gasket to the matching surface of oil pan lower.

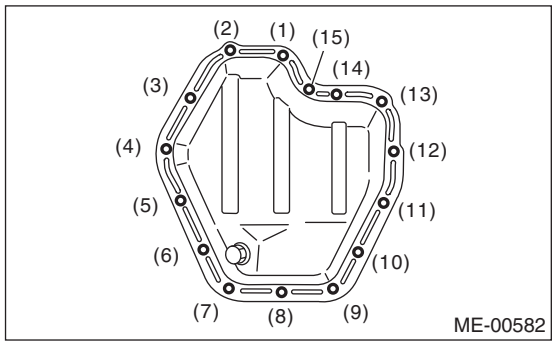
Liquid gasket:
THREE BOND 1280B (Part No. K0877YA018)

Applying liquid gasket diameter:
5.0±1.0 mm (0.20±0.04 in)



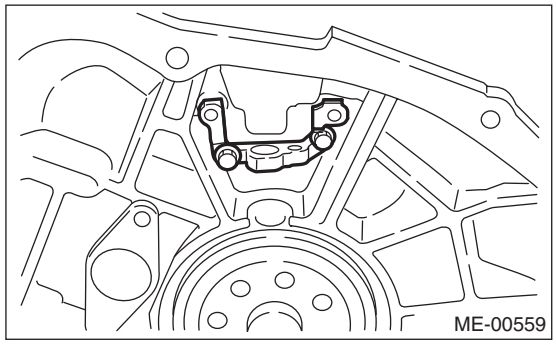
24) Tighten the oil pan lower installing bolts in the numerical order as shown in the figure.

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

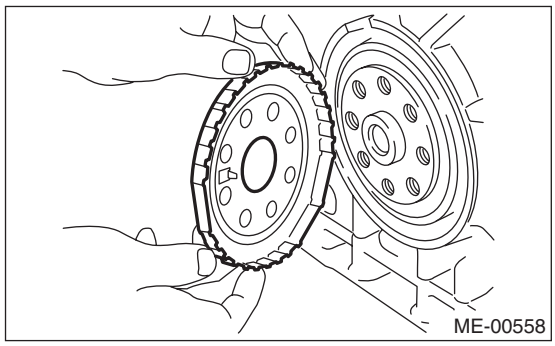


25) Install the crankshaft sensor bracket.

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

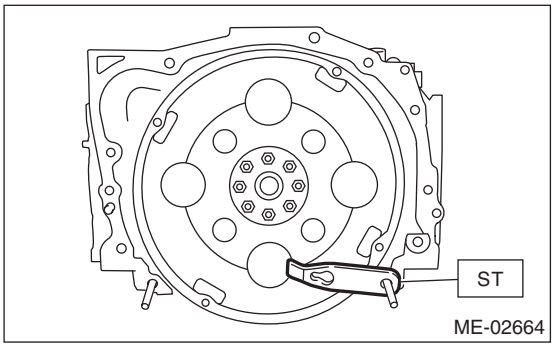


26) Install the crankshaft sensor plate.



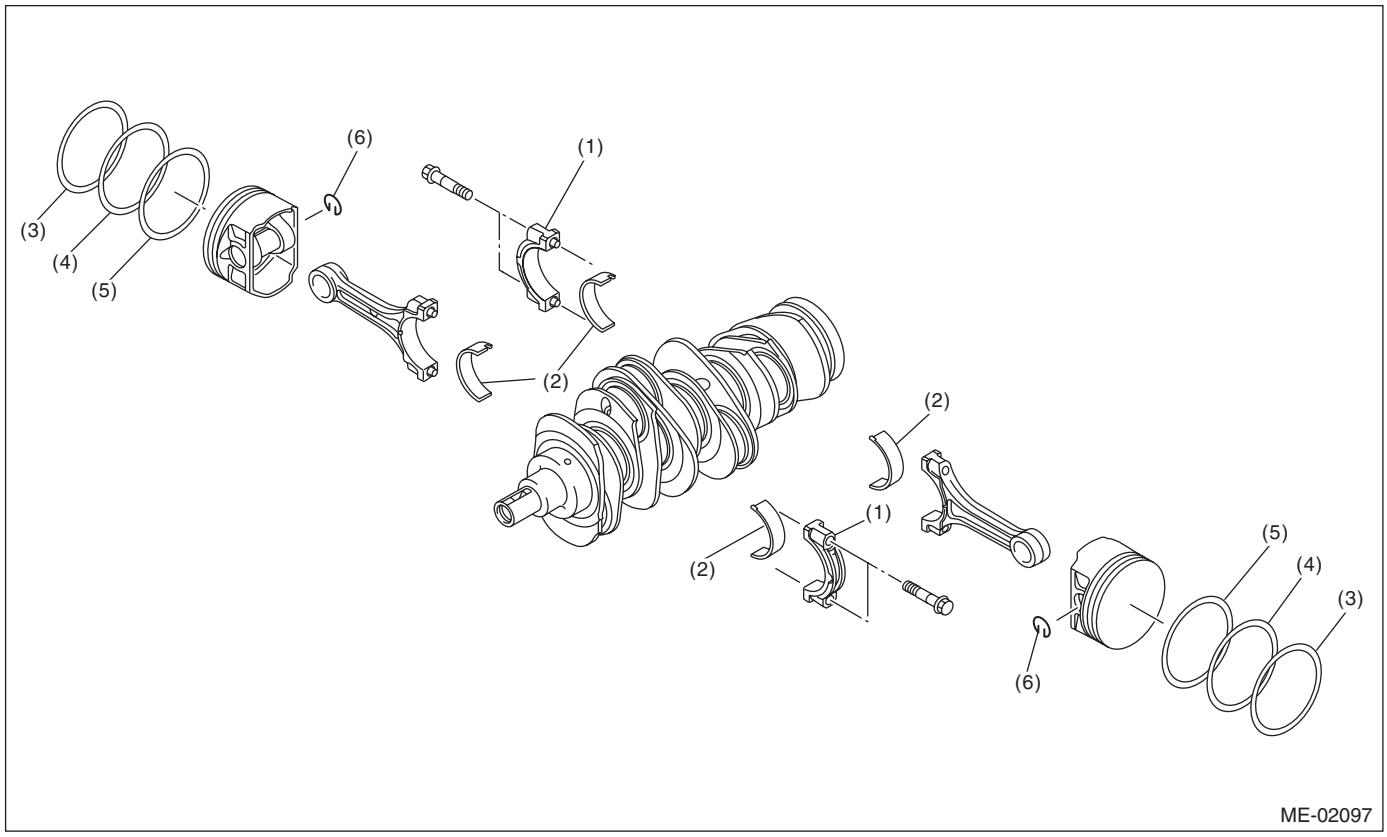
27) Install the drive plate.
To lock the crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
81 N·m (8.3 kgf-m, 60 ft-lb)



28) Install the cylinder head. <Ref. to ME(H6DO)-57, INSTALLATION, Cylinder Head.>
29) Install the camshaft. <Ref. to ME(H6DO)-54, INSTALLATION, Camshaft.>
30) Install the rear chain cover. <Ref. to ME(H6DO)-51, INSTALLATION, Rear Chain Cover.>
31) Install the crank sprocket.
<Ref. to ME(H6DO)-50, INSTALLATION, Crank Sprocket.>
32) Install the cam sprocket. <Ref. to ME(H6DO)-49, INSTALLATION, Cam Sprocket.>
33) Install the timing chain assembly.
<Ref. to ME(H6DO)-45, INSTALLATION, Timing Chain Assembly.>
34) Install the front chain cover.
<Ref. to ME(H6DO)-42, INSTALLATION, Front Chain Cover.>
35) Install the crank pulley.
<Ref. to ME(H6DO)-41, INSTALLATION, Crank Pulley.>

C: DISASSEMBLY



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

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

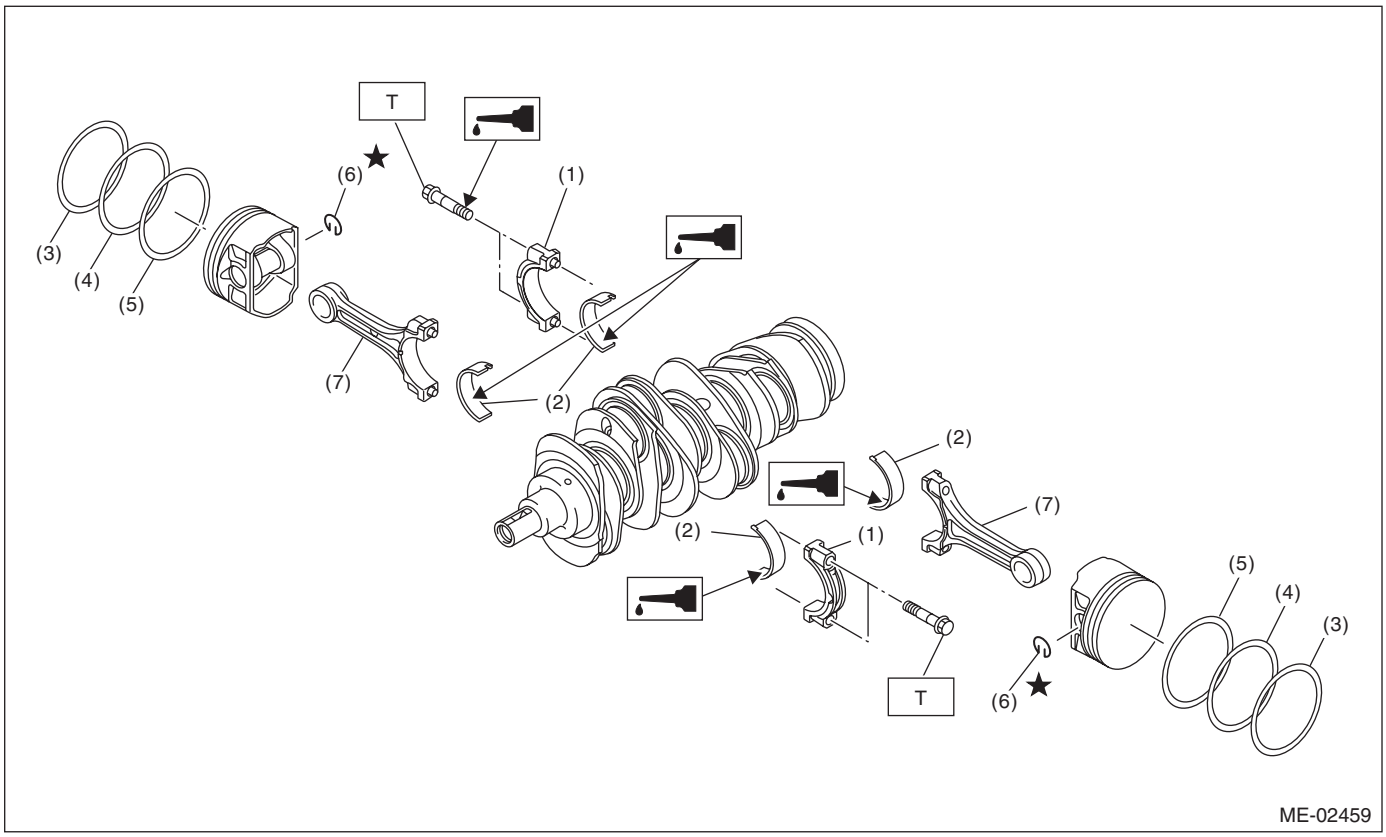
NOTE:
Arrange the removed connecting rod, connecting rod cap and bearing in order, to prevent confusion.

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

NOTE:
Arrange the removed piston rings in proper order, to prevent confusion.

5) Remove the snap ring.

D: ASSEMBLY



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

Tightening torque: N·m (kgf-m, ft-lb)
T: 53 (5.4, 39)

1) Apply oil to the surfaces of the connecting rod bearings. Install the connecting rod bearings on connecting rods and connecting rod caps.
2) Install the connecting rod on crankshaft.

NOTE:
Position each connecting rod with the marking side facing forward.

3) Install the connecting rod cap.
Make sure the arrow mark on connecting rod cap facing front during installation.

CAUTION:
• Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
• When tightening the connecting rod bolts, apply oil on the threads and flange end.

4) Install the oil ring spacer, upper rail and lower rail in this order by hand. Install the second ring and top ring using piston ring expander.

E: INSPECTION

1. CYLINDER BLOCK

1) Visually check for cracks and damage. Especially, inspect the important parts using liquid penetrant tester.
2) Check the oil passages for clogging.
3) Inspect the crankcase surface that mates with cylinder head for warping by using a straight edge.

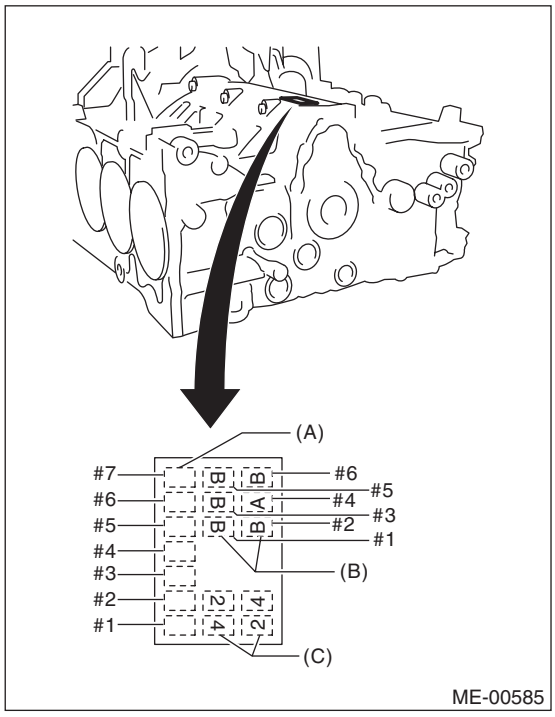
Standard height of cylinder block:
202 mm (7.95 in)

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: 89.205 — 89.215 mm (3.5120 — 3.5124 in)
B: 89.195 — 89.205 mm (3.5116 — 3.5120 in)



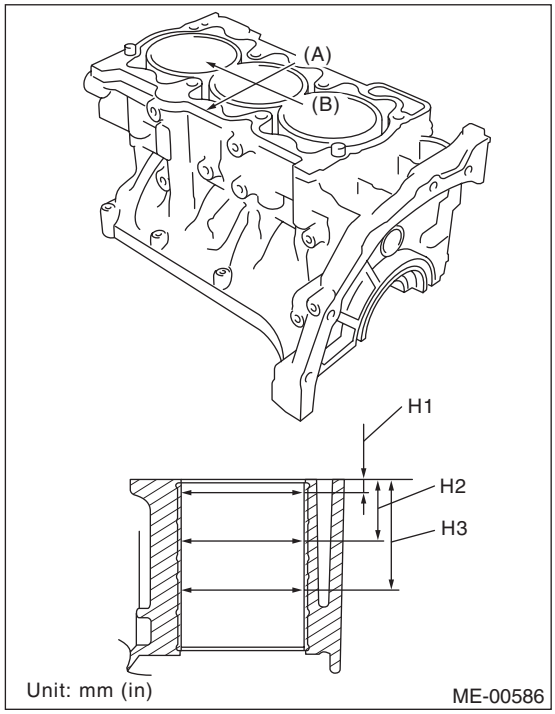
(A) Main journal size mark
(B) Cylinder bore size mark
(C) Cylinder block (RH) – (LH) combination mark

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

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

Cylindricality:
Standard
0.030 mm (0.0012 in)

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



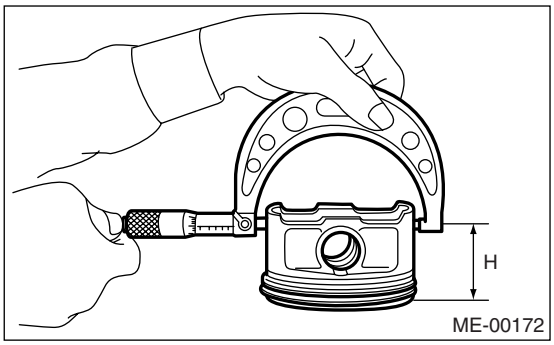
(A) Piston pin direction
(B) Thrust direction
H1: 10 mm (0.39 in)
H2: 45 mm (1.77 in)
H3: 80 mm (3.15 in)

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

4) How to measure the outer diameter of each piston:
Measure the outer diameter of each piston at the height 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 (1.4865 in)
Piston outer diameter:
Standard
A: 89.205 — 89.215 mm (3.5120 — 3.5124 in)
B: 89.195 — 89.205 mm (3.5116 — 3.5120 in)
0.25 mm (0.0098 in) oversize
89.445 — 89.465 mm (3.5215 — 3.5222 in)
0.50 mm (0.0197 in) oversize
89.695 — 89.715 mm (3.5313 — 3.5321 in)



5) Calculate the clearance between cylinder and piston.

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

20 Cylinder to piston clearance at 20°C (68°F):
Standard
–0.010 — 0.010 mm (–0.00039 — 0.00039 in)

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

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

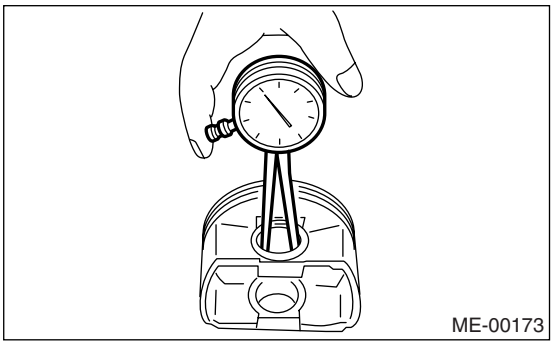
(2) If the cylinder inner diameter exceeds 89.715 mm (3.5321 in) after boring and honing, replace the crankcase.

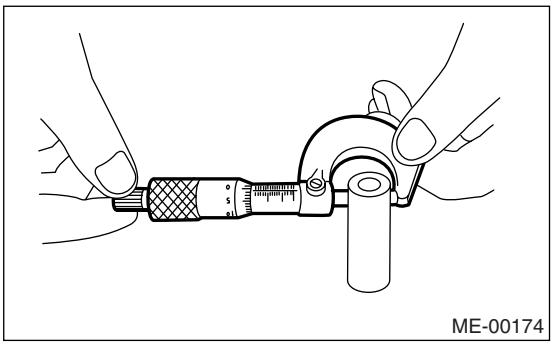
NOTE:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

3. PISTON AND PISTON PIN

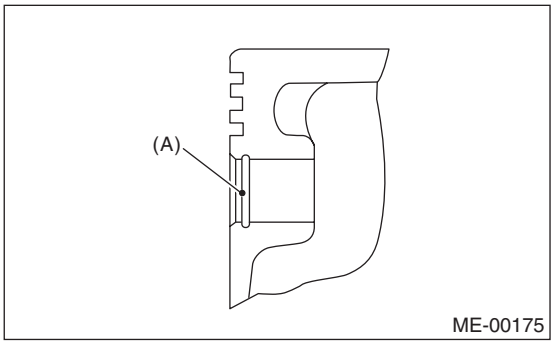
1) Check the pistons and piston pins for damage, cracks and wear, and the piston ring grooves for wear and damage. Replace if faulty.
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(H6DO)-71, CYLINDER AND PISTON, INSPECTION, Cylinder Block.>If any of the clearances is not within standard, replace the piston or bore the cylinder to use an oversize piston.
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.

Standard clearance between piston pin and hole in piston:
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.

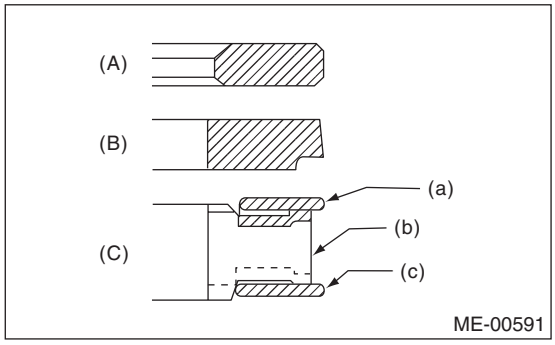


5) Check the piston pin snap ring for distortion, cracks and wear.

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 one of the same size as piston.

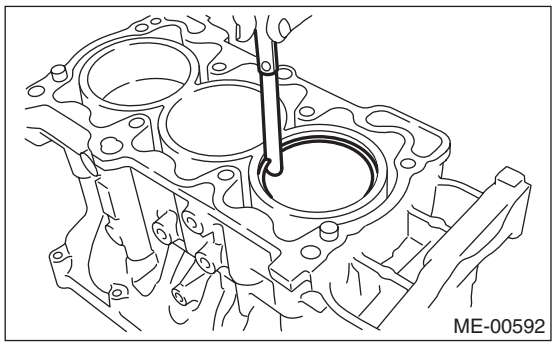
CAUTION:
• Marks are displayed on the end of top and second rings. When installing the ring to piston, face this mark upward.
• Oil ring consists of the upper rail, expander and lower rail. When installing on the piston, be careful of the direction of each rail



(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.

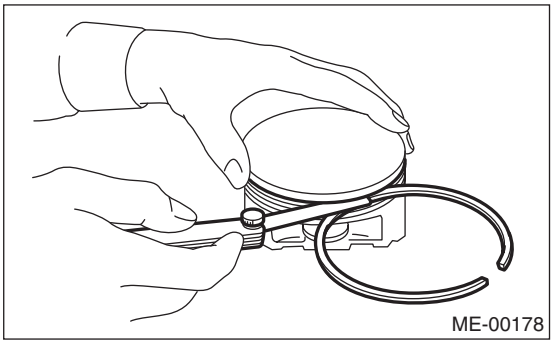
		Standard mm (in)
Piston ring gap	Top ring	0.20 — 0.35 (0.0079 — 0.0138)
	Second ring	0.35 — 0.50 (0.0138 — 0.0197)
	Oil ring	0.20 — 0.60 (0.0079 — 0.0236)



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

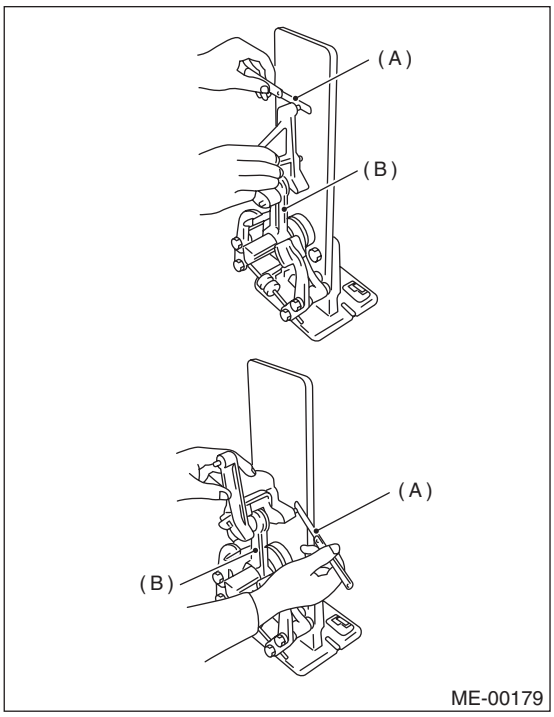
NOTE:
Before measuring the clearance, clean the piston ring groove and piston ring.

		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		0.045 — 0.125 (0.0018 — 0.0049)



5. CONNECTING ROD

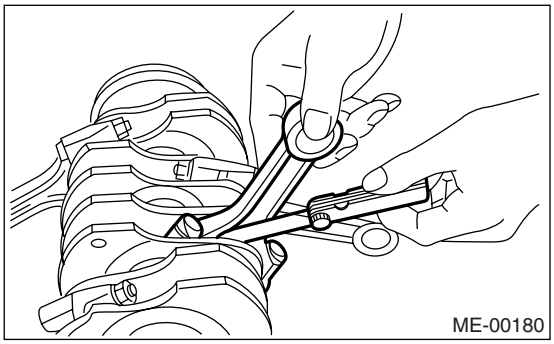
1) Replace the connecting rod, if the large or small end thrust surface is damaged.
2) Check for bend or twist using a connecting rod aligner. Replace the connecting rod if it has the bend or twist.



(A) Thickness gauge
(B) Connecting rod

3) Install the connecting rod fitted with bearing to crankshaft and measure the thrust clearance. If the clearance exceeds the standard or offset wear occurs, 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 one of standard size or undersize as necessary. (See the table below.)

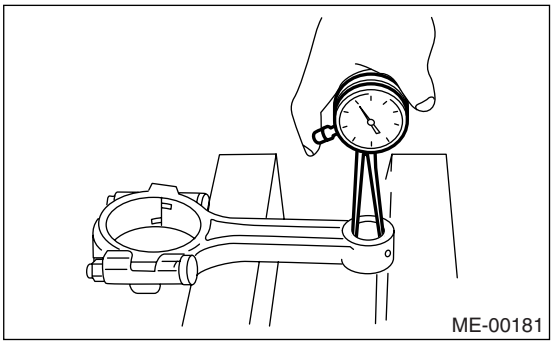
Connecting rod oil clearance:
Standard
0.016 — 0.043 mm (0.0006 — 0.0017 in)

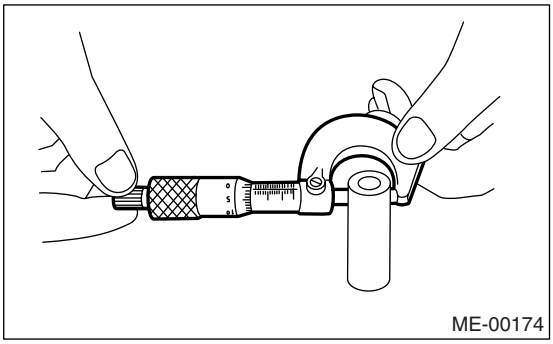
Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.490 — 1.506 (0.0587 — 0.0593)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.509 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.519 — 1.523 (0.0598 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.619 — 1.623 (0.0637 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

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

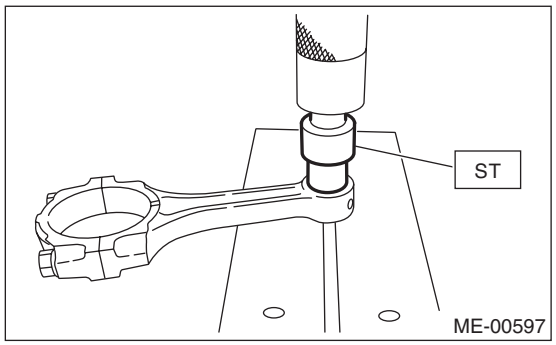
Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)





7) Replacement procedure is as follows.
(1) Remove the bushing from connecting rod with ST and press.
(2) Press the bushing with ST after applying oil on the periphery of bushing.

ST 18350AA000 CONNECTING ROD BUSHING REMOVER & INSTALLER

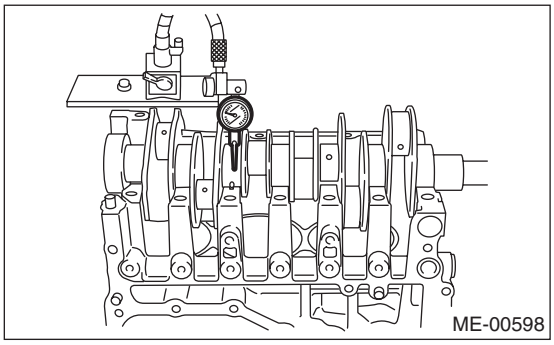


(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After completion of reaming, clean the bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

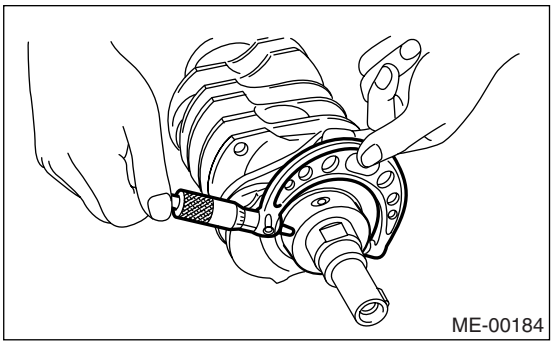
1) Clean the crankshaft completely, and check it for cracks using liquid penetrant tester. Replace if defective.
2) Check the crankshaft for bend, and repair or replace if needed. Repair or replace if bended.

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



3) Inspect the crank journal and crank pin for wear. If they are not within the specification, replace the bearing with a suitable (undersize) one, and replace or readjust 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 and crank journal:
Out-of-roundness
0.005 mm (0.0002 in)
Cylindricality
0.006 mm (0.0002 in)

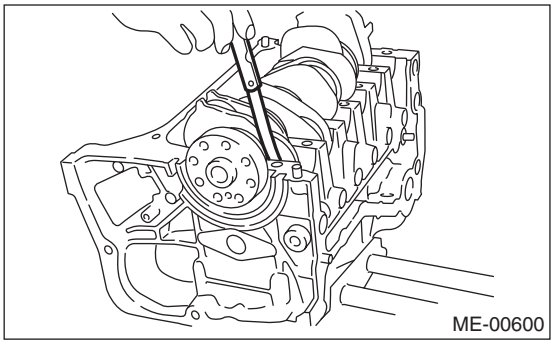


Unit: mm (in)

		Crank journal diameter		Crank pin outer diameter
		#1, #3, #5, #7	#2, #4, #6	
Standard	Journal O.D.	63.992 — 64.008 (2.5194 — 2.5200)		51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.992 — 2.005 (0.0784 — 0.0789)	1.996 — 2.009 (0.0786 — 0.0791)	1.490 — 1.506 (0.0587 — 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)	2.015 — 2.018 (0.0793 — 0.0794)	1.509 — 1.513 (0.0594 — 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)	2.025 — 2.028 (0.0797 — 0.0798)	1.519 — 1.523 (0.0598 — 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)	2.125 — 2.128 (0.0837 — 0.0838)	1.619 — 1.623 (0.0637 — 0.0639)

4) 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 recondition the crankshaft as necessary.

Crankshaft oil clearance:
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)

22.Oil Flow Control Solenoid Valve

A: REMOVAL

Oil flow control solenoid valve is a unit with camshaft cap.
Refer to "Camshaft" for removal.
<Ref. to ME(H6DO)-53, REMOVAL, Camshaft.>

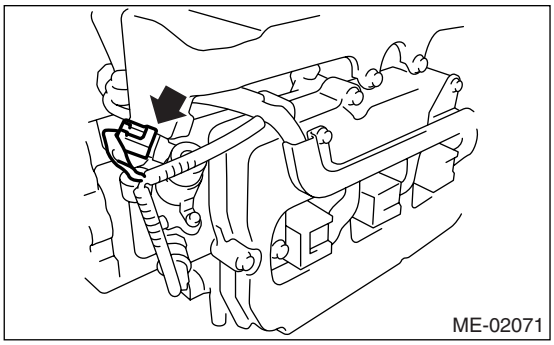
B: INSTALLATION

Install in the reverse order of removal.

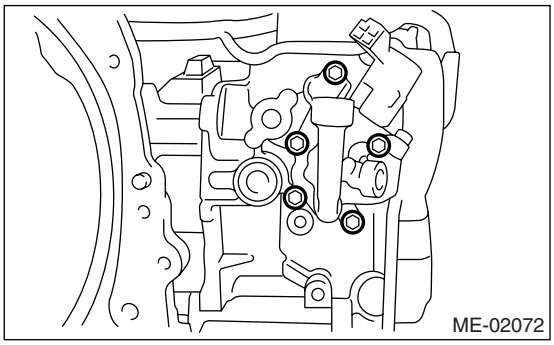
23.Oil Switching Solenoid Valve

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the air intake chamber.
<Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
3) Disconnect the connector from oil switching solenoid valve.



4) Remove the oil switching solenoid valve.
5) Remove the variable valve lift diagnosis oil pressure switch.
<Ref. to FU(H6DO)-26, REMOVAL, Variable Valve Lift Diagnosis Oil Pressure Switch.>
6) Remove the oil temperature sensor.
<Ref. to FU(H6DO)-27, REMOVAL, Oil Temperature Sensor.>
7) Remove the oil flow control solenoid valve holder from cylinder head.

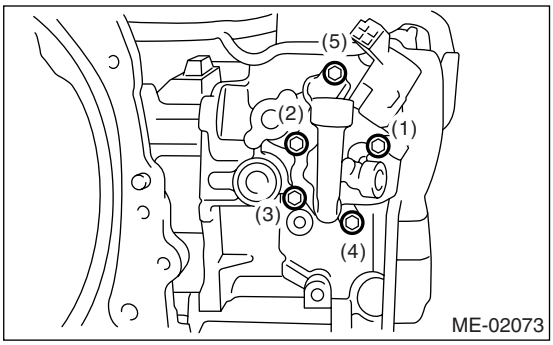


B: INSTALLATION

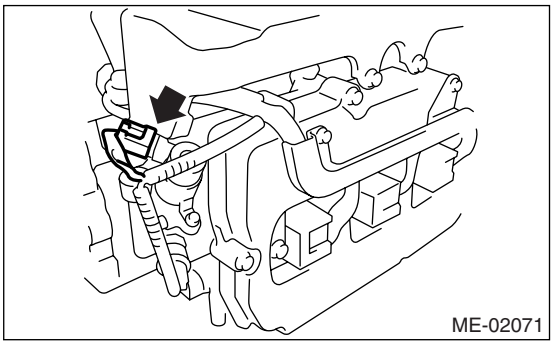
1) Install the oil switching solenoid valve holder.

NOTE:
Always use new gasket.

(1) Temporarily tighten the bolts by tightening torque of 5 — 10 N·m (0.5 — 1.0 kgf-m, 3.7 — 7.4 ft-lb) in order shown in the figure.
(2) Tighten the bolts by tightening torque of 10±0.5 N·m (1.0±0.05 kgf-m, 7.4±0.37 ft-lb) in order shown in the figure.



2) Install the oil temperature sensor.
<Ref. to FU(H6DO)-27, INSTALLATION, Oil Temperature Sensor.>
3) Install the variable valve lift diagnosis oil pressure switch.
<Ref. to FU(H6DO)-26, INSTALLATION, Variable Valve Lift Diagnosis Oil Pressure Switch.>
4) Install the oil switching solenoid valve.
5) Connect the connector to oil switching solenoid valve.



6) Install the air intake chamber.
<Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

24.Intake and Exhaust Valve

A: SPECIFICATION

Refer to “Cylinder Head” for removal and installation procedures of intake and exhaust valves <Ref. to ME(H6DO)-57, REMOVAL, Cylinder Head.>, <Ref. to ME(H6DO)-57, INSTALLATION, Cylinder Head.>.

25.Piston

A: SPECIFICATION

Refer to “Cylinder Block” for removal and installation procedures of pistons. <Ref. to ME(H6DO)-62, REMOVAL, Cylinder Block.> <Ref. to ME(H6DO)-64, INSTALLATION, Cylinder Block.>

26.Connecting Rod

A: SPECIFICATION

Refer to “Cylinder Block” for removal and installation procedures of connecting rod.
<Ref. to ME(H6DO)-62, REMOVAL, Cylinder Block.> <Ref. to ME(H6DO)-64, INSTALLATION, Cylinder Block.>

27.Crankshaft

A: SPECIFICATION

Refer to “Cylinder Block” for removal and installation procedures of crankshaft. <Ref. to ME(H6DO)-62, REMOVAL, Cylinder Block.> <Ref. to ME(H6DO)-64, INSTALLATION, Cylinder Block.>

28.Engine Trouble in General

A: INSPECTION

NOTE:
The “RANK” shown in the chart shows the possibilities of the cause of trouble in order from “most likely” to “rarely”.
A — Most likely
B — Sometimes
C — Rarely

Symptom	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 or neutral 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
		Lack of or insufficient fuel	B
	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
		Trouble of tappet	C
		Trouble of tappet. In case noise occurs with valve moving. Or the harness involved to oil switching solenoid valve, variable valve lift diagnosis oil pressure switch and variable valve lift has trouble in a past.	B

Symptom	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 or insufficient fuel	B
	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
		Trouble of tappet	C
		Trouble of tappet. In case noise occurs with valve moving. Or the harness involved to oil switching solenoid valve, variable valve lift diagnosis oil pressure switch and variable valve lift has trouble in a past.	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 or insufficient fuel	B
	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
		Trouble of tappet	C
		Trouble of tappet. In case noise occurs with valve moving. Or the harness involved to oil switching solenoid valve, variable valve lift diagnosis oil pressure switch and variable valve lift has trouble in a past.	B

Symptom	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 or insufficient fuel	B
	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
		Improper engine oil (low viscosity)	B
		Trouble of tappet	C
		Trouble of tappet. In case noise occurs with valve moving. Or the harness involved to oil switching solenoid valve, variable valve lift diagnosis oil pressure switch and variable valve lift has trouble in a past.	B
	Lubrication system	Incorrect oil pressure	B
		Defective rocker cover gasket	C
	Cooling system	Over-heating	C
	Others	Evaporative emission control system malfunction	A
		Stuck or damaged throttle valve	B

Symptom	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 or insufficient fuel	C
	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
		Improper engine oil (low viscosity)	B
		Trouble of tappet	C
		Trouble of tappet. In case noise occurs with valve moving. Or the harness involved to oil switching solenoid valve, variable valve lift diagnosis oil pressure switch and variable valve lift has trouble in a past.	B
	Lubrication system	Incorrect oil pressure	B
	Cooling system	Over-heating	C
		Over-cooling	C
	Others	Evaporative emission control system malfunction	A

Symptom	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 or insufficient fuel	C
	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
		Trouble of tappet	C
		Trouble of tappet. In case noise occurs with valve moving. Or the harness involved to oil switching solenoid valve, variable valve lift diagnosis oil pressure switch and variable valve lift has trouble in a past.	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

Symptom	Problem parts etc.	Possible cause	RANK
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
	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
		Trouble of tappet	C
		Trouble of tappet. In case noise occurs with valve moving. Or the harness involved to oil switching solenoid valve, variable valve lift diagnosis oil pressure switch and variable valve lift has trouble in a past.	B
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over-cooling	C
	Others	Evaporative emission control system malfunction	C
8. Knocking	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened oil filler cap	B
	Chain	Defective timing	B
	Compression	Incorrect valve clearance	C
		Incorrect valve timing	B
		Trouble of tappet	C
		Trouble of tappet. In case noise occurs with valve moving. Or the harness involved to oil switching solenoid valve, variable valve lift diagnosis oil pressure switch and variable valve lift has trouble in a past.	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

Symptom	Problem parts etc.	Possible cause	RANK
10. Excessive fuel consumption	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Dirty air cleaner element	A
	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
		Trouble of tappet	C
		Trouble of tappet. In case noise occurs with valve moving. Or the harness involved to oil switching solenoid valve, variable valve lift diagnosis oil pressure switch and variable valve lift has trouble in a past.	B
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over-cooling	C

29.Engine Noise

A: INSPECTION

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	• Valve mechanism is defective. • Incorrect valve clearance • Worn valve rocker • Worn camshaft • Broken valve spring • Trouble of tappet
Heavy and dull clank	Oil pressure is low.	• Worn camshaft main bearing • Worn connecting rod bearing (large end)
	Oil pressure is normal.	Damaged engine mounting
High-pitched clank	Sound is noticeable when accelerating with an overload condition.	• Ignition timing advanced • Accumulation of carbon inside combustion chamber • Wrong spark plug • Improper gasoline
Clank when engine speed is between 1,000 and 2,000 rpms.	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn crankshaft main bearing • Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn cylinder liner and piston ring • Broken or stuck piston ring • Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	• Unusually worn valve lifter • Worn cam gear • Worn camshaft journal bore in crankcase
Squeaky sound	—	• Insufficient generator lubrication
Rubbing sound	—	• Poor contact of generator brush and rotor
Gear scream when starting engine	—	• Defective ignition starter switch • Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	• Loose drive belt • Defective water pump shaft
Hissing sound	—	• Insufficient compression • Air leakage in air intake system, hose, connection or manifold
Timing belt noise	—	• Loose timing belt • Belt contacting with case/adjacent part
Valve tappet noise	—	• Incorrect valve clearance • Trouble of tappet

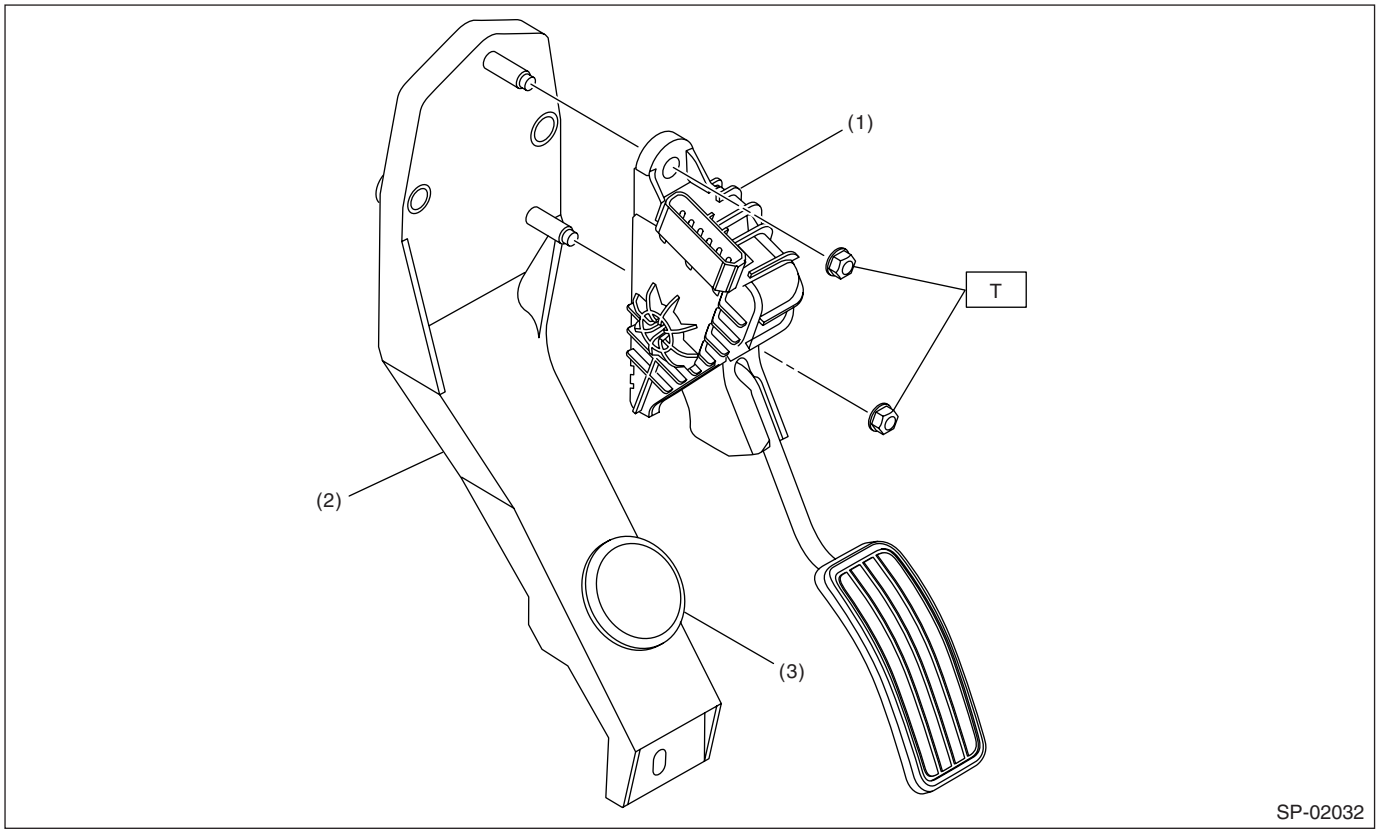
(NOTE*)
When disconnecting the fuel injector connector, the malfunction indicator light illuminates and DTC is stored in ECM memory. Therefore, carry out the clear memory mode <Ref. to EN(H6DO)(diag)-45, OPERATION, Clear Memory Mode.> and inspection mode <Ref. to EN(H6DO)(diag)-35, PROCEDURE, Inspection Mode.> after connecting the fuel injector connector.

1. General Description

A: SPECIFICATION

Accelerator pedal	Stroke	At pedal pad	49 — 59 mm (1.93 — 2.32 in)

B: COMPONENT



(1) Accelerator pedal ASSY
(2) Accelerator pedal bracket
(3) Stopper

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

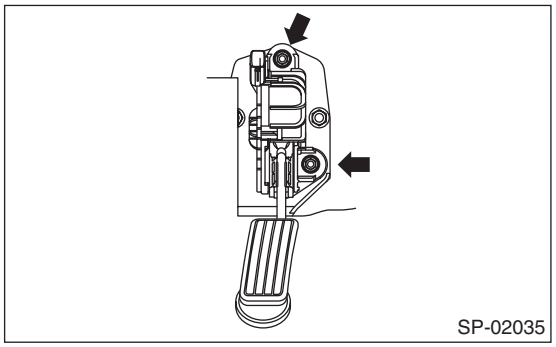
C: CAUTION

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

2. Accelerator Pedal

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Disconnect the connector.
3) Remove the nut securing accelerator pedal 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: DISASSEMBLY

NOTE:
The accelerator pedal cannot be disassembled.

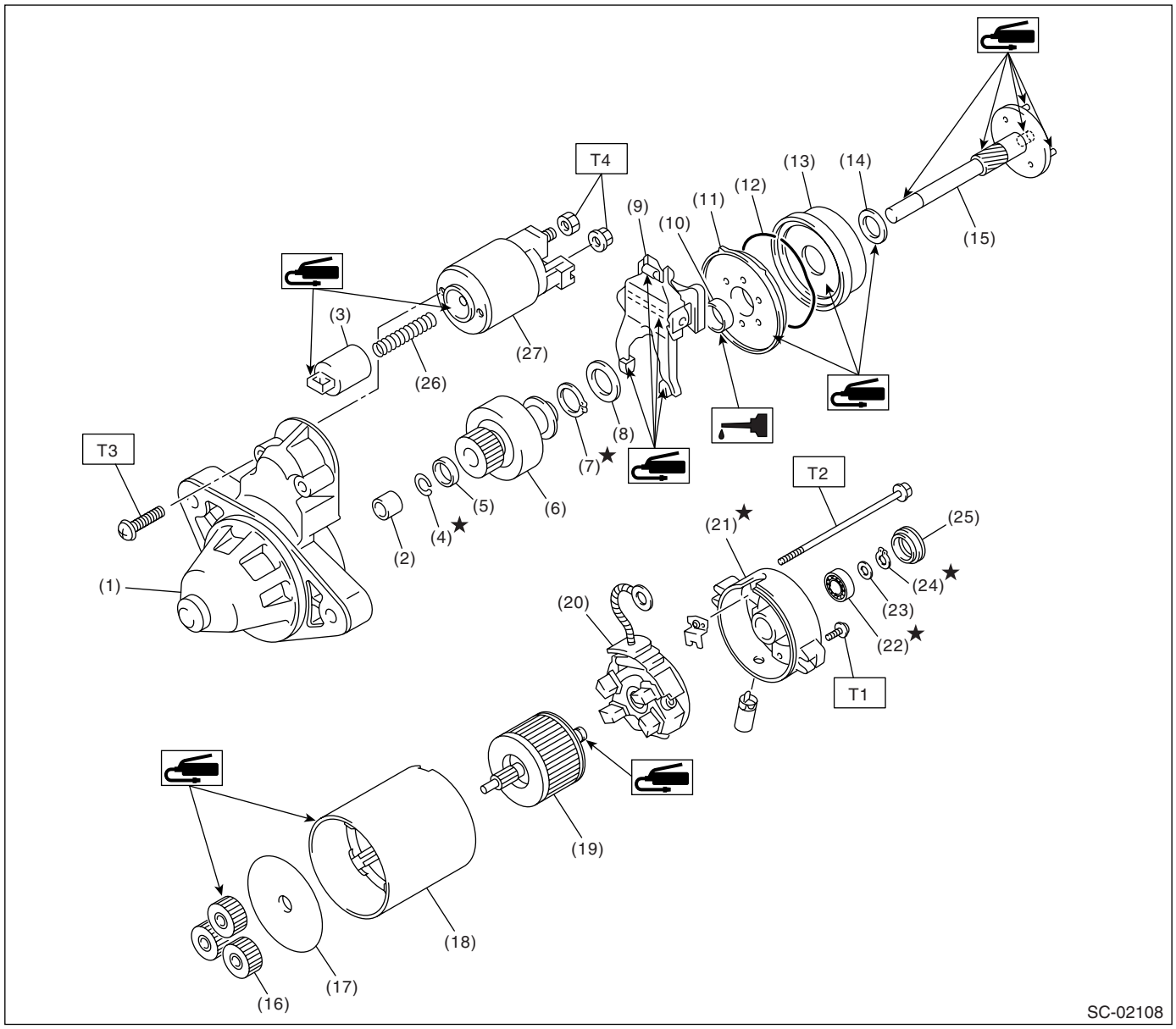
1. General Description

A: SPECIFICATION

Item			Specification
Vehicle model			AT
Starter	Type		Reduction type
	Model		428000-2290
	Manufacturer		DENSO
	Voltage and output		12 V — 1.4 kW
	Revolving direction		Counterclockwise (when observed from pinion)
	Number of pinion teeth		9
	No-load characteristics	Voltage	11 V
		Current	90 A or less
		Rotating speed	More than 1,720 rpm
	Load characteristics	Voltage	8 V
		Current	370 A
		Torque	12.78 N·m (1.30 kgf-m, 9.4 ft-lb) or more
		Rotating speed	More than 850 rpm
	Lock characteristics	Voltage	3 V
		Current	900 A or less
		Torque	15.42 N·m (1.57 kgf-m, 11.3 ft-lb) or more
Generator	Type		Rotating-field three-phase type, voltage regulator built-in type, with load response control system
	Model		A003TG0591
	Manufacturer		MITSUBISHI ELECTRIC
	Voltage and output		12 V — 110 A
	Polarity on ground side		Negative
	Revolving direction		Clockwise (when observed from pulley side)
	Armature connection		3-phase Y-type
	Output current		1,500 rpm — 50 A or more 2,500 rpm — 91 A or more 5,000 rpm — 105 A or more
	Specified voltage		14.1 — 14.8 V [20°C (68°F)]
Battery	Type and capacity		12 V — 52 AH (75D23L)

B: COMPONENT

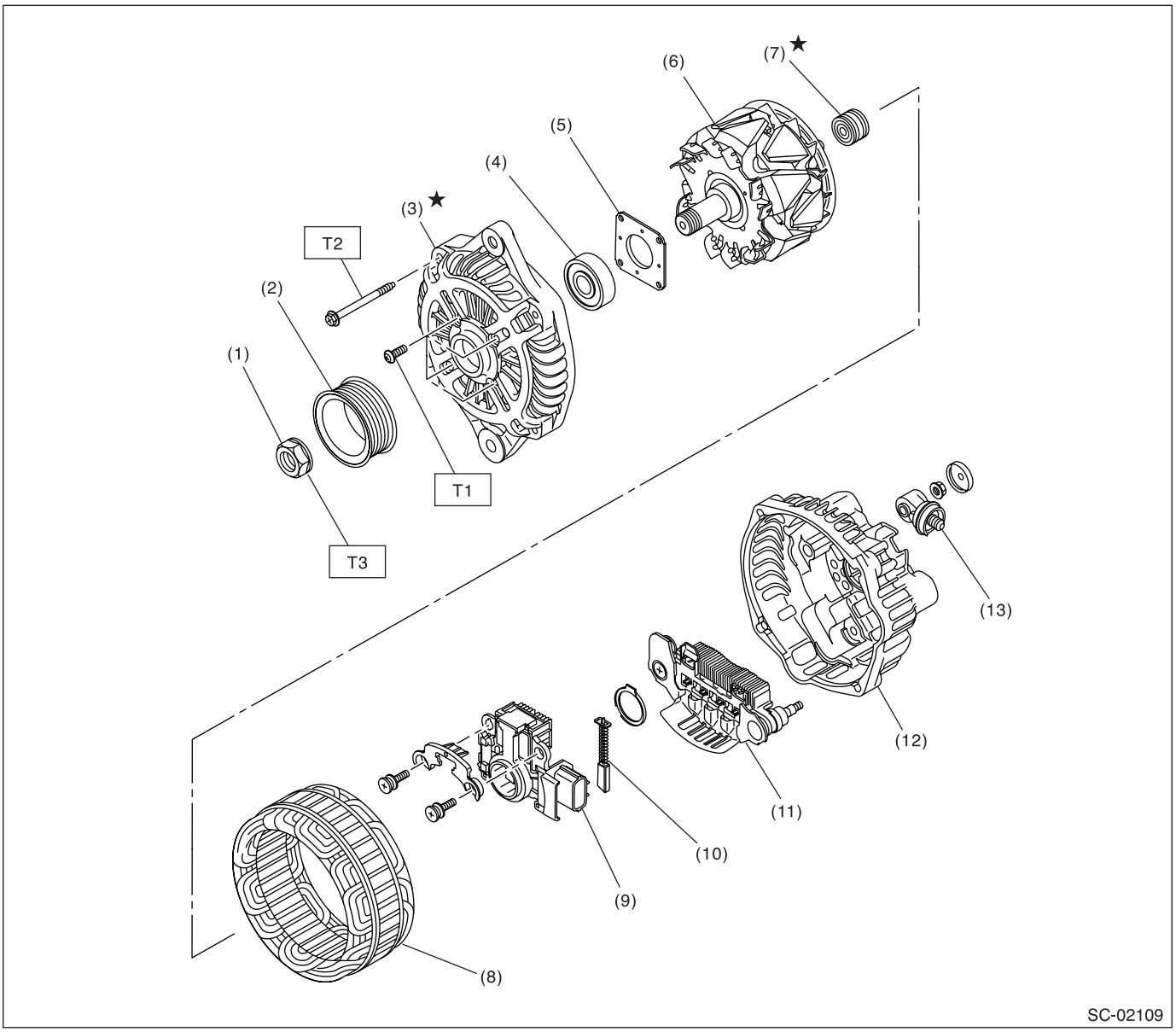
1. STARTER



(1) Front bracket
(2) Front bearing
(3) Plunger
(4) Snap ring
(5) Stopper
(6) Overrunning clutch
(7) Snap ring
(8) Washer
(9) Lever
(10) Oilless bearing
(11) Shock absorber bearing
(12) Wave washer
(13) Internal gear
(14) Washer
(15) Shaft
(16) Planetary gear
(17) Armature plate
(18) Yoke
(19) Armature
(20) Brush holder ASSY
(21) End frame
(22) Rear bearing
(23) Space ring
(24) Snap ring
(25) End frame cover
(26) Plunger spring
(27) Magnet switch

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.4 (0.14, 1.03)
T2: 6 (0.6, 4.4)
T3: 7.5 (0.8, 5.5)
T4: 10 (1.0, 7.4)

2. GENERATOR



(1) Pulley nut
(2) Pulley
(3) Front cover
(4) Ball bearing
(5) Bearing retainer
(6) Rotor
(7) Bearing
(8) Stator coil
(9) IC regulator with brush
(10) Brush
(11) Rectifier
(12) Rear cover
(13) Terminals

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*3.9 (0.4, 2.9)*
T2:	*4.6 (0.47, 3.4)*
T3:	*103 (10.5, 76)*

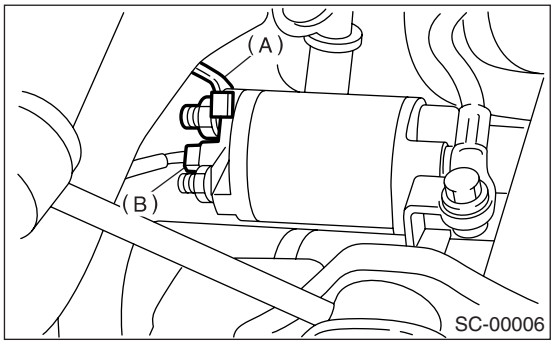
C: CAUTION

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

2. Starter

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Remove the air intake chamber. <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
4) Disconnect the connector and terminal from starter.



(A) Terminals
(B) Connector

5) Remove the starter from transmission.

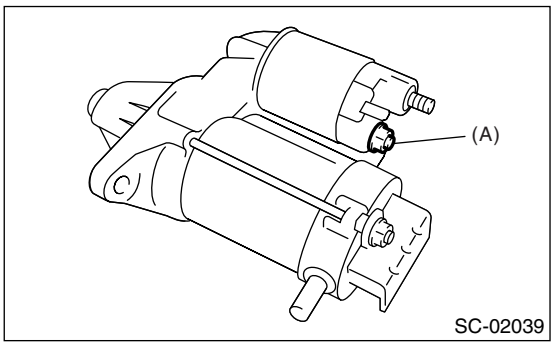
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)

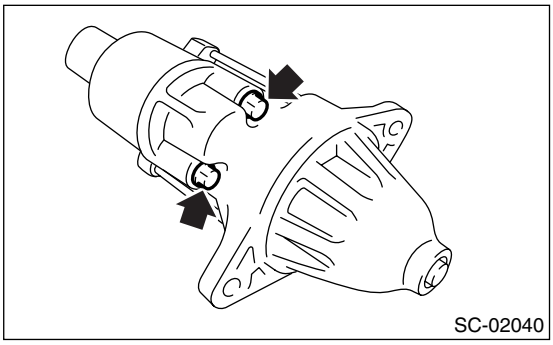
C: DISASSEMBLY

1) Loosen the nut which holds terminal M of magnet switch assembly, and then disconnect the harness from terminal.

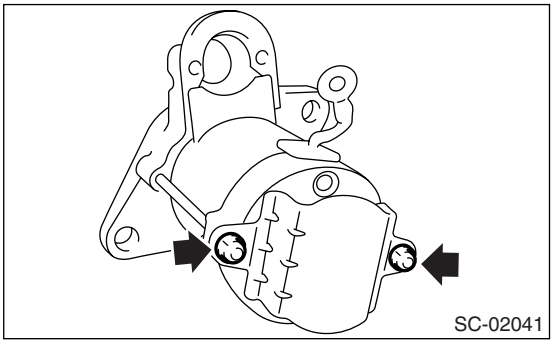


(A) Terminal M

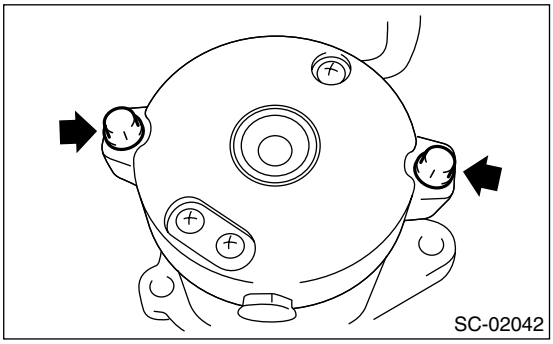
2) Remove the bolts which hold switch assembly, and then remove the switch assembly, plunger and plunger spring from starter.

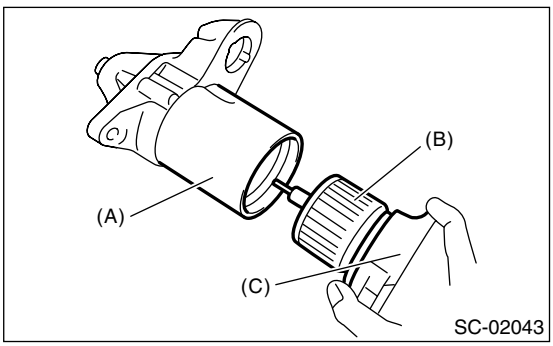


3) Remove the nuts of both sides, and then remove the rear cover.



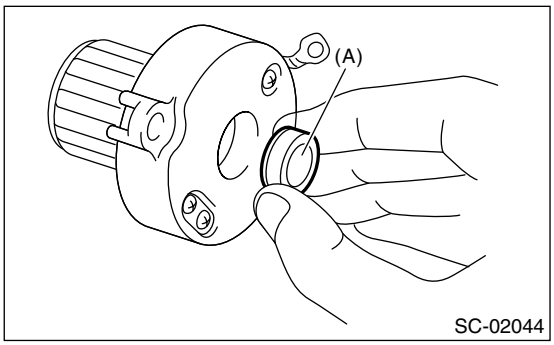
4) Remove the through-bolts of bolt side, and then detach the end frame and armature from yoke as a unit.





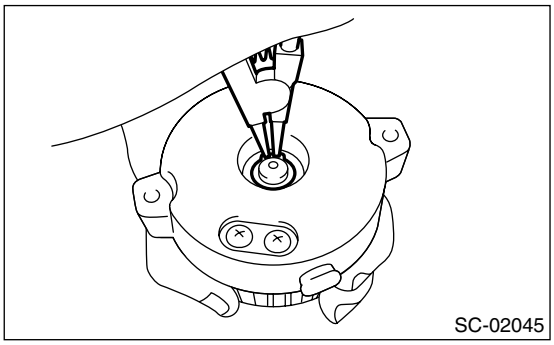
(A) Yoke
(B) Armature
(C) End frame

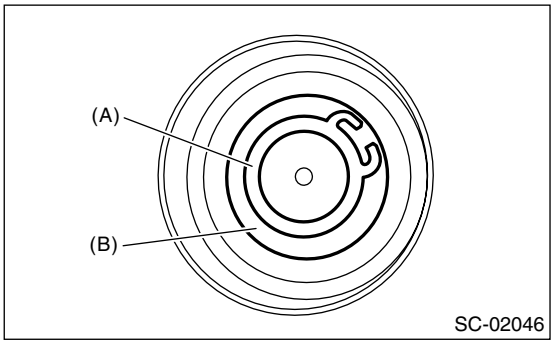
5) Remove the end frame cover.



(A) End frame cover

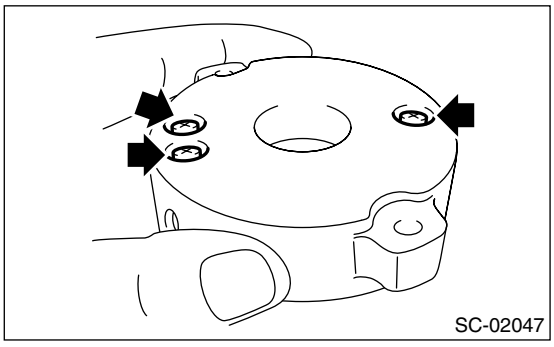
6) Remove the snap ring.
7) Remove the space ring.



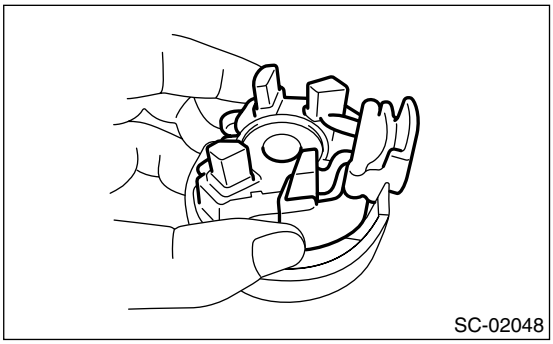


(A) Snap ring
(B) Space ring

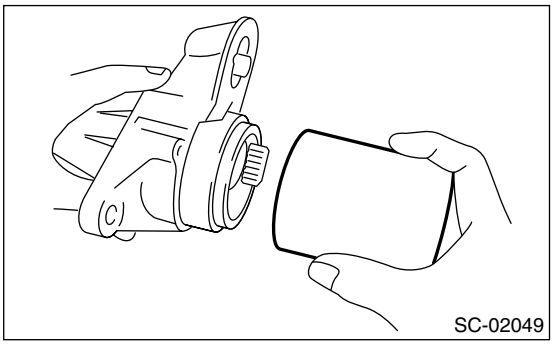
8) Remove the armature from end frame.
9) Remove the screws.



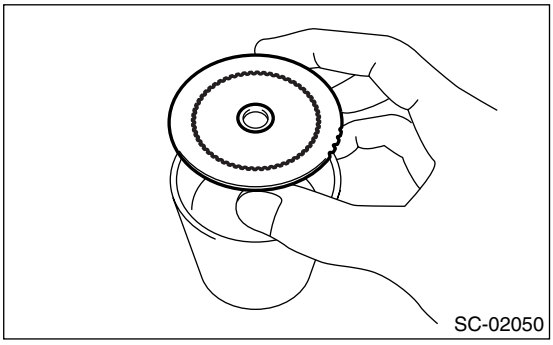
10) Remove the brush holder assembly from end frame.



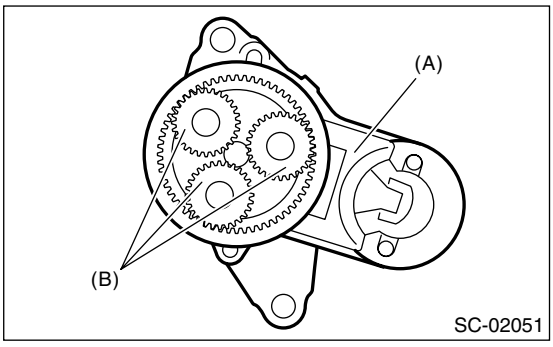
11) Remove the yoke from front bracket.



12) Remove the armature plate from the yoke.

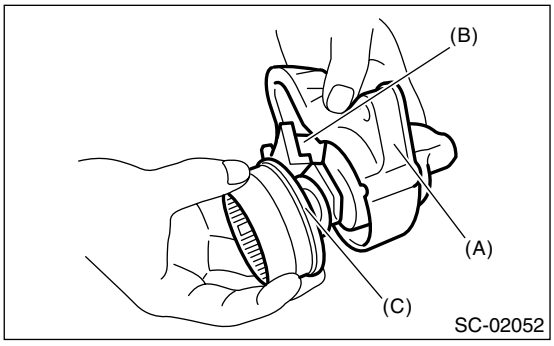


13) Remove the rubber seal and planetary gear.



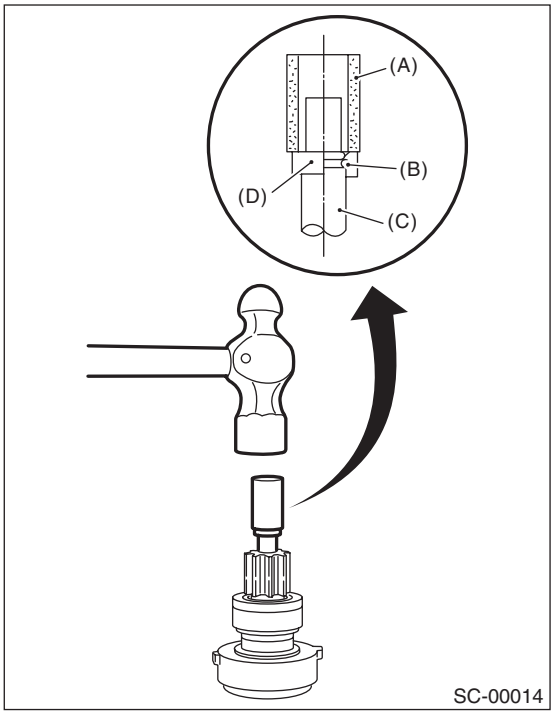
(A) Rubber seal
(B) Planetary gear

14) Remove the shaft assembly, overrunning clutch and lever from front bracket as a unit.



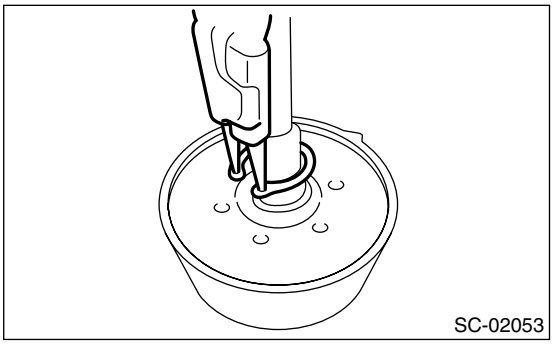
(A) Front bracket
(B) Lever
(C) Shaft ASSY

15) Remove the overrunning clutch from shaft assembly as follows:
(1) Remove the stopper from snap ring by lightly tapping the stopper with an appropriate tool (such as a fit socket wrench).
(2) Remove the snap ring, stopper and clutch from shaft.

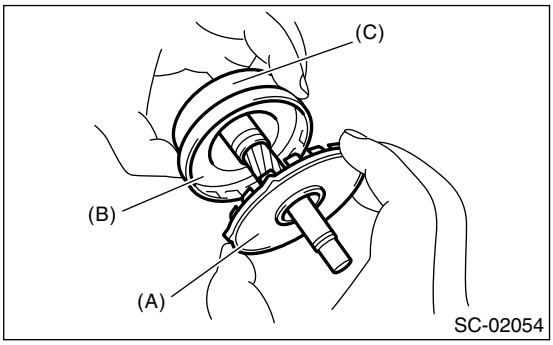


(A) Socket wrench
(B) Snap ring
(C) Shaft
(D) Stopper

16) Remove the snap ring.

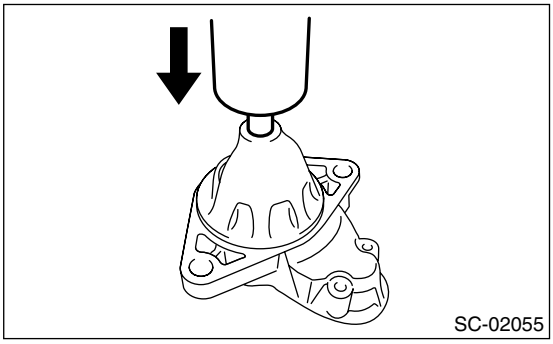


17) Remove the shock absorber bearing, wave washer and internal gear from shaft.

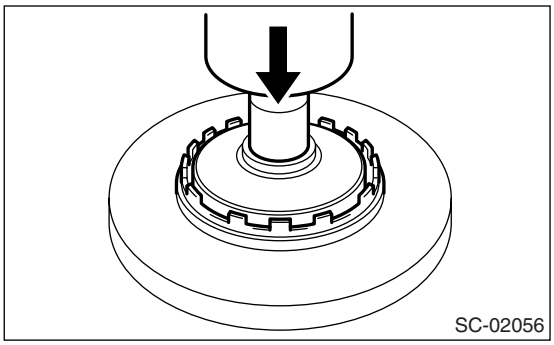


(A) Shock absorber bearing
(B) Wave washer
(C) Internal gear

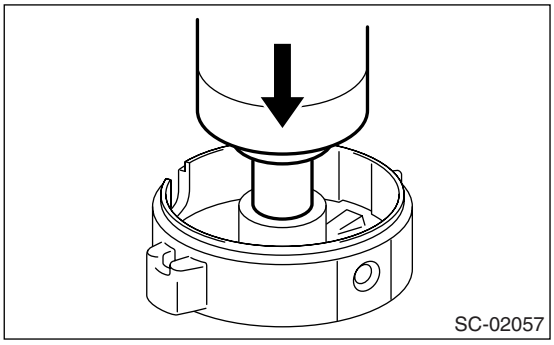
18) Remove the front bearing from front bracket.
(1) Set an appropriate tool (ϕ13 mm) to front bearing.
(2) Using a press, remove the front bearing.



19) Remove the oilless bearing from shock absorber bearing.
(1) Set an appropriate tool (ϕ20 mm) to oilless bearing.
(2) Using a press, remove the oilless bearing.



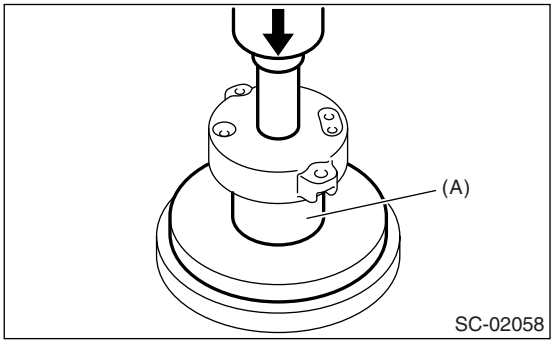
20) Remove the rear bearing from end frame.
(1) Set an appropriate tool (ϕ16 mm) to rear bearing.
(2) Using a press, remove the rear bearing.



D: ASSEMBLY

1) Press-fit the rear bearing into end frame.
(1) Set an appropriate tool (ϕ22 mm) to rear bearing.
(2) Press-fit the rear bearing using a press.

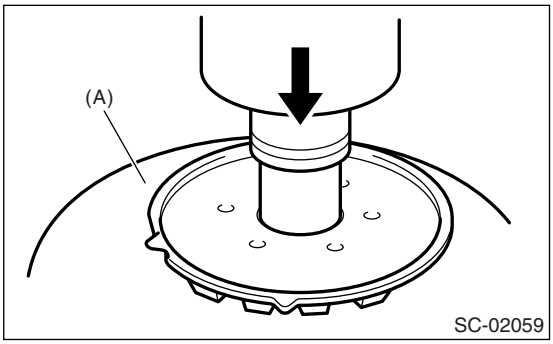
NOTE:
- Use a new bearing.
- Use a flat base.
- Press-fit the bearing outer ring until it contact to the base bottom.



(A) Base

2) Press-fit the oilless bearing into shock absorber bearing.
(1) Set an appropriate tool (ϕ20 mm) to oilless bearing.
(2) Press-fit the oilless bearing using a press.

NOTE:
- Use a new bearing.
- Use a flat base.
- Press-fit the bearing outer ring until it contact to the base bottom.

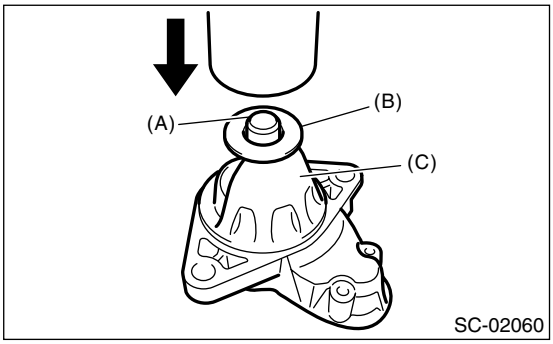


(A) Base

3) Press-fit the front bearing into front bracket.
(1) Set the front bearing into front bracket.
(2) Set an appropriate tool (2.0-mm thickness plate) to front bracket, and press-fit the front bearing using a press.

NOTE:
- Use a new bearing.
- Measure the protrusion of front bearing after press-fitting, to check if it is within standard value.

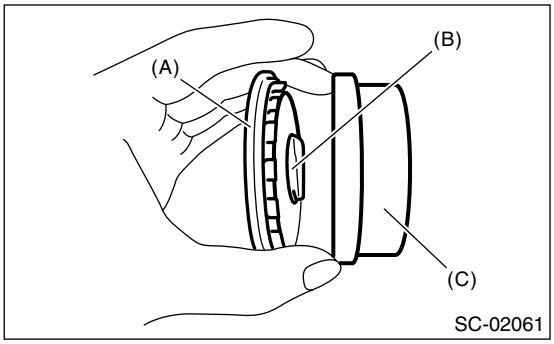
Standard
2.0 — 2.4 mm (0.0787 — 0.0945 in)



(A) Front bearing
(B) Plate
(C) Front bracket

4) Assemble the internal gear and wave washer to shock absorber bearing.

NOTE:
Align with the pawl position of shock absorber bearing to install internal gear.

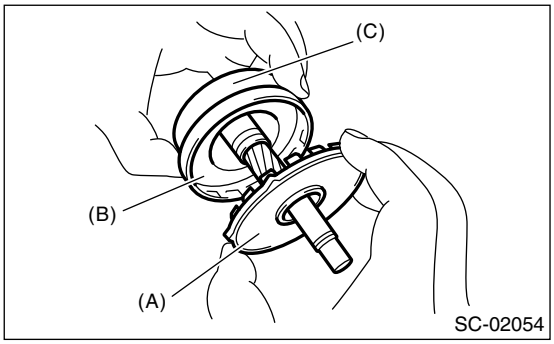


(A) Shock absorber bearing
(B) Wave washer
(C) Internal gear

5) Assemble the washer and internal gear to shaft.

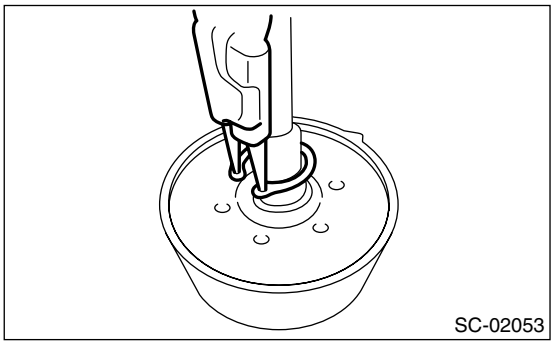
NOTE:
Apply grease to the both sides of the shaft spline and washer.

Grease:
DENSO HL50



(A) Shock absorber bearing
(B) Wave washer
(C) Internal gear

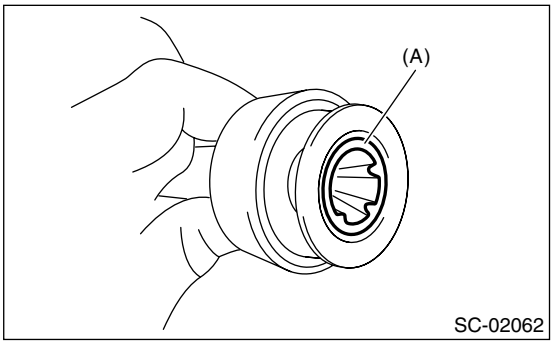
6) Assemble the snap ring.



7) Assemble the overrunning clutch to shaft.

NOTE:
Apply grease to the stop ring entire perimeter.

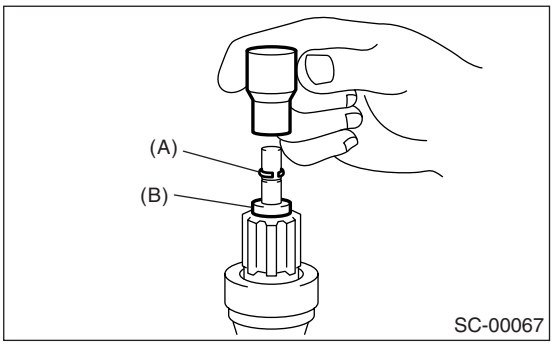
Grease:
DENSO HL50



(A) Stop ring

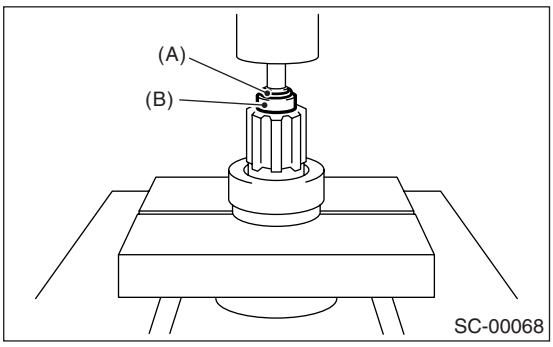
8) Install the stopper to shaft as follows:
(1) Insert the snap ring into the shaft groove by lightly tapping it with an appropriate tool (such as a fit socket wrench).

NOTE:
Use new snap rings.



(A) Snap ring
(B) Stopper

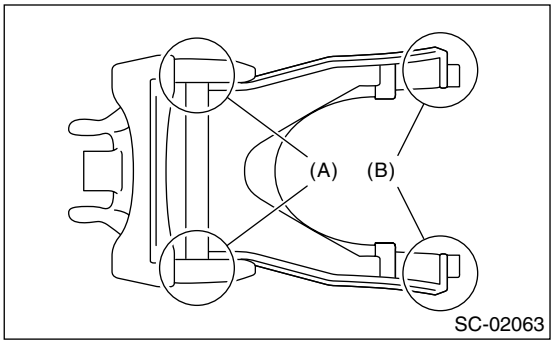
(2) Press-fit the stopper to snap ring using a press.



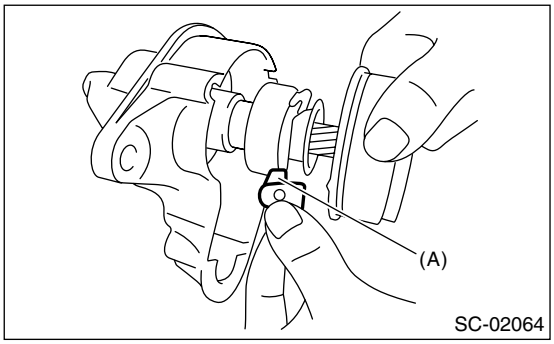
(A) Snap ring
(B) Stopper

9) Install the shaft assembly to front bracket.
(1) Apply grease to the sliding part (A) of lever pin and the pole piece (B) of arm.

Grease:
DENSO HL50

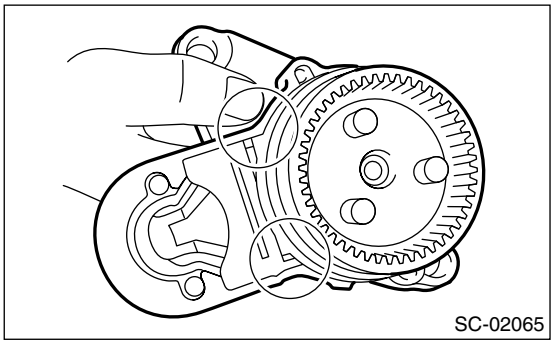


(2) Insert the lever arm into the position on over running clutch as shown in the figure.

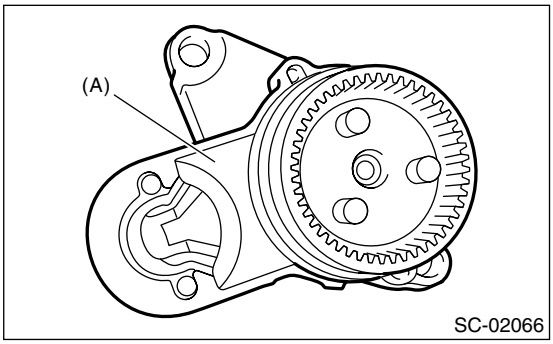


(A) Lever

(3) Align the shaft assembly to the position on front bracket as shown in the figure.

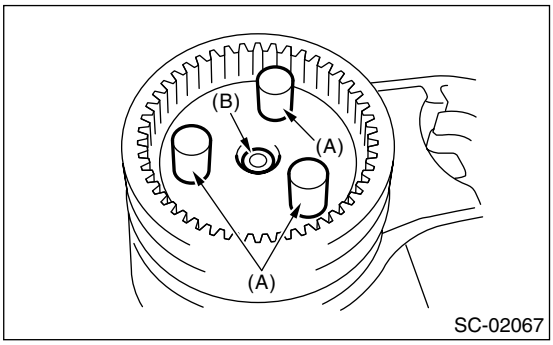


10) Install the rubber seal.



(A) Rubber seal

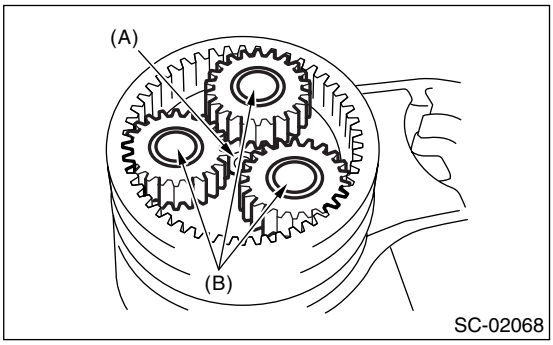
11) Install the planetary gear.
(1) Apply a grease to the pin (A) and bushing (B).



(2) Assemble the planetary gear to pin.
(3) Apply grease to the planetary gear clearance (A) and pin upper part (B).

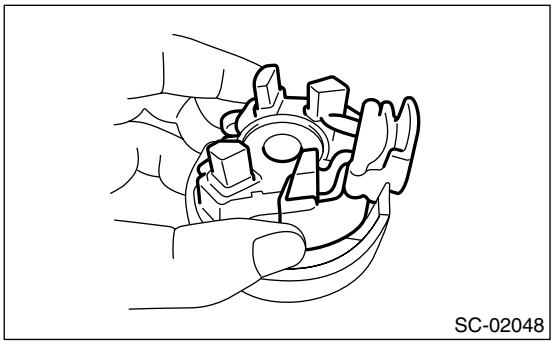
NOTE:
- Apply grease so that it contacts each gear.
- be careful not to allow dirt to get in.

Grease:
DENSO HL50

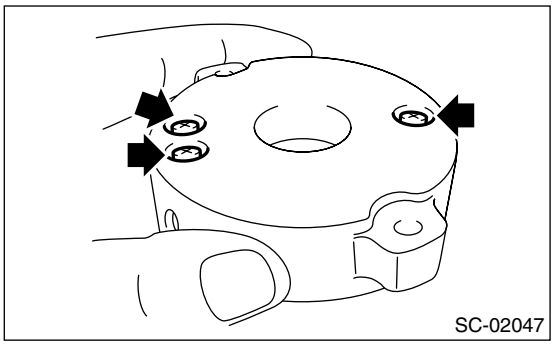


12) Assemble the brush assembly to end frame.

NOTE:
- Be careful not to allow grease to get on brush.
- Align the rubber seal part with end frame groove.


SC-02048

Tightening torque:
1.4 N·m (0.14 kgf-m, 1.03 ft-lb)


SC-02047

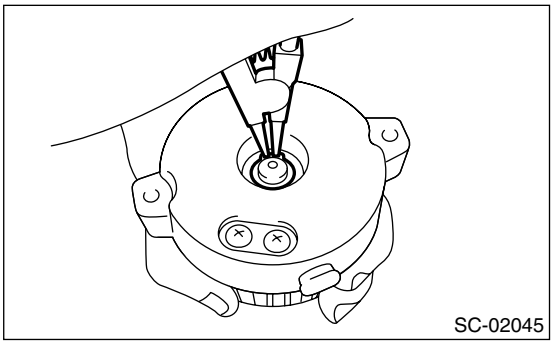
13) Install the armature to end frame.

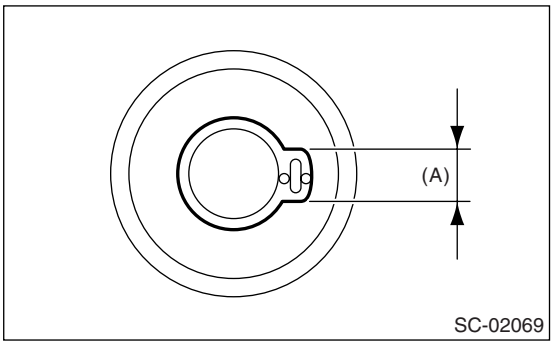
NOTE:
- Apply grease to the rear bearing inner circumference.
- Be careful not to allow grease to attach to commutator.

Grease:
DENSO HL50

14) Set the space ring, then assemble the snap ring.

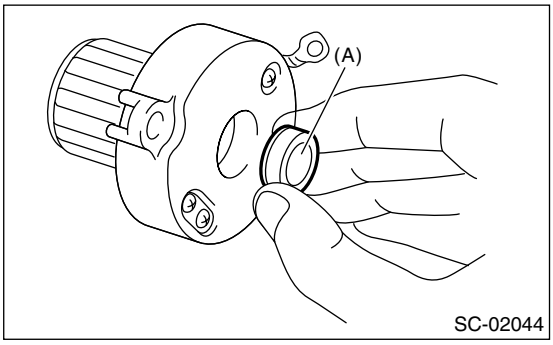
NOTE:
- Use new snap rings.
- Check the dimension of (A) in the figure after assembling snap ring. If it exceeds 5.0 mm (0.20 in), assemble a new snap ring again.


SC-02045



SC-02069

15) Install the end frame cover.

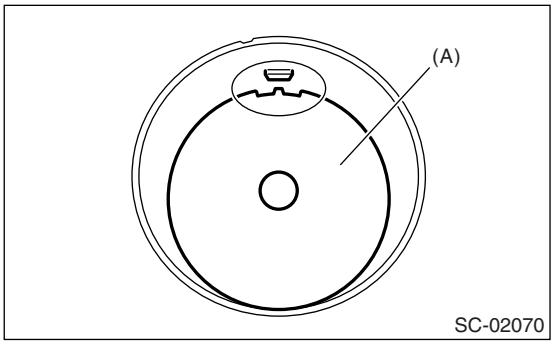


SC-02044

(A) End frame cover

16) Assemble the armature plate to yoke.

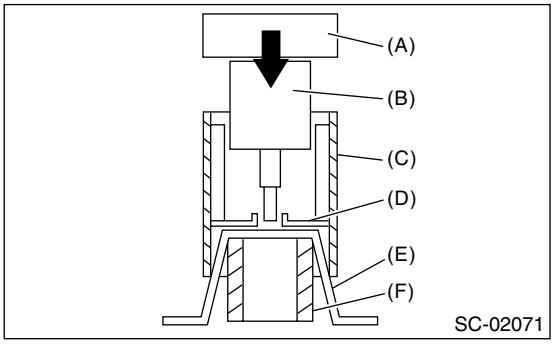
NOTE:
• Align the rotation stopper of armature plate with the drive out part of yoke inner circumference.
• Be careful of the assembly direction of armature plate.



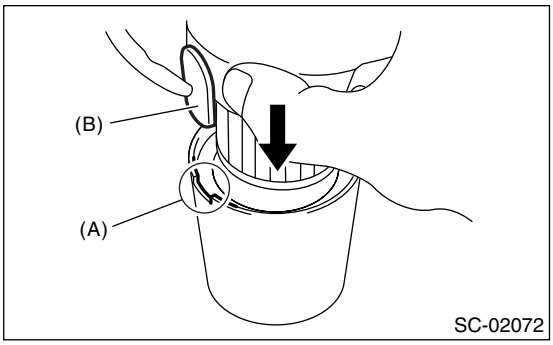
(A) Armature plate

17) Assemble the armature to yoke.

NOTE:
• Be careful not to allow armature plate to move. It is recommendable to support with cylindrical pipe as shown in the figure.
• Align the positions of cutout portion of yoke with the rubber part of end frame.
• Be careful not to damage the magnet.



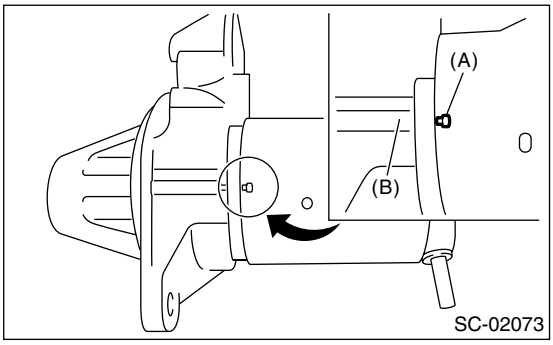
(A) End frame
(B) Armature
(C) Yoke
(D) Armature plate
(E) Cloth
(F) Pipe



(A) Cutout portion of yoke
(B) Rubber part

18) Assemble the yoke to front bracket.

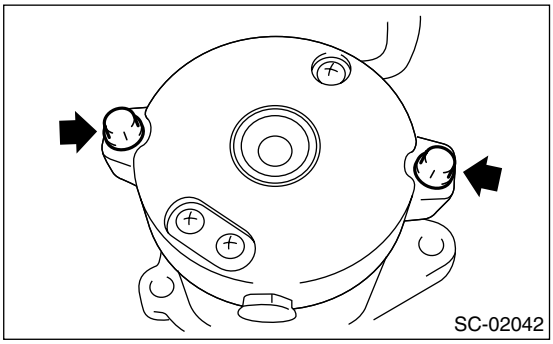
NOTE:
• Apply grease to the end surface of yoke (mating surface with front bracket).
• Align the drive out position of yoke outer perimeter with the cutout portion of front bracket.



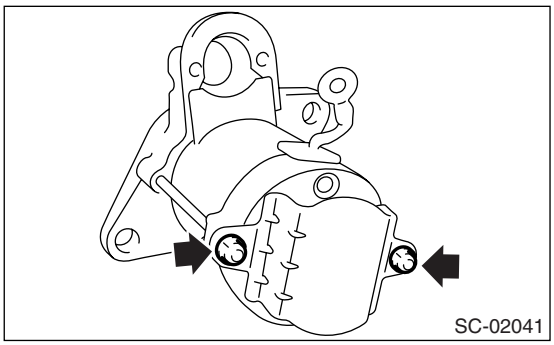
(A) Drive out
(B) Cutout

19) Tighten the through bolts on both sides.

Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



20) Install the rear cover.

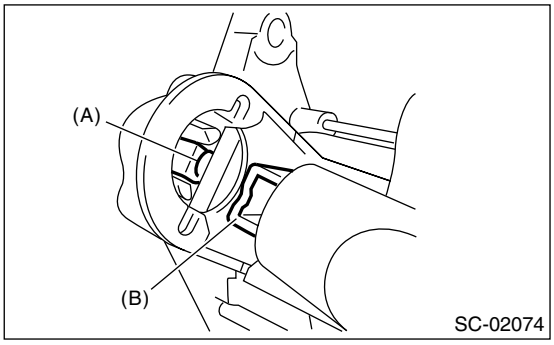


21) Install the magnet switch assembly to front bracket.

(1) Assemble the plunger hook to lever.

NOTE:
Apply grease to the plunger hook and sleeve inner circumference.

Grease:
DENSO HL50

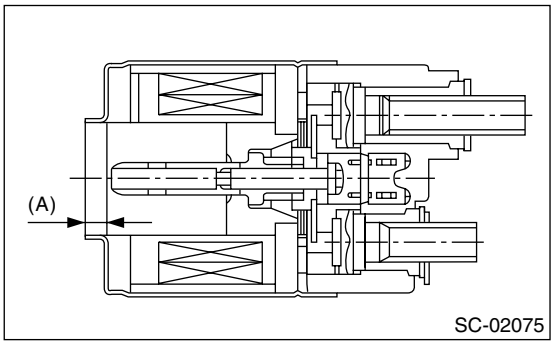


(A) Lever
(B) Plunger hook

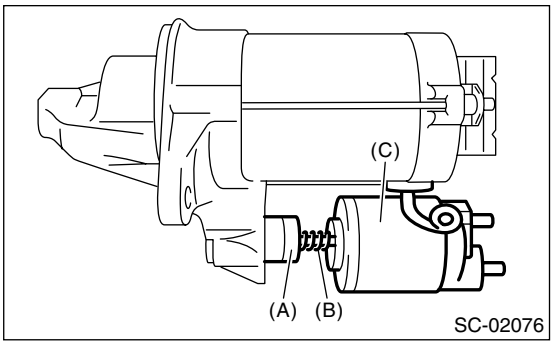
(2) Assemble the plunger spring and magnet switch to front bracket.

NOTE:
Apply grease to the end surface of magnet switch as shown in the figure.

Grease:
DENSO HL50



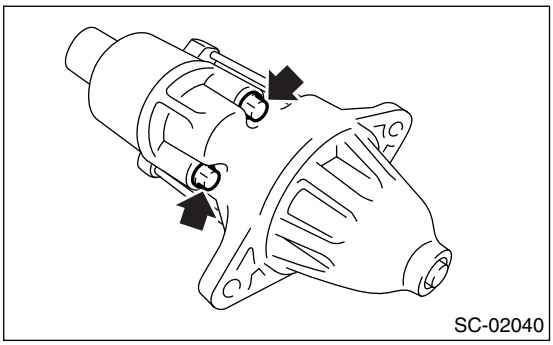
(A) 5 mm



(A) Plunger
(B) Plunger spring
(C) Magnet switch

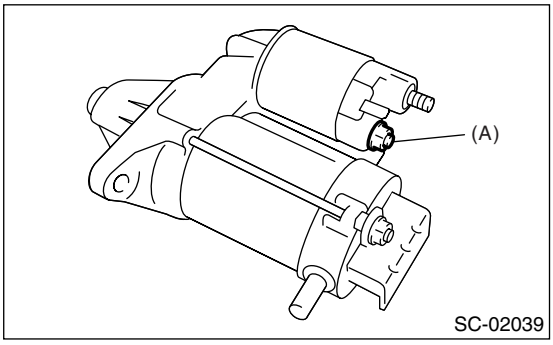
(3) Tighten the bolt.

Tightening torque:
7.5 N·m (0.8 kgf-m, 5.5 ft-lb)



22) Connect the harness to terminal M of magnet switch assembly.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



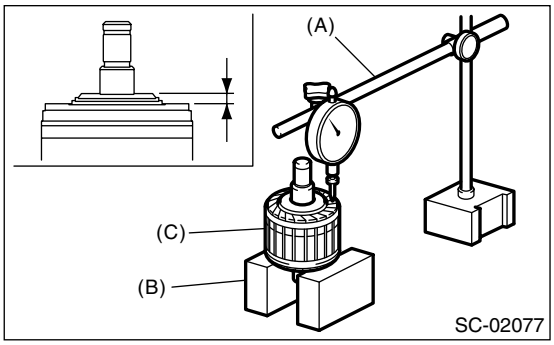
(A) Terminal M

E: INSPECTION

1. ARMATURE

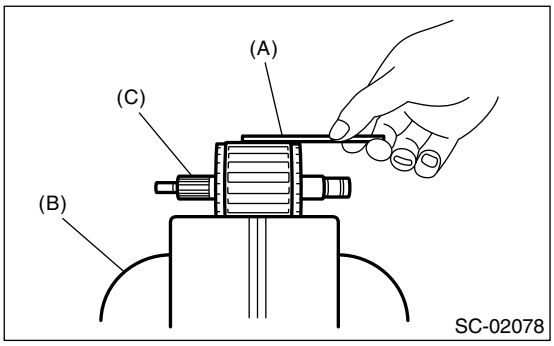
1) Check the commutator for any sign of burns of rough surfaces or stepped wear. If it has minor wear, correct it by using sand paper (#300).
2) Run-out test
Check the commutator for run-out, and then replace if it exceeds the limit.

Commutator run-out:
Standard
3.1 mm (0.1220 in)
Service limit
Less than 3.8 mm (0.1496 in)



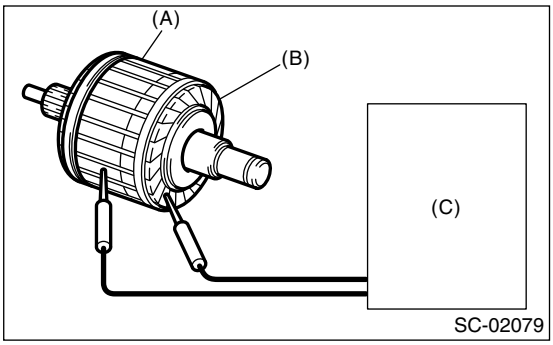
(A) Dial gauge
(B) Block
(C) Armature

3) Armature short-circuit test
Check the armature for short circuit by placing it on growler tester. Hold an iron sheet (thickness gauge, etc.) against the armature core while slowly rotating the armature. A short-circuited armature will cause the iron sheet to vibrate and to be attracted to core. If the iron sheet is attracted or vibrates, the armature, which is short-circuited, must be replaced or repaired.



(A) Iron sheet (thickness gauge etc.)
(B) Growler tester
(C) Armature

4) Armature discontinuity test
Using a circuit tester, touch one probe to the Armature and the other to commutator. No continuity is normal. If there is continuity, the armature is grounded.
Replace the armature if it is grounded.



(A) Armature
(B) Commutator
(C) Circuit tester

2. OVERRUNNING CLUTCH

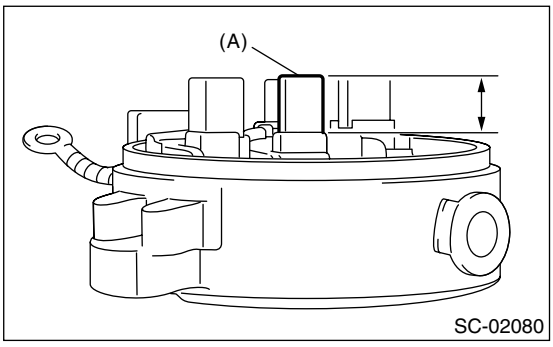
Inspect the teeth of pinion for wear and damage. Replace if it is damaged. Rotate the pinion in the right direction of rotation (counterclockwise). It should rotate smoothly. But in the opposite direction, it should be locked.

CAUTION:
Do not clean the overrunning clutch with oil to prevent grease from flowing out.

3. BRUSH AND BRUSH HOLDER

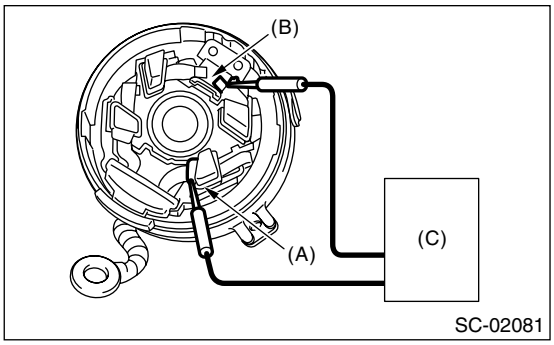
1) Brush length
Measure the brush length, and then replace if it exceeds the service limit.
Replace if abnormal wear or cracks are noticed.

Brush length:
Standard
9.0 mm (0.354 in)
Service limit
6.0 mm (0.236 in)



(A) Brush

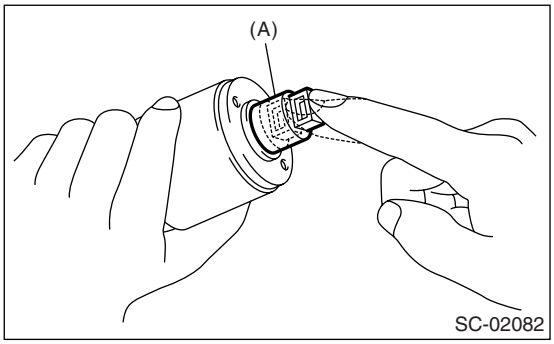
2) Brush movement
Be sure the brush moves smoothly inside brush holder.
3) Brush holder discontinuity test
Using a circuit tester, bring one probe into contact with positive side brush holder and the other with negative side brush holder.
No continuity is normal.



(A) Positive side
(B) Negative side
(C) Circuit tester

4. SWITCH ASSEMBLY

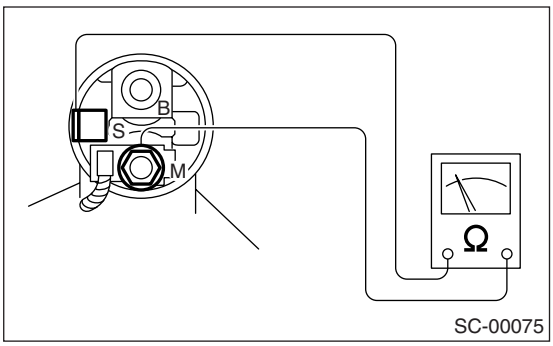
1) Return spring check
Make sure the plunger returns to its original position immediately after pressed-in then released.



(A) Plunger

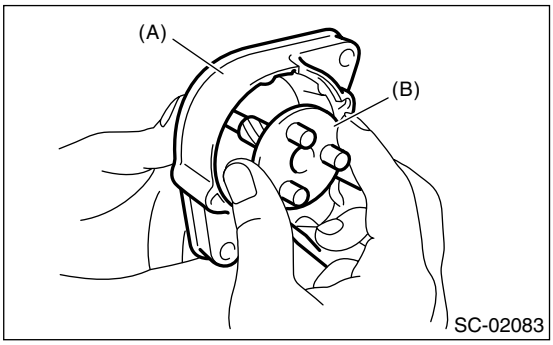
2) Magnet switch continuity test
Be sure there is continuity between the terminals S and M, and between terminal S and ground. Use a circuit tester.
Also check to be sure there is no continuity between terminal M and B.

Terminal/Resistance:
S — M/1 Ω or less
S — Ground/1 Ω or less
M — B/1 MΩ or more



5. FRONT BEARING

Check the front bearing to make sure there are no damage or rust.
Also, insert the shaft into front bearing to make sure the front bearing rotates smoothly when the shaft is rotated.
Replace the front bearing if faulty.



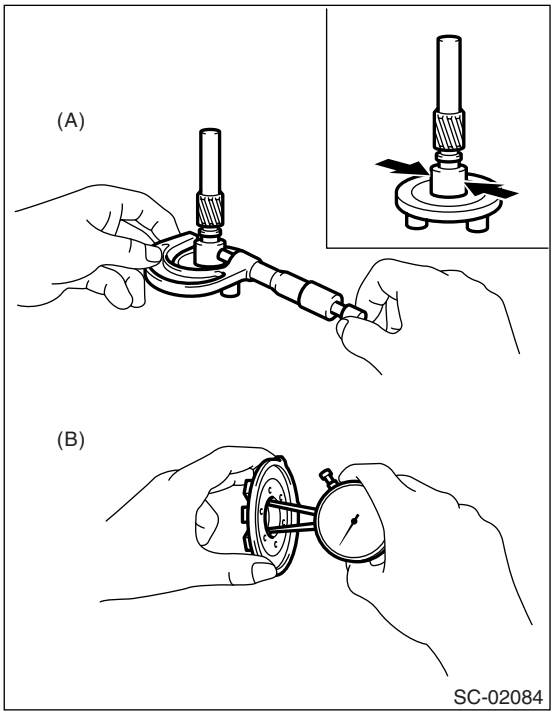
(A) Front bracket
(B) Shaft

6. SHOCK ABSORBER BEARING CLEARANCE

Measure the outside (A) diameter of sliding part for shaft shock absorber bearing.
Then, measure the inside (B) diameter of shock absorber bearing, and calculate the clearance.
If it exceeds the service limit, replace the oilless bearing or shaft.

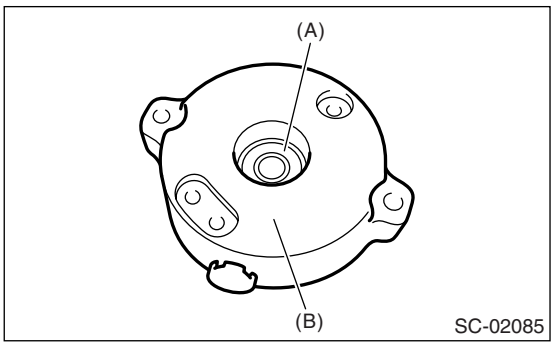
Shock absorber bearing sliding part:
Standard
18 mm (0.709 in)

Clearance:
Standard
0.03 — 0.061 mm (0.001 — 0.0024 in)
Service limit
0.1 mm (0.003 in)



7. REAR BEARING

Check the rear bearing, and replace the rear bearing if there are damage, lock or rust.

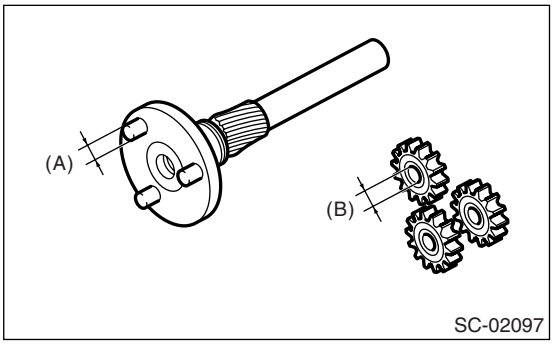


(A) Bearing
(B) End frame

8. PLANETARY GEAR BUSHING

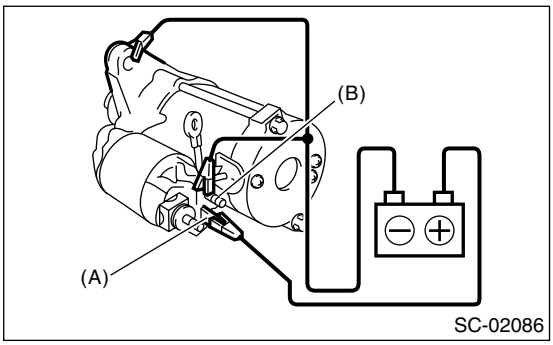
Measure the outer diameter (A) of pin which is press-fitted into shaft.
Then, measure the inner diameter (B) of planetary gear bushing, and calculate the clearance.
If it exceeds the service limit, replace the planetary gear or shaft.

Clearance:
Standard
0.035 — 0.065 mm (0.001 — 0.0025 in)
Service limit
0.1 mm (0.003 in)



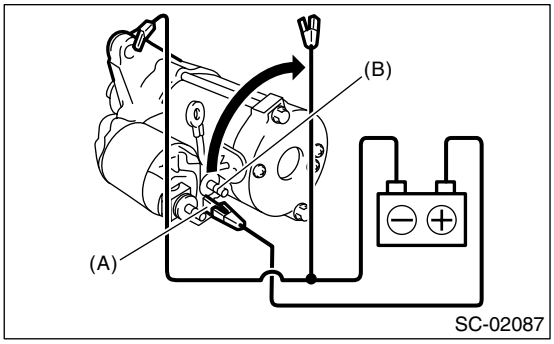
9. SWITCH ASSEMBLY OPERATION

NOTE:
Test period of each test must be within short time (3 — 5 seconds).
1) Vacuum test
Disconnect the harness from terminal M and connect it as shown in the figure. Make sure the pinion gear sticks out.



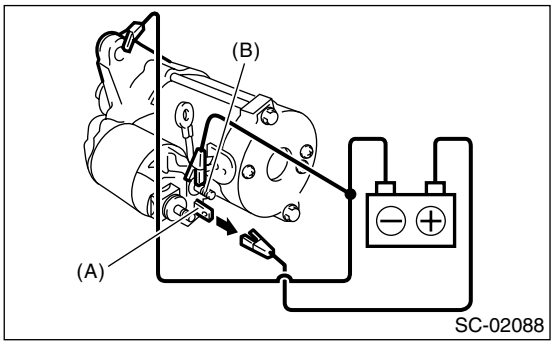
(A) Terminal S
(B) Terminal M

2) Hold test
Make sure the pinion gear remains stick out even after disconnecting terminal M in the above condition.



(A) Terminal S
(B) Terminal M

3) Return test
Connect the positive terminal to terminal S and the negative terminal to terminal M and starter body to pull the pinion gear at the main contact point. Make sure the pinion gear returns to its original position when the terminal S is disconnected.

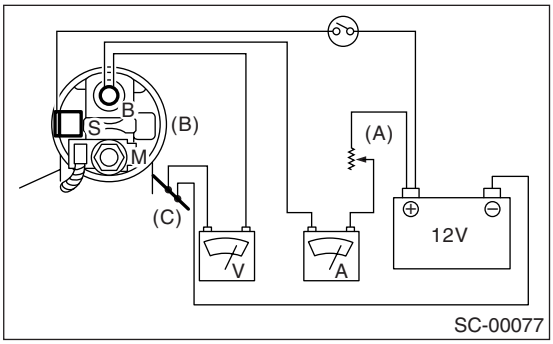


(A) Terminal S
(B) Terminal M

10.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) Starter body
(C) Magnetic switch

1) No-load test
With switch on, adjust the variable resistance until the voltage is 11 V, read the value of 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
More than 1,720 rpm

2) Load test
Apply the specified braking torque to starter. The condition is satisfactory if the current draw and rotating speed are within specifications.

Load test (standard):

Voltage/Load
8 V/12.78 N·m (1.30 kgf-m, 9.4 ft-lb)

Current/Speed
370 A/850 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):

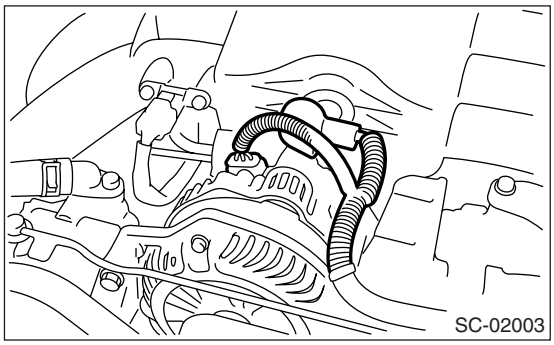
Voltage/Current
3 V/900 A or less

Torque
15.42 N·m (1.57 kgf-m, 11.3 ft-lb)

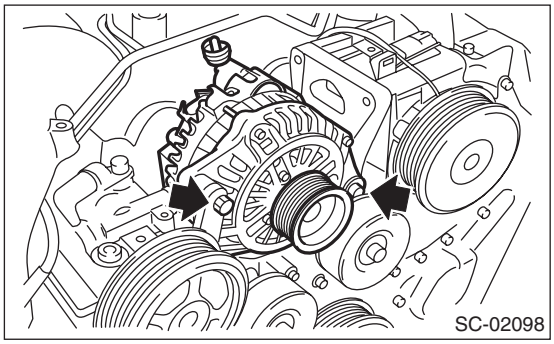
3. Generator

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.
3) Disconnect the connector and terminal from generator.


SC-02003

4) Remove the V-belts. <Ref. to ME(H6DO)-31, REMOVAL, V-belt.>
5) Remove the bolts which install the generator onto bracket.

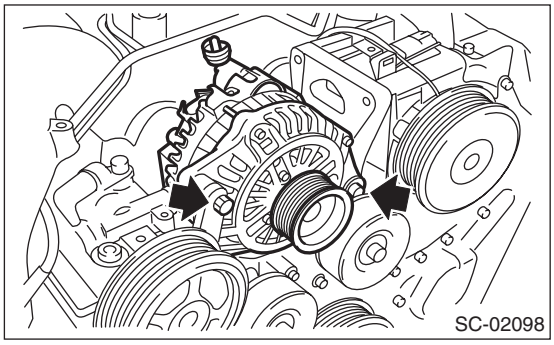

SC-02098

B: INSTALLATION

Install in the reverse order of removal.

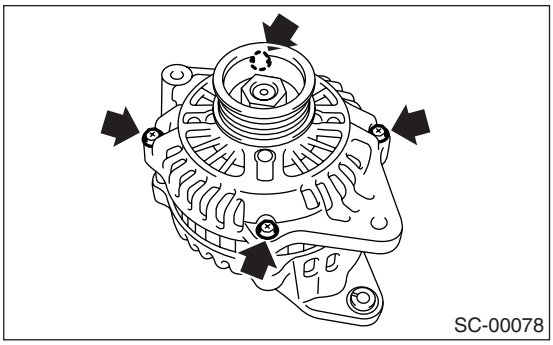
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Check and adjust the V-belt tension.
<Ref. to ME(H6DO)-31, INSPECTION, V-belt.>

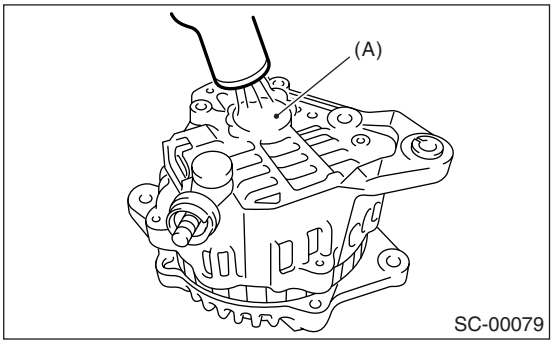

SC-02098

C: DISASSEMBLY

1) Remove the four through-bolts.

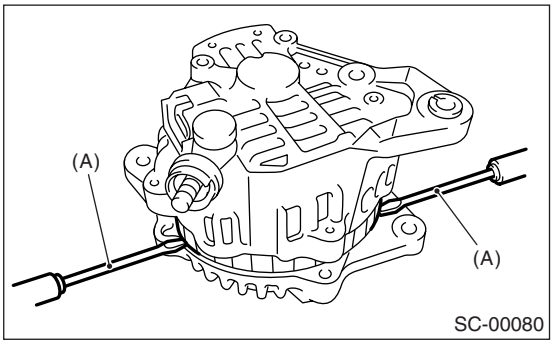

SC-00078

2) Heat the portion (A) of rear cover to 50°C (122°F) with a heater drier.



SC-00079

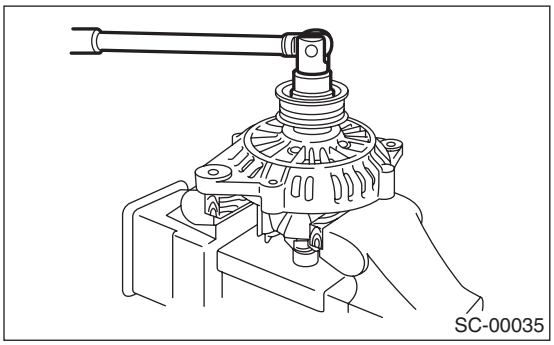
3) Then insert the tip of a flat tip screwdriver into the gap between stator core and front cover. Pry them apart to disassemble.



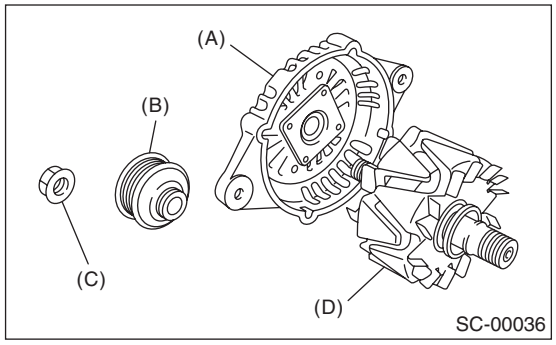
SC-00080

(A) Screwdriver

4) Hold the rotor with a vise and remove pulley nut.

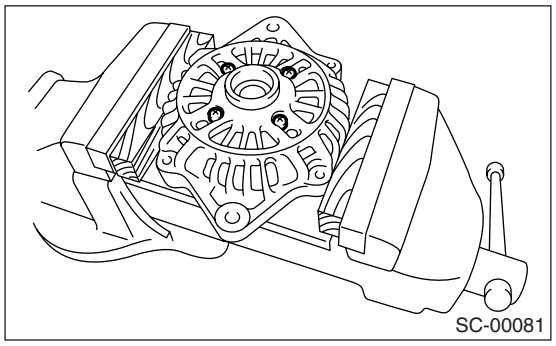

SC-00035

CAUTION:
When holding the rotor with a vise, place aluminum plates or wooden pieces on the vise jaws to prevent rotor from damage.

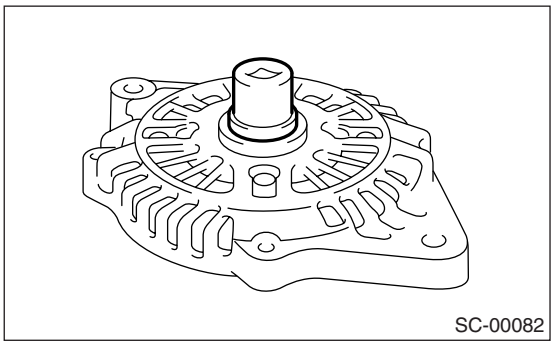


(A) Front cover
(B) Pulley
(C) Nut
(D) Rotor

5) Remove the ball bearing as follows.
(1) Remove the bolt, and then remove the bearing retainer.

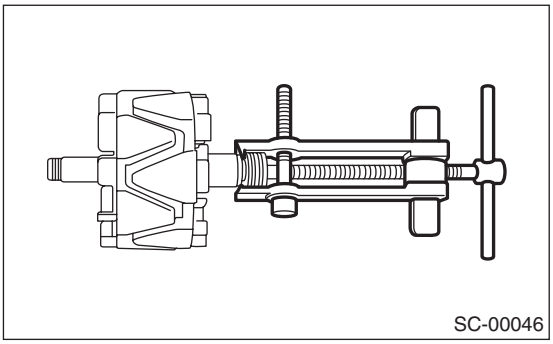


(2) Firmly install an appropriate tool (such as a fit socket wrench) to bearing inner race.



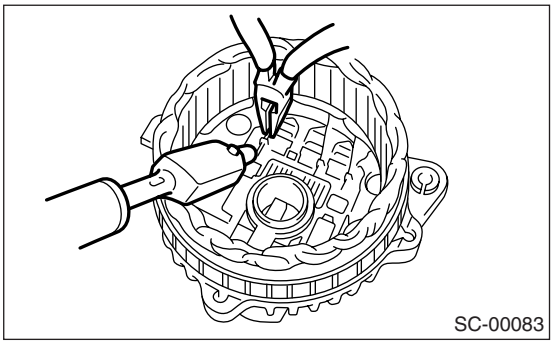
(3) Push the ball bearing off the front cover using a press.

6) Remove the bearing from rotor using a bearing puller.

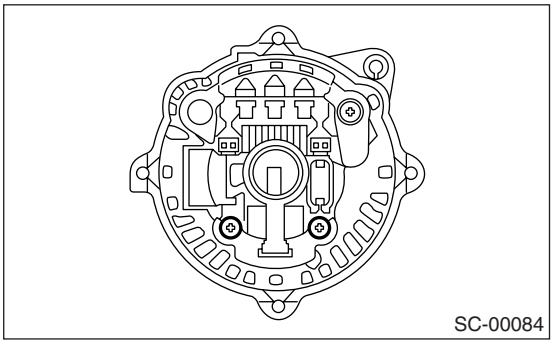


7) Separate the connection between rectifier and stator coil to remove stator coil.

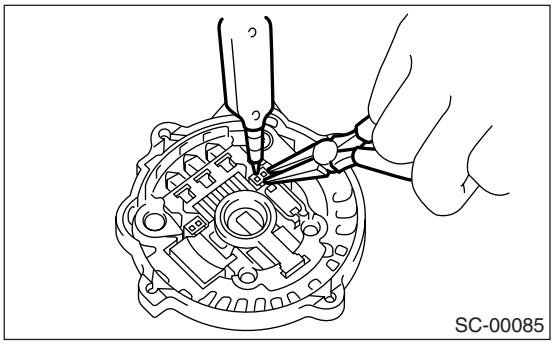
CAUTION:
Do not allow a 180 — 270 W soldering iron to contact the terminals for more than 5 seconds at once because the rectifier cannot withstand so much heat.



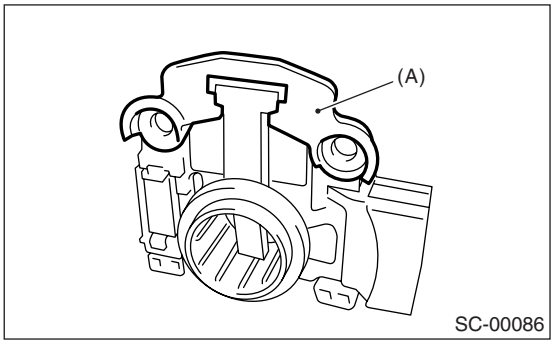
8) Remove the IC regulator as follows.
(1) Remove the screws which secure IC regulator to rear cover.



(2) Unsolder the connection between IC regulator and rectifier to remove IC regulator.


SC-00085

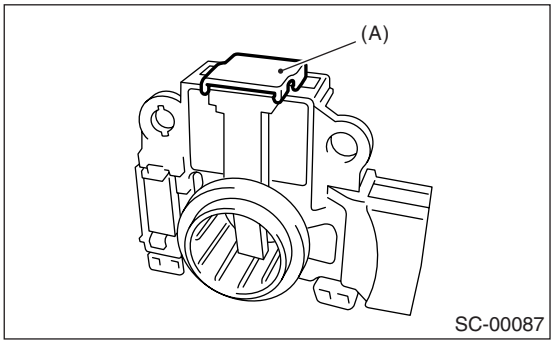
9) Remove the brush as follows.
(1) Remove the cover A.



SC-00086

(A) Cover A

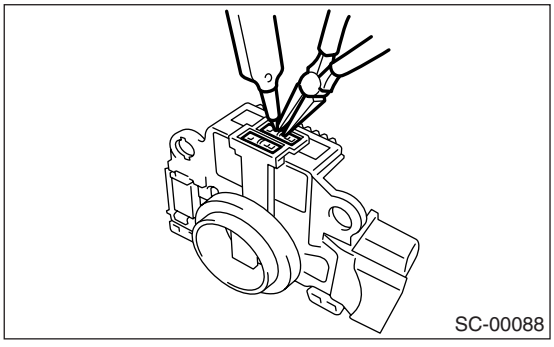
(2) Remove the cover B.



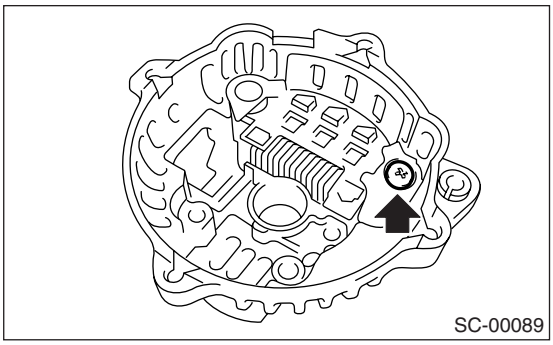
SC-00087

(A) Cover B

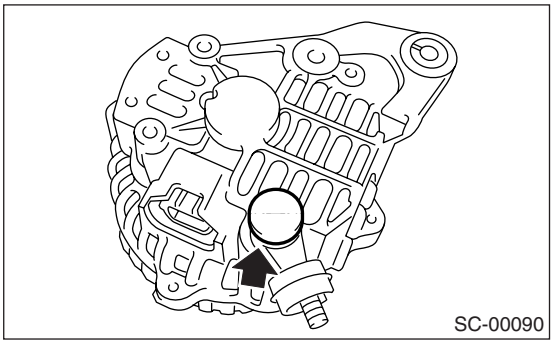
(3) Separate the brush from connection to remove.


SC-00088

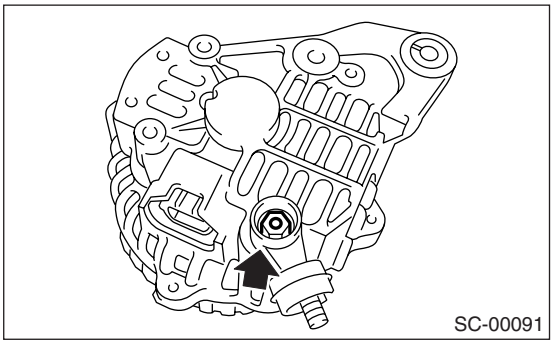
10) Remove the rectifier as follows.
(1) Remove the bolts which secure rectifier.


SC-00089

(2) Remove the cover of terminal B.


SC-00090

(3) Remove the nut of terminal B, and then remove the rectifier.


SC-00091

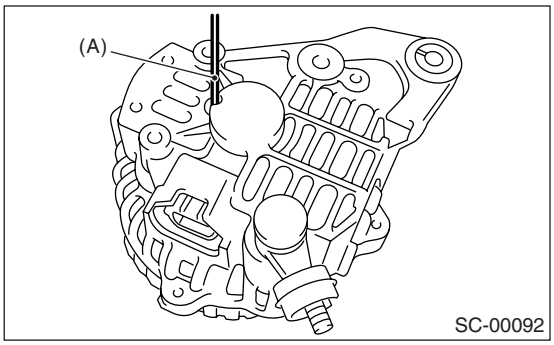
D: ASSEMBLY

Assemble in the reverse order of disassembly.

1) Pulling up brush

Before assembling, press the brush down into brush holder, and then fix them in that position by passing a [1 mm (0.08 in) dia. 40 to 50 mm (1.6 to 2.0 in) long] wire through the hole as shown in the figure.

CAUTION:
Be sure to remove the wire after reassembly.



(A) Wire

2) Install the ball bearing.
   (1) Set the ball bearing on the front cover, and then securely install an appropriate tool (such as a fit socket wrench) to the bearing outer race.
   (2) Press the ball bearing into the specified position using a press.
   (3) Install the bearing retainer.

3) Press the bearing (rear side) into the rotor shaft using a press to install.

4) Heat the bearing box in rear cover [50 to 60°C (122 to 140°F)], and then press the rear bearing into rear cover.

CAUTION:
Grease should not be applied to rear bearing. Remove the oil completely if it is found on bearing box.

5) After reassembly, turn the pulley by hand to check that rotor turns smoothly.

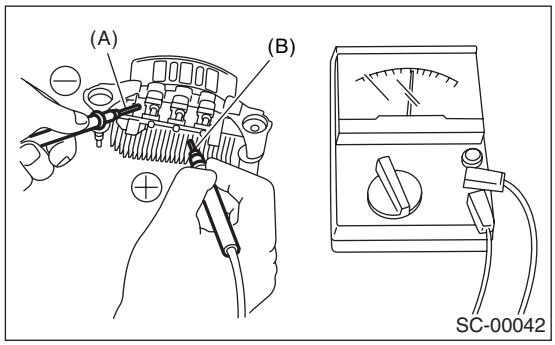
E: INSPECTION

1. DIODE

CAUTION:
Never use a mega tester (designed for reading high voltage) or any other similar instrument for this test; otherwise, the diodes may be damaged.

1) Checking positive diode

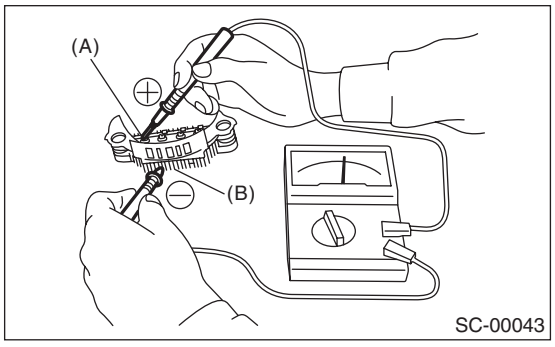
Check for continuity between the diode lead and positive side heat sink. The positive diode is in good condition if resistance is 1 Ω or less only in the direction from the diode lead to heat sink.



(A) Diode lead
(B) Heat sink (positive side)

2) Checking negative diode

Check for continuity between the negative side heat sink and diode lead. The negative diode is in good condition if resistance is 1 Ω or less only in the direction from the heat sink to diode lead.



(A) Diode lead
(B) Heat sink (negative side)

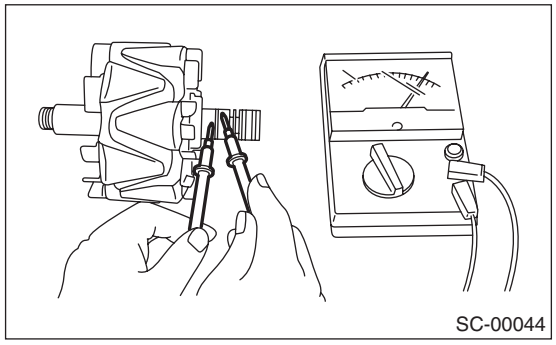
2. ROTOR

1) Slip ring surface
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) Slip ring outer diameter
Measure the slip ring outer diameter. If the slip ring is worn, replace the rotor assembly.

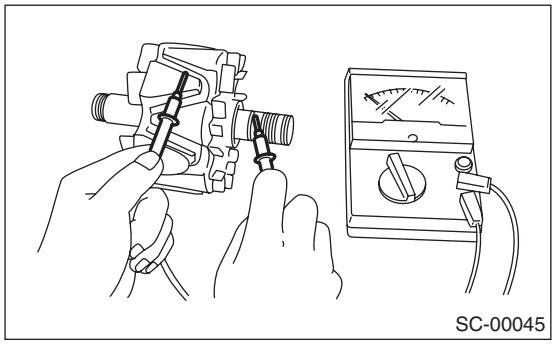
Slip ring outer diameter:
Standard
22.7 mm (0.894 in)
Limit
22.1 mm (0.870 in)

3) Continuity test
Check the resistance between slip rings using circuit tester.
If the resistance is not within the standard, replace the rotor assembly.

Specified resistance:
Approx. 1.6 — 1.9 Ω



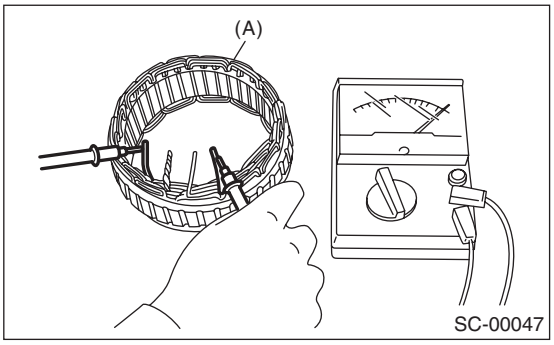
4) Insulation test
Check the continuity between slip ring and rotor core or shaft. If resistance is 1 Ω or less, the rotor coil is grounded, so replace the rotor assembly.



5) Ball bearing (rear side)
Check the rear ball bearing. Replace it if the noise is heard or the rotor does not turn smoothly.

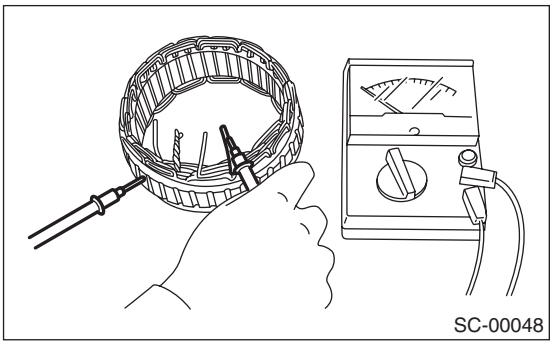
3. STATOR

1) Continuity test
Inspect the stator coil for continuity between each end of the lead wires. If resistance is 1 MΩ or more, the lead wire is broken, so replace the stator assembly.



(A) Stator

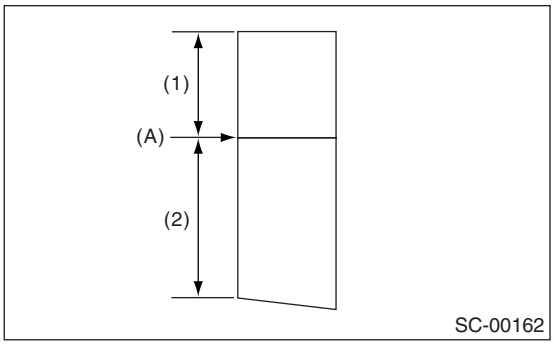
2) Insulation test
Inspect the stator coil for continuity between stator core and each end of lead wire. If resistance is 1 Ω or less, the stator coil is grounded, so replace the stator assembly.



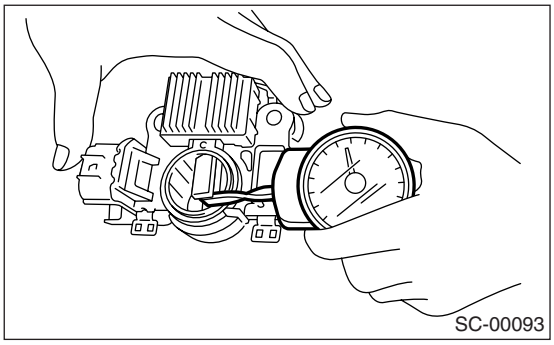
4. BRUSH

1) Measure the length of each brush. If wear exceeds the service limit, replace the brush. Each brush has the service limit mark (A) on it.

Brush length:
Service limit (1)
5.0 mm (0.197 in)
Standard (2)
18.5 mm (0.728 in)



2) Checking brush spring for proper pressure
Using a spring pressure indicator, push the brush into the brush holder until its tip protrudes 2 mm (0.08 in). Then measure the pressure of brush spring. If the pressure is less than 2.2 N (224 g, 7 91 oz), replace the brush spring with a new one. The new spring must have a pressure of 4.8 to 6.0 N (489 to 612 g, 17.26 to 21.58 oz).



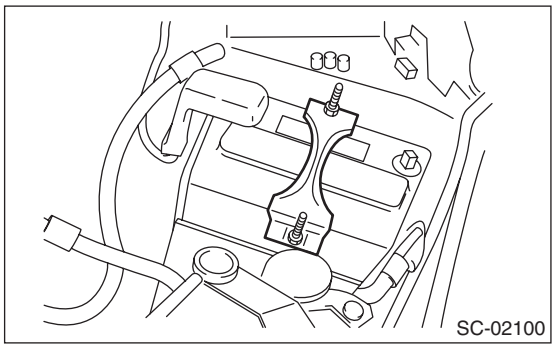
5. BEARING (FRONT SIDE)

Check the front ball bearing. If the resistance is felt while rotating, or abnormal noise is heard, replace the ball bearing

4. Battery

A: REMOVAL

1) Disconnect the positive (+) terminal after disconnecting the negative (–) terminal of battery.
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:
3.4 N·m (0.35 kgf-m, 2.5 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.
• Initial diagnosis of electronic control throttle is performed after battery installation. Because of this, start the engine 10 seconds or more after the ignition switch is turned ON.

C: INSPECTION

WARNING:
• Electrolyte has toxicity; be careful of handling the fluid.
• Avoid contact with skin, eyes or clothing. Especially at contact with eyes, flush with water for 15 minutes and get prompt medical attention.
• Batteries produce explosive gases. Keep sparks, flame, cigarettes away.
• Ventilate when charging or using in enclosed space.
• For safety, in case an explosion does occur, wear eye protection or shield your eyes when working near any battery. Never lean over a battery.
• Do not let battery fluid contact eyes, skin, fabrics, or paint-work because battery fluid is corrosive acid.
• To lessen the risk of sparks, remove rings, metal watch-bands, and other metal jewelry. Never allow metal tools to contact the positive battery terminal and anything connected to it while you are at the same time in contact with any other metallic portion of the vehicle. This may cause short circuit.

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.

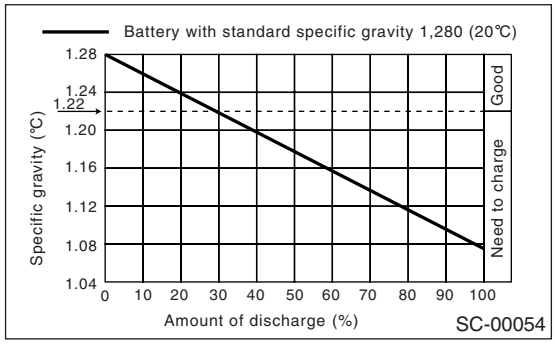
3. SPECIFIC GRAVITY OF ELECTROLYTE

1) Measure specific gravity of electrolyte using a hydrometer and a thermometer.
Specific gravity varies with temperature of electrolyte so that it must be corrected at 20°C (68°F) using the following equation:

$$S_{20} = St + 0.0007 \times (t - 20)$$

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 corrected specific gravity.
Standard specific gravity: 1.220 — 1.290 [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.



D: MEASUREMENT

WARNING:
Do not bring an open flame close to the battery at this time.

CAUTION:
• Prior to charging, corroded terminals should be cleaned with a brush and common 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

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, the quick charging must be carried out within a current range that will not increase the electrolyte temperature above 40°C (104°F).
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.

CAUTION:
• Observe the items in 3. NORMAL CHARGING.
• Never use more than 10 A when charging the battery because it will shorten the battery life.

1. General Description

A: GENERAL DESCRIPTION

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

2. Schedule

A: MAINTENANCE SCHEDULE 1

		Maintenance interval [Number of months or km (miles), whichever occurs first]												
	Months	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75	Continued in the table below.	Remarks
	× 1,000 km	4.8	12	24	36	48	60	72	81.4	96	108	120		
	× 1,000 miles	3	7.5	15	22.5	30	37.5	45	52.5	60	67.5	75		
1	Engine oil	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		
3	Spark plug					R				R				
4	Drive belt(s)					I				I				
6	Fuel line					(I)				(I)				Note (1)
7	Air cleaner element					R				R				Note (2)
8	Cooling system					I				I				
9	Engine coolant					R				R				
10	Automatic transmission fluid					I				I				Note (3)
11	Front & rear differential oil					I				I				
12	Brake line			I		I		I		I		I		
13	Brake fluid					R				R				
14	Disc brake pad and disc			I		I		I		I		I		
15	Parking brake			I		I		I		I		I		
16	Suspension			I		I		I		I		I		
17	Wheel bearing									(I)				
18	Axle boots and joints			I		I		I		I		I		
19	Tire rotation		I	I	I	I	I	I	I	I	I	I		Note (4)
20	Steering system (Power steering)			I		I		I		I		I		
21	SRS airbag system	Inspect every 10 years												
22	A/C filter	Replace every 24 months or 24,000 km (15,000 miles).												Note (5)

Symbols used:
R: Replace
I: Inspection
(R) or (I): Recommended service for safe vehicle operation.

NOTE:
(1) This inspection is not required to maintain emission warranty eligibility and it dose not affect the manufacturer's obligations under EPA's in-use compliance program.
(2) When the vehicle is used in extremely dusty conditions, the air cleaner element should be replaced more often.
(3) ATF filter is maintenance free part. ATF filter needs replacement, when it has physically rust, damaged or ATF leaked.
(4) A tire should be replaced when the tread wear indicator appears as a solid band across the tread. The indicators appear when the remaining tread has been worn to 1.8 mm (0.071 in) or less.
(5) When the A/C filter is mounted

PERIODIC MAINTENANCE SERVICES

		Maintenance interval [Number of months or km (miles), whichever occurs first]											
	Months	Continued from the table above.	82.5	90	97.5	105	112.5	120	127.5	135	142.5	150	Remarks
	× 1,000 km		132	144	156	168	180	192	204	216	228	240	
	× 1,000 miles		82.5	90	97.5	105	112.5	120	127.5	135	142.5	150	
1	Engine oil		R	R	R	R	R	R	R	R	R	R	
2	Engine oil filter		R	R	R	R	R	R	R	R	R	R	
3	Spark plug			R				R				R	
4	Drive belt(s)			I		R				I			
5	Camshaft drive belt			I		R				I			
6	Fuel line			(I)				I				(I)	Note (1)
7	Air cleaner element			R				R				R	Note (2)
8	Cooling system			I				I				I	
9	Engine coolant			R				R				R	
10	Automatic transmission fluid			I				I				I	Note (3)
11	Front & rear differential oil			I				I				I	
12	Brake line			I		I		I		I		I	
13	Brake fluid			R				R				R	
14	Disc brake pad and disc			I		I		I		I		I	
15	Parking brake			I		I		I		I		I	
16	Suspension			I		I		I		I		I	
17	Wheel bearing							(I)				(I)	
18	Axle boots and joints			I		I		I		I		I	
19	Tire rotation		I	I	I	I	I	I	I	I	I	I	Note (4)
20	Steering system (Power steering)			I		I		I		I		I	
21	SRS airbag system	Inspect every 10 years											
22	A/C filter	Replace every 24 months or 24,000 km (15,000 miles).											Note (5)

Symbols used:
R: Replace
I: Inspection
(R) or (I): Recommended service for safe vehicle operation.

NOTE:
(1) This inspection is not required to maintain emission warranty eligibility and it dose not affect the manufacturer's obligations under EPA's in-use compliance program.
(2) When the vehicle is used in extremely dusty conditions, the air cleaner element should be replaced more often.
(3) ATF filter is maintenance free part. ATF filter needs replacement, when it has physically rust, damaged or ATF leaked.
(4) A tire should be replaced when the tread wear indicator appears as a solid band across the tread. The indicators appear when the remaining tread has been worn to 1.8 mm (0.071 in) or less.
(5) When the A/C filter is mounted

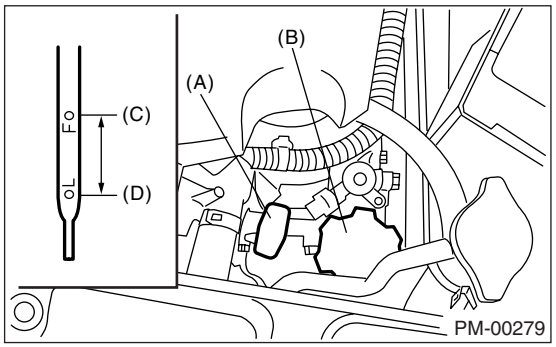
B: MAINTENANCE SCHEDULE 2

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						
Automatic transmission fluid	15 months						R
	24,000 km						
	15,000 miles						
Front & rear differential 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

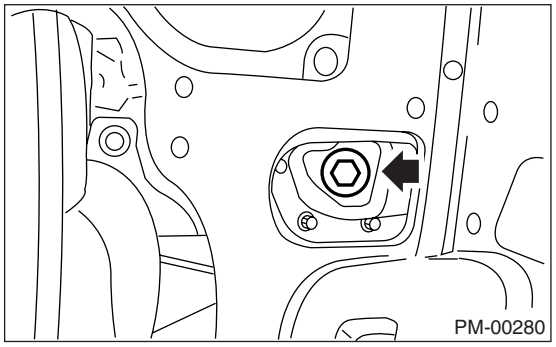
A: REPLACEMENT

1) Open the engine oil filter cap for quick draining of the engine oil.



(A) Oil level gauge
(B) Oil filler cap
(C) Upper level
(D) Lower level

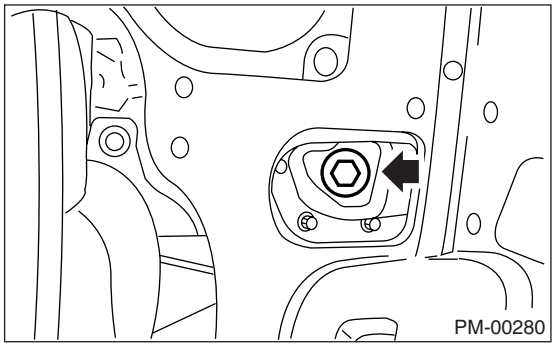
2) Drain the engine oil by removing the engine oil drain plug.



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

NOTE:
Use a new drain plug gasket.

Tightening torque:
44 N·m (4.5 kgf-m, 33 ft-lb)



4) Fill engine oil through the level gauge up to the center between the upper level and the lower level. Place the vehicle on a level surface when checking oil level. Use engine oil of the proper quality and viscosity, selected in accordance with the following.

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

Engine oil capacity

When replacing engine oil and oil filter
Upper level
Approx. 5.7 ℓ (6.0 US qt, 5.0 Imp qt)
Lower level:
Approx. 4.7 ℓ (5.0 US qt, 4.10 Imp qt)

When replacing engine oil only
Upper level:
Approx. 5.5 ℓ (5.8 US qt, 4.8 Imp qt)
Lower level:
Approx. 4.5 ℓ (4.8 US qt, 4.0 Imp qt)

The proper viscosity oil helps the engine maintain its ideal temperature, and cranking speed increased by reducing viscosity friction in hot condition.

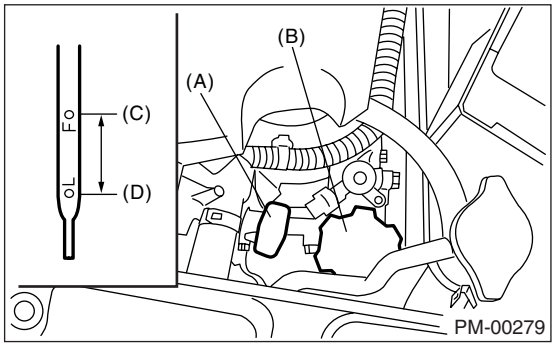
CAUTION:
When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API standard and SAE viscosity No. designated by SUBARU.

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

5) Close the engine oil filler cap.
6) Start the engine and warm it up for a time.
7) Stop the engine to inspect the oil level again. <Ref. to PM-7, INSPECTION, Engine Oil.>

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 in the proper orientation.
4) Remove it again and check the oil reading.
If the engine oil level is below the “L” line, add oil to bring the level up to the “F” line. To prevent overfilling the engine oil, do not add oil above the “F” line when the engine is cold.



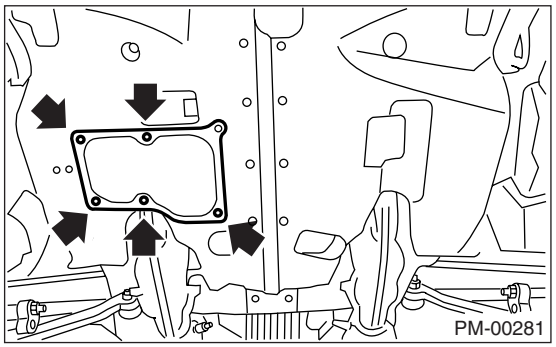
(A) Oil level gauge
(B) Oil filler cap
(C) Upper level
(D) Lower level

5) Check whether it is notably dirty, or there is coolant or gasoline mixed in. Replace if it is notably dirty. If there is coolant or gasoline mixed in, check the engine.
6) After pouring in engine oil, run the engine for several minutes, then stop it. Wait for several minutes until the oil has returned to the oil pan.

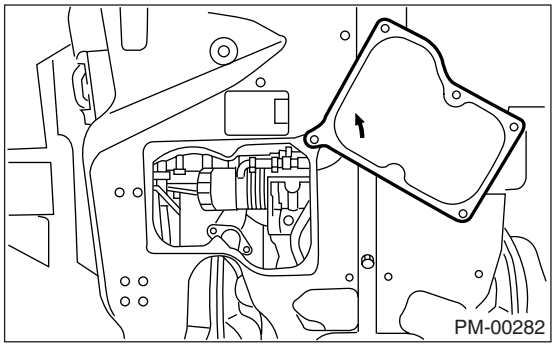
4. Engine Oil Filter

A: REPLACEMENT

1) Remove the service hole cover clip.

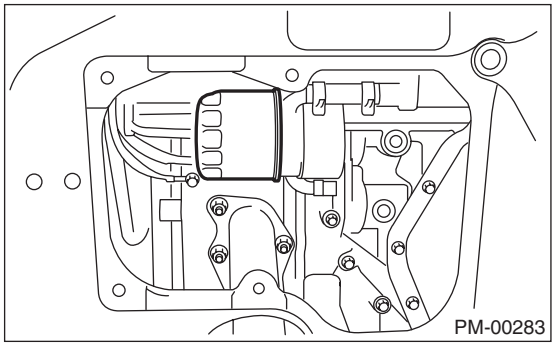


2) Rotate the service hole cover in the direction of the arrow.



3) Remove the oil filter using ST.

ST 49857000 OIL FILTER WRENCH (Outer diameter: 80 mm (3.15 in))



4) Obtain a new oil filter and apply a thin coat of engine oil to the seal rubber.

5) Install the oil filter by turning it by hand, while being careful not to damage seal rubber. Then, after the seal rubber touches the oil cooler, tighten it a further 3/4 turn.

CAUTION:
Do not tighten excessively, because this can cause oil leaks.

6) After installing the oil filter, run the engine and make sure that no oil is leaking around seal rubber.

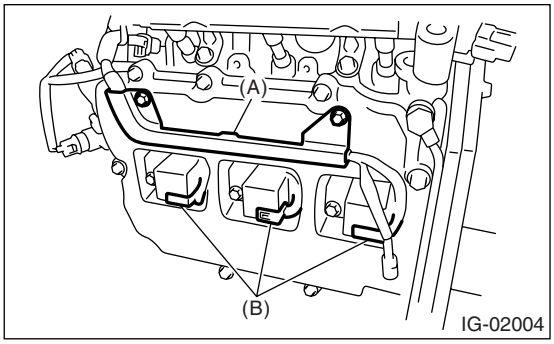
NOTE:
The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

7) Check the engine oil level. <Ref. to PM-7, INSPECTION, Engine Oil.>

5. Spark Plug

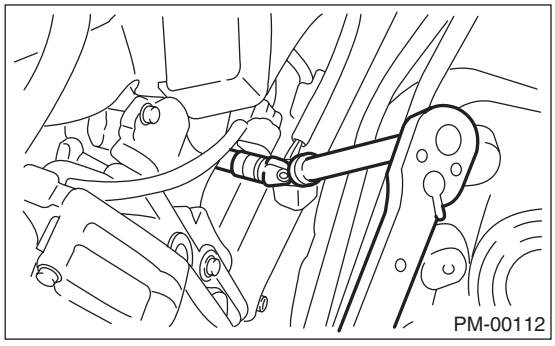
A: REPLACEMENT

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.

Recommended spark plug:
NGK: ILFR6B

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

7) Tighten the ignition coil.

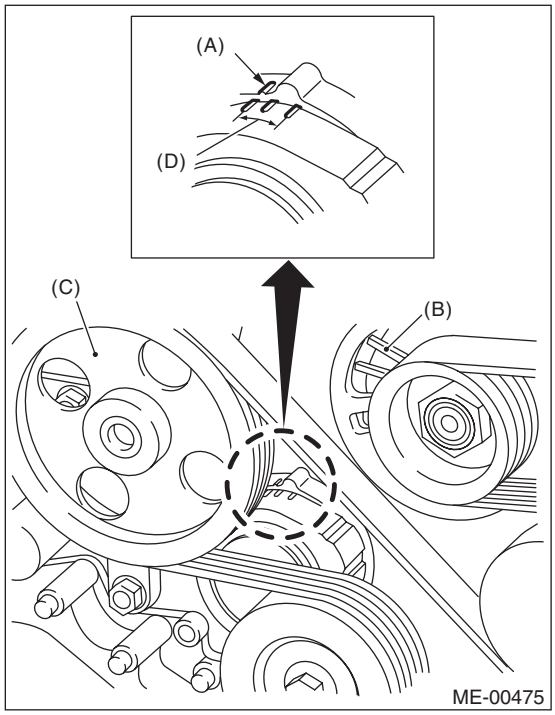
Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)

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.

6. V-belt

A: INSPECTION

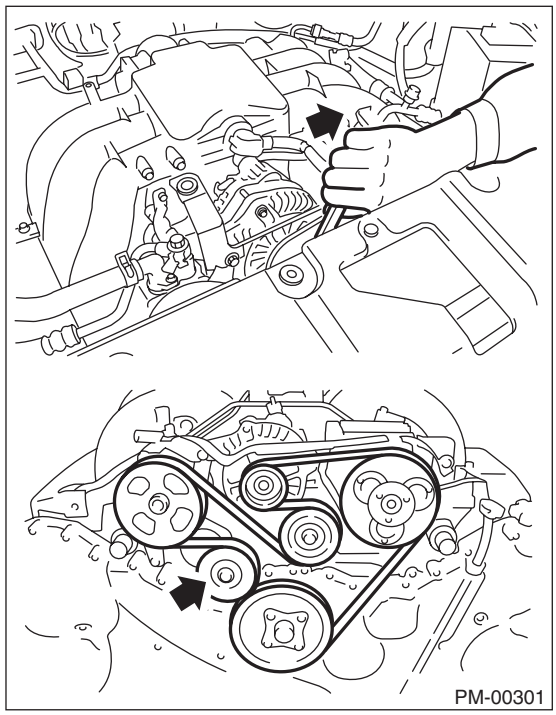
1) Replace the belts if cracks, fraying or wear are found.
2) Make sure that the V-belt automatic belt tension indicator (A) is within the range of its use limit (D).



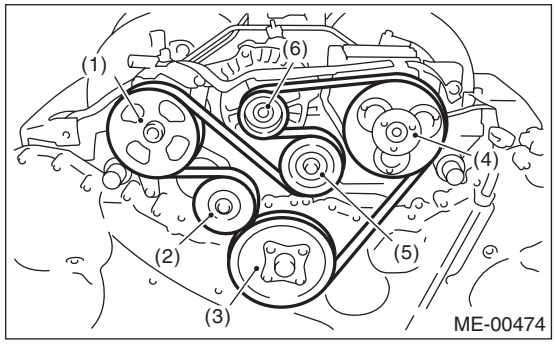
(A) Indicator
(B) Generator
(C) Power steering oil pump
(D) Service limit

B: REPLACEMENT

1) Remove the cover.
2) Fit the tool to the belt tensioner mounting bolt.
3) Turn the tool in the direction of the arrow, and loosen the V-belt to remove it.



4) Install in the reverse order of removal.



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

7. Fuel Line

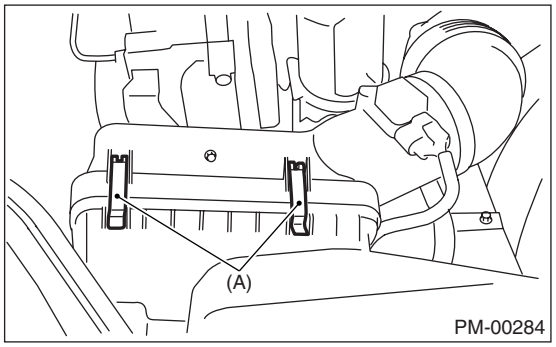
A: INSPECTION

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)-48, Fuel Delivery, Return and Evaporation Lines.>

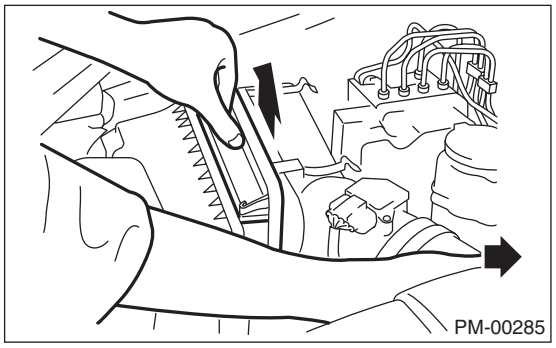
8. Air Cleaner Element

A: REPLACEMENT

1) Disconnect the ground cable from battery.
2) Remove the clips (B) on air cleaner case.



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



4) Install in the reverse order of removal.

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

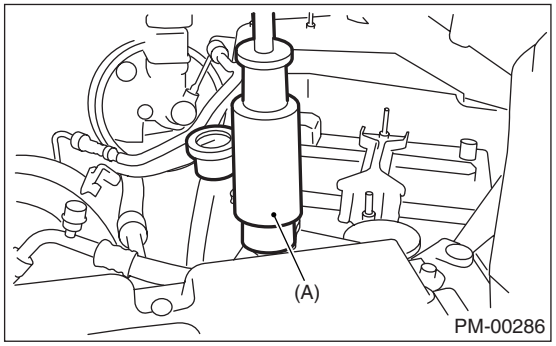
9. Cooling System

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^2, 23 psi)

NOTE:
- Hose joints and other connections for leakage
- Each portion of radiator for leakage
- Be particularly careful not to deform the filler neck of radiator when installing and removing the tester and after testing.



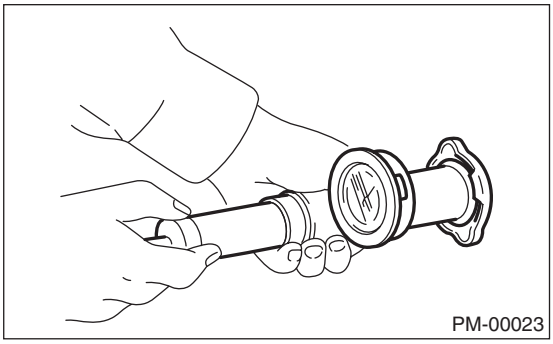
- When performing this check, be sure to keep the engine stationary and fill radiator with coolant.
- Wipe off check points before applying pressure.
- Use care not to spill coolant when detaching tester from radiator.

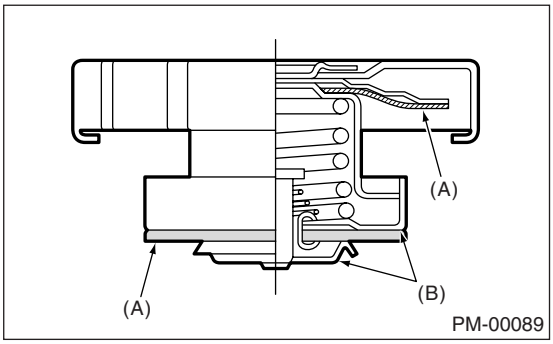
2) Check the radiator cap valve open pressure using radiator cap tester.

NOTE:
Rust or dirt on 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 service limit value has been maintained for this period.

Radiator cap valve open pressure
Standard:
93 — 123 kPa (0.95 — 1.25 kg/cm^2, 14 — 18 psi)
Service limit:
83 kPa (0.85 kg/cm^2, 12 psi)





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

3) Start the engine, and then check it does not overheat or it is cooled excessively. If it overheats or it is cooled excessively, check the cooling system.
<Ref. to CO(H6DO)-13, Water Pump.> <Ref. to CO(H6DO)-14, Thermostat.> <Ref. to CO(H6DO)-15, Radiator.> <Ref. to CO(H6DO)-20, 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)-8, INSPECTION, Radiator Fan System.>

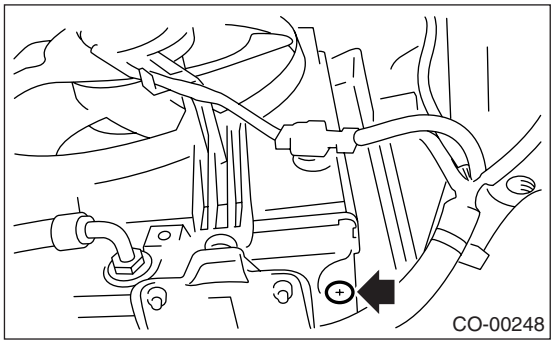
10.Engine Coolant

A: REPLACEMENT

1. REPLACEMENT OF ENGINE COOLANT

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

1) Lift-up the vehicle.
2) Remove the under cover.
3) Place a container under drain pipe.
4) Remove the 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 number: 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):
Approx. 7.4 ℓ (7.8 US qt, 6.5 Imp qt)

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

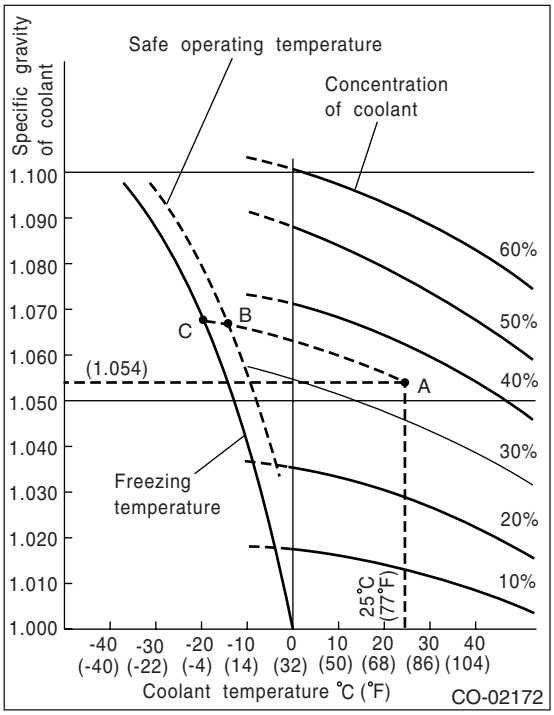
10) Close the radiator cap, and start the engine. Race 5 to 6 times at 3,000 rpm or less, then stop the engine. (Complete this operation within 40 seconds.)
11) Wait for one minute after the engine stops, then open the radiator cap. If the engine coolant level drops, add engine coolant into radiator 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 by engine coolant pressure at this time, air purge seems to be mostly completed.

16) Stop the engine and wait until the engine coolant temperature lowers to 30°C (86°F).
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 less than 3,000 rpm. If the flowing sound is heard from heater core, repeat the procedures from step 10).

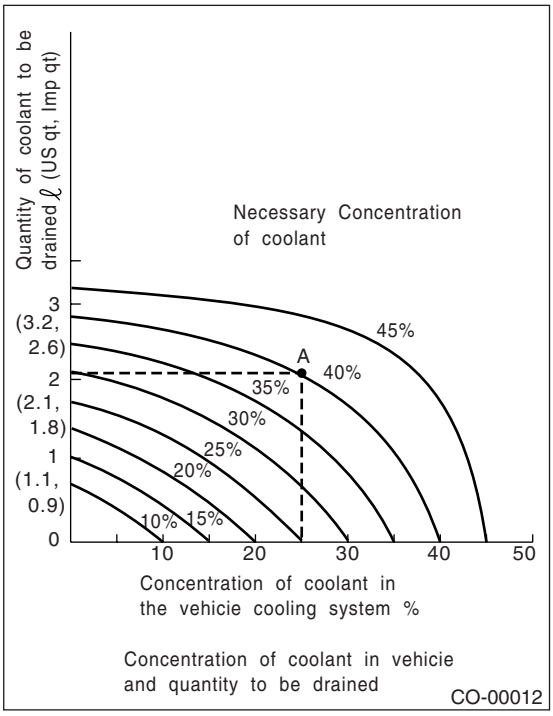
2. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERATURE

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



3. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

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

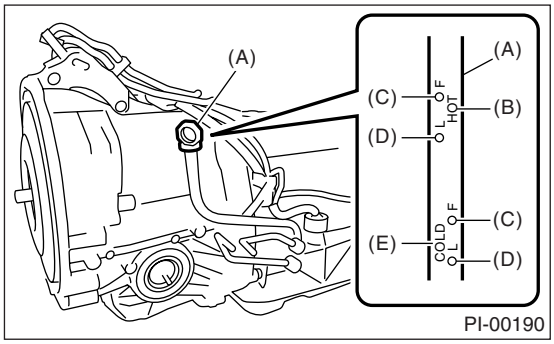


11. Automatic Transmission Fluid

A: INSPECTION

CAUTION:
The level of ATF varies with fluid temperature. Pay attention to the fluid 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)-15, 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. Measure the ATF level with engine idling for one or two minutes.



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

4) Make sure that ATF level is above the center of upper and lower marks at "HOT" side.
5) If the ATF level is below the center between upper and lower marks, add the recommended ATF until the fluid level is found above the center between upper and lower marks.

CAUTION:
- **Use care not to exceed the upper limit level.**
- **Adding ATF to the upper limit mark on "HOT" side when the ATF temperature is below 70°C (158°F) will overfilling of ATF, causing a transmission failure.**

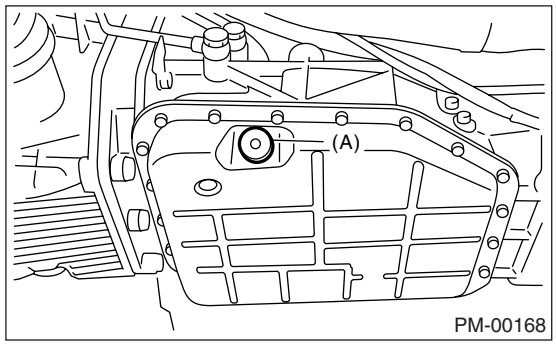
6) Check ATF level after raising ATF temperature to 70 — 80°C (158 — 176°F) by running the vehicle or by idling the engine again.
7) Check the ATF for leaks.
Check for leaks in the transmission. If there are leaks, it is necessary to repair or replace gasket, oil seals, plugs or other parts.

B: REPLACEMENT

1. AUTOMATIC TRANSMISSION FLUID

1) Drain the ATF by removing drain plug.

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



(A) ATF drain plug

2) Replace the gasket with new one, and then tighten the drain plug to specified torque.

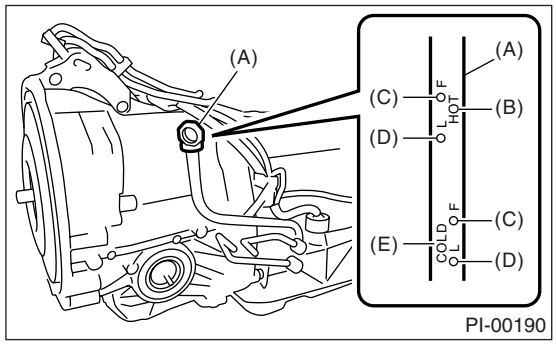
Tightening torque:
20 N·m (2.0 kgf-m, 4.5 ft-lb)

3) Pour in the ATF using the oil charge pipe.

Recommended ATF:
Refer to "RM" section. <Ref. to RM-3, FLUID, RECOMMENDED MATERIALS, Recommended Materials.>

Capacity:
Fill the same amount of ATF when drained.

4) Check the ATF level. <Ref. to PM-16, INSPECTION, Automatic Transmission Fluid.>



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

2. ATF FILTER

NOTE:
Basically, the ATF filter is maintenance free, but when it is rusted or physically damaged or leaking, the ATF filter needs to be replaced.

For the replacement procedure of ATF filter, refer to “ATF FILTER”.
<Ref. to 5AT-55, ATF Filter.>

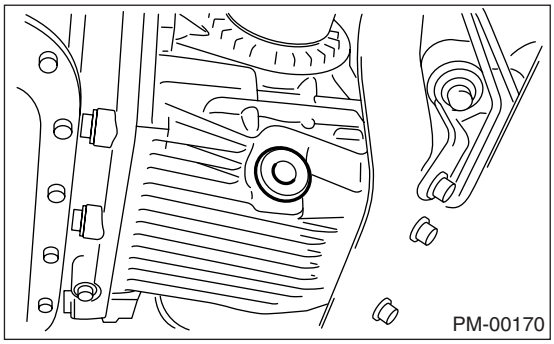
12.Front & Rear Differential Oil

A: REPLACEMENT

1. FRONT DIFFERENTIAL

1) Drain the differential gear oil by removing drain plug using TORX® BIT T70.

NOTE:
• Before starting work, cool off the differential gear oil well.
• If front differential gear oil adheres to the exhaust pipe, wipe it off completely.



2) Replace the gasket with new one, and then tighten the drain plug to specified torque.

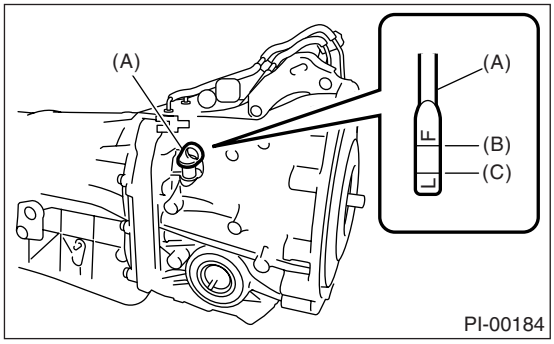
Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)

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

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

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

Gear oil capacity:
1.3 — 1.5 ℓ (1.4 — 1.6 US qt, 1.1 — 1.3 lmp qt)



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

2. REAR DIFFERENTIAL

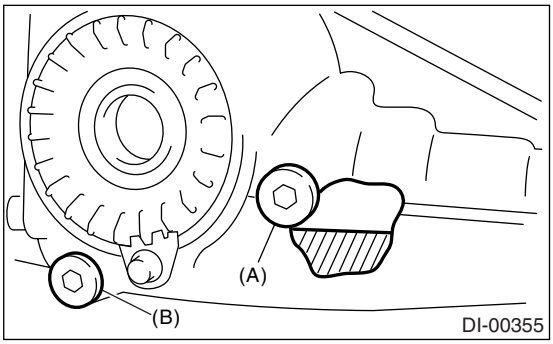
1) Drain the oil by removing drain plug.
2) Remove the filler plug for quick draining oil.
3) Tighten the drain plug after draining oil and replacing with a new gasket.

Tightening torque:
29 N·m (3.1 kgf-m, 21.4 ft-lb)

4) 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:
0.8 ℓ (0.8 US qt, 0.7 lmp qt)



(A) Filler plug
(B) Drain plug

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

5) Replace the gasket with a new one and tighten the filler plug.

Tightening torque:
29 N·m (3.1 kgf-m, 21.4 ft-lb)

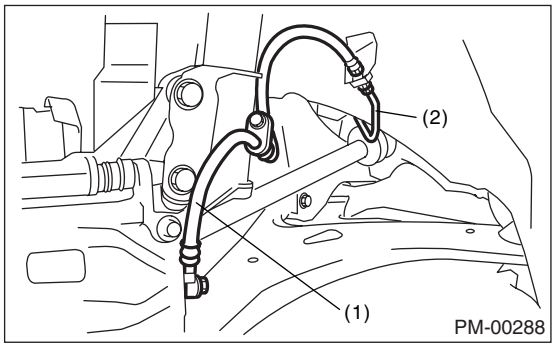
13.Brake Line

A: INSPECTION

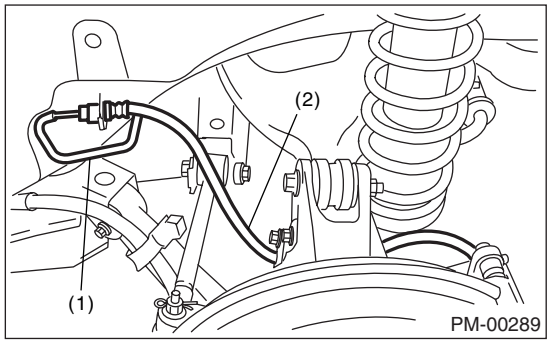
1. BRAKE LINE

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

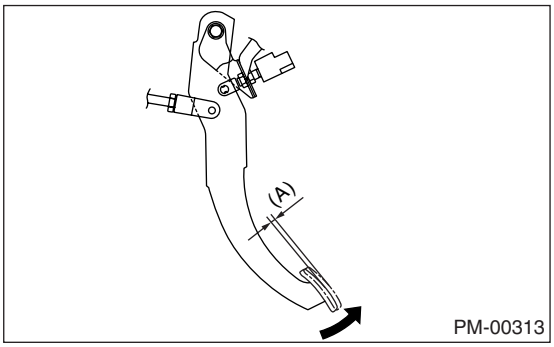


(1) Rear brake pipe
(2) Rear brake hose

2. SERVICE BRAKE

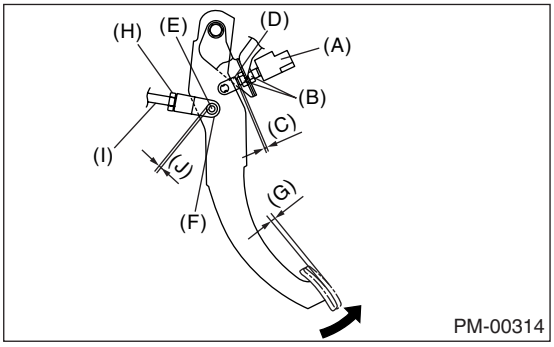
1) Check the free play of brake pedal with pulling up the force of less than 10 N (1 kgf, 2 lb).

Brake pedal free play (Pulling up direction of pedal)
0.5 — 2.0 mm (0.02 — 0.08 in)



(A) Pedal free play

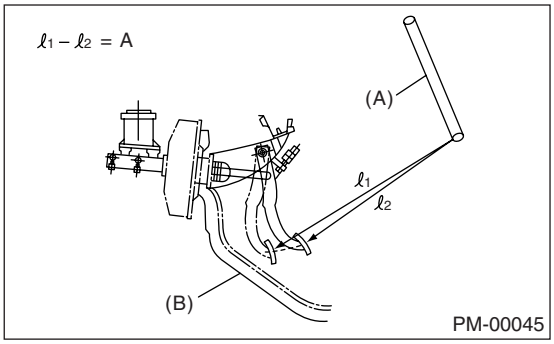
2) If the free play is out of specifications above, adjust the brake pedal as follows.
(1) Make sure the engine is off. (No vacuum is applied to brake booster.)
(2) There should be play between brake booster clevis and pin at brake pedal installing portion. [Pulling up the brake pedal pad with a force of less than 10 N (1 kgf, 2 lb) to a stroke of 0.5 to 2.0 mm (0.02 to 0.08 in).]
(3) If there is no free play between clevis pin and clevis, turn brake switch adjusting nut until the clearance between stopper and screw of brake switch becomes 0.8 mm (0.031 in).



(A) Brake switch
(B) Adjusting nut
(C) 0.8 mm (0.031 in)
(D) Stopper
(E) Clevis pin
(F) Clevis
(G) Pedal free play
(H) Lock nut
(I) Brake booster operating rod
(J) Play at pin

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 less than specified value. If the measured value is more than specification, there is possibility of entering air in hydraulic unit.

Brake pedal stroke A:
115 mm (4.5 in)/ 500 N (51 kgf, 112 kg) or less

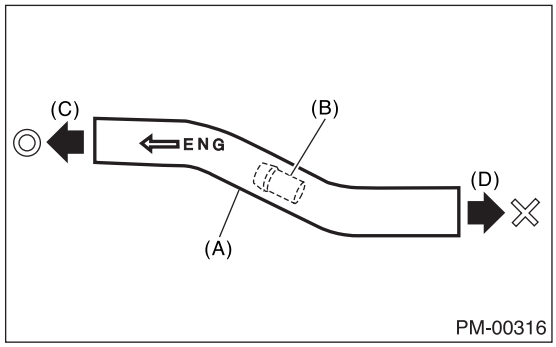


(A) Steering wheel
(B) Toe board

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.

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

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

14.Brake Fluid

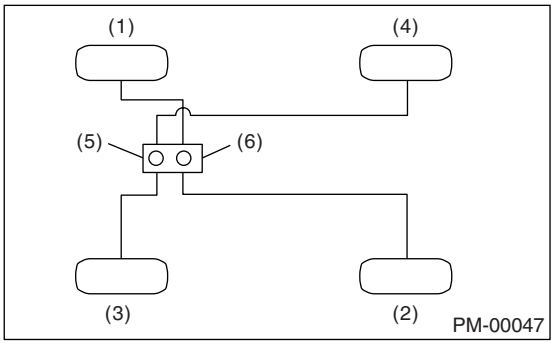
A: REPLACEMENT

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-3, FLUID, RECOMMENDED MATERIALS, Recommended Materials.>

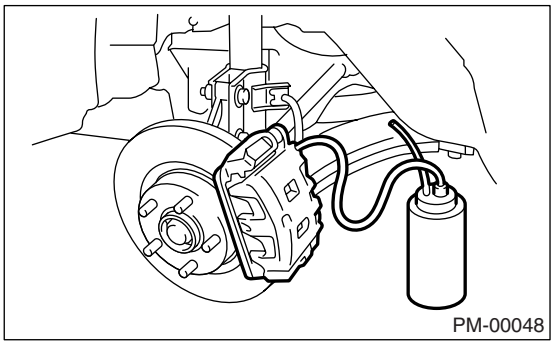
NOTE:
• Avoid mixing different brands of brake fluid to prevent degrading the quality of fluid.
• Be careful not to allow dirt or dust to get into the reservoir tank.

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.
• During air bleeding, 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 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, 5.8 ft-lb)

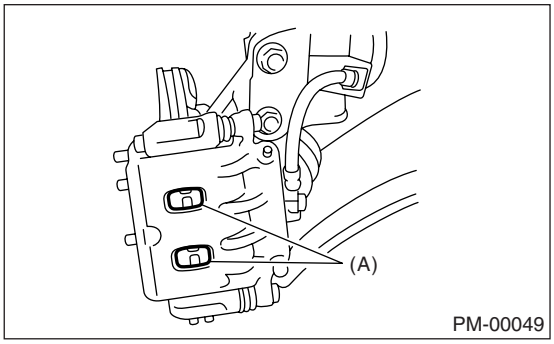
10) Bleed air from each wheel cylinder by following steps from 5) to 9).
11) Depress the brake pedal with a force of approx. 294 N (30 kgf, 66 lb) and hold it there for approx. 20 seconds. At this time check the pedal to see if it makes any unusual movement. Visually inspect the bleeder screws and brake pipe joints to confirm there is no fluid leakage.
12) Install the wheels, and drive the vehicle for a short distance between 2 to 3 km (1 to 2 mile) to confirm brakes are operating properly.

15.Disc Brake Pad & 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.



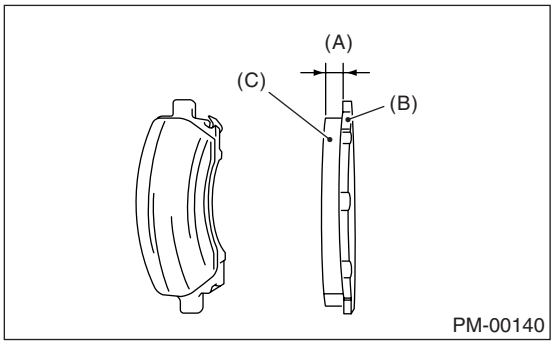
(A) Inspection hole

- Front

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

- Rear

Pad thickness	mm (in)
Standard	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

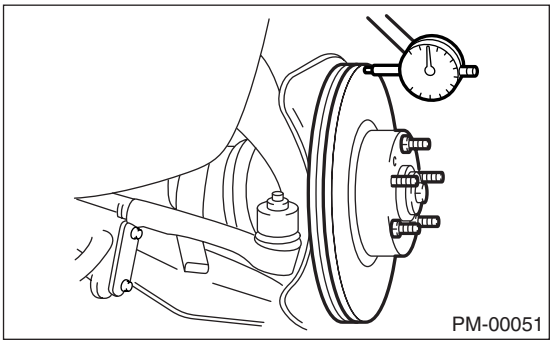
Disc rotor thickness	mm (in)
Standard	30 (1.18)
Wear limit	28 (1.10)

- Rear

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

4) Remove the caliper body. <Ref. to BR-15, Front Disc Brake Assembly.> <Ref. to BR-22, Rear Disc Brake Assembly.>
5) Tighten the wheel nuts to secure disk rotor.
6) Set a dial gauge at a point less than 10 mm (0.39 in) from outer periphery of the rotor, and then measure the disk rotor runout.

Disc rotor runout limit:
Front: 0.05 mm (0.002 in)
Rear: 0.05 mm (0.002 in)



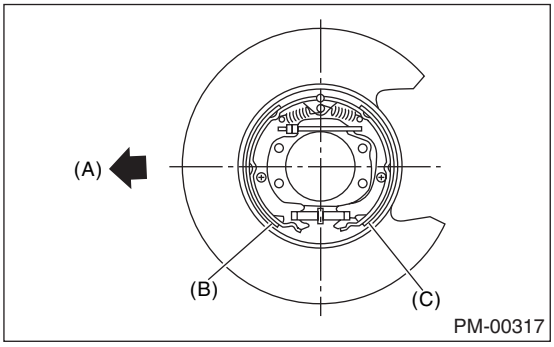
16.Parking Brake

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

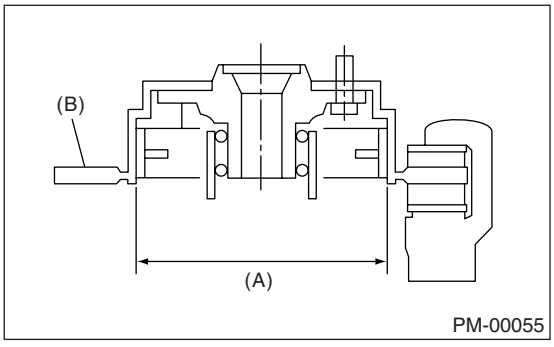
Thickness of brake lining (except for back metal):
Standard: 4.0 mm (0.157 in)
Wear limit: 1.5 mm (0.059 in)



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

2) Check the inside of disk rotor for wear, dents or other damage. If the inside surface of dick 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 (8.26 in)
Wear limit: 211 mm (8.30 in)

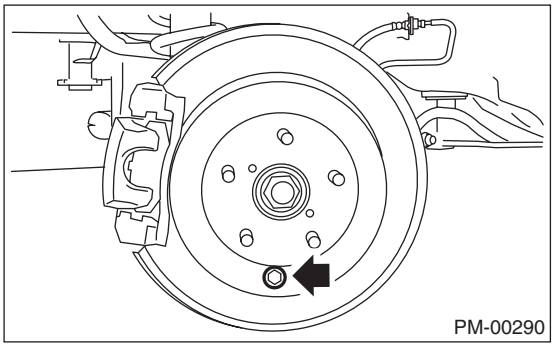


(A) Inside diameter
(B) Disc

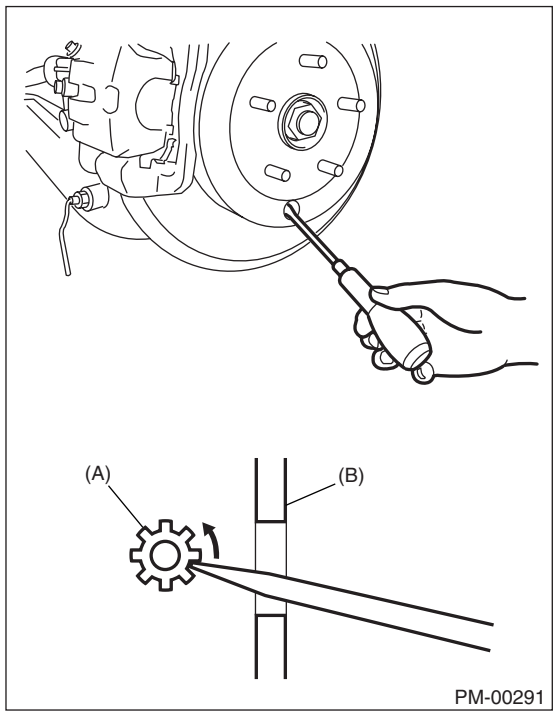
3) If the deformation or wear of back plate, shoe, etc. is noticeable, replace them.
4) When the shoe return spring tension is excessively weakened, replace it.
5) Check whether the parking brake pedal is at the predetermined number of notches (5 to 6 notches).

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

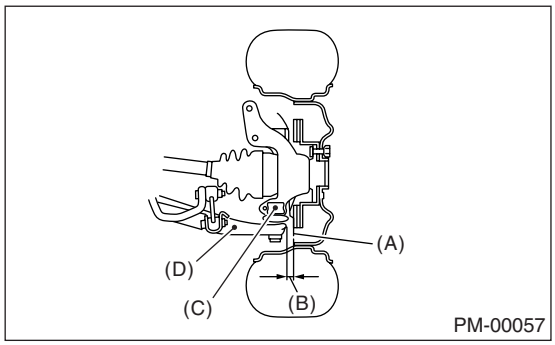
5) Turn back (downward) the adjuster several notches until the brake pedal no longer has any drag.
6) Install the cover (rubber) in original position correctly.
7) Install the rear tires.
8) Adjust so that the parking brake pedal is at the predetermined number of notches (5 to 6 notches).

17.Suspension

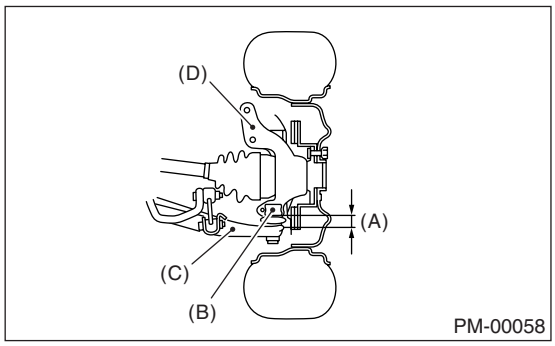
A: INSPECTION

1. SUSPENSION BALL JOINT

1) Jack-up the vehicle until front wheels are off ground.
2) Grasp the bottom of tire and move it in and out along the shaft. If relative movement is observed between the brake disc cover (A) and end of front arm (D), ball joint (C) may be excessively worn.



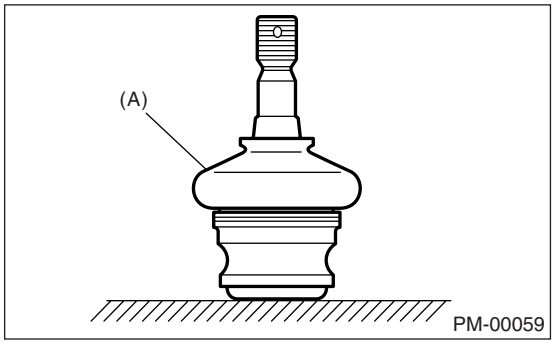
3) Grasp the end of front arm and move it up and down. Relative movement (A) between the housing (D) and front arm (C) boss indicates ball joint (B) may be excessively worn.



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-15, Front Ball Joint.>
5) Damage of dust seal
Visually inspect the ball joint dust seal. If it is damaged, remove the front arm. <Ref. to FS-16, Front Arm.> Also, measure the free play of the ball joint. <Ref. to FS-15, Front Ball Joint.>

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

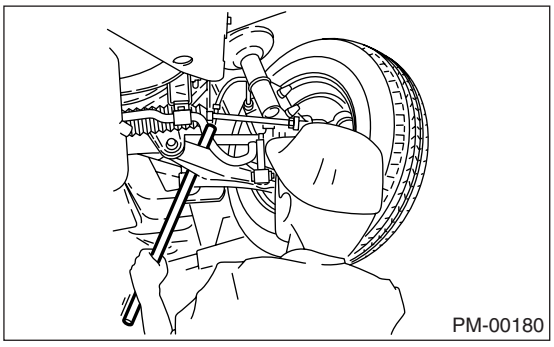
NOTE:
When the front arm ball joint has been removed or replaced, check the toe-in of front wheel. If the front wheel toe-in is not at specified value, adjust the toe-in. <Ref. to FS-6, Wheel Alignment.>



(A) Dust seal

2. FRONT, REAR SUSPENSION BUSHING

Apply pressure with tire lever etc, and inspect the bushing for wear or crack. Replace the bushings and the arm assembly or link assembly if there is wear or there are cracks.



3. WHEEL ARCH HEIGHT

1) Unload the cargo and set the vehicle in curb weight (empty) condition.
2) Check the wheel arch height of the front and rear suspensions to ensure that they are within specified values. <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) When no components are deformed, adjust wheel arch height by replacing coil spring in the suspension whose wheel arch height is out of standard. <Ref. to FS-6, Wheel Alignment.> <Ref. to RS-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, crossmember, front arm, etc.]
- Parts connecting suspension and body

3) When the toe-in and camber are out of standard value, adjust them so that they conform to standard value.
4) When the right-and-left turning angles of tire are out of standard, adjust to standard value.

5. WHEEL ALIGNMENT OF REAR SUSPENSION

1) Check the alignment of rear suspension to ensure that following items are within standard values.
- Toe-in
- Camber
- Thrust angle

<Ref. to RS-7, Wheel Alignment.>
2) When the camber angle does not conform to standard value, visually inspect the following components. If the deformation is observed, replace the damaged parts.
- Suspension components [Shock absorber, rear upper arm, front lateral link, rear lateral link, rear trailing link, sub frame]
- Parts connecting suspension and body

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

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 ones.
- 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 ones. 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.

18.Wheel Bearing

A: INSPECTION

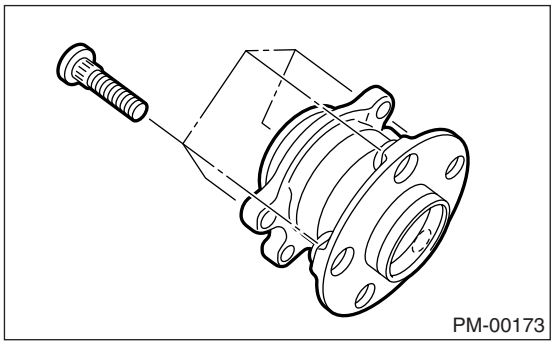
1. FRONT WHEEL BEARING

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-24, 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.

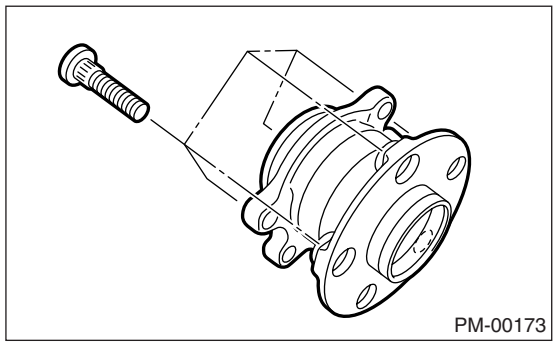


2. REAR WHEEL BEARING

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-28, 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.



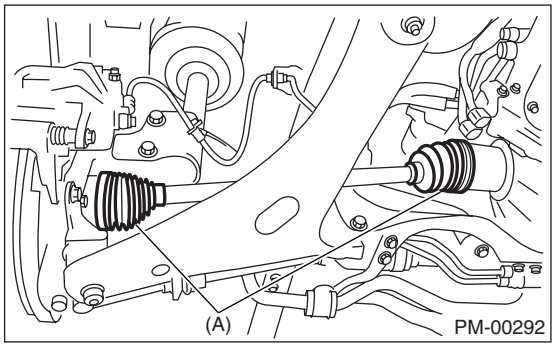
19.Axle Boots & Joints

A: INSPECTION

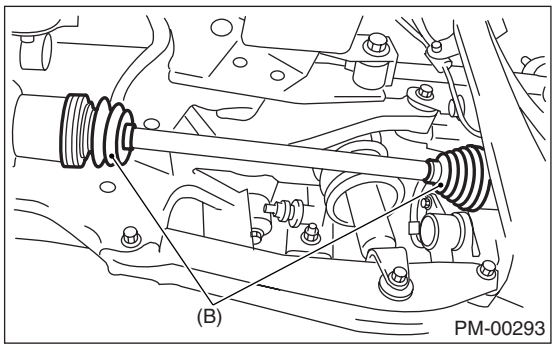
1. FRONT AND REAR AXLE BOOTS

Inspect the front axle boots (A) and rear axle boots (B) for deformation, damage or failure. If faulty, replace with new one. <Ref. to DS-24, Front Drive Shaft.> <Ref. to DS-28, Rear Drive Shaft.>

- Front



- Rear



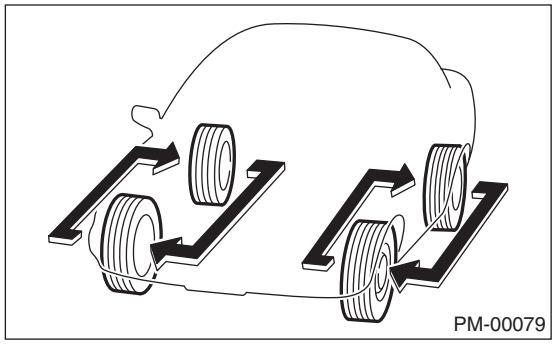
2. PROPELLER SHAFT

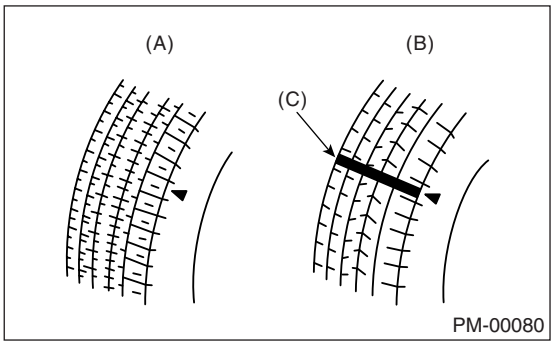
Inspect the propeller shaft for damage or failure. If faulty, replace with new one. <Ref. to DS-10, Propeller Shaft.>

20.Tire Rotation

A: INSPECTION

1) When the tread has worn down to 1.8 mm (2/0.071 in) or the wear indicator appears across the tread, replace the tire. (Replace the right and left tire as a set.)
2) If the tire appears to be worn unevenly, adjust the wheel alignment.
3) Next, make a tire rotation between front and rear as shown in the figure, make sure tires are worn evenly.


PM-00079



PM-00080

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

4) Re-register the transmitter ID when rotation was performed. <Ref. to TPM(diag)-9, REGISTER TRANSMITTER ID, OPERATION, Subaru Select Monitor.>

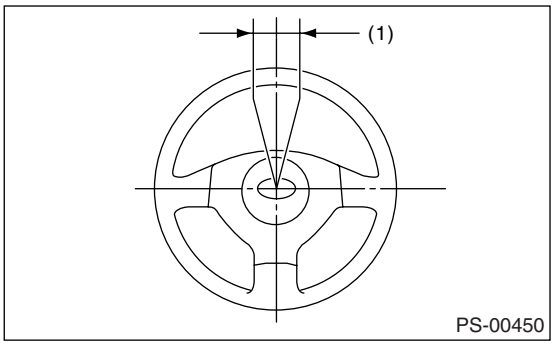
21.Steering System (Power Steering)

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.

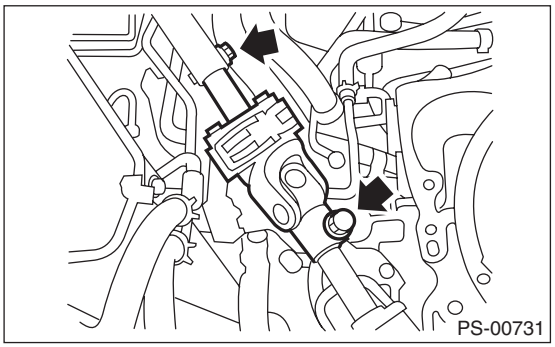
Maximum permissible play:
0.5 mm (0.020 in)

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.

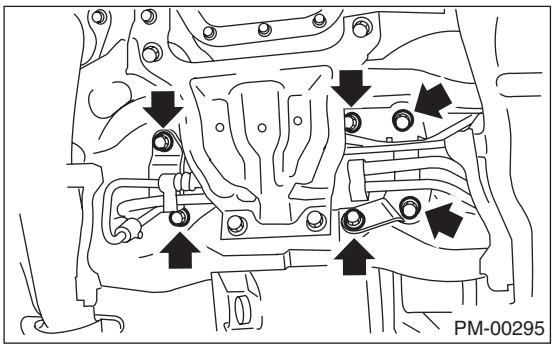
Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)



3. GEARBOX

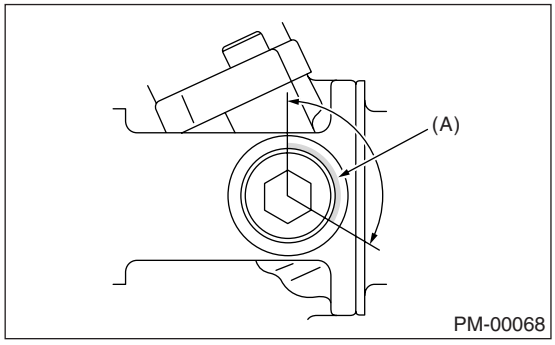
1) With the vehicle placed on a level surface, turn the steering wheel 90° in both the left and right directions.
While the wheel is being rotated, reach under the vehicle and check for looseness in gearbox.

Tightening torque:
60 N·m (6.1 kgf-m, 44.1 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.
4) Apply liquid gasket to at least 1/3 of entire perimeter of adjusting screw thread.
5) Tighten the adjusting screw to 25 N·m (2.5 kgf-m, 18.1 ft-lb) and then loosen.

6) Tighten the adjusting screw to 3.9 N·m (0.40 kgf-m, 2.9 ft-lb) and then loosen 20°.



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

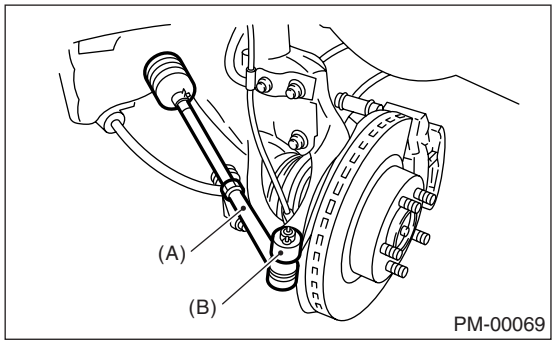
7) Install the lock nut. While holding the adjusting screw with wrench, tighten the lock nut using ST.
ST 926230000 SPANNER

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

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

4. TIE-ROD

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



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

2) Check the connections of knuckle ball joints for play, inspect for damage on dust seals, and check 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 (2.75 kgf-m, 19.9 ft-lb)

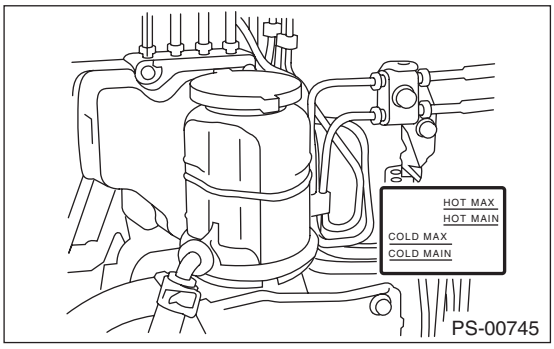
3) Check the lock nut on the tie-rod for tightness. If it is loose, retighten it to the specified torque.

Tightening torque:
85 N·m (8.7 kgf-m, 63 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, add fluid to bring it up to MAX.



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-3, FLUID, RECOMMENDED MATERIALS, Recommended Materials.>

Fluid capacity:
0.9 ℓ (1.0 US qt, 0.8 Imp qt)

6. POWER STEERING FLUID FOR LEAKS

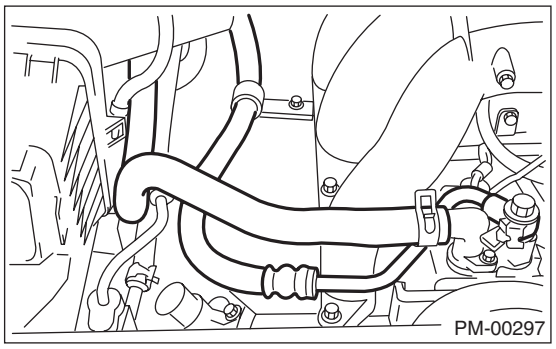
Inspect the underside of oil pump and gearbox of power steering system, hoses, pipes and their couplings for fluid leaks.
If the fluid leaks are found, retighten their fitting bolts (or nuts) and/or replace their parts.

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 one if necessary.

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



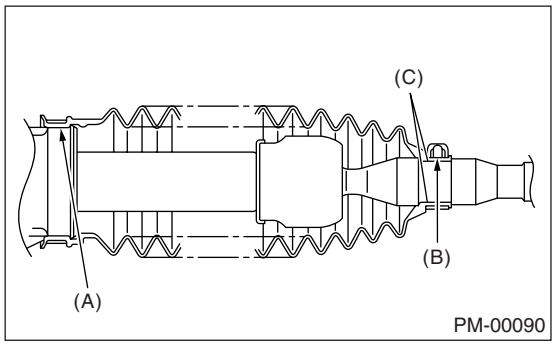
8. POWER STEERING PIPES FOR DAMAGES

Check the power steering pipes for corrosion and damage.
Replace the pipes with new ones 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

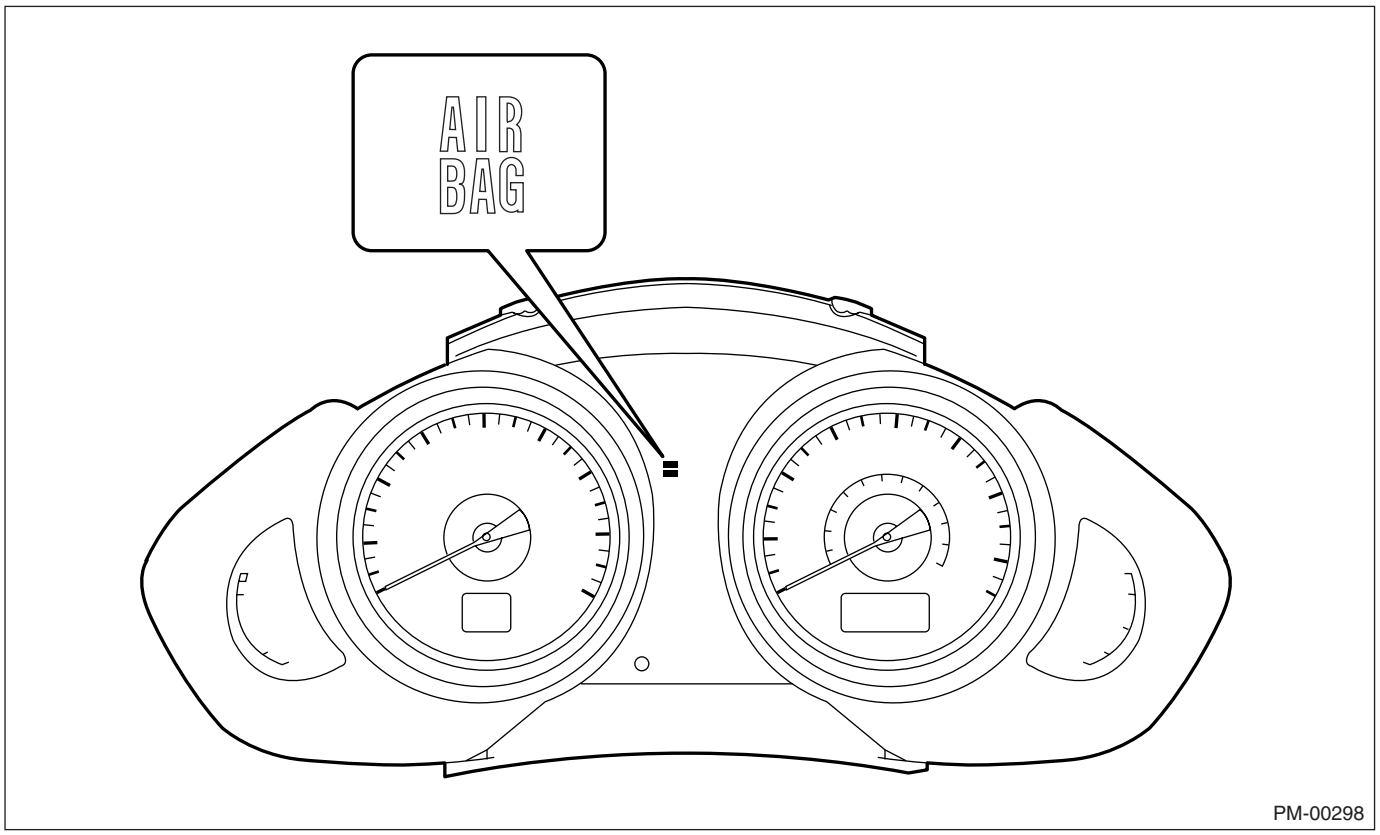
Inspect the fitting bolts and nuts of oil pump and bracket for looseness, and retighten them if necessary.
Inspect and/or retighten them when engine is cold.

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)-31, 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-49, REPLACEMENT, A/C Filter.>

1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER CLUTCH

Type	Symmetric, 3 element, single stage, 2 phase torque converter
Stall torque ratio	1.9
Nominal diameter	250 mm (9.84 in)
Stall speed (at sea level)	2,300 — 2,800 rpm
One–way clutch	Sprague 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	4 sets
One-way clutch (sprague type)	3 sets

4. TRANSMISSION GEAR RATIO

1st	3.841
2nd	2.352
3rd	1.529
4th	1.000
5th	0.839
Rev.	2.764

5. PLANETARY GEAR AND PLATE

Number of front internal gear teeth	102
Number of front carrier teeth	24
Number of front sun gear teeth	54
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	98
Number of rear carrier teeth	18
Number of rear sun gear teeth	62
Number of front brake drive plates	2
Number of input clutch drive plates	5
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	4
Number of low coast brake drive plates	3

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 (Part No. K0140Y0700) Recommended fluid: IDEMITSU ATF HP CASTROL TRANSMAX J PENNZOIL QUAKERSTATE • PENNZOIL ATF-J NOTE: Using of recommended fluid is permitted only on the area where the specified is not available.
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

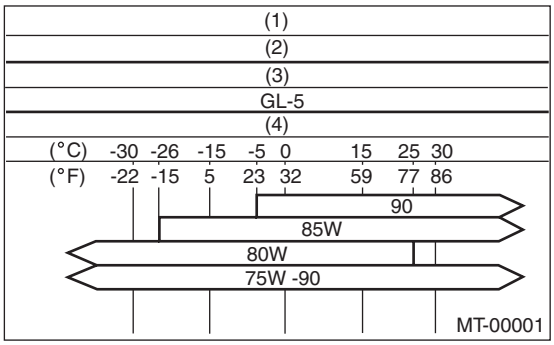
9. TRANSFER

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

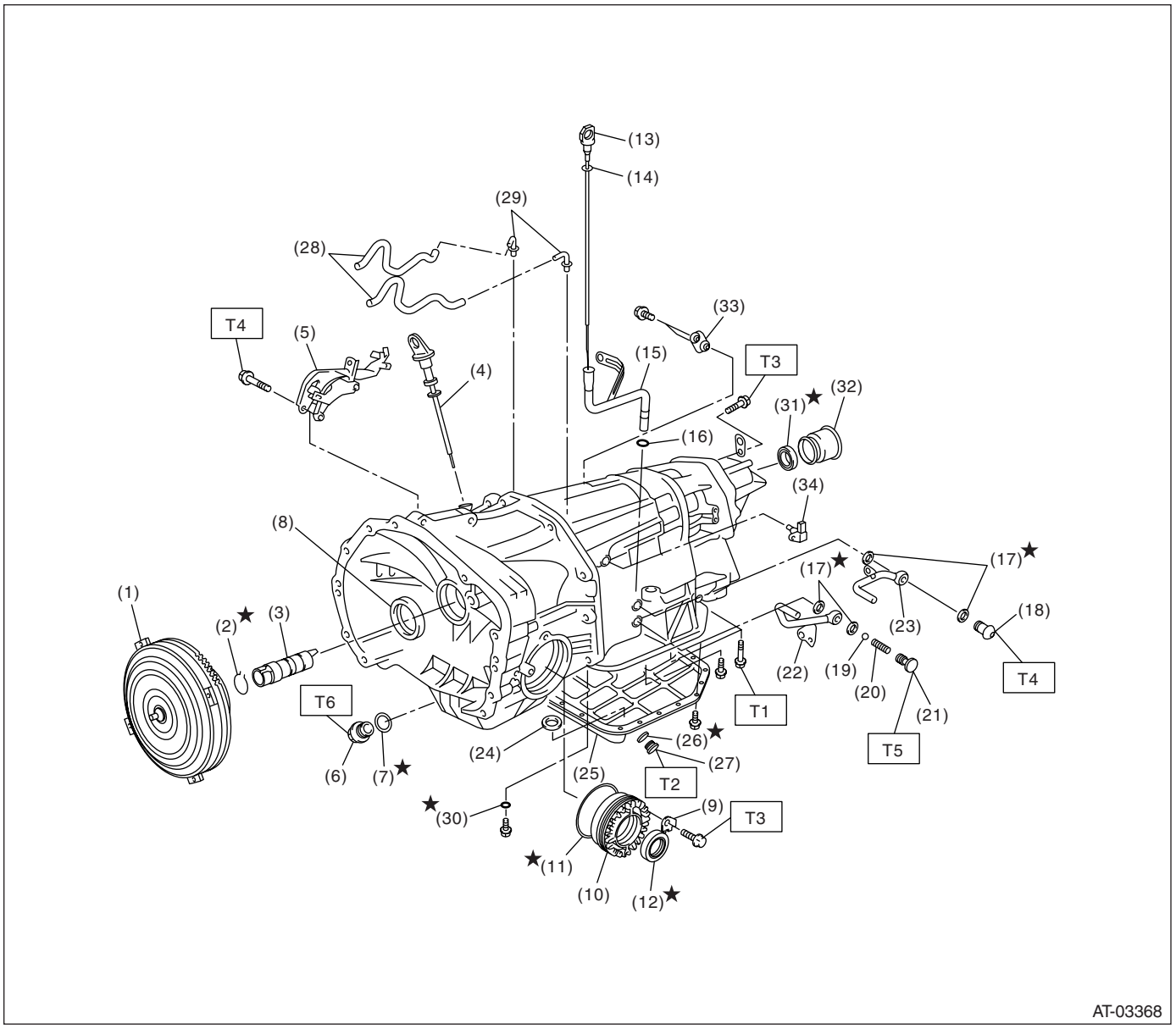
Front final reduction gear ratio	3.583

11.RECOMMENDED GEAR OIL

Lubrication oil	 (1) Item (2) Front differential gear oil (3) API standard (4) SAE viscosity No. and applicable temperature
Front differential gear oil capacity ℓ (US qt, Imp qt)	1.3 — 1.5 (1.4 — 1.6, 1.1 — 1.3)

B: COMPONENT

1. TORQUE CONVERTER CLUTCH & TRANSMISSION ASSEMBLY

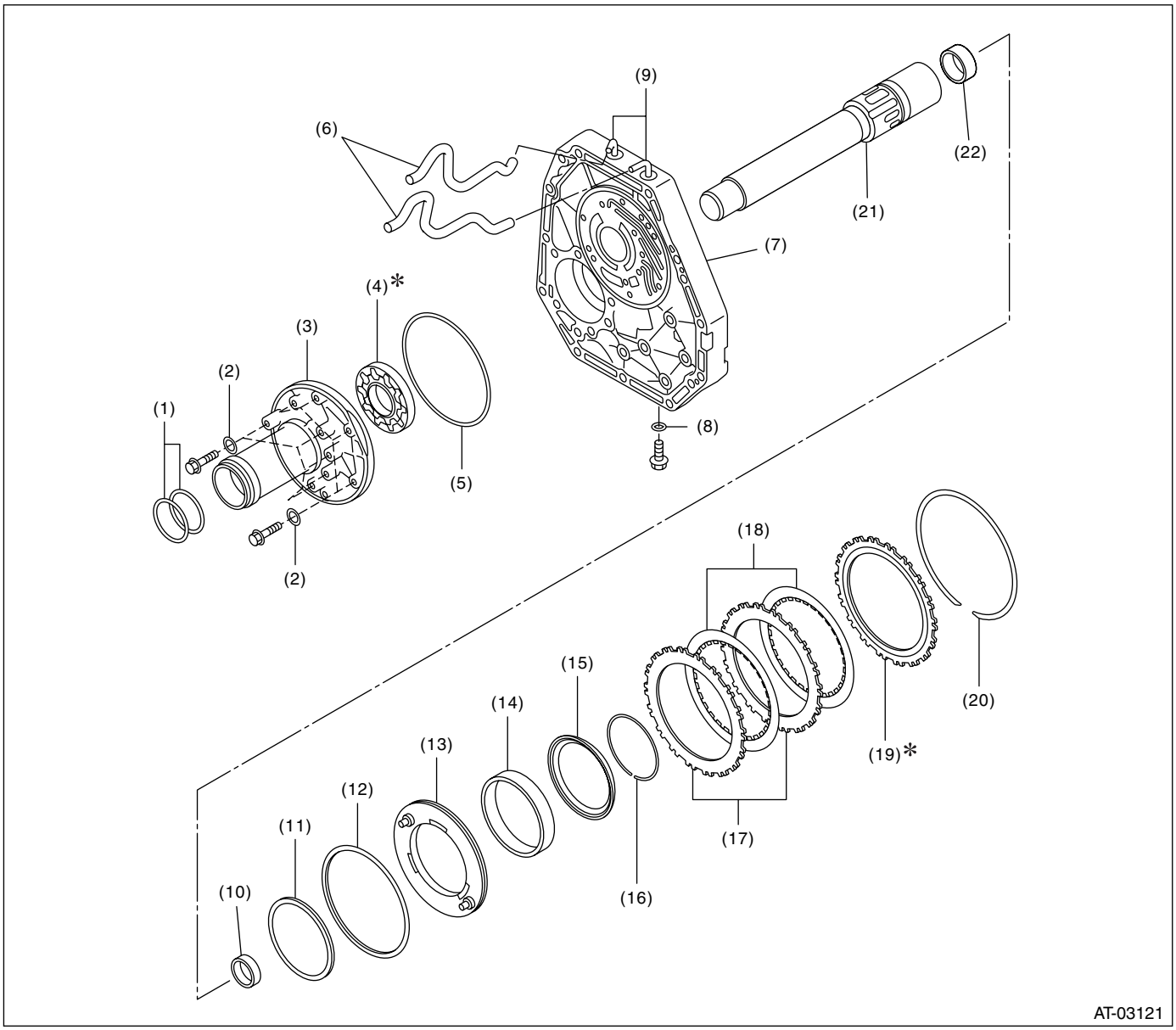


AT-03368

(1) Torque converter ASSY
(2) Circlip
(3) Oil pump shaft
(4) Differential oil level gauge
(5) Pitching stopper bracket
(6) Differential oil drain plug
(7) Gasket
(8) Oil seal
(9) Lock plate
(10) Side retainer
(11) O-ring
(12) Oil Seal
(13) ATF level gauge
(14) O-ring
(15) Oil charge pipe
(16) O-ring
(17) Gasket
(18) Union screw
(19) Ball
(20) Spring
(21) Union screw
(22) ATF outlet pipe
(23) ATF inlet pipe
(24) Magnet
(25) Oil pan
(26) Gasket
(27) ATF drain plug
(28) Breather hose
(29) Nipple
(30) O-ring
(31) Oil seal
(32) Dust cover
(33) Floating bracket
(34) Turbine speed sensor 1

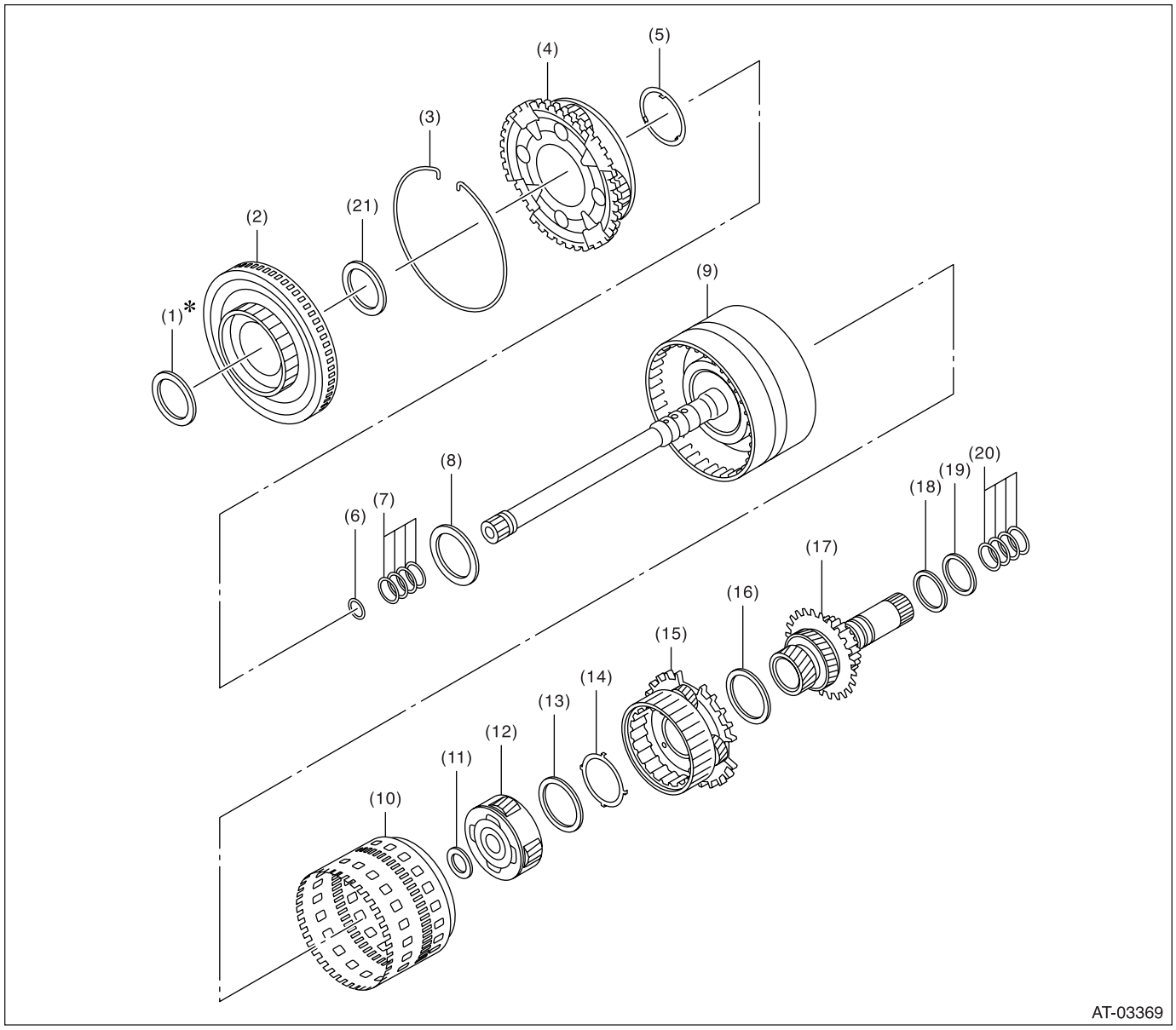
Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.7)
T2: 20 (2.0, 14.8)
T3: 25 (2.5, 18)
T4: 40 (4.1, 29.5)
T5: 45 (4.6, 33.2)
T6: 70 (7.1, 51.6)

2. OIL PUMP & FRONT BRAKE



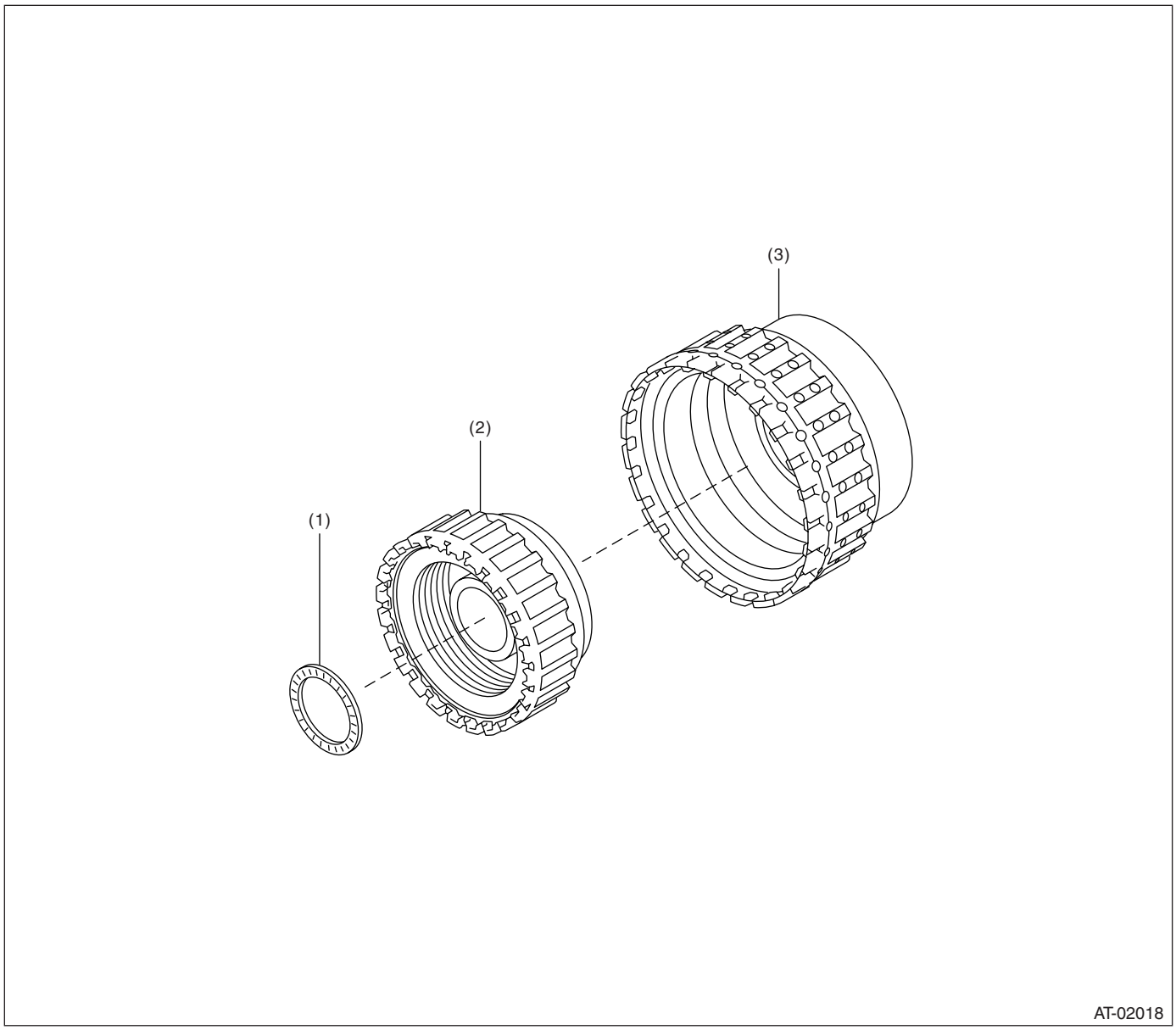
(1) O-ring
(2) Washer
(3) Oil pump housing
(4) Oil pump rotor
(5) O-ring
(6) Air breather hose
(7) Oil pump cover
(8) O-ring
(9) Nipple
(10) Needle bearing
(11) D-ring (Inner)
(12) D-ring (Outer)
(13) Front brake piston
(14) Return spring
(15) Retainer
(16) Snap ring
(17) Driven plate
(18) Drive plate
(19) Retainer plate
(20) Snap ring
(21) Stator shaft
(22) Needle bearing

3. FRONT PLANETARY CARRIER AND MIDDLE & REAR PLANETARY CARRIER



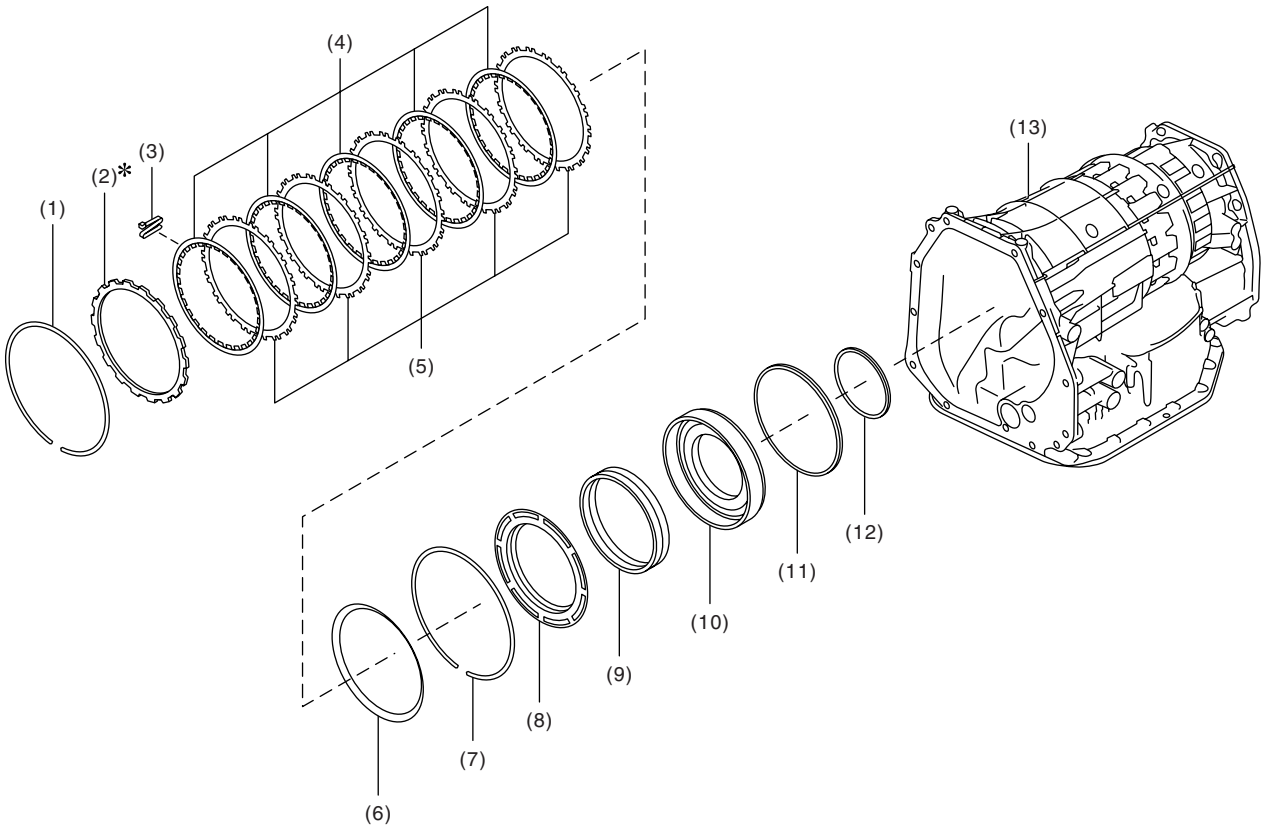
(1) Thrust bearing
(2) Front sun gear ASSY
(3) Snap ring
(4) Front carrier ASSY
(5) Race bearing
(6) O-ring
(7) Seal ring
(8) Thrust bearing
(9) Input clutch ASSY
(10) Rear internal gear ASSY
(11) Thrust bearing
(12) Middle carrier ASSY
(13) Thrust bearing
(14) Race bearing
(15) Rear carrier ASSY
(16) Thrust bearing
(17) Middle & rear sun gear ASSY
(18) Washer
(19) Thrust bearing
(20) Seal ring
(21) Thrust bearing

4. DIRECT CLUTCH AND HIGH & LOW REVERSE CLUTCH



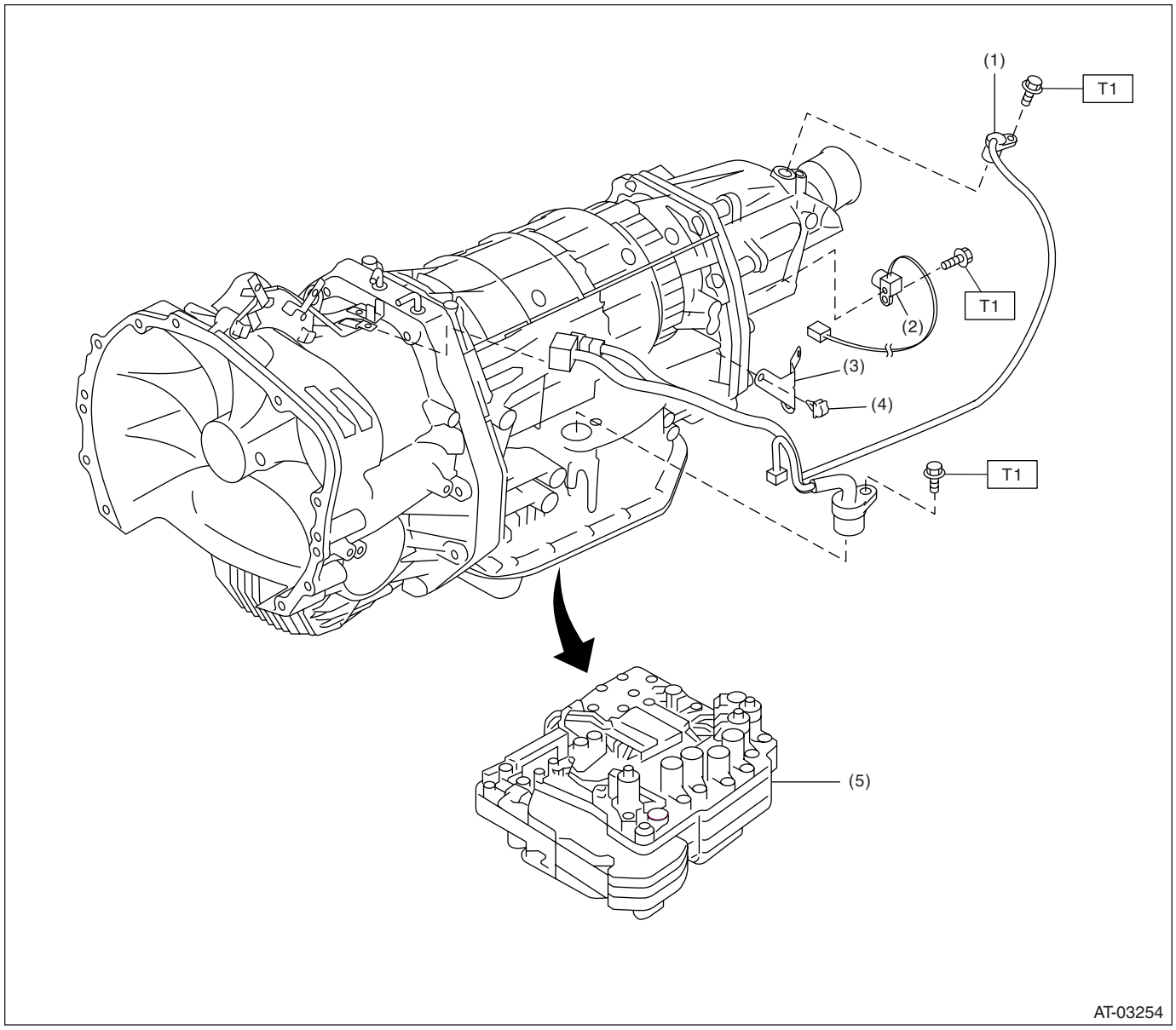
(1) Thrust bearing (2) High & low reverse clutch ASSY (3) Direct clutch ASSY

5. REVERSE BRAKE



(1) Snap ring
(2) Retainer plate
(3) Leaf spring
(4) Drive plate
(5) Driven plate
(6) Dish plate
(7) Snap ring
(8) Retainer
(9) Leaf spring
(10) Reverse brake piston
(11) D-ring (Outer)
(12) D-ring (Inner)
(13) AT main case

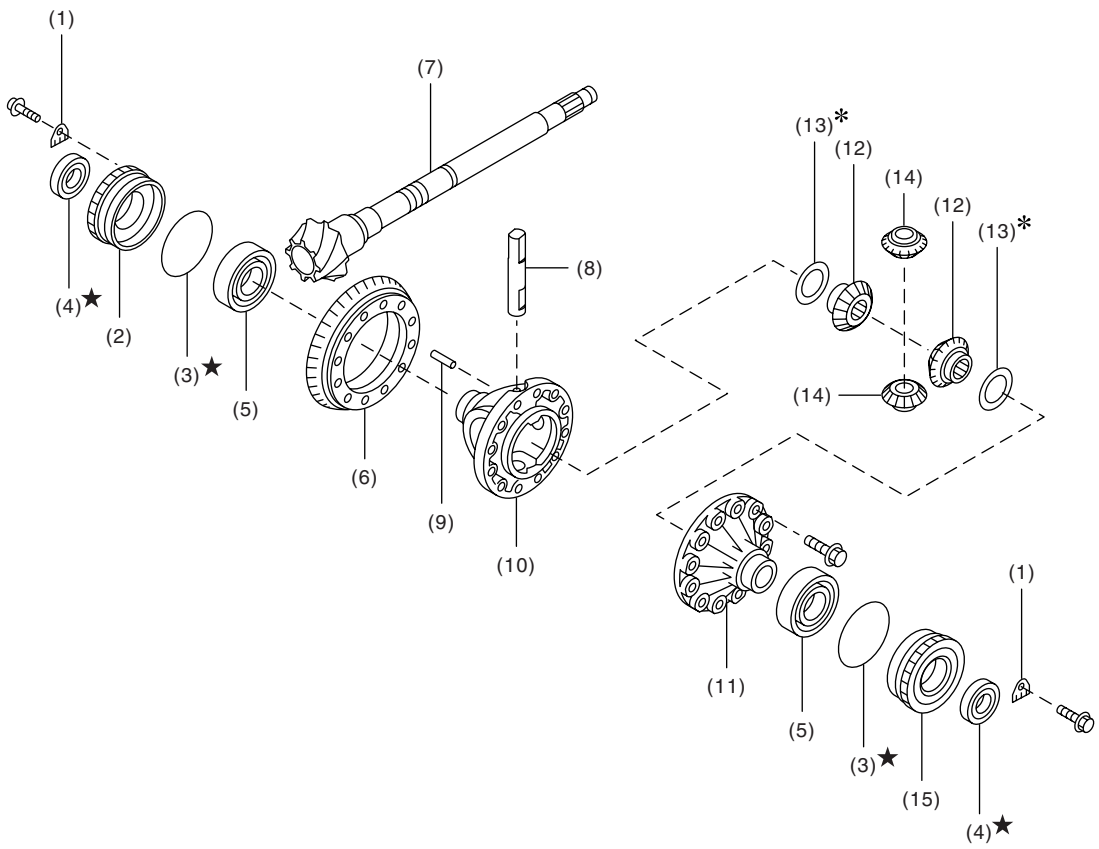
6. CONTROL VALVE & TRANSMISSION HARNESS



(1) Transmission harness ASSY
(2) Front vehicle speed sensor
(3) Harness bracket
(4) Clip
(5) Control valve ASSY

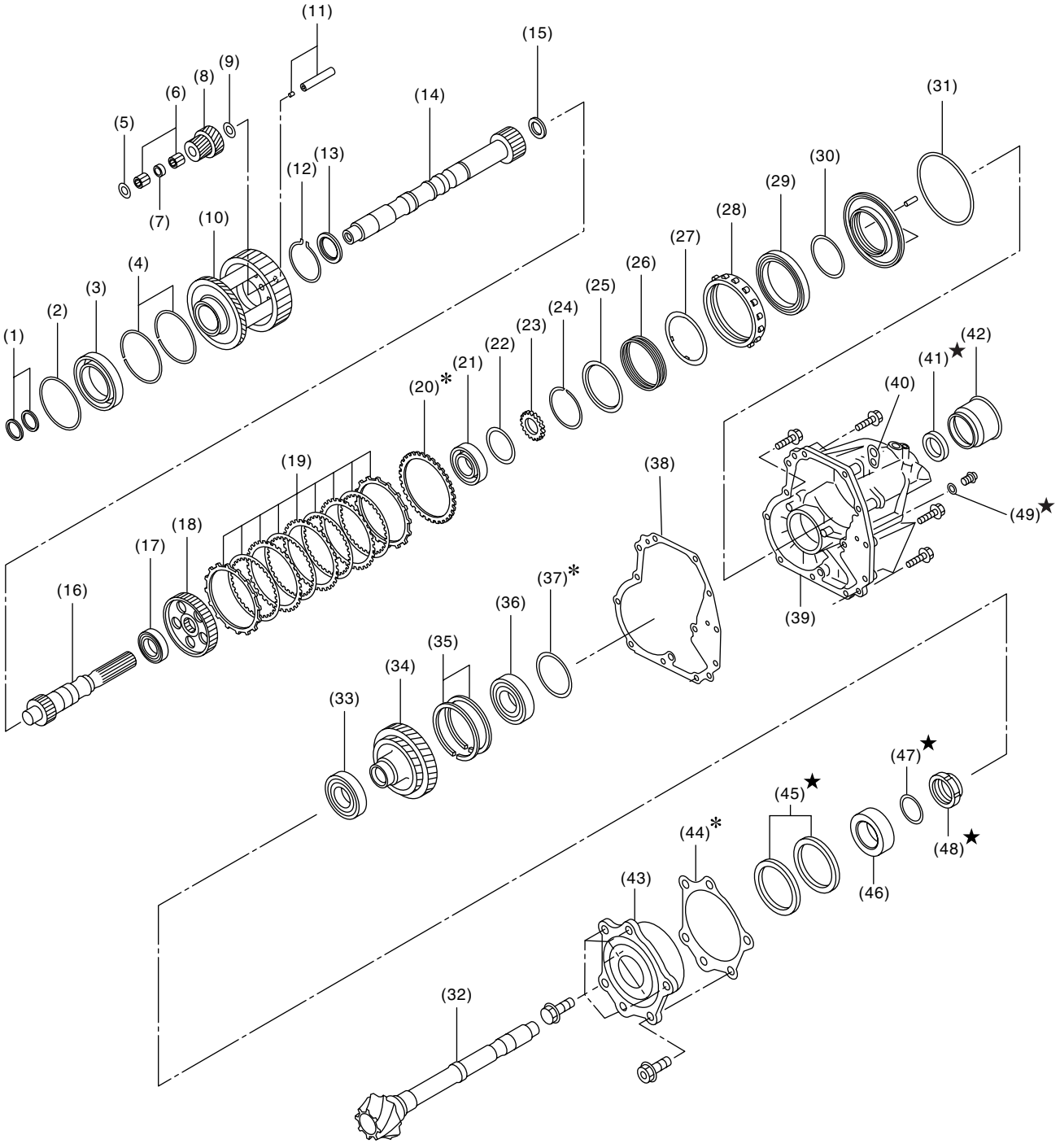
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7(0.7, 5.2)

7. DIFFERENTIAL GEAR



(1) Retainer plate RH
(2) Differential side retainer RH
(3) O-ring
(4) Oil seal
(5) Taper roller bearing
(6) Hypoid driven gear
(7) Drive pinion shaft
(8) Pinion shaft
(9) Straight pin
(10) Differential case RH
(11) Differential case LH
(12) Differential bevel gear
(13) Washer
(14) Differential bevel pinion
(15) Differential side retainer LH

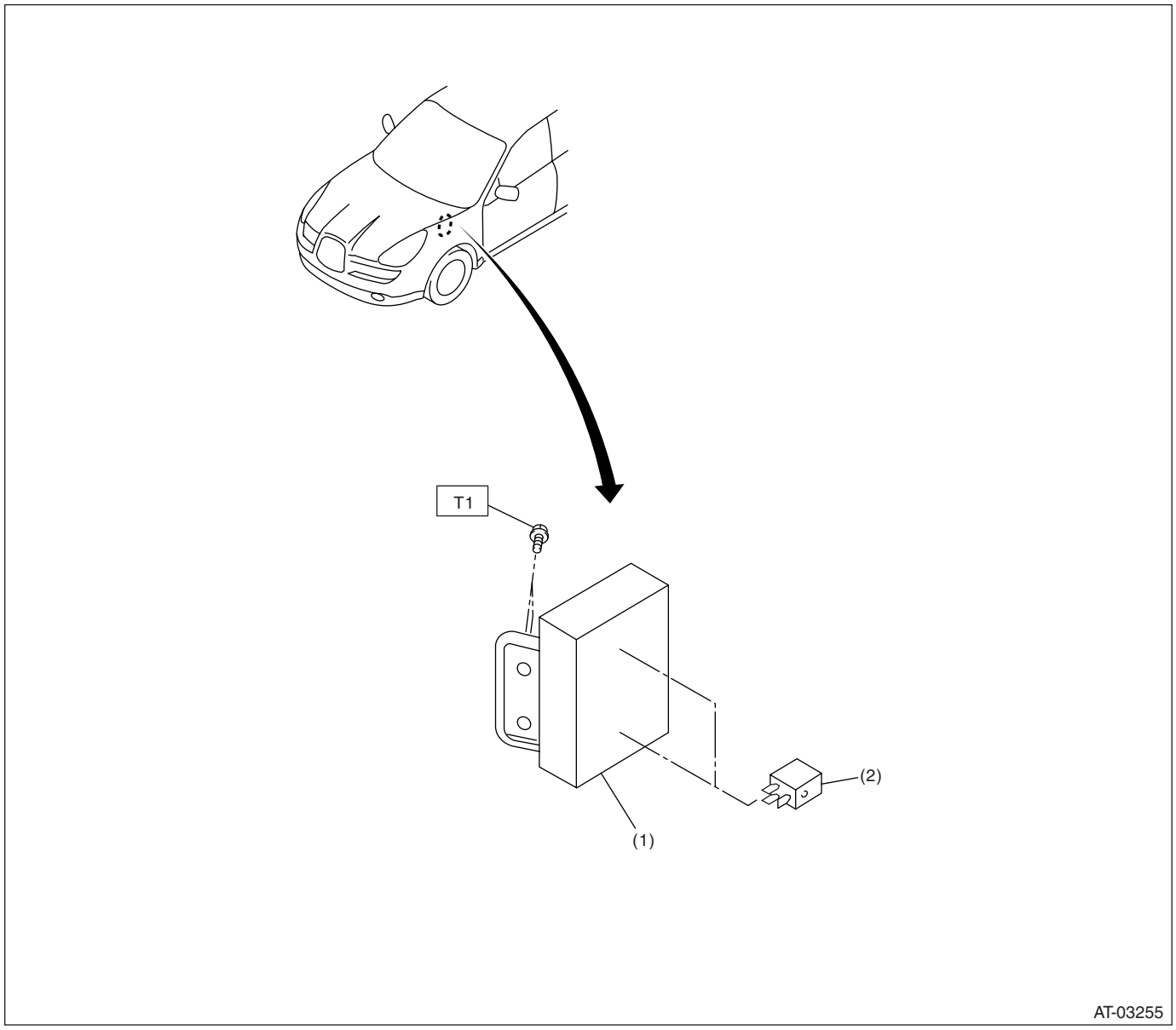
8. TRANSFER CASE, EXTENSION CASE & REDUCTION GEAR



AT-03247

(1) Seal ring
(2) Reduction gear shim
(3) Ball bearing
(4) Snap ring
(5) Planetary pinion washer
(6) Needle bearing
(7) Spacer
(8) Pinion gear
(9) Washer
(10) Planetary carrier ASSY
(11) Planetary pinion shaft ASSY
(12) Snap ring
(13) Thrust bearing
(14) Intermediate shaft
(15) Thrust washer
(16) Rear drive shaft
(17) Ball bearing
(18) Transfer clutch hub
(19) Transfer clutch plate
(20) Driven plate No. 3.
(21) Ball bearing
(22) Rear drive shaft shim
(23) Revolution gear
(24) Snap ring
(25) Clutch spring retainer
(26) Return spring
(27) Spring retainer
(28) Pressure plate
(29) Ball bearing
(30) O-ring
(31) D-ring
(32) Drive pinion shaft
(33) Ball bearing
(34) Reduction driven gear
(35) Snap ring
(36) Ball bearing
(37) Shim
(38) Shim
(39) Extension case
(40) Transmission hanger
(41) Oil seal
(42) Dust cover
(43) Taper roller bearing
(44) Drive pinion shim
(45) Oil seal
(46) Drive pinion collar
(47) O-ring
(48) Lock nut
(49) O-ring

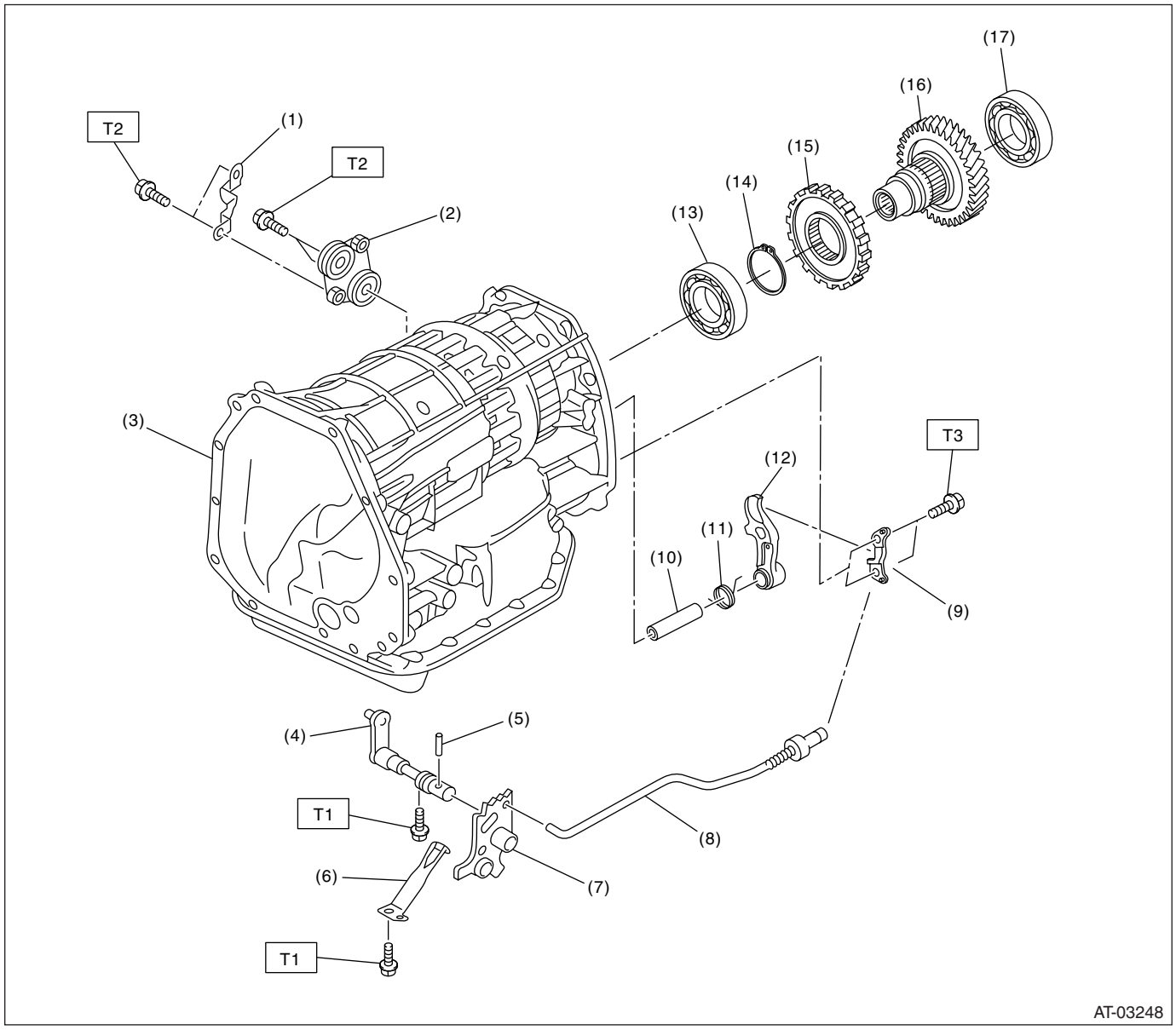
9. TRANSMISSION CONTROL MODULE



(1) Transmission control module (TCM)
(2) Relay

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)

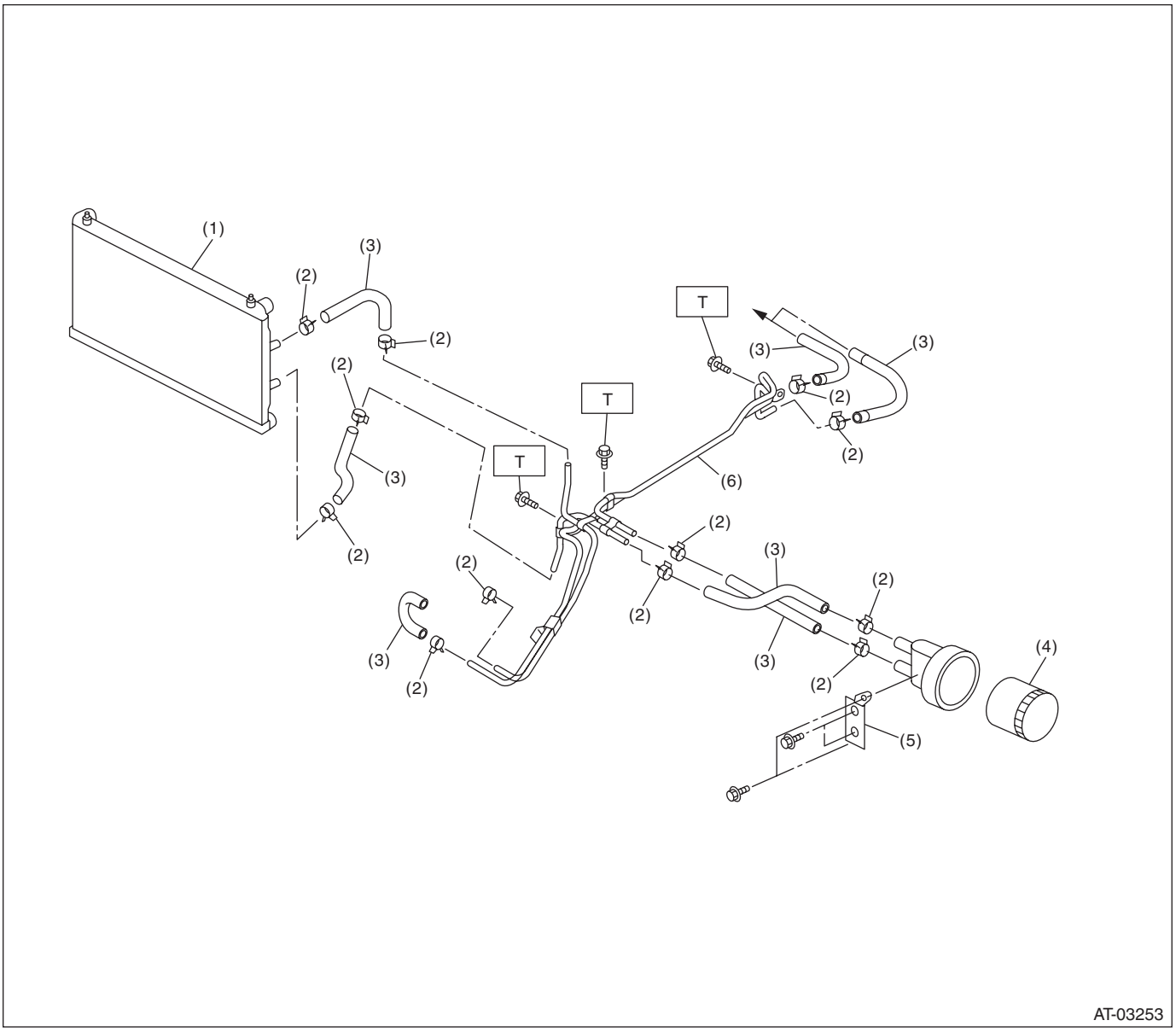
10.TRANSMISSION CONTROL DEVICE & PARKING SUPPORT



(1) Bracket
(2) Floating bracket
(3) AT main case
(4) Range select lever
(5) Straight pin
(6) Detent spring
(7) Manual plate
(8) Parking rod
(9) Parking support actuator
(10) Parking pawl shaft
(11) Return spring
(12) Parking pawl
(13) Ball bearing
(14) Snap ring
(15) Parking gear
(16) Reduction driven gear
(17) Ball bearing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.6, 4.4)
T2: 25 (2.5, 18)
T3: <Ref. to 5AT-73, Parking Pawl.>

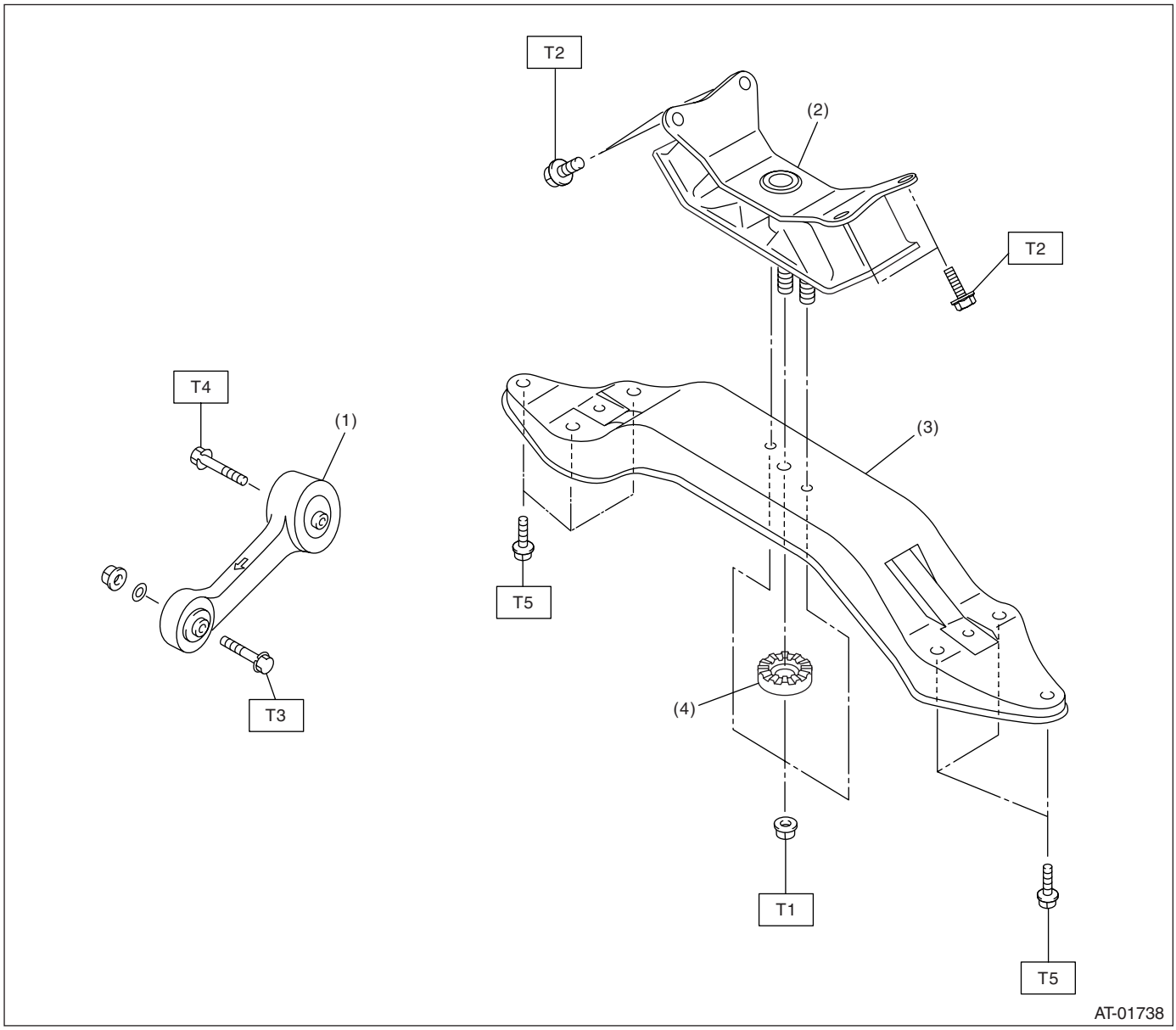
11.OIL COOLER PIPE AND OIL COOLER



(1) Radiator
(2) Clip
(3) ATF hose
(4) ATF filter
(5) ATF filter bracket
(6) ATF cooler pipe

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

12.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, 26)
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 work clothing, including a cap, protective goggles and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- 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.
- Be careful not to burn yourself, because each part on the vehicle is hot after running.
- Use SUBARU genuine gear oil, grease or the equivalent. Do not mix them with that of another grade or from other 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 revolution surfaces before installation.
- Replace deformed or damaged snap rings with new parts.
- Before installing O-rings or oil seals, apply sufficient amount of ATF fluid to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying liquid gasket, completely remove the old seal.

D: PREPARATION TOOL

1. SPECIAL TOOL

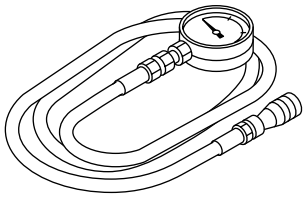
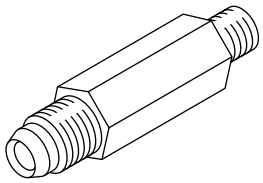
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	ADAPTER	Used with oil pump cover installed on when measuring line pressure.

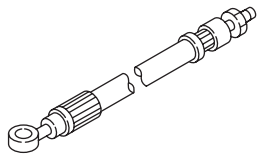
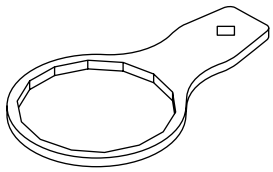
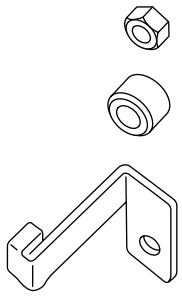
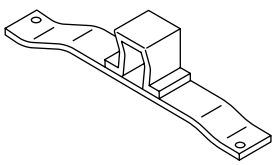
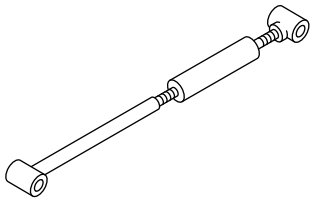
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498897700	498897700	OIL PRESSURE ADAPTER	Used for measuring transfer clutch pressure.
 ST-498545400	498545400	FILTER WRENCH	Used for removing and installing the ATF filter.
 ST-498277200	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.
 ST41099AA010	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 ST41099AA020	41099AA020	ENGINE SUPPORT	Used for supporting engine.

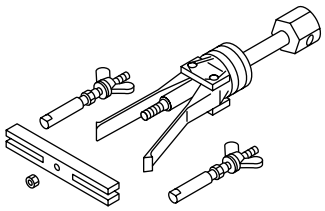
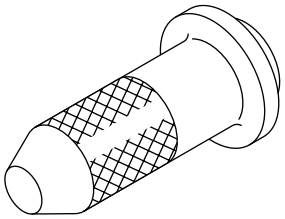
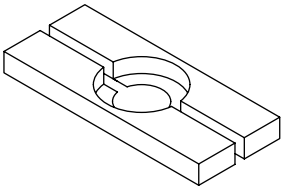
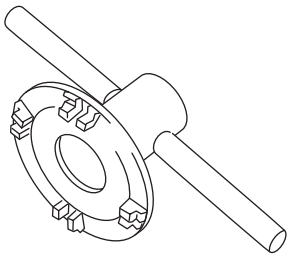
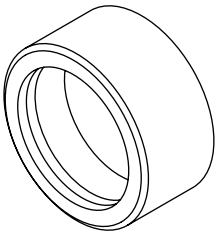
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398527700	398527700	PULLER ASSY	• Used for removing the extension case roller bearing. • Used for removing the extension oil seal. • Used for removing the front differential side retainer bearing outer race. • Used for removing the front differential side retainer oil seal.
 ST-498057300	498057300	INSTALLER	Used for installing the extension oil seal.
 ST-498077000	498077000	REMOVER	Used for removing the differential taper roller bearing.
 ST18630AA010	18630AA010	WRENCH COMPL RETAINER	Used for removing and installing the differential side retainer.
 ST-398487700	398487700	DRIFT	Used for installing the front differential taper roller bearing.

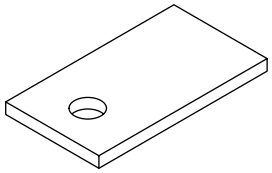
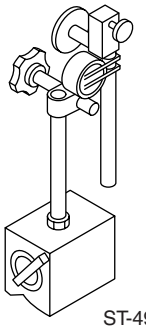
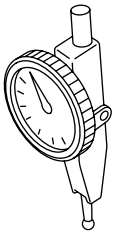
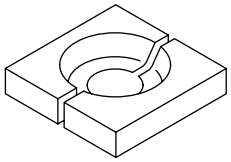
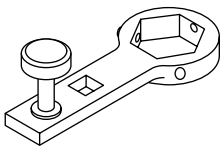
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498255400	498255400	PLATE	Used for measuring the backlash of hypoid gear.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring the gear backlash. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring the gear backlash. • Used with MAGNET BASE (498247001).
 ST-498517000	498517000	REPLACER	Used for removing the front roller bearing.
 ST-499787700	499787700	WRENCH	Used for removing and installing the drive pinion lock nut.

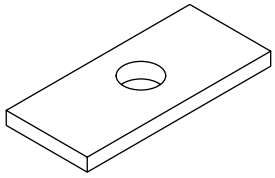
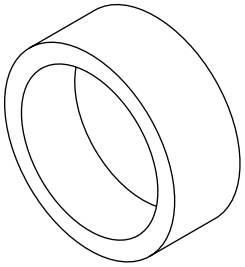
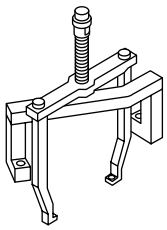
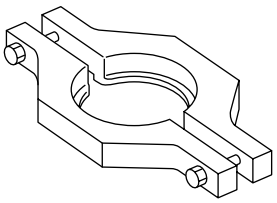
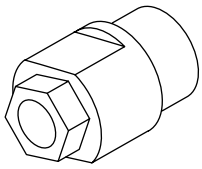
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398643600	398643600	GAUGE	Used for measuring the total end play, extension end play and drive pinion height.
 ST-378744300	378744300	PISTON GUIDE	Used for measuring height from mating surface of the main case to pressure plate.
 ST-499737100	499737100	PULLER SET	Used for removing the reduction driven gear assembly.
 ST-498077300	498077600	REMOVER	Used for removing the ball bearing.
 ST18667AA010	18667AA010	HOLDER	• Used for removing and installing the drive pinion lock nut. • Used as a handle to rotate gear when checking tooth contact.

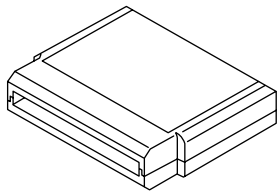
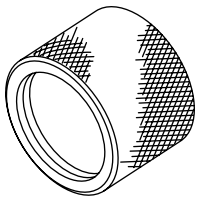
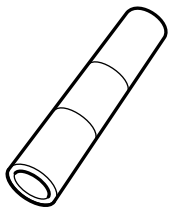
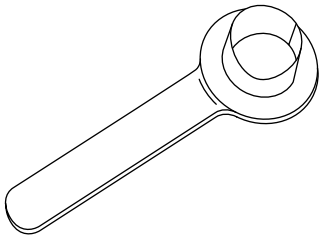
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for the electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for the electrical system.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing the differential side retainer oil seal.
 ST18654AA000	18654AA000	INSTALLER	Used for removing and installing the ball bearing.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.

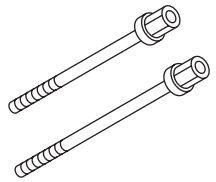
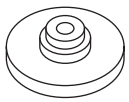
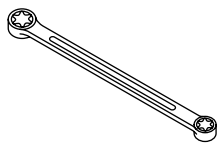
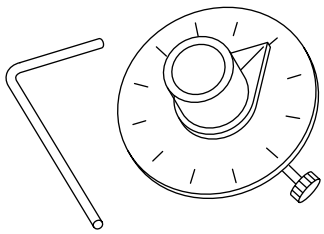
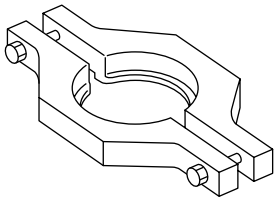
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18763AA000	18763AA000	COMPRESSOR SHAFT	Used for disassembling multi-plate clutch for shift transmission.
 ST18765AA000	18765AA000	COMPRESSOR SUPPORT	Used for disassembling multi-plate clutch for shift transmission.
 ST18676AA020	18676AA020	TORX® WRENCH	Used for disassembling torque converter case.
 ST18854AA000	18854AA000	ANGLE GAUGE	Used for tightening parking support.
 ST-498077300	498077300	REMOVER	Used for removing ball bearing of reduction driven gear.

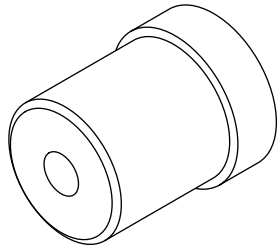
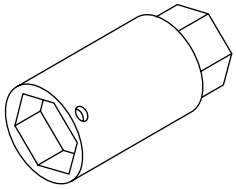
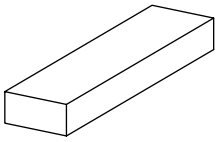
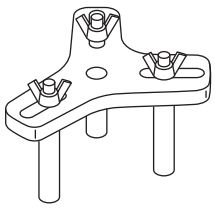
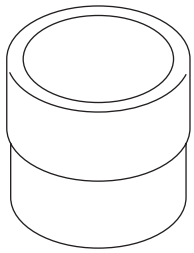
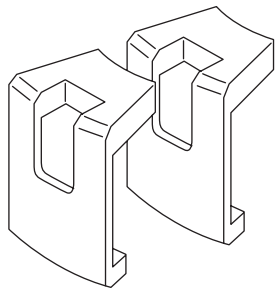
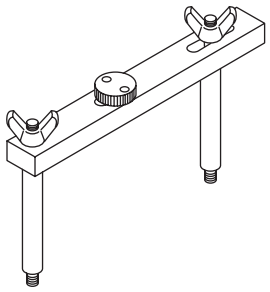
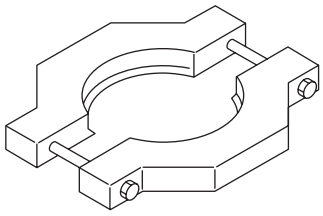
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing the oil seal.
 ST-499787500	499787500	ADAPTER	Used for removing and installing drive pinion lock nut.
 ST-499575400	499575400	GAUGE	Used for measuring height of total end play.
 ST18762AA000	18762AA000	COMPRESSOR SPECIAL TOOL	Used for disassembling multi-plate clutch for shift transmission.
 ST-499755602	499755602 (Newly adopted tool)	PRESS	Used for installing the parking gear.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18680AA010	18680AA010 (Newly adopted tool)	HOLDER GEAR	Used for removing reduction driven gear assembly. (2-piece set)
 ST18766AA000	18766AA000 (Newly adopted tool)	SUPPORT PULLER	Used for removing reduction driven gear assembly.
 ST18767AA000	18767AA000 (Newly adopted tool)	REMOVER	• Used to pull out the parking gear. • Used to pull out the bearing from the VTD assembly.

2. GENERAL TOOL

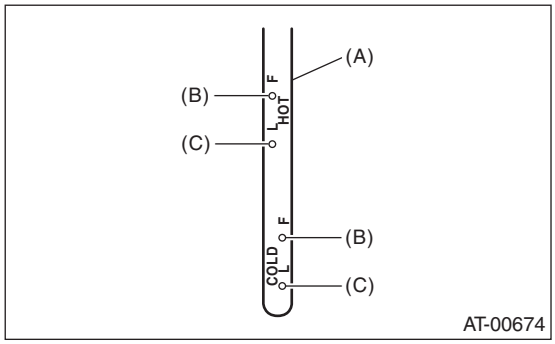
TOOL NAME	REMARKS
Depth gauge	Used for measuring the transmission end play.
Thickness gauge	Used for measuring clearance of the clutch, brake and oil pump.
Micrometer	Used for measuring thickness of the drive pinion.
Spring balance	Used for measuring the starting torque of the drive pinion.
Circuit tester	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.

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)-15, 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)-15, 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

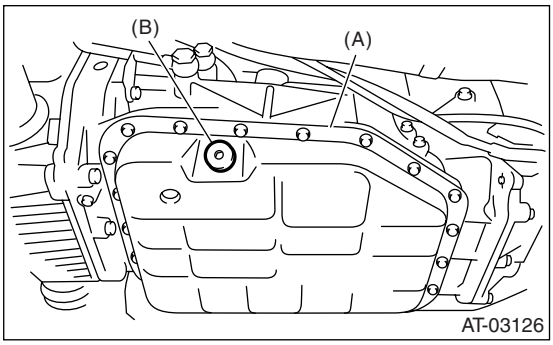
1) Lift-up the vehicle.
2) Remove the ATF drain plug to drain ATF.

CAUTION:
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 condition of ATF.
<Ref. to 5AT-27, 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 (Part No. K0140Y0700)

Recommended fluid:
IDEMITSU ATF HP
CASTROL TRANSMAX J
PENNZOIL QUAKERSTATE • PENNZOIL ATF-J

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-26, INSPECTION, Automatic Transmission Fluid.>

C: CONDITION CHECK

NOTE:
When replacing ATF, check the inside condition of transmission body by inspecting the drained ATF.

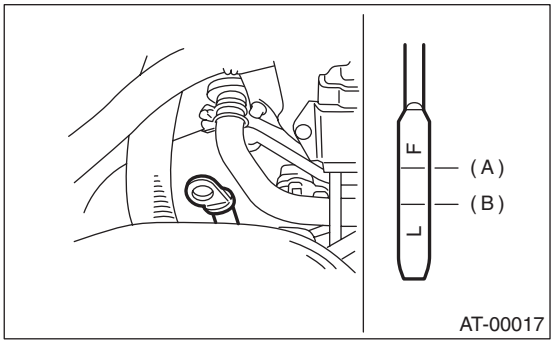
Fluid condition	Trouble and possible cause	Corrective action
Large amount of metallic pieces are found.	Internal metal parts of transmission body are excessively worn.	Replace ATF and check if AT operates correctly.
Is thick and is a varnish-form fluid.	Clutch etc. is burned.	Replace ATF and check the 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.

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

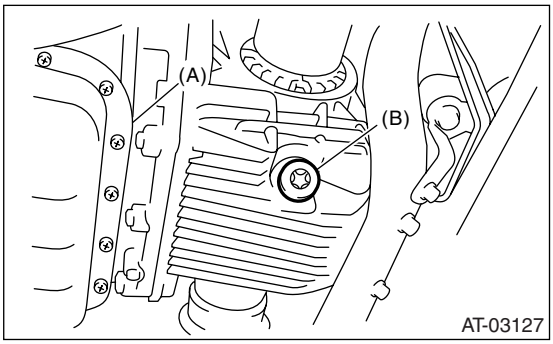
1) Lift-up the vehicle.
2) Remove the differential gear oil drain plug using TORX® BIT T70, and then drain differential gear oil.

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-28, 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 when shifting down from 5th to 4th range while driving in 5th gear of manual mode [50 to 60 km/h (31 to 37 MPH)].
• Check the 3rd gear engine brake when 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 when 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 when 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 AND 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.

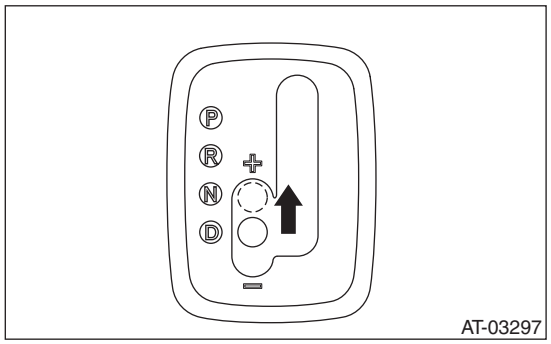
5. Stall Test

A: INSPECTION

NOTE:
The stall test is extremely important in diagnosing the condition of an automatic transmission and engine. It should be conducted to measure the engine stall speeds in “R” and “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)-15, 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.
12) Perform the procedure for “R” range in the same way as “2nd on manual mode”.

NOTE:

- Do not continue the stall test for MORE THAN FIVE SECONDS 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.

Stall speed (at sea level):
2,300 — 2,800 rpm

Stall speed (at sea level)	Range	Possible faulty part
Below specified value	R	• Engine • One-way clutch of torque converter clutch
Over specified value	2nd gear of manual mode	• Line pressure too low • Forward brake • Forward brake one-way clutch • Direct clutch • 3rd one-way clutch
	R	• Line pressure too low • Reverse clutch

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, forward 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 a one minute 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
Specification: 1.2 sec. 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
Specification: 1.5 sec. or less

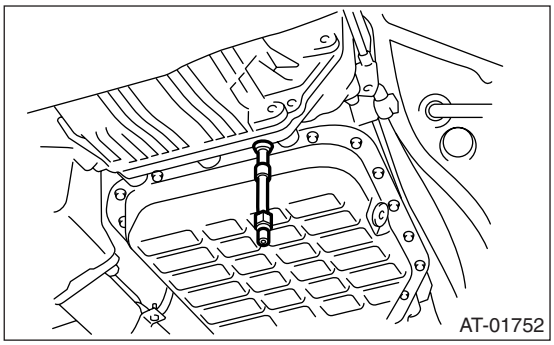
If “N” → “R” time lag is longer than specification:
- Line pressure too low
- Reverse brake worn

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.
• Slippage or inability to operate the vehicle may, in most cases, be due to loss of 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
5) Lower the vehicle, and pull ST1 and ST2 into the vehicle.
ST1 498897200 OIL PRESSURE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE
6) Connect the Subaru Select Monitor to the data link connector and read the current data. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) Perform the line pressure test.

NOTE:
• Do not perform the line pressure test for more than 5 seconds 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.
• Adjust the throttle valve angle in order to match the “P/L Solenoid Pressure” displayed on the Subaru Select Monitor.

Range of the selector lever	Throttle opening angle	ATF temperature condition	“P/L Solenoid Pressure” displayed on the Subaru Select Monitor kPa	Standard line pressure kPa (kg/cm^2, psi)
D	Full closed	45 — 55°C (104 — 131°F)	490	385 — 555 (3.93 — 5.66, 55.8 — 80.5)
	Full open		1,370	1,235 — 1,475 (12.59 — 15.04, 179.1 — 213.9)
R	Full closed		1,370	1,530 — 1,925 (15.60 — 19.6, 221.9 — 279.2)

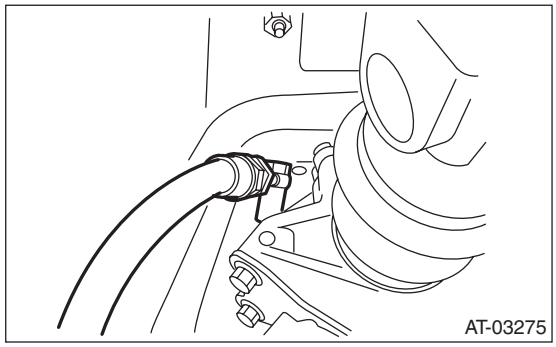
8. Transfer Clutch Pressure Test

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 498897700 OIL PRESSURE ADAPTER
ST 498897800 ADAPTER SET



4) Set the ST.
ST 498575400 OIL PRESSURE GAUGE
5) Lower the vehicle, and pull ST3 into the vehicle.
ST1 498897700 OIL PRESSURE ADAPTER
ST2 498897800 ADAPTER SET
ST3 498575400 OIL PRESSURE GAUGE
6) Connect the Subaru Select Monitor to the data link connector and read the current data. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) Perform the transfer clutch pressure test.

NOTE:
• Do not perform the transfer clutch pressure test for more than 5 seconds 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 throttle valve angle in order to obtain the “T/F Solenoid Pressure” displayed on the Subaru Select Monitor.

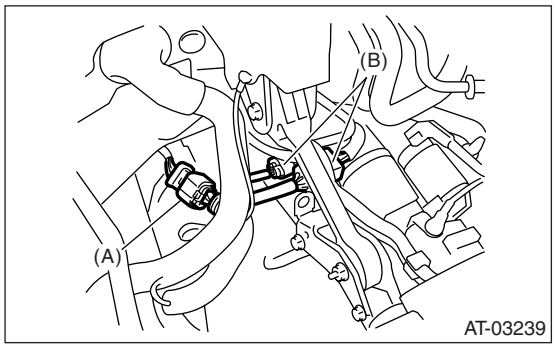
Range of the selector lever	Throttle opening angle	ATF temperature condition	“T/F Solenoid Pressure” displayed on the Subaru Select Monitor kPa	Standard line pressure kPa (kg/cm^2, psi)
D	Full open	45 — 55°C (104 — 131°F)	900	800 — 915 (8.16 — 9.33, 116.0 — 132.7)
	Partial throttle		500	400 — 535 (4.08 — 5.46, 58.0 — 77.6)
N	Full closed		0	0 — 50 (0 — 0.51, 0 — 7.3)

8) Remove the ST and install the test plug.
9) Install the heat shield cover.

9. Automatic Transmission Assembly

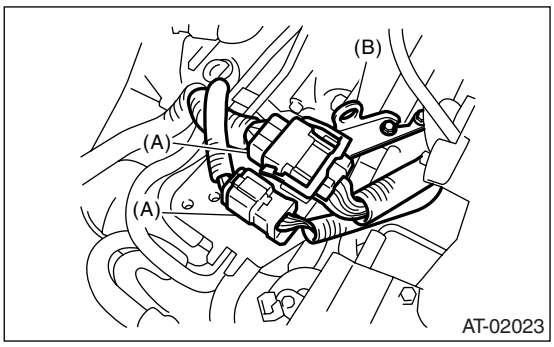
A: REMOVAL

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. <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
6) Remove the air breather hose. <Ref. to 5AT-60, REMOVAL, Air Breather Hose.>
7) Remove the starter. <Ref. to SC(H6DO)-6, REMOVAL, Starter.>
8) Disconnect the front oxygen (A/F) sensor and transmission harness connector.



(A) Front oxygen (A/F) sensor
(B) Transmission harness connectors

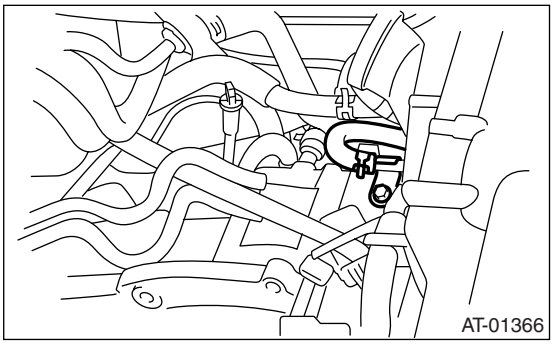
9) Disconnect the engine harness connectors, and then remove the engine hanger rear.



(A) Engine harness connectors
(B) Engine hanger rear

10) Remove the vacuum pipe & hose assembly and the brake vacuum pump. <Ref. to BR-39, REMOVAL, Brake Vacuum Pump.>

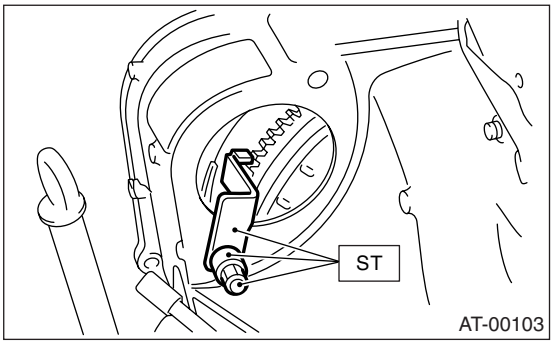
11) Remove the throttle body securing bolts to and slide the throttle body over.



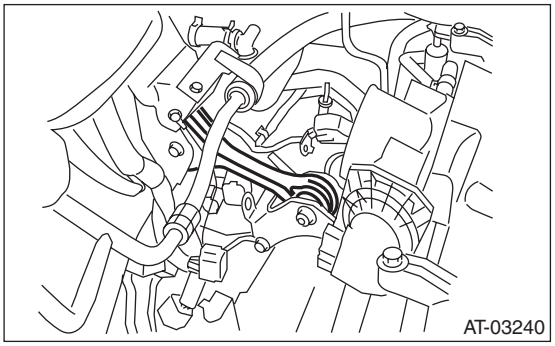
12) Separate the torque converter from drive plate.
(1) Remove the service hole plug.
(2) Remove the bolts which hold torque converter to drive plate.
(3) Remove the four bolts by rotating the clamp pulley a little at a time.
(4) Make sure the torque converter moves freely by rotating with finger through the starter installation hole.

CAUTION:
Be careful not to drop bolts into converter housing.

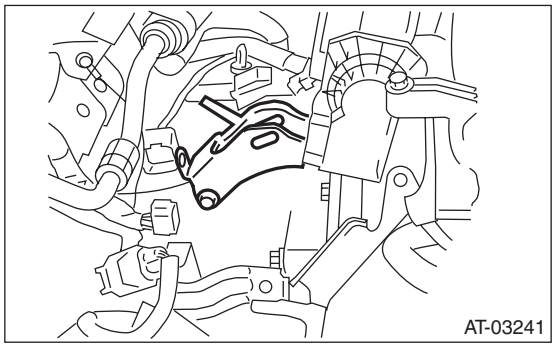
13) Install the ST to the converter case.
ST 498277200 STOPPER SET



14) Remove the pitching stopper.

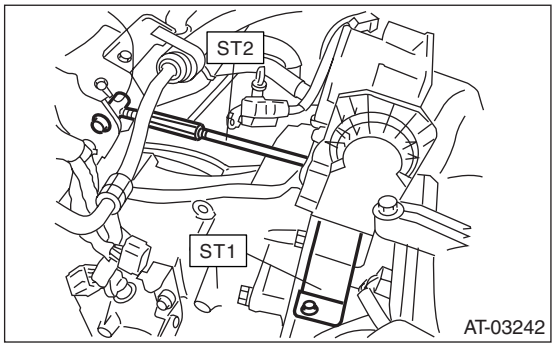


15) Remove the pitching stopper bracket.

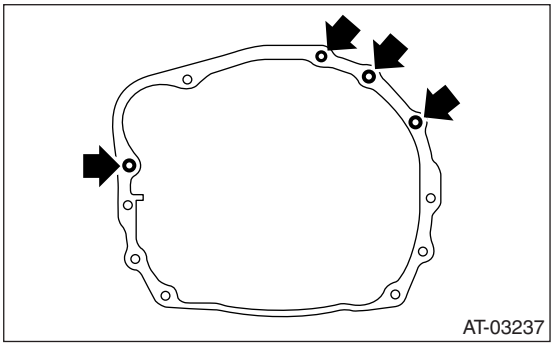


16) Set the ST.

ST1 41099AA010 ENGINE SUPPORT BRACKET
ST2 41099AA020 ENGINE SUPPORT

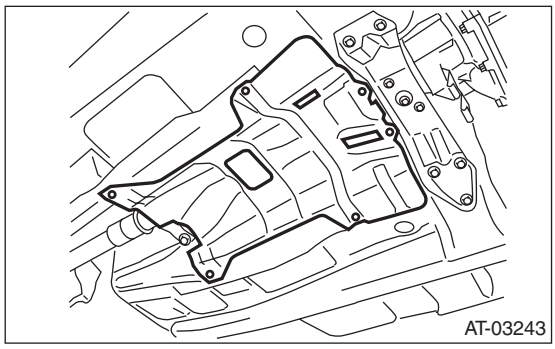


17) Remove the transmission mounting bolt (upper side).

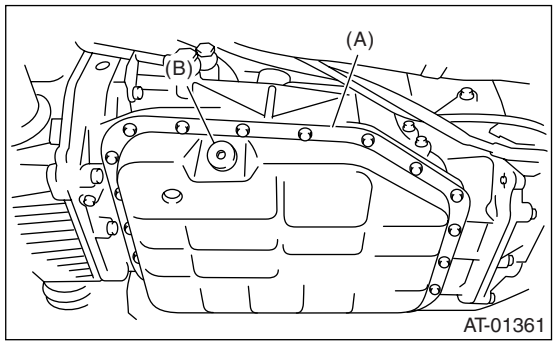


18) Lift-up the vehicle.
19) Remove the under cover.
20) Remove the front exhaust pipe, rear exhaust pipe and muffler. <Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-6, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Muffler.>

21) Remove the heat shield cover.

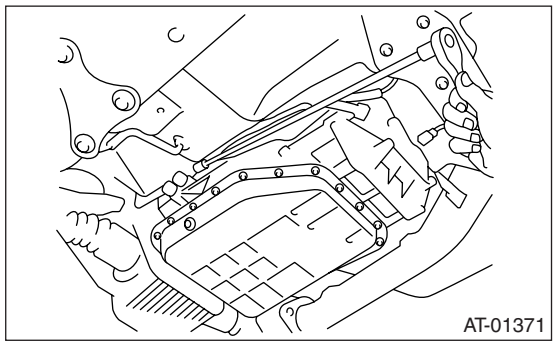


22) Remove the ATF drain plug to drain ATF.

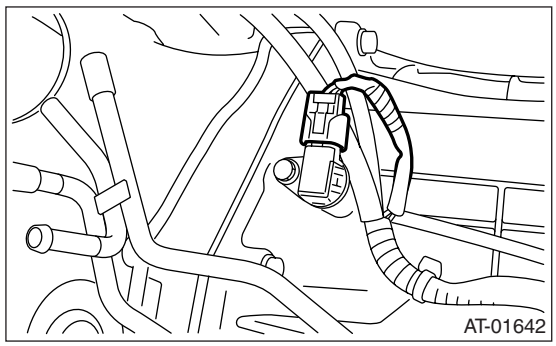


(A) Oil pan
(B) Drain plug

23) Remove the oil charge pipe.

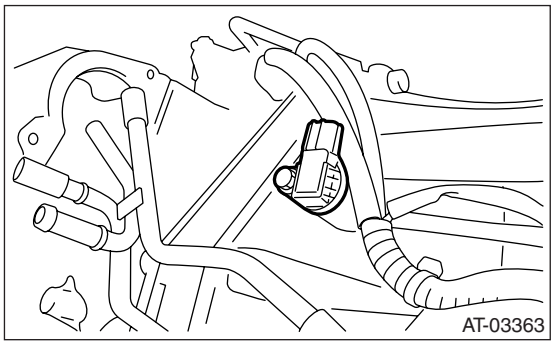


24) Disconnect the connector from turbine speed sensor 1.

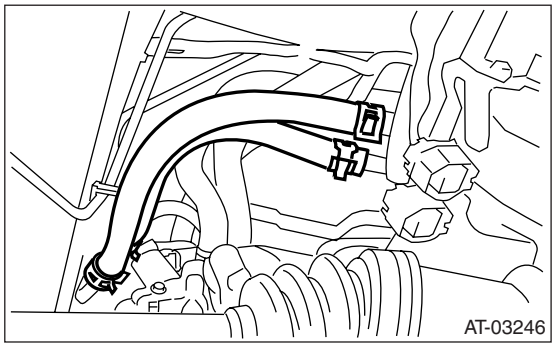


25) Remove the turbine speed sensor 1 from the transmission body.

CAUTION:
Failure to follow this procedure may cause the interference between vehicle body and sensor while removing/installing transmission, and resulting in damage.

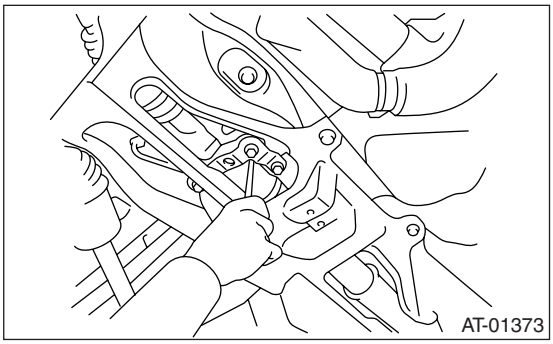

AT-03363

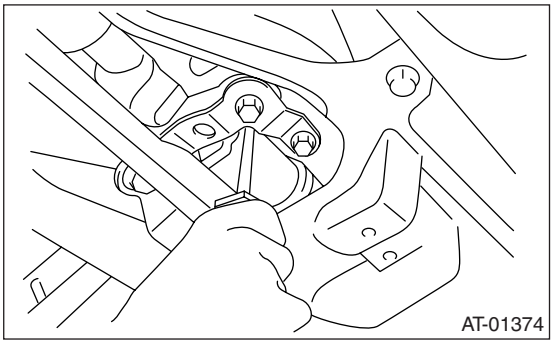
26) To prevent contamination by foreign objects, cover the attachment hole for turbine speed sensor 1 with vinyl tape.
27) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
28) Remove the shift select cable. <Ref. to CS-26, REMOVAL, Select Cable.>
29) Disconnect the hose from the ATF inlet and outlet pipes.


AT-03246

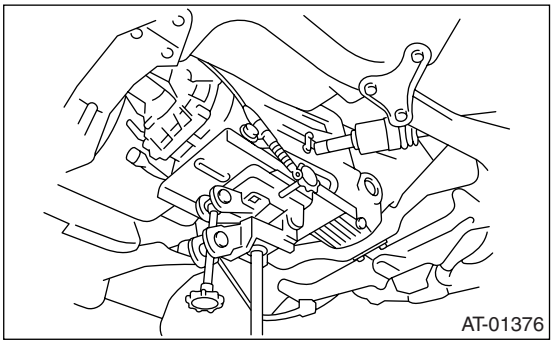
30) Remove the front crossmember support plate. <Ref. to FS-13, REMOVAL, Front Crossmember Support Plate.>

31) Remove the two clutch housing cover securing bolts.

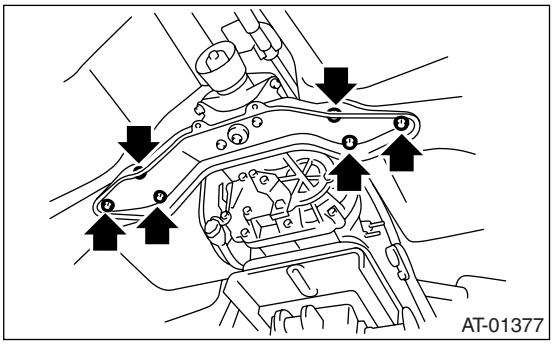

AT-01373


AT-01374

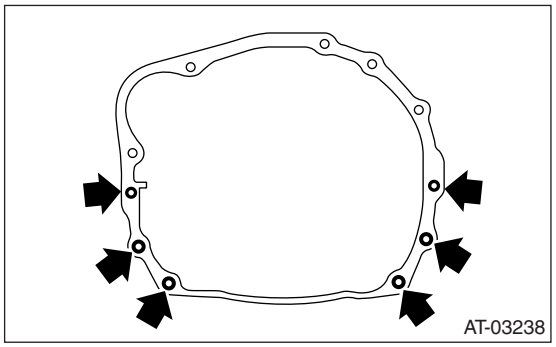
32) Remove the front stabilizer clamp. <Ref. to FS-14, REMOVAL, Front Stabilizer.>
33) Remove the bolts which secure front ball joint to the housing. <Ref. to FS-15, REMOVAL, Front Ball Joint.>
34) Pull out the drive shaft from transmission.
35) Set the transmission jack under the transmission.


AT-01376

36) Remove the rear crossmember.


AT-01377

37) Remove the transmission mounting bolts and nuts (lower side).

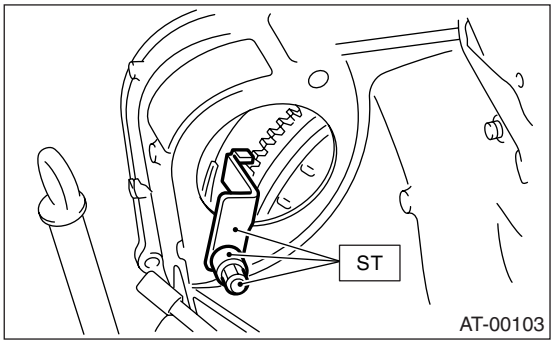


38) Remove the transmission.

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.

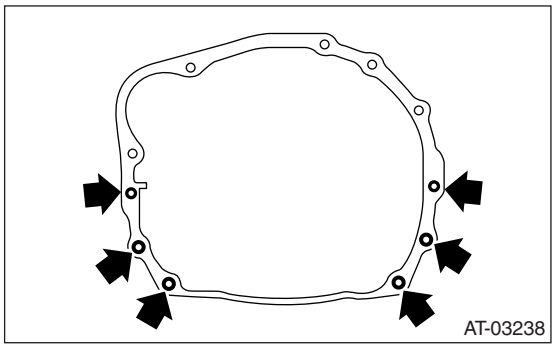
B: INSTALLATION

1) Install the ST to converter case.
ST 498277200 STOPPER SET



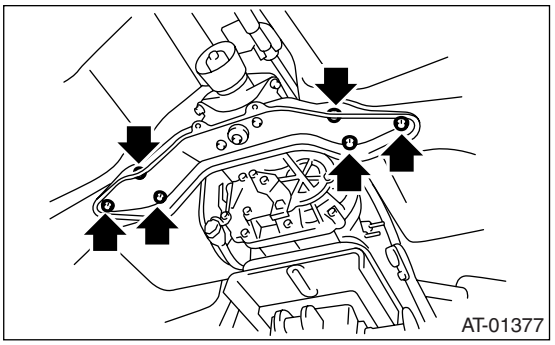
2) Install the transmission onto the engine.
3) Install the engine mounting bolts and nuts (lower side).

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



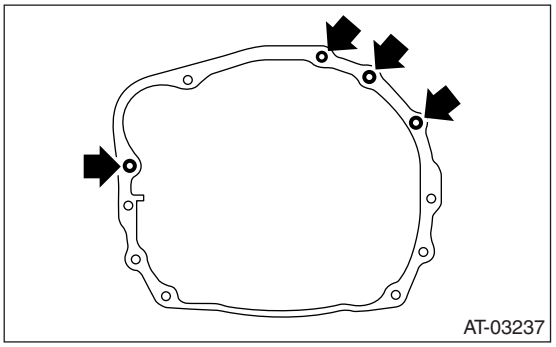
4) Install the transmission rear crossmember.

Tightening torque:
75 N·m (7.6 kgf-m, 55.3 ft-lb)



5) Remove the transmission jack.
6) Lower the vehicle.
7) Install the engine mounting bolt (upper side).

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



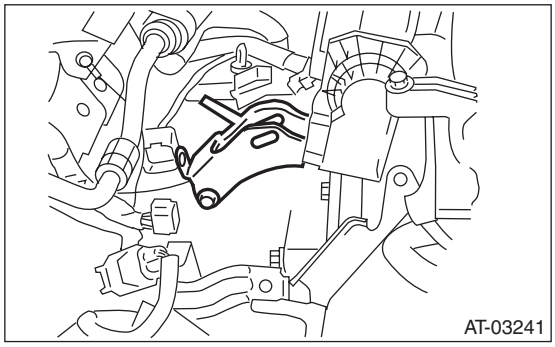
8) Remove the ST from converter case.
ST 498277200 STOPPER SET
9) Install the torque converter to drive plate.
(1) Install the bolts which hold torque converter to drive plate.
(2) Install all four bolts by rotating the crank pulley a little at a time.
(3) Install the service hole.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

10) Install the starter. <Ref. to SC(H6DO)-6, INSTALLATION, Starter.>

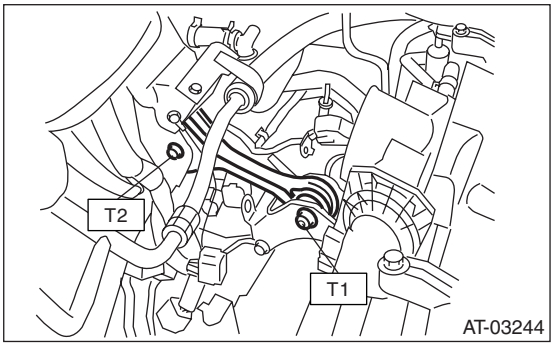
11) Remove the ST and install the pitching stopper bracket.

Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb)



12) Attach the pitching stopper.

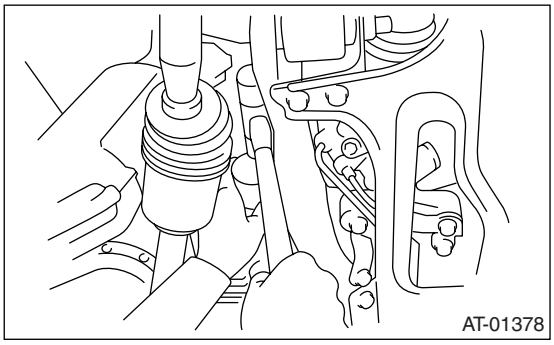
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



13) Lift-up the vehicle.
14) 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.

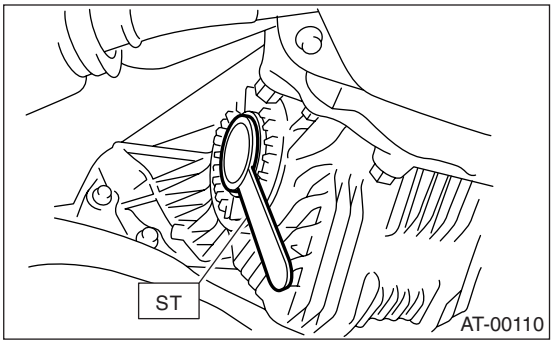
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

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.



15) Apply grease to the oil seal lips.
16) Set the ST to side retainer.

ST 28399SA000 OIL SEAL PROTECTOR



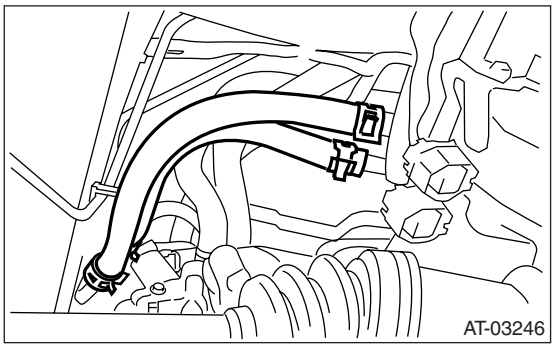
17) Install the front drive shaft into the transmission.

NOTE:
Replace the circlip of drive shaft with a new one.

18) Install the front drive shaft into transmission, remove the ST and insert the drive shaft securely.

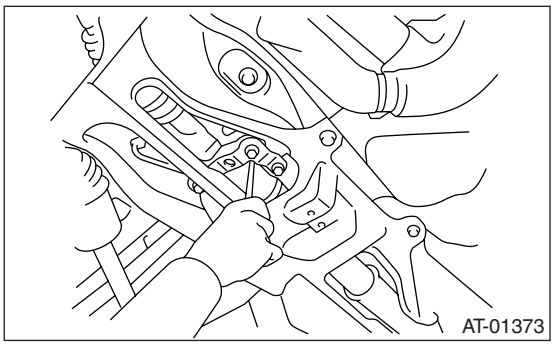
ST 28399SA000 OIL SEAL PROTECTOR

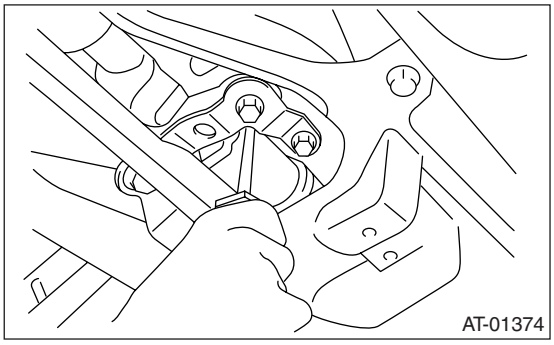
19) Install the inlet and outlet hoses to the ATF inlet and outlet pipes.



20) Insert the ball joint into housing. <Ref. to FS-15, INSTALLATION, Front Ball Joint.>
21) Install the front stabilizer clamp. <Ref. to FS-14, INSTALLATION, Front Stabilizer.>

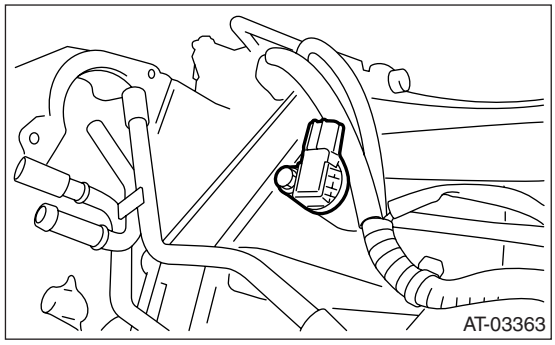
22) Install the clutch housing cover securing bolts.





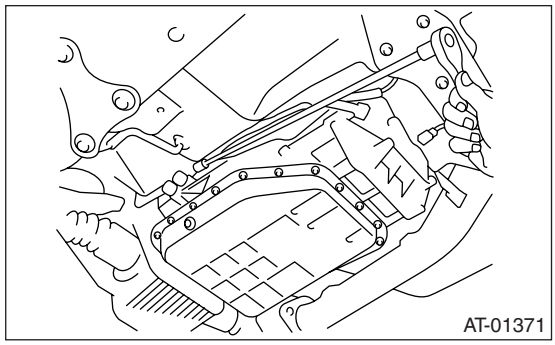
23) Install the front cross support plate. <Ref. to FS-13, INSTALLATION, Front Crossmember Support Plate.>
24) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
25) Install the shift select cable. <Ref. to CS-26, INSTALLATION, Select Cable.>
26) Install the turbine speed sensor 1 and harness, and then connect the connector.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

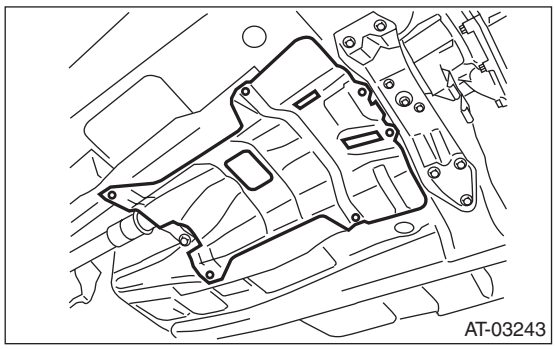


27) Install the oil charge pipe.

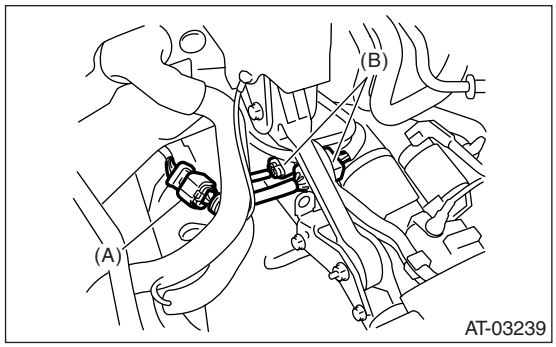
Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)



28) Install the heat shield cover.



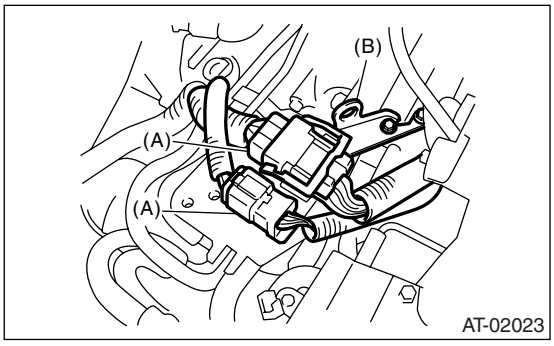
29) Install the front exhaust pipe, rear exhaust pipe and muffler. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-8, INSTALLATION, Muffler.>
30) Install the under cover.
31) Lower the vehicle.
32) Connect the front oxygen (A/F) sensor and transmission harness connector.



(A) Front oxygen (A/F) sensor
(B) Transmission harness connectors

33) Attach the vacuum pump and vacuum pipe & hose. <Ref. to BR-39, INSTALLATION, Brake Vacuum Pump.>

34) Install the engine hanger rear, and then connect the engine harness connector.



(A) Engine harness connectors
(B) Engine hanger rear

35) Pour ATF from the oil charge pipe. <Ref. to 5AT-26, REPLACEMENT, Automatic Transmission Fluid.>
36) Install the air breather hose. <Ref. to 5AT-60, INSTALLATION, Air Breather Hose.>
37) Install the throttle body to intake manifold.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

38) Install the air intake chamber. <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>
39) Install the collector cover.
40) Connect the ground cable to the battery.
41) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
42) Perform the inspection with driving the vehicle 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.

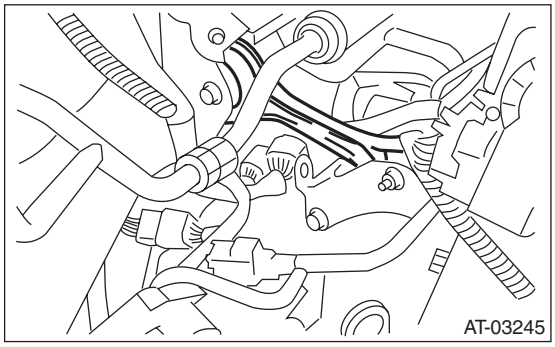
NOTE:
If excessive shift shock is felt, execute advance operation of learning control. <Ref. to 5AT(diag)-21, PROCEDURE, Learning Control.>

10.Transmission Mounting System

A: REMOVAL

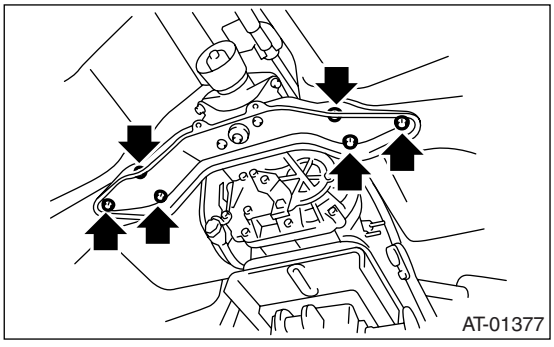
1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the air intake chamber. <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
3) Remove the pitching stopper.



2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Jack–up the vehicle and support it with rigid racks.
3) Remove the front exhaust pipe, rear exhaust pipe and muffler. <Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-6, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-8, 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.



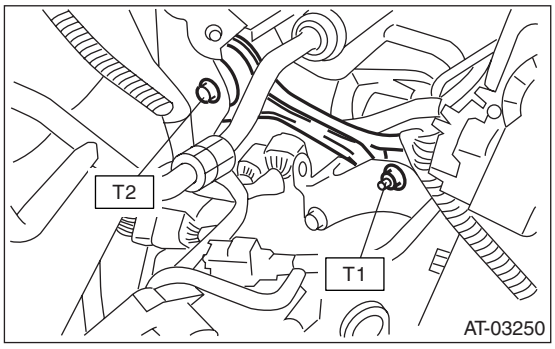
7) Remove the rear cushion rubber from transmission.

B: INSTALLATION

1. PITCHING STOPPER

1) Attach 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. <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>
3) Connect the ground cable to the battery.

2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

1) Install the rear cushion rubber to the transmission.

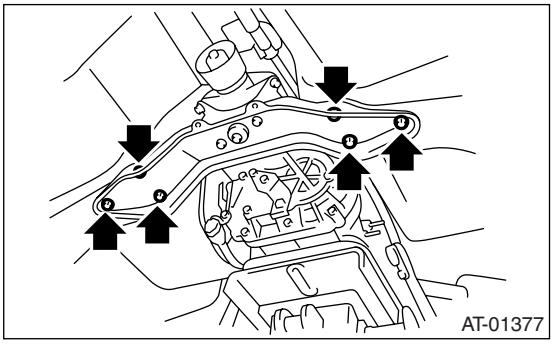
Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb)

2) Attach the cross member to the rear cushion rubber.

Tightening torque:
35 N·m (3.6 kgf-m, 26 ft-lb)

3) Install the cross.

Tightening torque:
75 N·m (7.6 kgf-m, 55.3 ft-lb)



4) Remove the transmission jack.
5) Install the heat shield cover.
6) 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)-8, INSTALLATION, Muffler.>
7) Connect the ground cable to the 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 the cross 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-43, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT

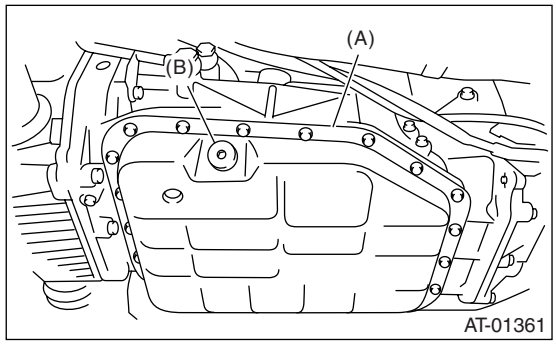
1) Lift-up the vehicle.
2) Clean the transmission exterior.
3) Remove the ATF drain plug to drain ATF.

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.

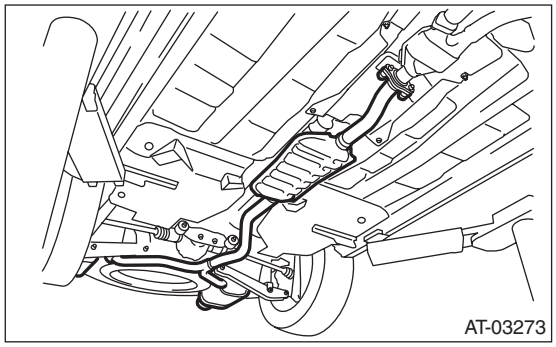
NOTE:
Use a new gasket.

Tightening torque:
20 N·m (2.0 kgf-m, 14.8 ft-lb)



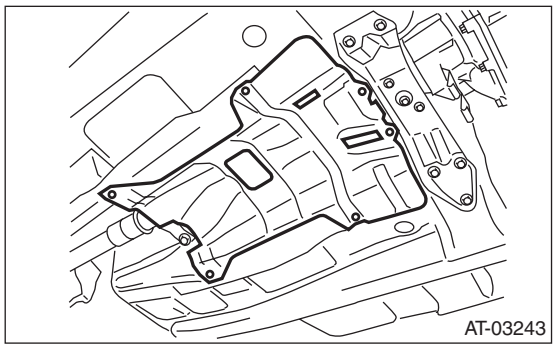
(A) Oil pan
(B) ATF drain plug

5) Remove the rear exhaust pipe and muffler.

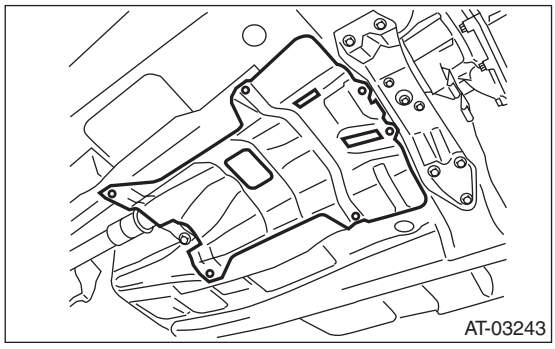


6) Remove the front exhaust pipe.

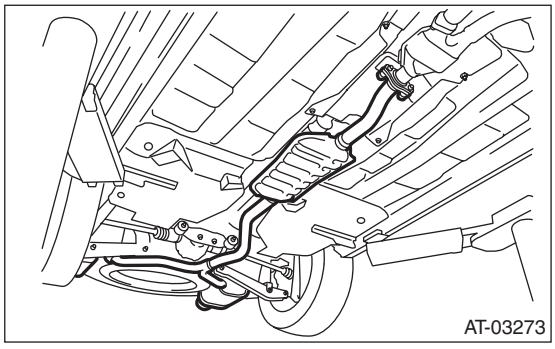
7) Remove the heat shield cover.



8) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
9) Using the ST, remove the oil seal.
ST 398527700 PULLER
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.



13) Install the front exhaust pipe.
14) Install the rear exhaust pipe and muffler.



15) Pour ATF from the oil charge pipe.

Specified fluid:
SUBARU ATF (Part No. K0140Y0700)

Recommended fluid:
IDEMITSU ATF HP
CASTROL TRANSMAX J
PENNZOIL QUAKERSTATE • PENNZOIL ATF-J

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.

16) Check the level and leaks of the ATF. <Ref. to 5AT-26, Automatic Transmission Fluid.>

12. Differential Side Retainer Oil Seal

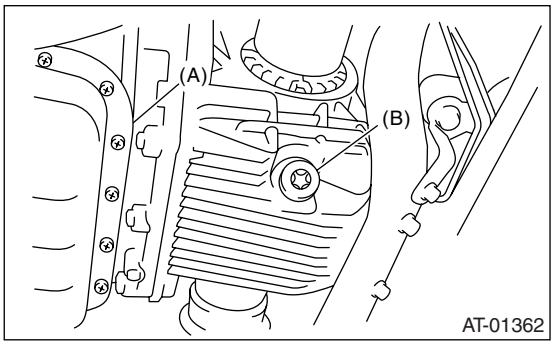
A: INSPECTION

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)-4, 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.



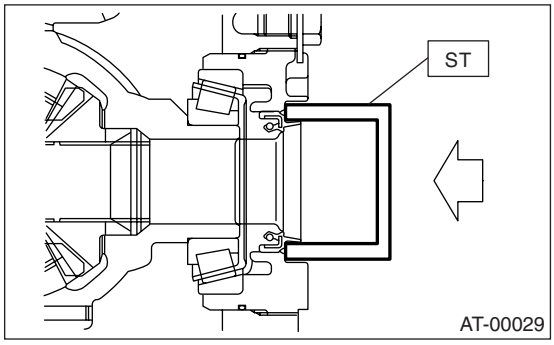
(A) Oil pan
(B) Differential gear oil drain plug

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-24, 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



8) Apply oil to the oil seal lips.
9) Install the front drive shaft. <Ref. to DS-24, 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 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)

13) Check the level of differential gear oil. <Ref. to 5AT-28, INSPECTION, Differential Gear Oil.>

13.Inhibitor Switch

A: INSPECTION

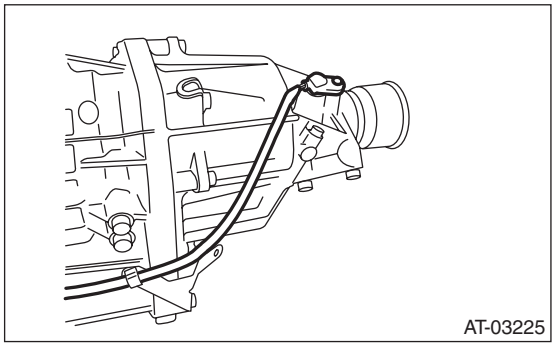
Inhibitor switch cannot be checked, because the inhibitor switch is installed on control valve assembly. When a malfunction occurs, refer to 5AT (diag) section. <Ref. to 5AT(diag)-31, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

14.Front Vehicle Speed Sensor

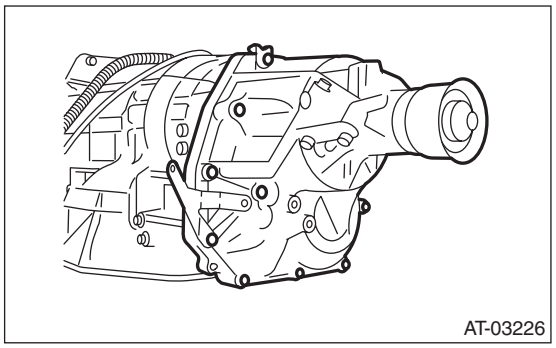
A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor.

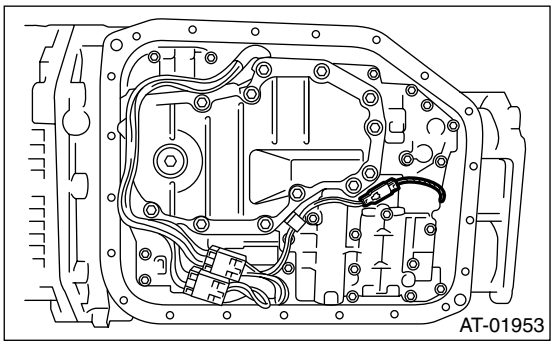
NOTE:
Secure the harness of the rear vehicle speed sensor to the transmission body using wire etc.


AT-03225

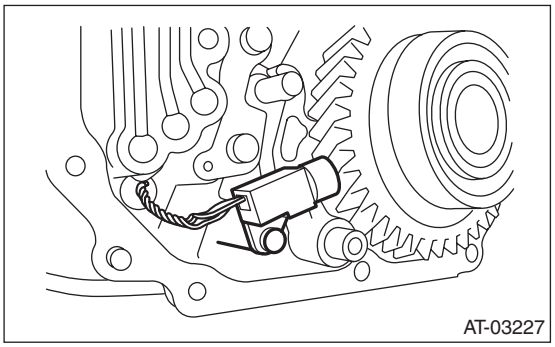
3) Remove the extension case.


AT-03226

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.


AT-01953

8) Remove the front vehicle speed sensor securing bolt.

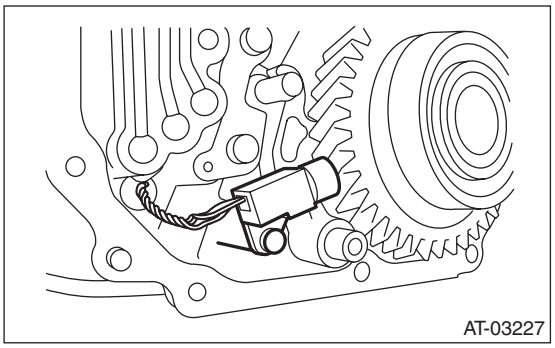

AT-03227

9) Remove the front vehicle speed sensor through the hole of AT transmission main case.

B: INSTALLATION

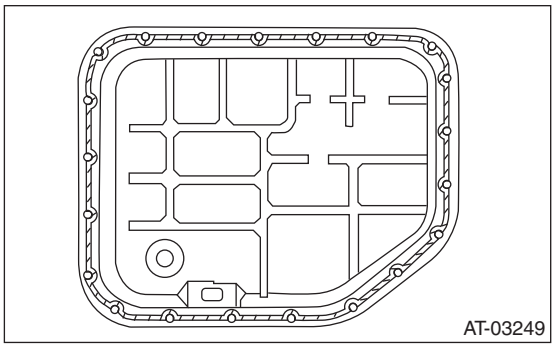
1) Install the front vehicle speed sensor.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)


AT-03227

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)


AT-03249

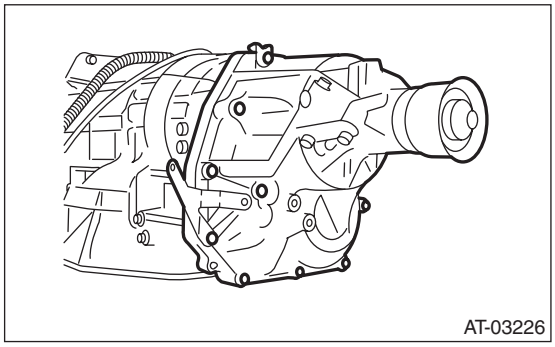
4) Install the oil pan by equally tightening the bolts.

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.>

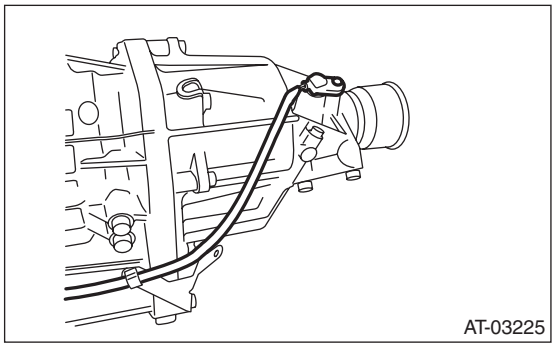
6) Install the extension case.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)


AT-03226

7) Install the rear vehicle speed sensor.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

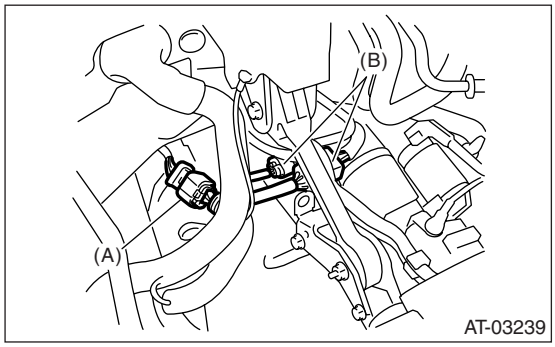

AT-03225

8) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>
9) Pour ATF from the oil charge pipe. <Ref. to 5AT-26, REPLACEMENT, Automatic Transmission Fluid.>
10) Check the level and leaks of ATF. <Ref. to 5AT-26, INSPECTION, Automatic Transmission Fluid.>

15.Rear Vehicle Speed Sensor

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the air intake chamber. <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
4) Disconnect the front oxygen (A/F) sensor and transmission harness connector.

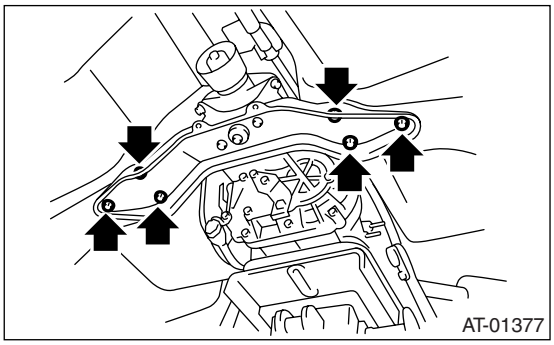


(A) Front oxygen (A/F) sensor
(B) Transmission harness connectors

5) Remove the transmission harness connector and front oxygen (A/F) sensor connector from the stay.
6) Lift-up the vehicle.
7) Clean the transmission exterior.
8) Drain the ATF completely. <Ref. to 5AT-26, REPLACEMENT, Automatic Transmission Fluid.>
9) Remove the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-6, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Muffler.>
10) Remove the heat shield cover.
11) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
12) Place the transmission jack under the transmission.

NOTE:
Make sure that the support plate of transmission jack does not touch the cross.

13) Remove the transmission rear crossmember bolt.



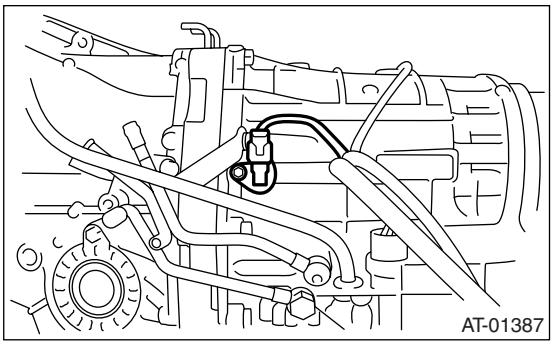
14) Lower the transmission jack.

NOTE:
Do not separate the transmission jack and transmission.

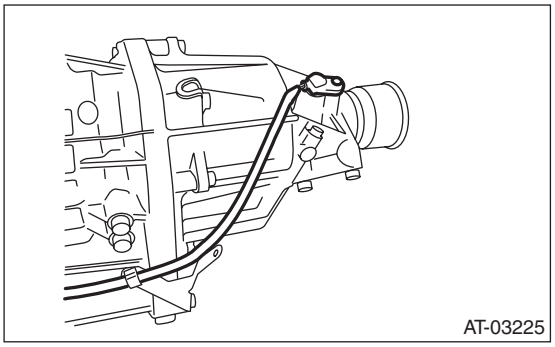
15) Remove the oil charge pipe. <Ref. to 5AT-61, REMOVAL, Oil Charge Pipe.>
16) Remove the ATF cooler inlet and outlet pipes.

NOTE:
When removing the outlet pipe, be careful not to lose the ball and spring used with retaining screw.

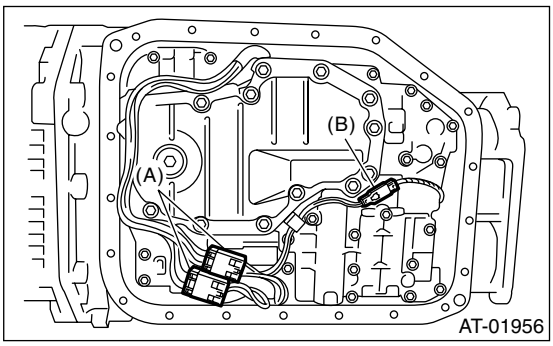
17) Disconnect the connector from turbine speed sensor 1.



18) Remove the rear vehicle speed sensor.

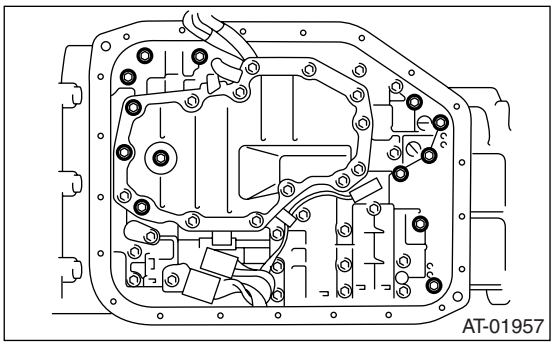


19) Remove the oil pan.
20) Disconnect the control valve connector and front vehicle speed sensor connector.

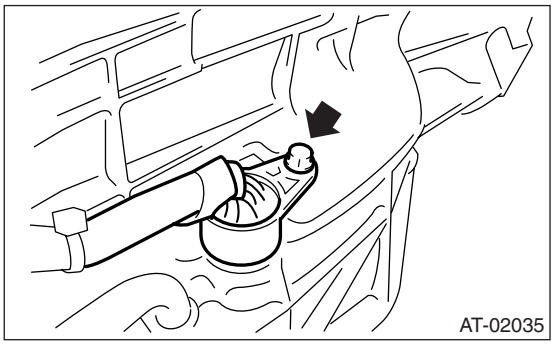


(A) Control valve connector
(B) Front vehicle speed sensor connector

21) Remove the control valve body.



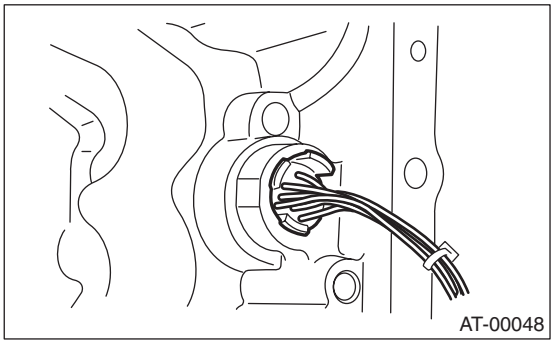
22) Remove the bolt securing harness of transmission main case.



23) Remove the harness assembly.

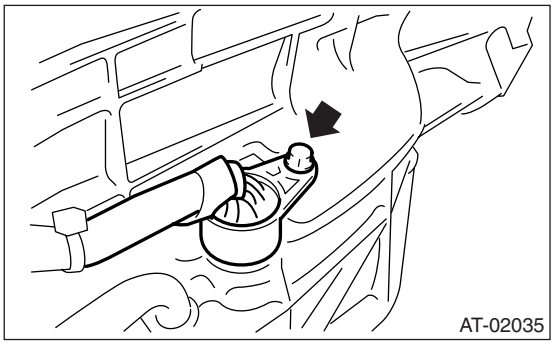
B: INSTALLATION

1) Pass the harness assembly through the hole in transmission case.



2) Install the securing bolt of transmission main case.

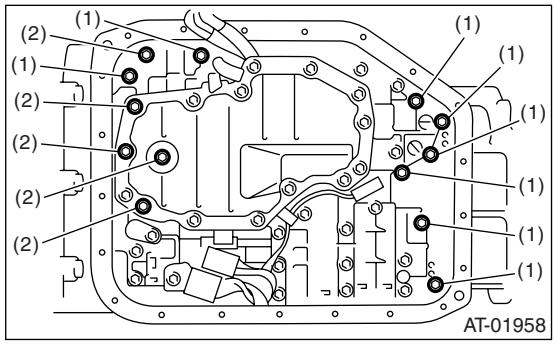
Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)



3) Install the control valve body.

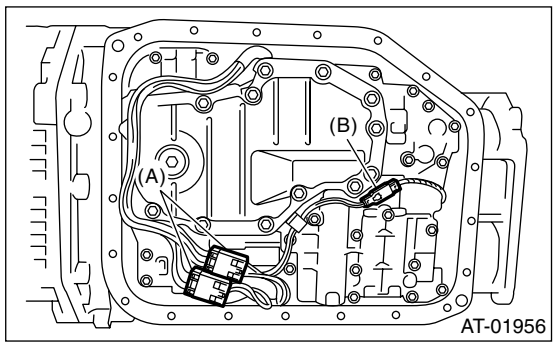
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

NOTE:
Be careful not to catch harness in.



(1) 58 mm (2.28 in)
(2) 65 mm (2.56 in)

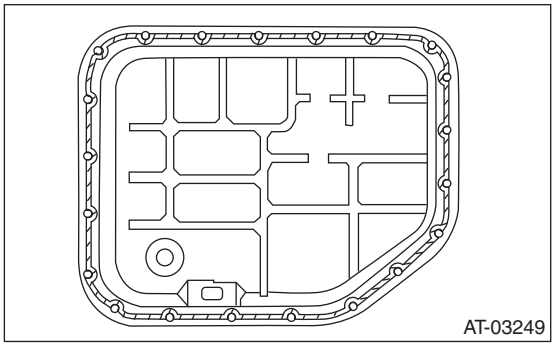
4) Connect the control valve connector and front vehicle speed sensor connector.



(A) Control valve connector
(B) Front vehicle speed sensor connector

5) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



6) Install the oil pan by equally tightening the bolts.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

7) Install the rear vehicle speed sensor and turbine speed sensor 1, and then fasten the harness.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

8) Install a new aluminum washer and oil cooler pipe.

Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb) (ATF inlet pipe)
45 N·m (4.6 kgf-m, 33.2 ft-lb) (ATF outlet pipe)

9) Install the oil charge pipe. <Ref. to 5AT-61, INSTALLATION, Oil Charge Pipe.>
10) Install the transmission rear crossmember bolt.

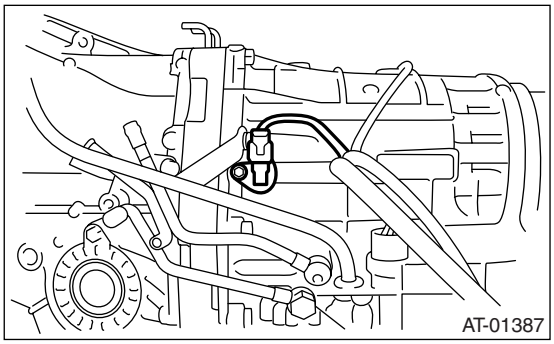
Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)

11) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
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)-8, INSTALLATION, Muffler.>
14) Lower the vehicle.
15) Install the transmission connector to the stay, and then connect the connector.
16) Install the air intake chamber. <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>
17) Pour ATF from the oil charge pipe. <Ref. to 5AT-26, REPLACEMENT, Automatic Transmission Fluid.>
18) Check the level and leaks of ATF. <Ref. to 5AT-26, INSPECTION, Automatic Transmission Fluid.>

16.Turbine Speed Sensor 1

A: REMOVAL

1) Remove the air intake chamber. <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
2) Lift-up the vehicle.
3) Disconnect the turbine speed sensor 1 connector.



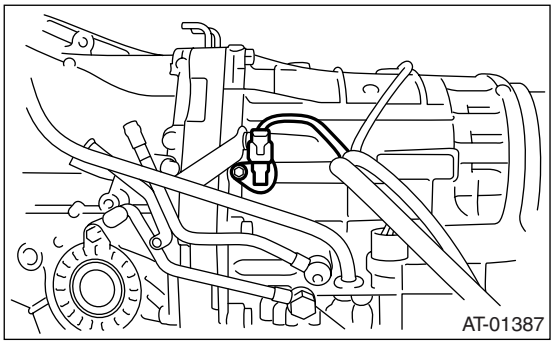
4) Remove the turbine speed sensor 1.

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 air intake chamber. <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

17.Control Valve Body

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) 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.

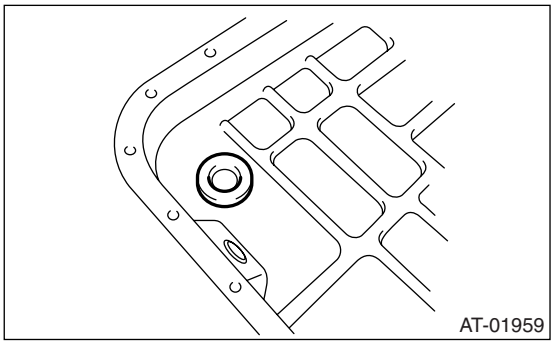
NOTE:
Use a new gasket.

Tightening torque:
20 N·m (2.0 kgf-m, 14.8 ft-lb)

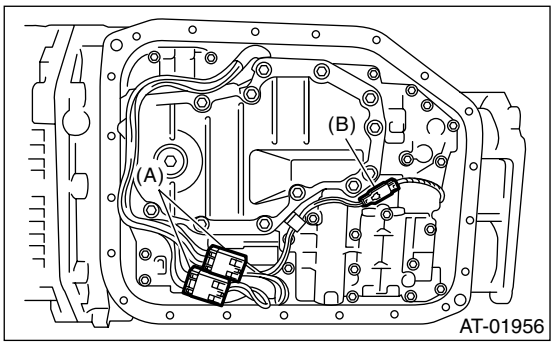
7) Remove the oil pan.

CAUTION:
Be sure to prevent the entering of dust and other foreign matters into oil pan.

8) Remove the magnet.



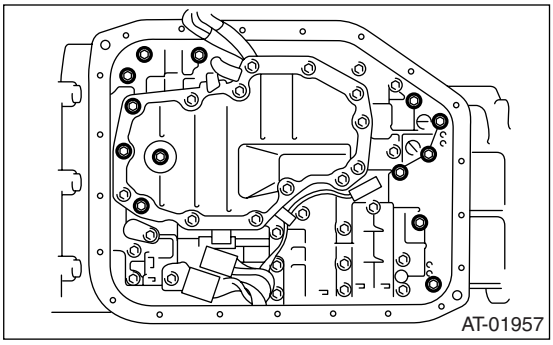
9) Clean the magnet.
10) Completely remove the remaining liquid gasket on the transmission case and oil pan.
11) Disconnect the control valve connector and front vehicle speed sensor connector.



(A) Control valve connector
(B) Front vehicle speed sensor connector

12) Remove the control valve body.

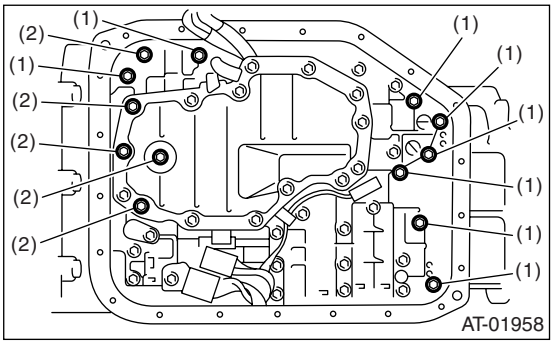
NOTE:
The control valve body is replaced as an assembly only, because it is a non-disassembly part.



B: INSTALLATION

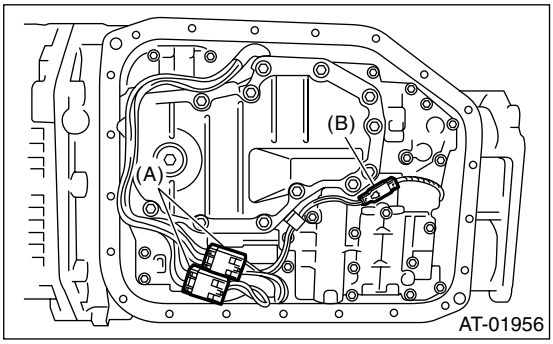
1) Check the control valve body for dust and other foreign matter.
2) Install the control valve body to transmission by equally tightening the bolts.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



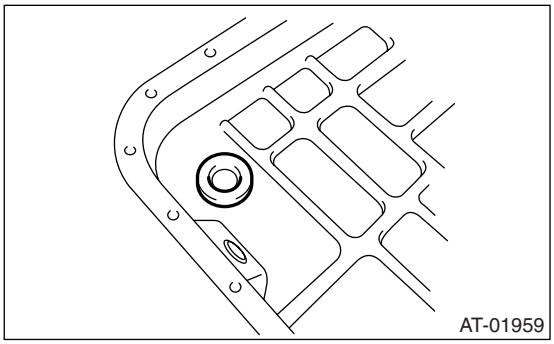
(1) 58 mm (2.28 in)
(2) 65 mm (2.56 in)

3) Connect the control valve connector.



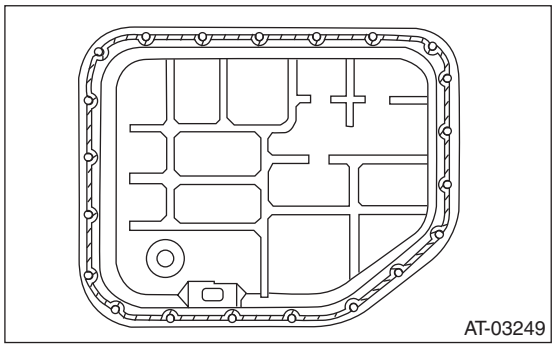
(A) Control valve connector
(B) Front vehicle speed sensor connector

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)



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.

Specified and recommended fluid:
<Ref. to 5AT-3, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>

Capacity:
Fill with the same amount of ATF as drained.

8) Check the ATF level.
<Ref. to 5AT-26, Automatic Transmission Fluid.>
9) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
10) Perform the inspection with driving the vehicle 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.

NOTE:
If excessive shift shock is felt, execute advance operation of learning control. <Ref. to 5AT(diag)-21, PROCEDURE, Learning Control.>

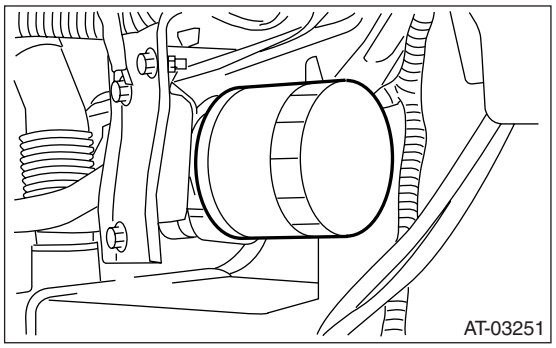
C: INSPECTION

Check each parts for holes, damages or other foreign matters.

18.ATF Filter

A: REMOVAL

1) Remove the front bumper. <Ref. to EI-21, REMOVAL, Front Bumper.>
2) Using the ST, remove the ATF filter.
ST 498545400 OIL FILTER WRENCH



B: INSTALLATION

1) Apply a thin coat of ATF to the oil seal part of new ATF filter.
2) Install the ATF filter. Turn it by hand, being careful not to damage oil seal.
3) Tighten the ATF filter using ST.
Calculate the ATF filter tightening torque using following formula.
$T2 = L2/(L1 + L2) \times T1$
T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST length 78 mm (3.07 in)
L2: Torque wrench length
Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf-m, ft-lb)
100 (3.94)	7.7 (0.79, 5.7)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	10 (1.0, 7.4)

NOTE:
Align the ST with the torque wrench while tightening the ATF filter.

ST 498545400 OIL FILTER WRENCH
4) Fill ATF.
5) Inspect the level of ATF. <Ref. to 5AT-26, Automatic Transmission Fluid.>
6) Install the front bumper. <Ref. to EI-22, INSTALLATION, Front Bumper.>

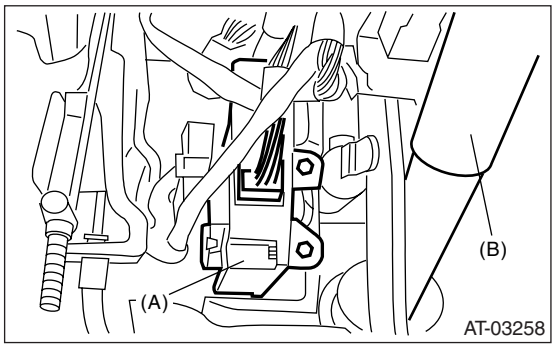
C: INSPECTION

Check for rust, hole, ATF leaks or other damage.
Replace the part if any damage is found in the inspection.

19.Transmission Control Module (TCM)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the lower cover and then disconnect the connector.
3) Disconnect the connector from TCM.



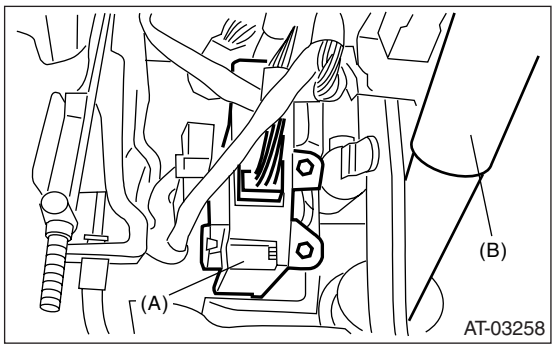
(A) Transmission control module (TCM)
(B) Steering column

4) Remove the relay from TCM body.
5) Remove the TCM.

B: INSTALLATION

1) Install the relay to TCM body.
2) Install the TCM.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



(A) Transmission control module (TCM)
(B) Steering column

3) Connect the connector to the 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 inspection with driving the vehicle 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.

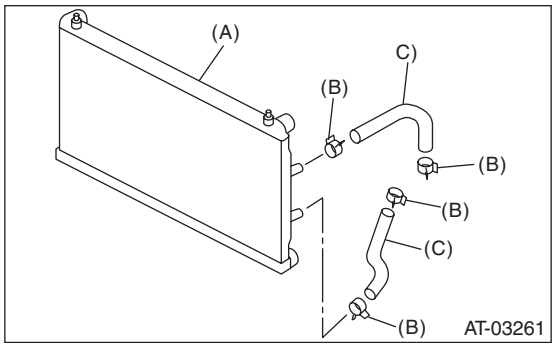
NOTE:
If excessive shift shock is felt, execute advance operation of learning control. <Ref. to 5AT(diag)-21, PROCEDURE, Learning Control.>

20.ATF Cooler Pipe & Hose

A: REMOVAL

1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Disconnect the ATF cooler hose from the radiator.

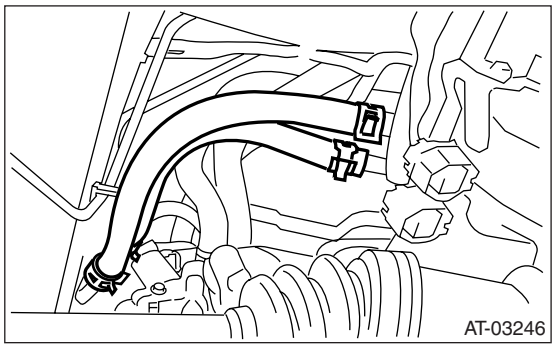
NOTE:
• Do not use a screwdriver or other pointed tools.
• If it is hard to remove the hose, wrap the hose with cloth to prevent from damaging it, and while turning with pliers, pull straight out by hand.



(A) Radiator
(B) Clip
(C) ATF cooler hose

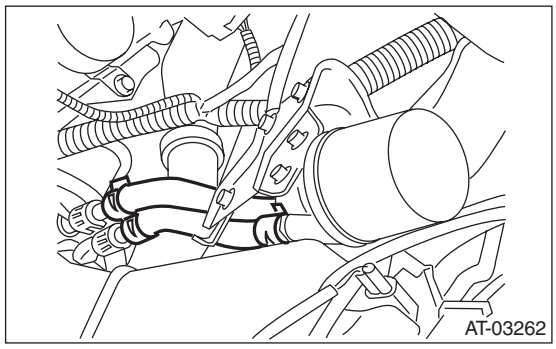
5) Disconnect the ATF cooler hoses from the pipes.

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.

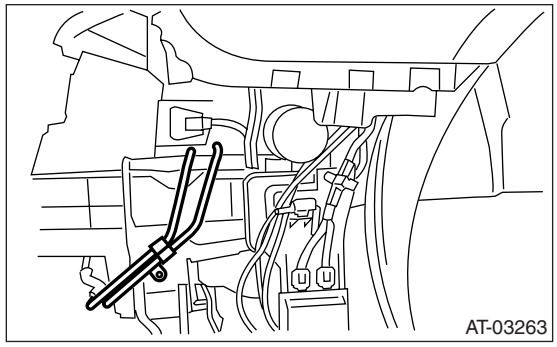


6) Remove the front bumper. <Ref. to EI-21, REMOVAL, Front Bumper.>

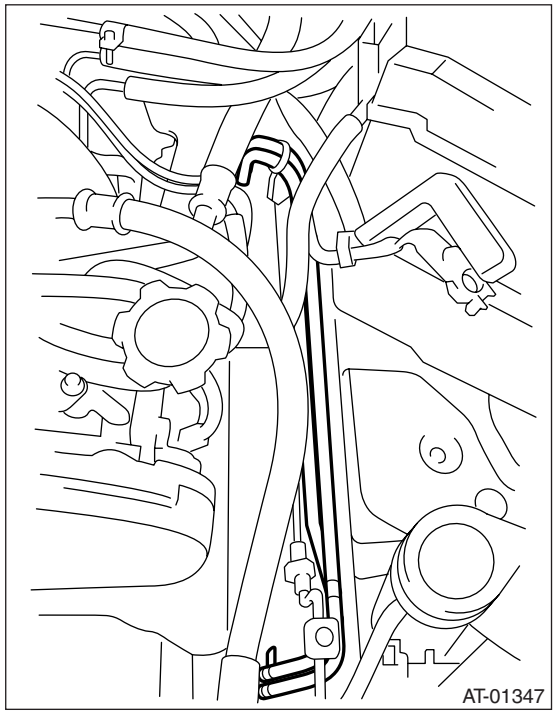
7) Remove the ATF filter inlet and outlet hoses.



8) Remove the bolts securing the ATF cooler pipe, and remove the ATF cooler hose.

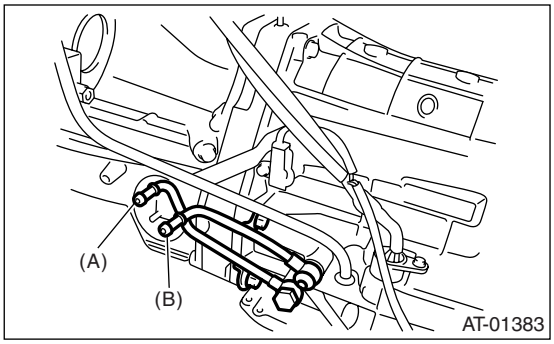


9) Disconnect the ATF cooler pipe from frame.



10) Remove the oil cooler inlet and outlet pipes.

NOTE:
When disconnecting the outlet pipe, be careful not to lose the ball and spring used with retaining screw.

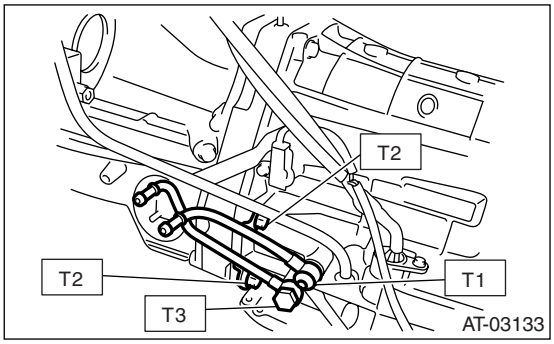


(A) Outlet pipe
(B) Inlet pipe

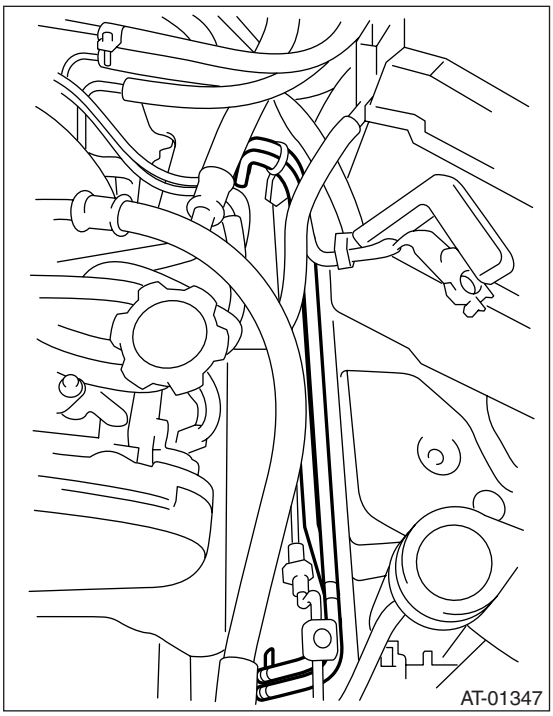
B: INSTALLATION

1) Install the oil cooler inlet and outlet pipes with new washer.

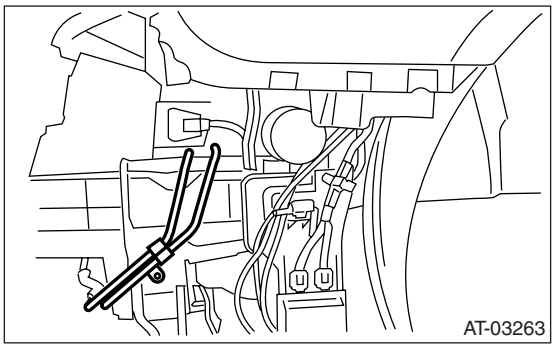
Tightening torque:
T1: 40 N·m (4.1 kgf-m, 29.5 ft-lb)
T2: 41 N·m (4.2 kgf-m, 30.4 ft-lb)
T3: 45 N·m (4.6 kgf-m, 33.2 ft-lb)



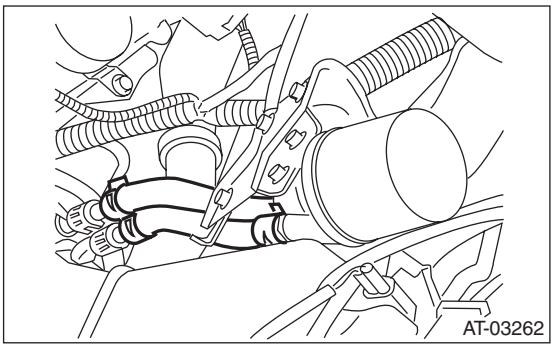
2) Install the ATF cooler pipe to frame.



3) Attach the bolts securing the ATF cooler pipe, and attach the ATF cooler hose.



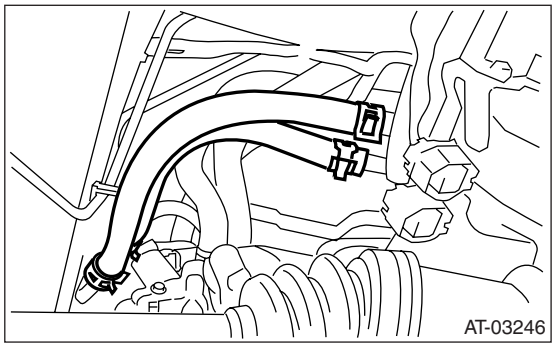
4) Attach the ATF filter inlet and outlet hoses.



5) Install the front bumper. <Ref. to EI-22, INSTALLATION, Front Bumper.>

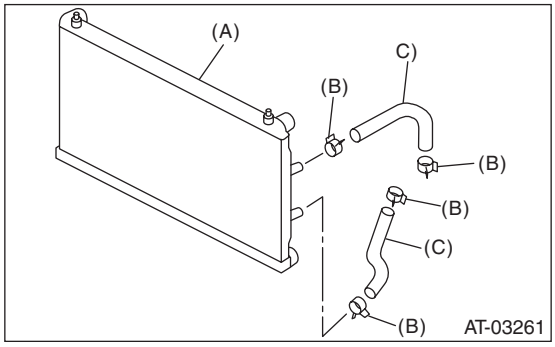
6) Connect the ATF cooler hose to the pipe on the transmission side.

NOTE:
• Install so that the hose is not folded over, excessively bent or twisted.
• Insert the hose to the specified position.



7) 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.



(A) Radiator
(B) Clip
(C) ATF cooler hose

8) Install the under cover.
9) Fill ATF. <Ref. to 5AT-26, Automatic Transmission Fluid.>

NOTE:
Make sure there are no ATF leaks in joints between the transmission, radiator, pipes, and hoses.

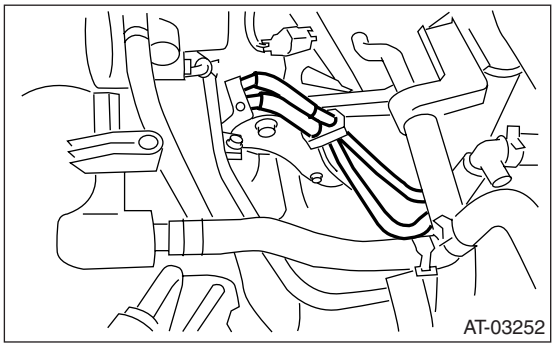
C: INSPECTION

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.

21.Air Breather Hose

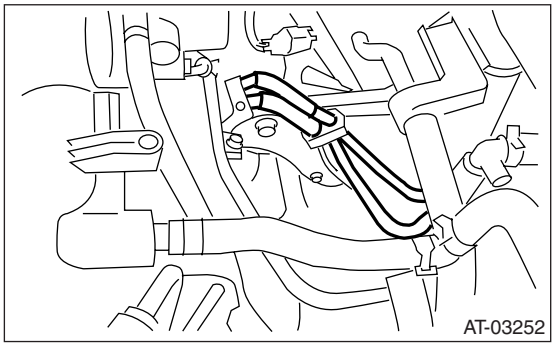
A: REMOVAL

1) Remove the air intake chamber. <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
2) Disconnect the air breather hose.



B: INSTALLATION

1) Connect the air breather hose.



2) Install the air intake chamber. <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

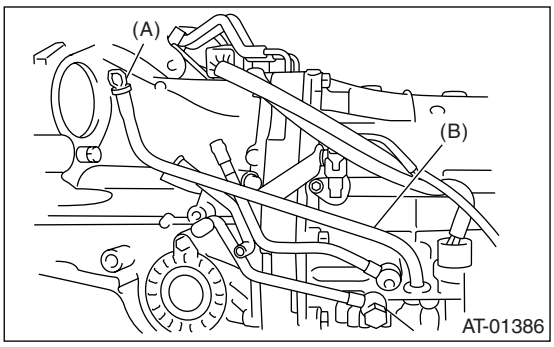
C: INSPECTION

Make sure the hose is not cracked or clogged.

22.Oil Charge Pipe

A: REMOVAL

1) Remove the air intake chamber. <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
2) Remove the oil charge pipe, and then remove the O-ring from flange side.

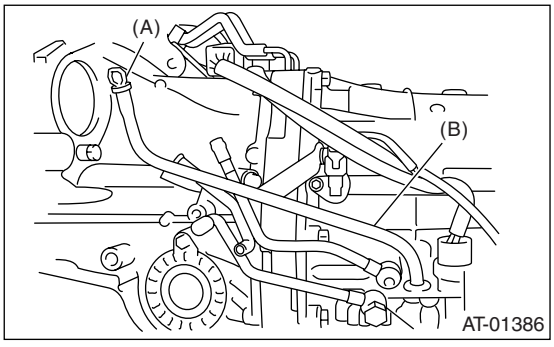


(A) Oil level gauge
(B) Oil charge pipe

B: INSTALLATION

1) Install the oil charge pipe with a new O-ring.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



(A) Oil level gauge
(B) Oil charge pipe

2) Install the air intake chamber. <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

C: INSPECTION

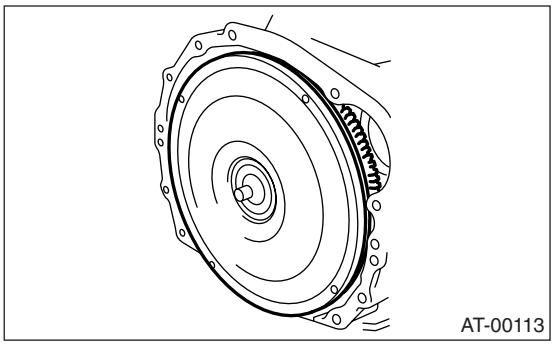
Make sure the oil charge pipe is not deformed or damaged.

23.Torque Converter Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-34, 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.

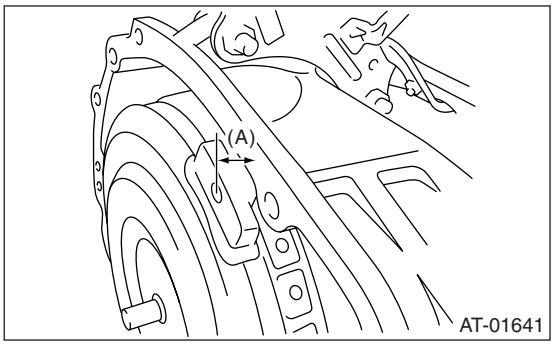
B: INSTALLATION

1) When the oil pump shaft is removed, install the shaft to torque converter.

NOTE:
Make sure the clip 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) Dimension A

6) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

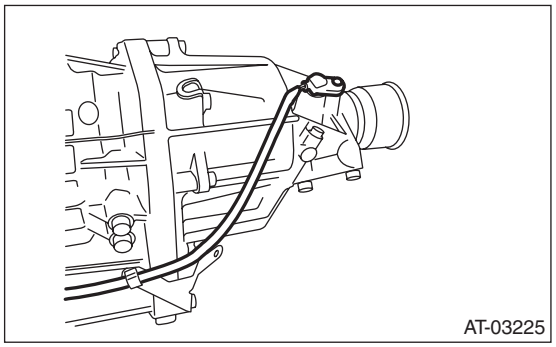
C: INSPECTION

Make sure the ring gear and protrusion of torque converter end are not deformed or damaged.

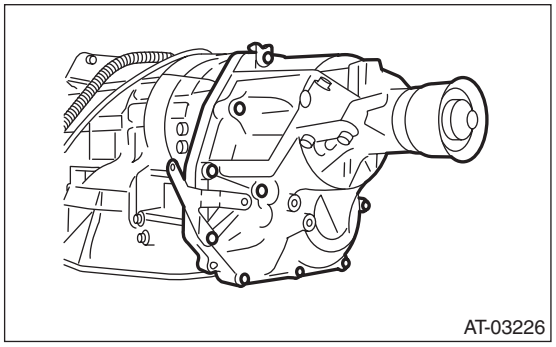
24.Extension Case

A: REMOVAL

1) Remove the transmission assembly.
<Ref. to 5AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor.


AT-03225

3) Remove the extension case.

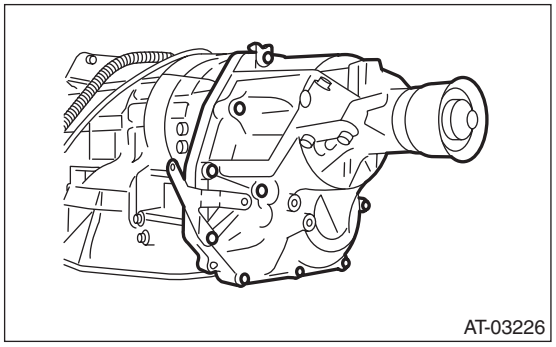

AT-03226

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.

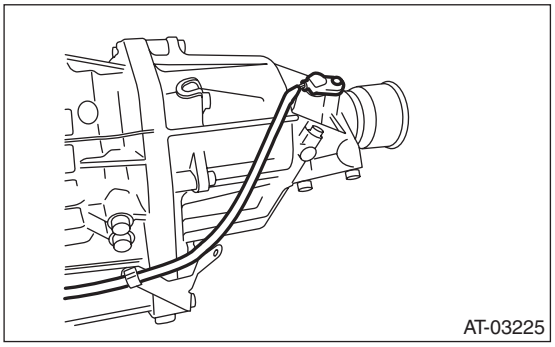
NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)


AT-03226

3) Install the rear vehicle speed sensor.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)


AT-03225

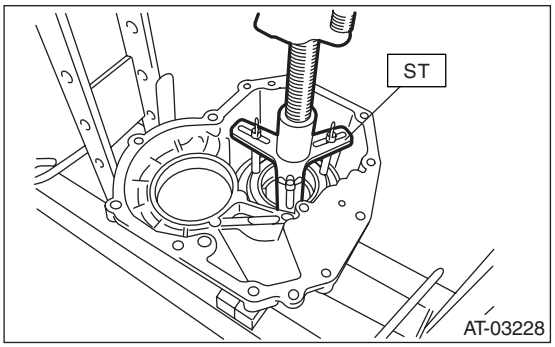
4) Install the transmission assembly.
<Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

1) Take out the transfer clutch and multi-plate clutch hub assembly by lightly tapping the end of rear drive shaft.

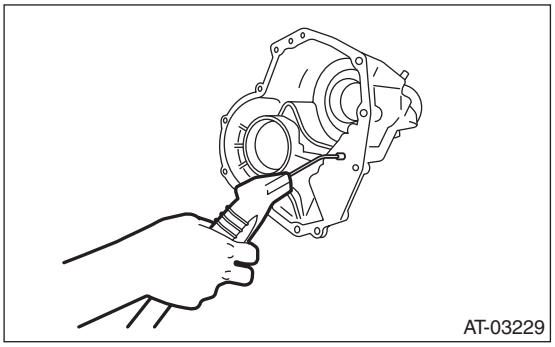
NOTE:
Be careful not to damage the oil seal of the extension.

2) Remove the snap ring using the ST and press.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



AT-03228

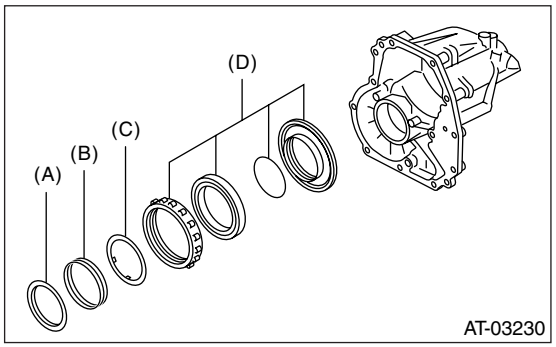
3) Supply compressed air to remove the clutch piston.


AT-03229

4) Remove the dust cover from extension case.
5) Remove the oil seal from the extension case.

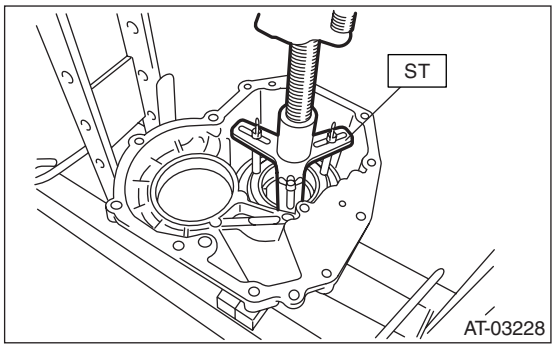
D: ASSEMBLY

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

4) Using the ST and compressor, install the snap ring.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



5) Install the transfer clutch. <Ref. to 5AT-65, INSTALLATION, Transfer Clutch.>
6) Install the multi-plate hub assembly.

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-65, ADJUSTMENT, Transfer Clutch.>

25.Transfer Clutch

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case, and then remove the transfer clutch. <Ref. to 5AT-63, REMOVAL, Extension Case.>, <Ref. to 5AT-63, DISASSEMBLY, Extension Case.>

B: INSTALLATION

1) Select the rear drive shaft shim. <Ref. to 5AT-65, ADJUSTMENT, Transfer Clutch.>
2) Select driven plate No. 3. <Ref. to 5AT-65, ADJUSTMENT, Transfer Clutch.>
3) Install the extension case. <Ref. to 5AT-63, INSTALLATION, Extension Case.>
4) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

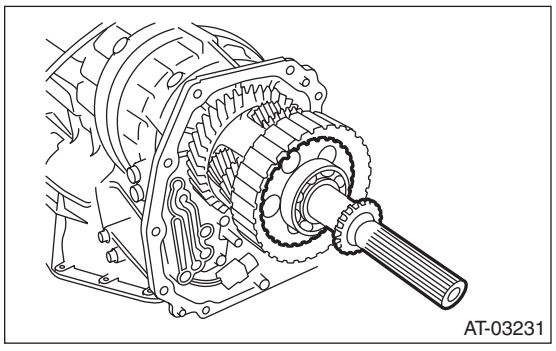
C: INSPECTION

- 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-65, ADJUSTMENT, Transfer Clutch.>

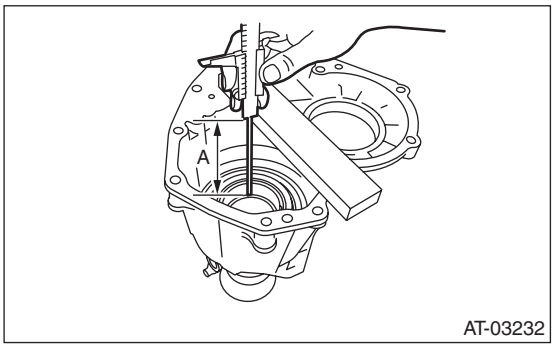
D: ADJUSTMENT

1. REAR DRIVE SHAFT SHIM SELECTION

1) Insert the rear drive shaft into the reduction drive gear and center differential assembly.


AT-03231

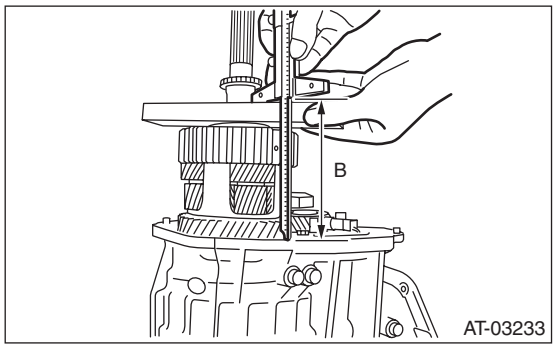
2) Using the ST, measure the depth “A”, which is from mating surface of extension case to ball bearing outer ring contact surface.
ST 398643600 GAUGE



AT-03232

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



AT-03233

B Measured value

4) Calculation formula:
When clearances are 0.05 mm (0.0020 in):
T (mm) = A – B + 0.23
[T (in) = A – B + 0.009]
When clearances are 0.25 mm (0.0098 in):
T (mm) = A – B +0.03
[T (in) = A – B +0.001]
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)

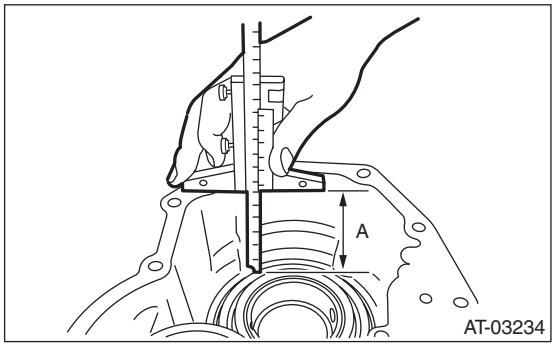
NOTE:
Calculation formula for “T” above is applied when measuring with the ST (398643600 GAUGE). When not using the ST,

When clearances are 0.05 mm (0.0020 in):
T (mm) = (A – α) – ((B – β) – 0.28) – 0.05
[T (in) = (A – α) – ((B – β) – 0.011) – 0.0020]
When clearances are 0.25 mm (0.0098 in):
T (mm) = (A – α) – ((B – β) – 0.28) – 0.25
[T (in) = (A – α) – ((B – β) – 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
α: Thickness of collar used when measuring "A"
β: Thickness of collar used when measuring "B"
0.28 (0.011): Gasket thickness (Unit mm (in))

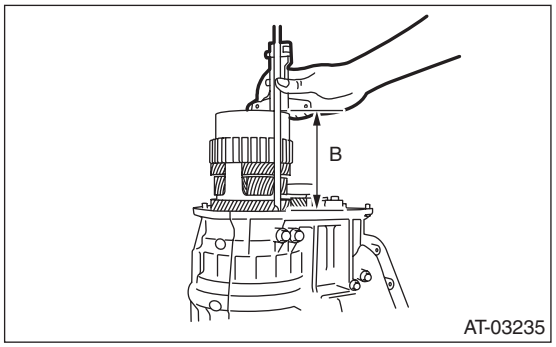
Adjustment shim	
Part No.	Thickness mm (in)
33281AA040	0.2 (0.008)
33281AA050	0.5 (0.020)
33281AA060	0.3 (0.012)

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 multi-plate clutch (LSD) piston.



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



4) Calculation formula:
When clearances are 0.2 mm (0.008 in):
T (mm) = A – B + 0.08
[T (in) = A – B + 0.0031]
When clearances are 0.6 mm (0.024 in):
T (mm) = A – B + 0.32
[T (in) = A – B + 0.0126]
T: Thickness of driven plate No. 3
A: Depth from mating surface of extension case to multi-plate clutch (LSD) piston
B: Height from AT main case mating surface to end of ST

Specification:
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 (mm) = A – (B – α – 0.28) – 0.2
[T (in) = A – (B – α – 0.011) – 0.008]
When clearances are 0.6 mm (0.024 in):
T (mm) = A – (B – α – 0.28) – 0.6
[T (in) = A – (B – α – 0.011) – 0.024]
is applied.
T: Thickness of driven plate No. 3
A: Depth from mating surface of extension case to multi-plate clutch (LSD) 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.
α: Thickness of tool used when measuring "B"
0.28 (0.011): Gasket thickness (Unit mm (in))

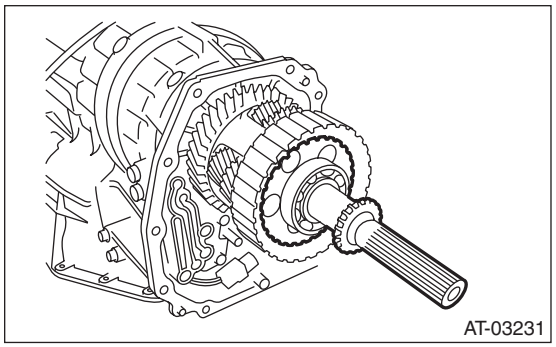
If it is out of specification, select the driven plate No. 3 to adjust within the specification.

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-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor, and then remove the extension case. <Ref. to 5AT-63, REMOVAL, Extension Case.>
3) Pull out the rear driveshaft from center differential assembly.



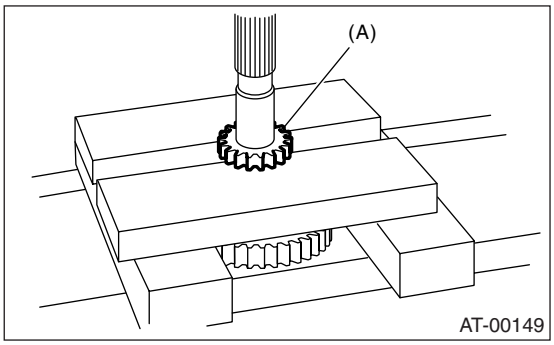
4) Remove the drive plate and driven plate.

B: INSTALLATION

1) Select the shim. <Ref. to 5AT-65, ADJUSTMENT, Transfer Clutch.>
2) Install drive plate and driven plate.
3) Insert the rear driveshaft into the center differential assembly.
4) Combine the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-63, INSTALLATION, Extension Case.>
5) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

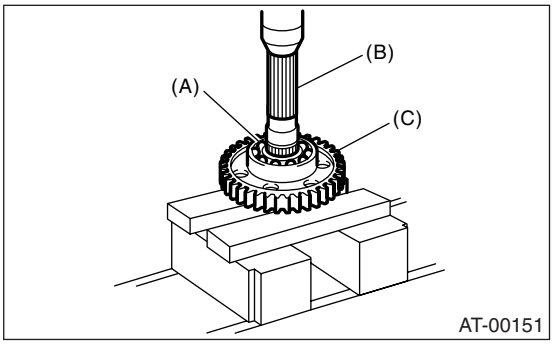
C: DISASSEMBLY

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.

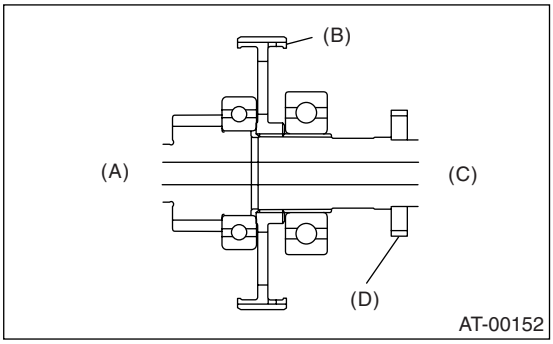


(A) Rear ball bearing
(B) Rear drive shaft
(C) Clutch hub

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

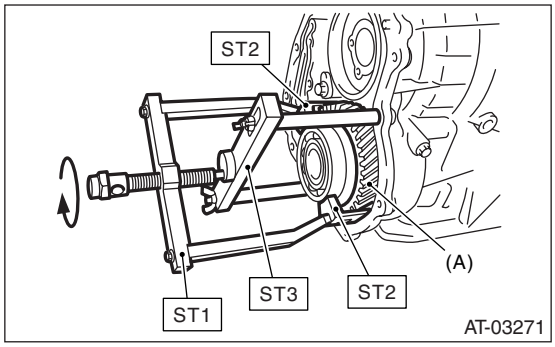
E: INSPECTION

- 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-65, ADJUSTMENT, Transfer Clutch.>

27.Reduction Driven Gear

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 5AT-63, 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



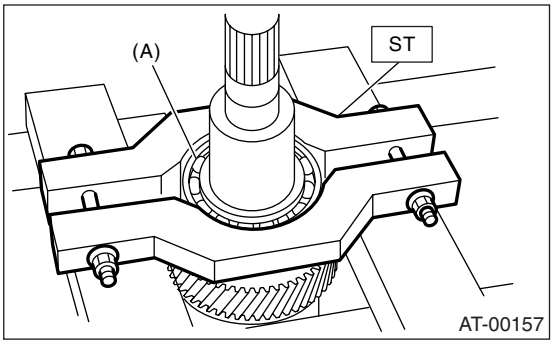
(A) Reduction driven gear

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-63, INSTALLATION, Extension Case.>
5) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

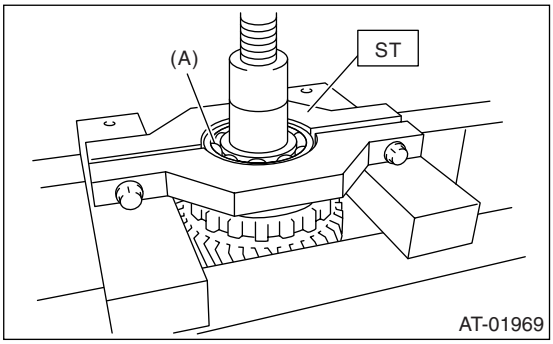
C: DISASSEMBLY

1) Remove the ball bearing from reduction driven gear using ST.
ST 498077300 REMOVER



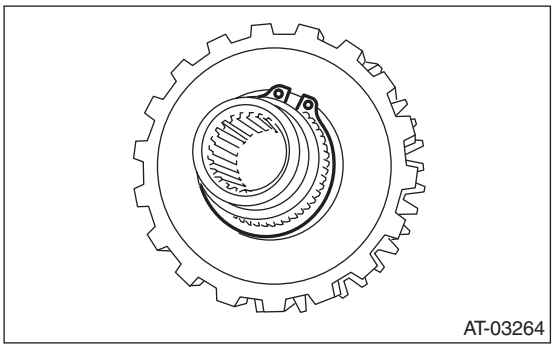
(A) Ball bearing

2) Remove the ball bearing on the reverse side with the same procedure as step 1).
ST 498077300 REMOVER

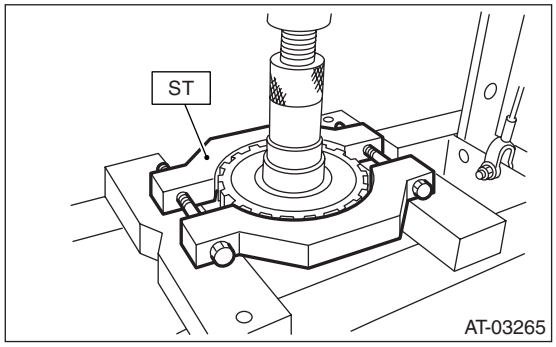


(A) Ball bearing

3) Remove the snap ring of the parking gear.

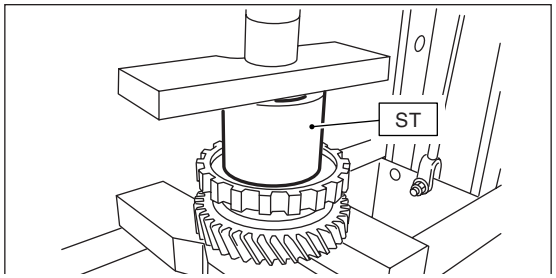


4) Using the ST, remove the parking gear.
ST 18767AA000 REMOVER

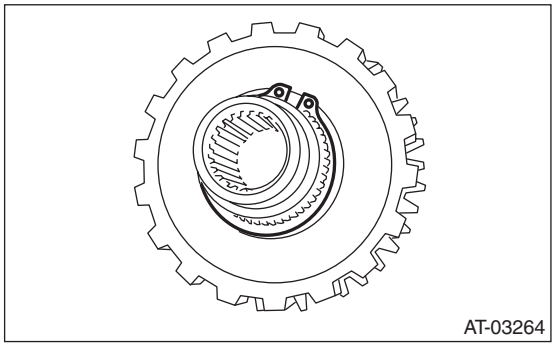


D: ASSEMBLY

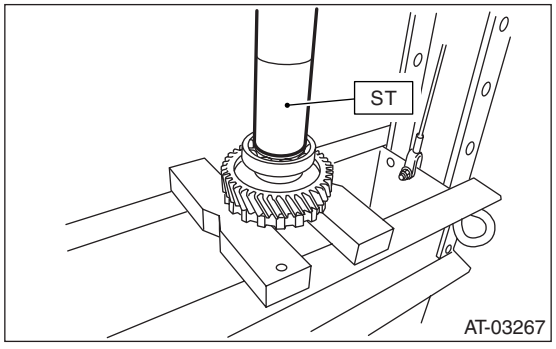
1) Using the ST, install the parking gear.
ST 499755602 PRESS



2) Install the snap ring.

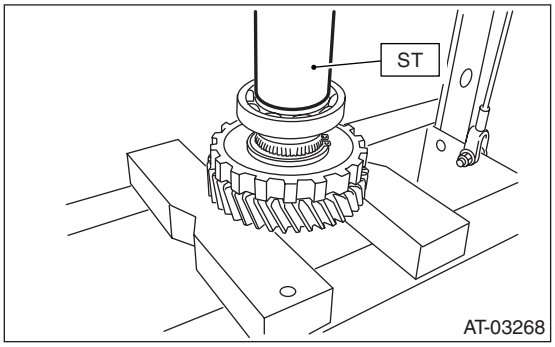


3) Install the new ball bearing to reduction driven gear using press.
ST 18654AA000 INSTALLER



(A) Ball bearing 1

4) Install the ball bearing on the reverse side with the same procedure as step 3).
ST 18654AA000 INSTALLER

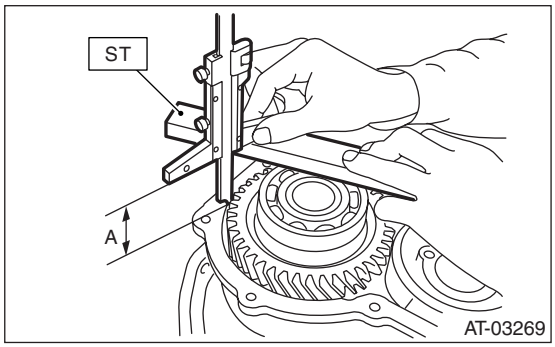


E: INSPECTION

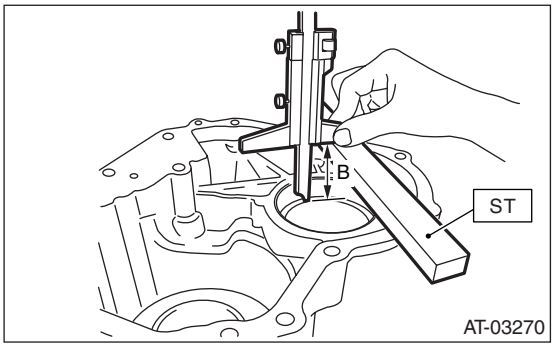
Make sure the ball bearing and gear is not deformed or damaged.

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



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



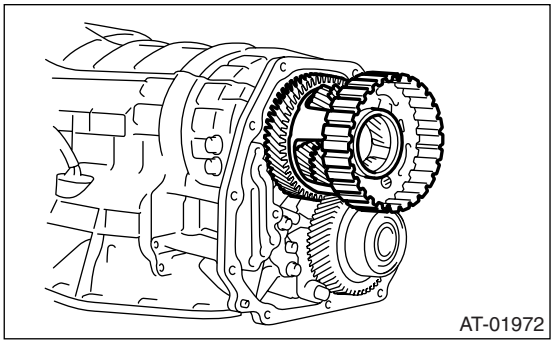
3) Calculation formula:
Select the ball bearing shim from the table to adjust clearances within 0.05 — 0.25 mm (0.0020 — 0.0098 in).
When clearances are 0.05 mm (0.0020 in):
T (mm) = B – A + 0.23
[T (in) = B – A + 0.0091]
When clearances are 0.25 mm (0.0098 in):
T (mm) = B – A + 0.03
[T (in) = B – A + 0.0011]
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-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 5AT-63, 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.

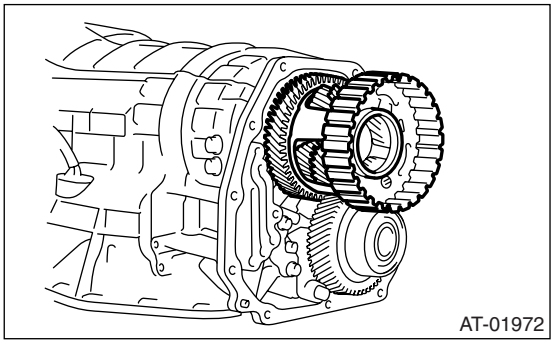


5) Pull out the shim(s) from transmission case.

B: INSTALLATION

1) Install the center differential assembly with the shim(s).

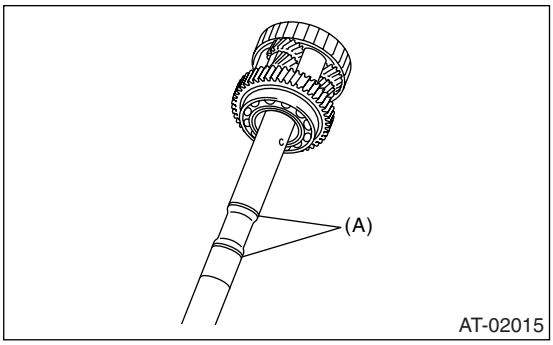
NOTE:
Press-fit it to the bottom of bearing shoulder completely.



2) Insert the rear driveshaft assembly. <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-63, INSTALLATION, Extension Case.>
4) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

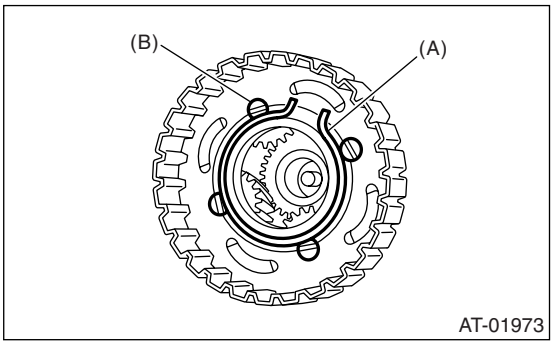
C: DISASSEMBLY

1) Remove the seal ring.



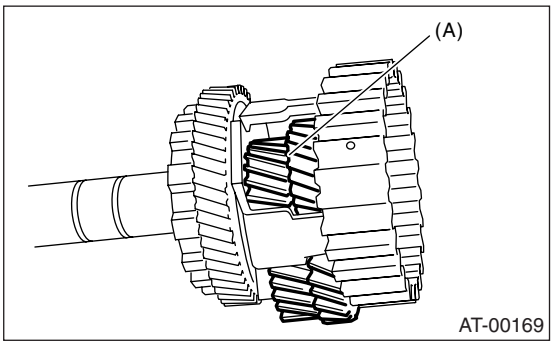
(A) Seal ring

2) Remove the snap ring, and pull out the shaft from center differential assembly.



(A) Snap ring
(B) Shaft

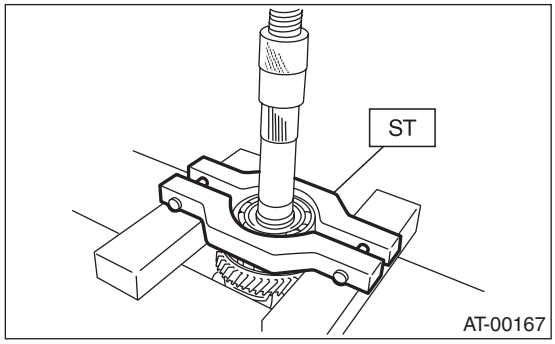
3) Remove the thrust washers, pinion gears and washers from center differential assembly.



(A) Pinion gear

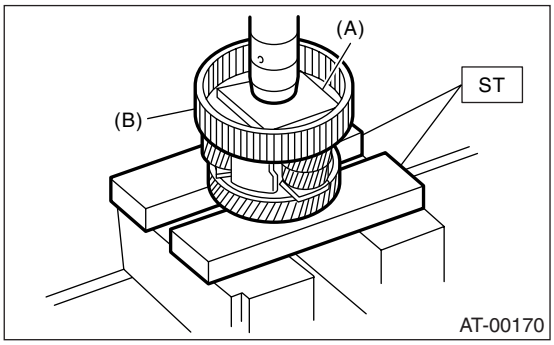
4) Pull out the intermediate shaft and thrust bearing.

5) Extract the ball bearing with ST1 and ST2.
ST1 18654AA000 INSTALLER
ST2 18767AA000 REMOVER



D: ASSEMBLY

1) Install the thrust washer onto intermediate shaft.
2) Install the thrust bearing onto intermediate shaft.
3) Install the pinion gears and washers.
4) Insert the shaft into the center differential assembly.
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.

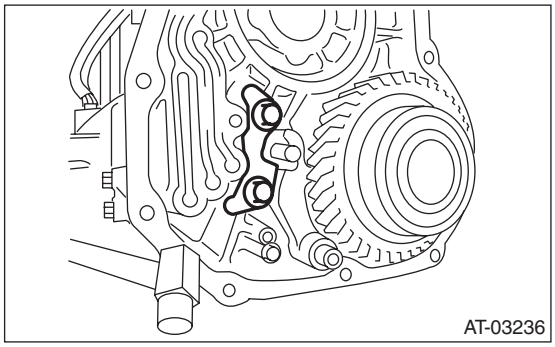
E: INSPECTION

• 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-65, ADJUSTMENT, Transfer Clutch.>

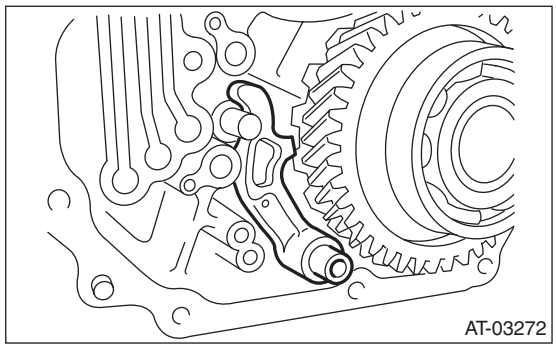
29.Parking Pawl

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case. <Ref. to 5AT-63, 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-47, REMOVAL, Front Vehicle Speed Sensor.>
5) Remove the parking support actuator.

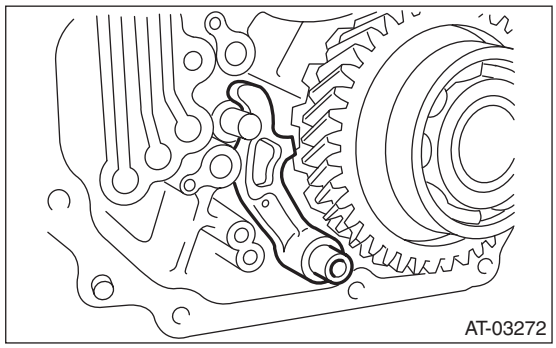


6) Remove the parking pawl, parking pawl shaft and return spring.



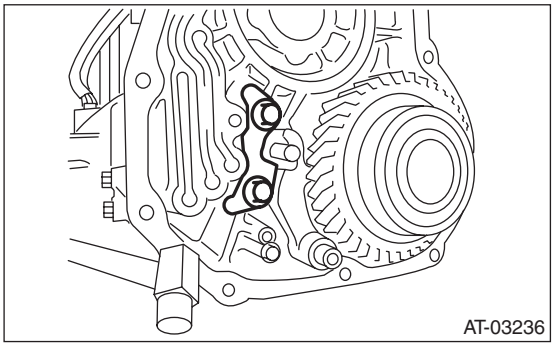
B: INSTALLATION

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±2 N·m (1.0±0.2 kgf-m, 7.4±1.5 ft-lb)

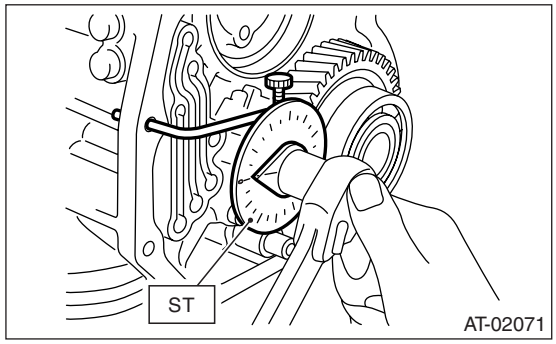


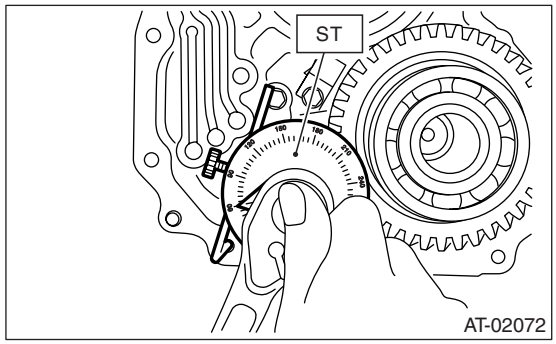
4) Using the ST, tighten the bolts which tightened in step 4) with specified angle.

Tightening angle:
17°±2°

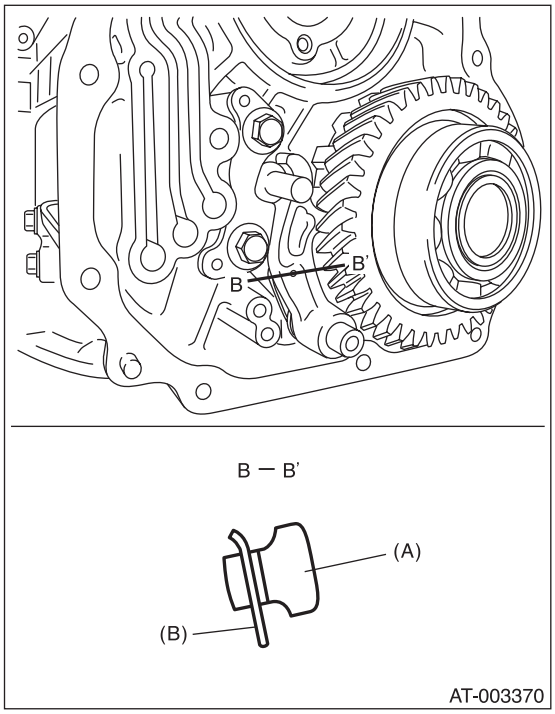
ST 18854AA000 ANGLE GAUGE

NOTE:
Do not use extension as much as possible.





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-47, 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-63, INSTALLATION, Extension Case.>
9) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

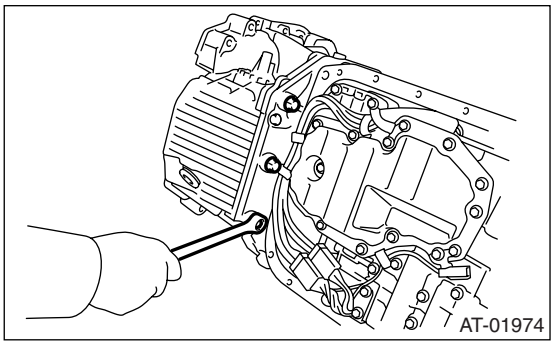
C: INSPECTION

Make sure that the tab of parking pawl on reduction driven gear is not worn or otherwise damaged.

30.Converter Case

A: REMOVAL

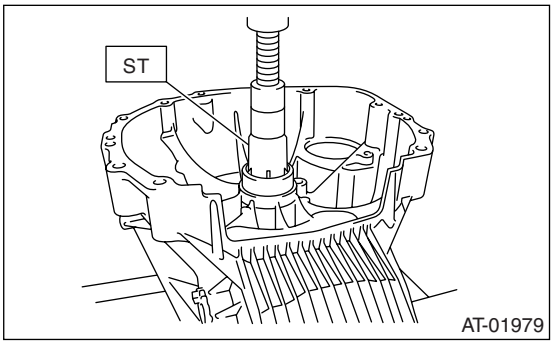
1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Remove the torque converter assembly. <Ref. to 5AT-62, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the turbine speed sensor 1. <Ref. to 5AT-52, REMOVAL, Turbine Speed Sensor 1.>
5) Remove the oil charge pipe. <Ref. to 5AT-61, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-57, REMOVAL, ATF Cooler Pipe & 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 differential assembly. <Ref. to 5AT-86, REMOVAL, Front Differential Assembly.>
12) Remove the oil seal from converter case.

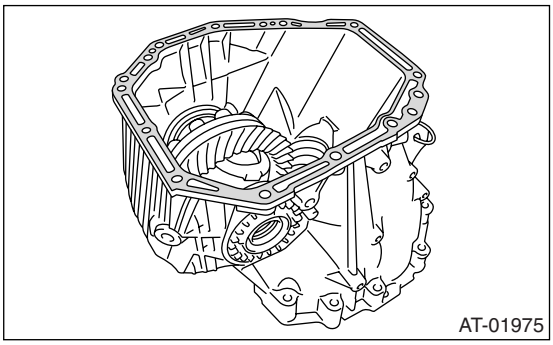
B: INSTALLATION

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 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)

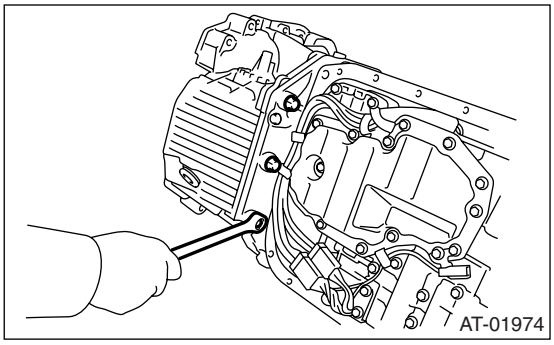


6) Install the converter case assembly without damaging bushing and oil seal.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

7) Install the three converter case mounting bolts (TORX®).
ST 18676AA020 TORX® WRENCH

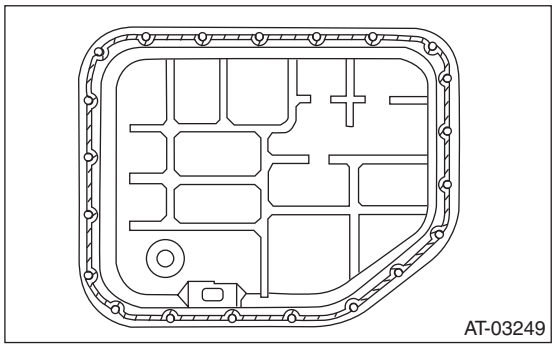
Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



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)

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-60, INSTALLATION, Air Breather Hose.>
11) Install the ATF filter pipe. <Ref. to 5AT-58, INSTALLATION, ATF Cooler Pipe & Hose.>
12) Install the oil charge pipe with O-ring. <Ref. to 5AT-61, INSTALLATION, Oil Charge Pipe.>
13) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
14) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

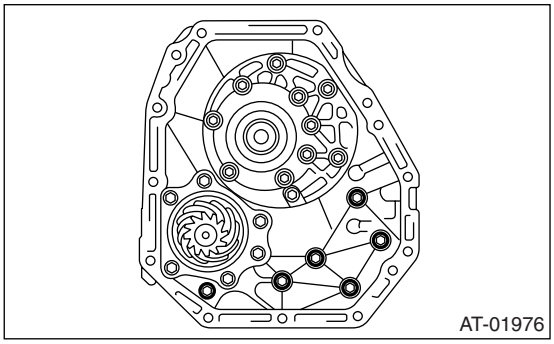
C: INSPECTION

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

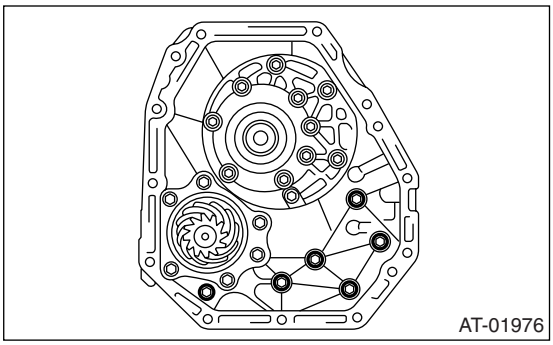
1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-62, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the oil charge pipe. <Ref. to 5AT-61, REMOVAL, Oil Charge Pipe.>
5) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-57, REMOVAL, ATF Cooler Pipe & 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, 30.4 ft-lb)

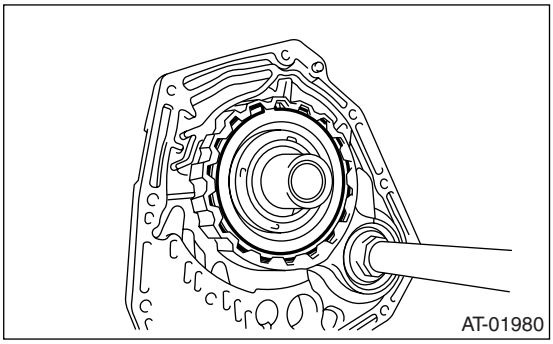


2) Install the converter case assembly to the transmission case assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
3) Install the transmission harness connector to the stay.
4) Install the ATF filter pipe. <Ref. to 5AT-58, INSTALLATION, ATF Cooler Pipe & Hose.>
5) Install the oil charge pipe together with an O-ring. <Ref. to 5AT-61, INSTALLATION, Oil Charge Pipe.>
6) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
7) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

1. FRONT BRAKE

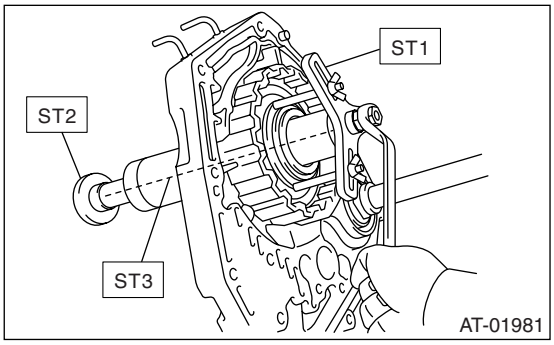
1) Remove the snap ring.



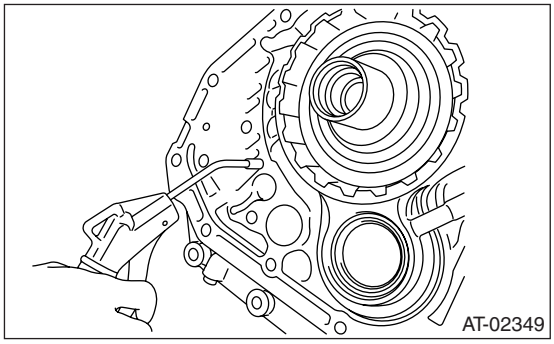
2) Remove the retainer plate, drive plate and driven plate.

3) Using the ST1, ST2 and ST3, remove the snap ring.

ST1	18762AA000	COMPRESSOR SPECIAL TOOL
ST2	18765AA000	COMPRESSOR SUPPORT
ST3	18763AA000	COMPRESSOR SHAFT



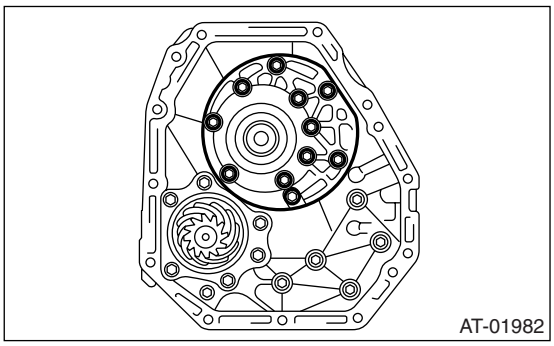
4) Remove the retainer and return spring.
5) Remove the front brake piston using compressed air.



6) Remove the D-ring from front brake piston.

2. OIL PUMP

1) Take out the oil pump housing.



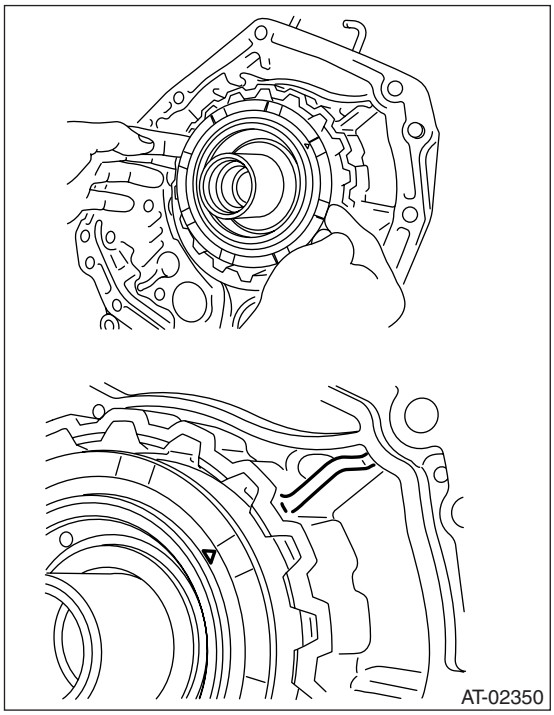
2) Take out the oil pump body.

D: ASSEMBLY

1. FRONT BRAKE

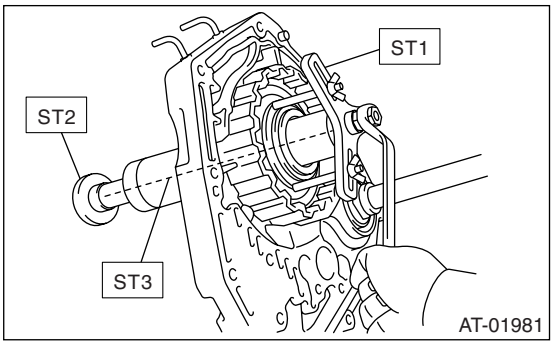
1) Apply ATF to D-ring, and then install it to the front brake piston.
2) Install the front brake piston to oil pump cover.

NOTE:
Install by aligning the "▲ " mark on front brake piston surface with the oil pump cover rib.



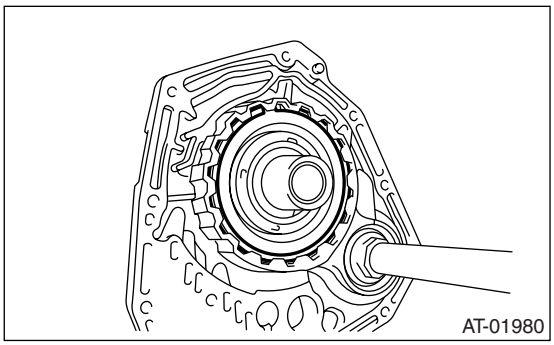
3) Install the retainer and return spring.
4) Install the front brake piston assembly using ST1, ST2 and ST3.

ST1	18762AA000	COMPRESSOR SPECIAL TOOL
ST2	18765AA000	COMPRESSOR SUPPORT
ST3	18763AA000	COMPRESSOR SHAFT



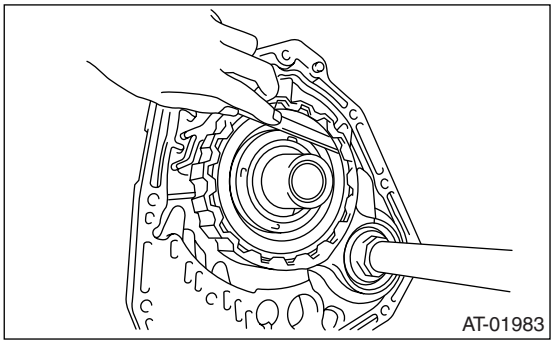
5) Install the genuine driven plate instead of retainer plate, and temporarily assemble the drive plate and driven plate.
Part No. 31536AA290 Driven plate

6) Install the snap ring.



7) Measure the clearance between retainer plate and snap ring, and then select the suitable retainer plate from table.

Front brake clearance specification:
0.7 — 1.1 mm (0.028 — 0.043 in)



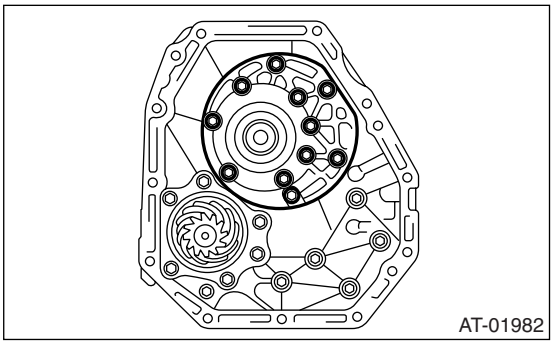
Front brake retainer plate	
Part No.	Thickness mm (in)
31567AB130	3.4 (0.134)
31567AB140	3.6 (0.142)
31567AB150	3.8 (0.150)
31567AB160	4.0 (0.157)

8) Remove the snap ring, replace the driven plate used in measurement of clearance with the retainer 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

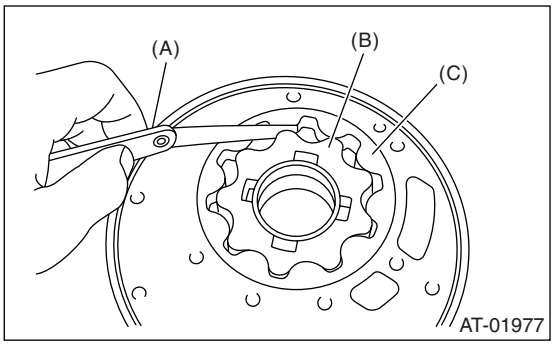
Check the following items.
- Drive plate facing for wear and damage
- Snap ring for wear, return spring for damage, and retainer for damage
- Piston for damage
- D-ring for damage

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
   (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.

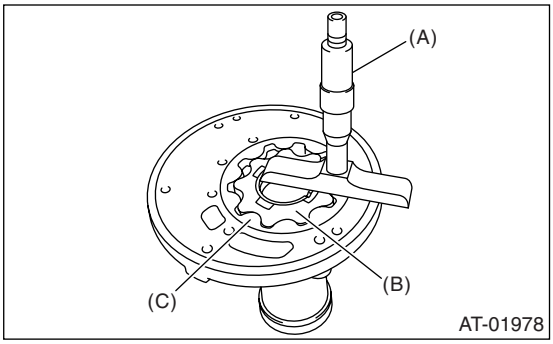
Tip clearance:
0.02 — 0.15 mm (0.0008 — 0.0059 in)



(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.

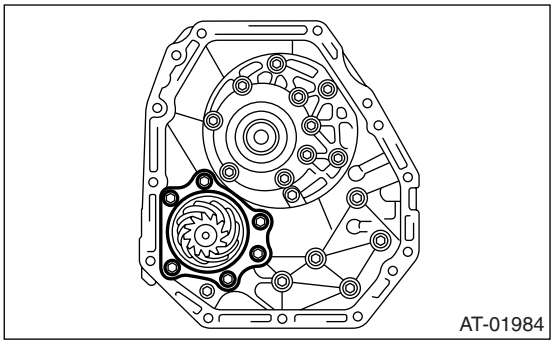
Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA130	11.37 — 11.38 (0.4476 — 0.4480)
15008AA140	11.38 — 11.39 (0.4480 — 0.4484)
15008AA150	11.39 — 11.40 (0.4484 — 0.4488)

Measure the total end play and adjust it to be within specifications. <Ref. to 5AT-99, ADJUSTMENT, AT Main Case.>

32.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-62, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Disconnect the air breather hose. <Ref. to 5AT-60, REMOVAL, Air Breather Hose.>
5) Remove the oil charge pipe. <Ref. to 5AT-61, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-57, REMOVAL, ATF Cooler Pipe & 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.



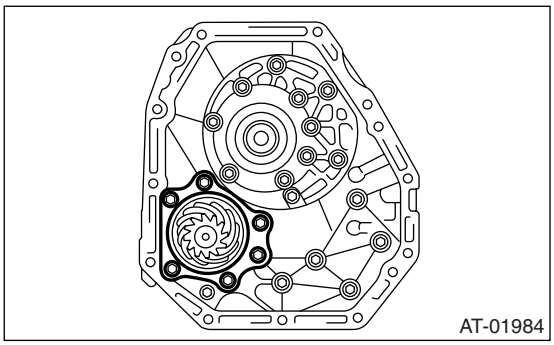
9) Remove the oil pump cover from AT main case. <Ref. to 5AT-77, Oil Pump Cover.>

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)

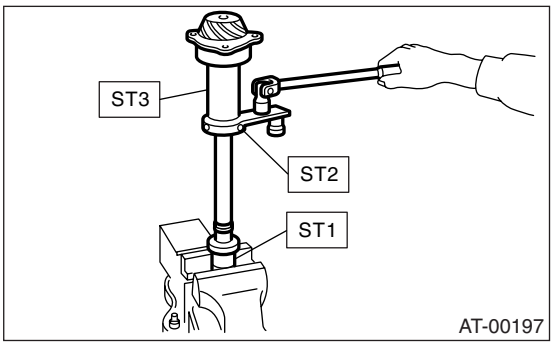


2) Adjust the tooth contact between drive pinion shaft assembly and the front differential side gear. <Ref. to 5AT-83, ADJUSTMENT, Drive Pinion Shaft Assembly.>
3) Join the converter case with the transmission case. <Ref. to 5AT-75, INSTALLATION, Converter Case.>
4) Install the transmission harness connector to the stay.
5) Install the ATF filter pipe. <Ref. to 5AT-58, INSTALLATION, ATF Cooler Pipe & Hose.>
6) Install the oil charge pipe with O-ring.
7) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
8) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

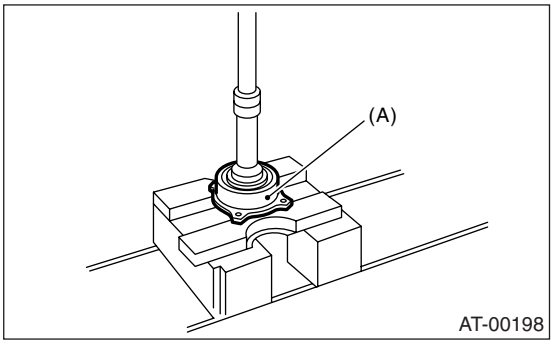
C: DISASSEMBLY

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

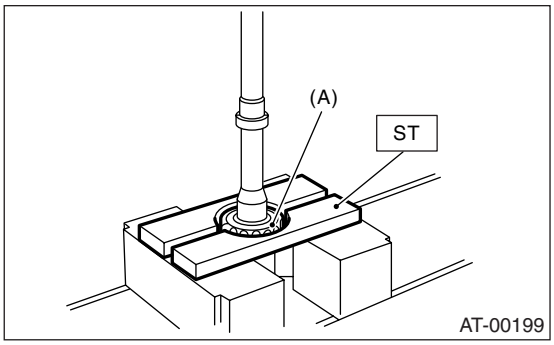


2) Remove the O-ring.
3) Separate the roller bearing and outer race from shaft using a press.



(A) Outer race

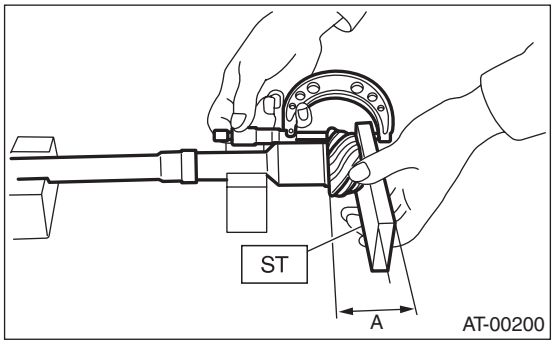
4) Separate the front roller bearing from shaft using a press and ST.
ST 498517000 REPLACER



(A) Front roller bearing

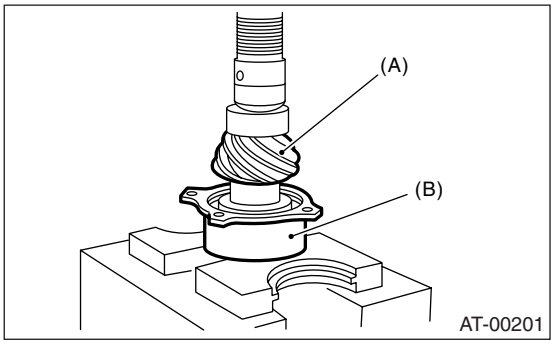
D: ASSEMBLY

1) Measure the dimension “A” of the drive pinion shaft.
ST 398643600 GAUGE



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

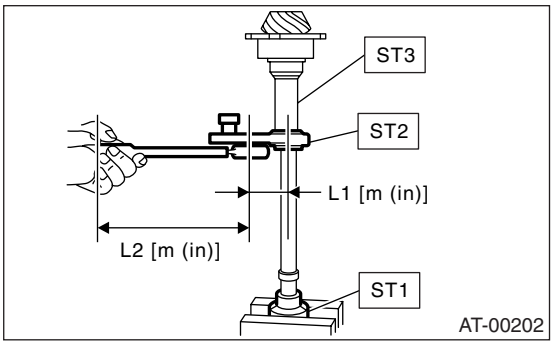
3) After fitting a new O-ring to the shaft, attach the drive pinion collar to the shaft.

4) Tighten the new lock nuts using ST1, ST2 and ST3.
Using the following equation, calculate the tightening torque.
T2 = L2/(L1 + L2) × T1
T1: 116 N·m (11.8 kgf-m, 85.3 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)
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)

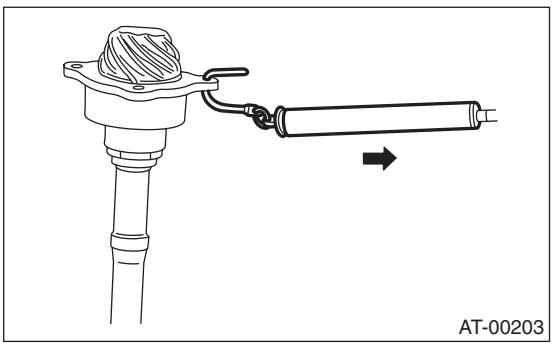
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

NOTE:
Attach ST2 to torque wrench as straight as possible.



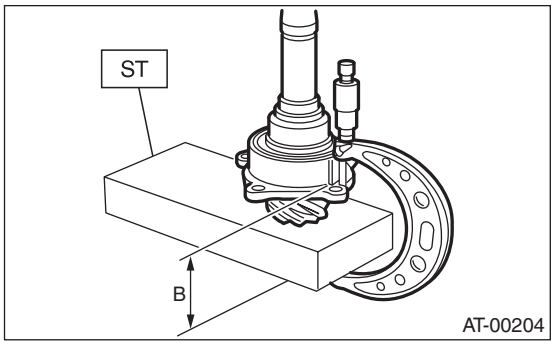
5) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If the torque is not within specified range, replace the roller bearing.

Starting torque:
7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 8.6 lb)



6) Crimp the locknut in 2 locations.

7) Measure dimension “B” of the drive pinion shaft
ST 398643600 GAUGE



8) Calculate the thickness “t” (mm) of the drive pinion shim.
$t = 6.5 \pm 0.0625 - (B - A)$
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.>

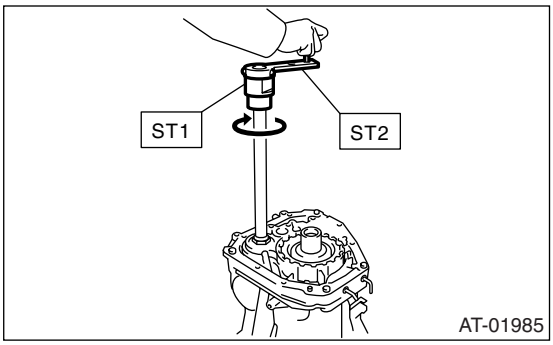
F: ADJUSTMENT

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.

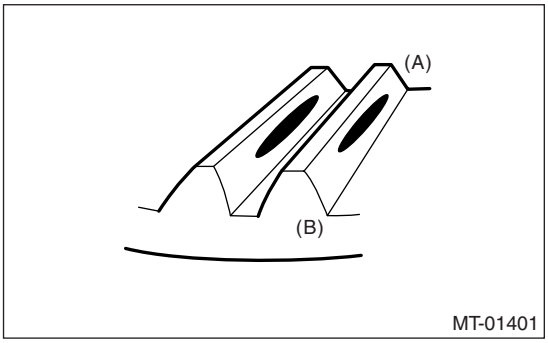
NOTE:
Use an old gasket or aluminum washer to prevent damaging the mating surface of the housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 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 red lead evenly to the surfaces of three or four teeth on 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 or thickness of the shim. <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.)

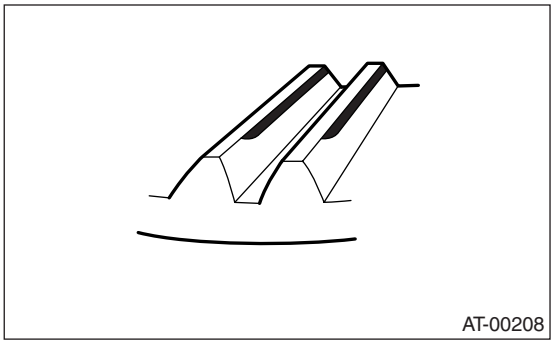


(A) Toe side
(B) Heel side

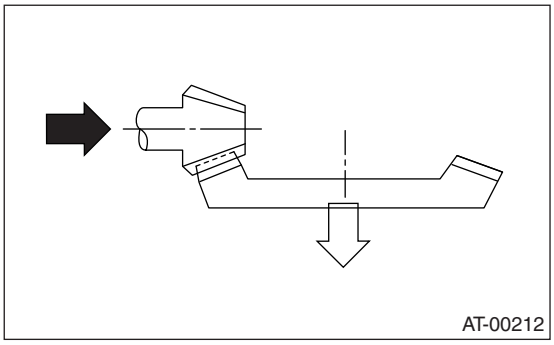
• Face contact

Inspection item: Backlash is too large.

Contact pattern



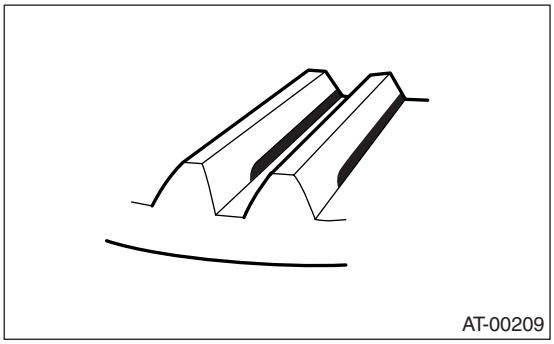
Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring drive pinion close to driven gear.



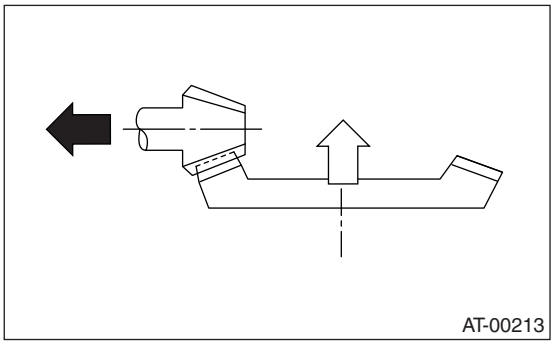
• Flank contact

Inspection item: Backlash is too small.

Contact pattern



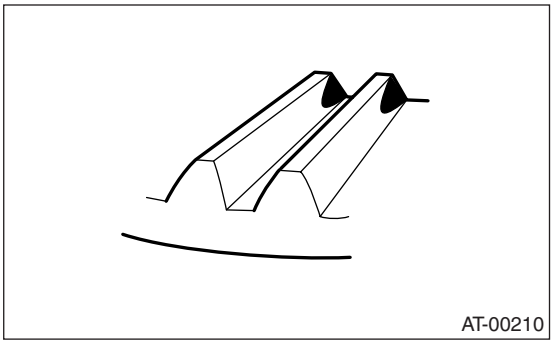
Adjustment: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from driven gear.



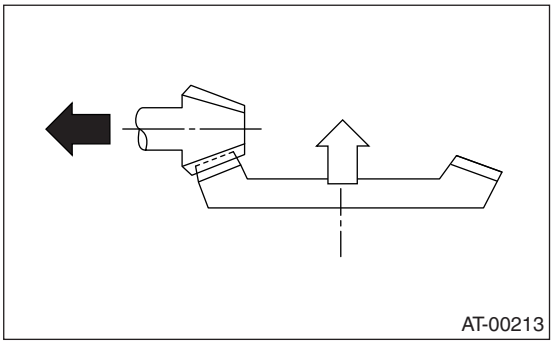
• Toe contact (inside contact)

Inspection item: Contact area is too small.

Contact pattern



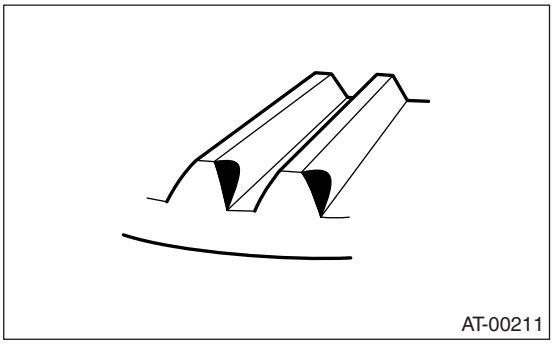
Adjustment: Reduce the thickness of pinion height adjusting washer according to the procedure for bringing drive pinion away from driven gear side.



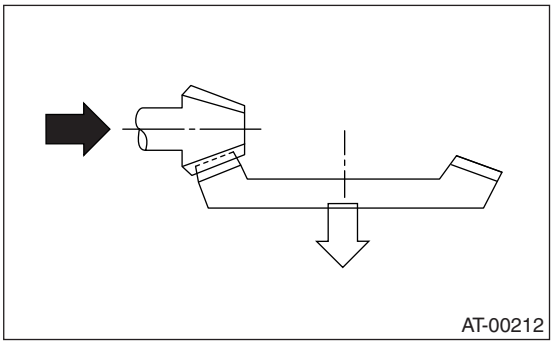
• Heel contact (outside end contact)

Inspection item: Contact area is too small.

Contact pattern

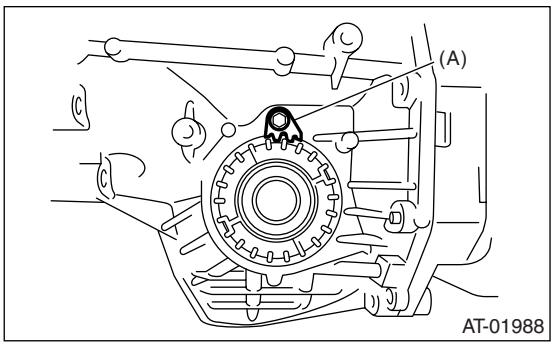


Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring drive pinion close to driven gear.



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 ft-lb)



(A) Lock plate

33.Front Differential Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-62, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the oil charge pipe. <Ref. to 5AT-61, REMOVAL, Oil Charge Pipe.>
5) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-57, REMOVAL, ATF Cooler Pipe & 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.

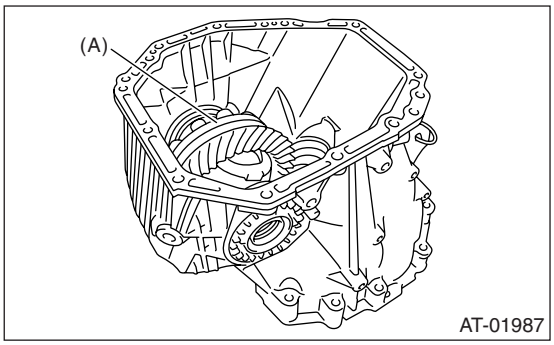
NOTE:
Hold the differential case assembly by hand to avoid damaging the retainer mounting hole of the converter case.

ST 18630AA010 WRENCH COMPL RETAINER

8) Remove the differential assembly while being careful not to damage the attachment part of retainer.

B: INSTALLATION

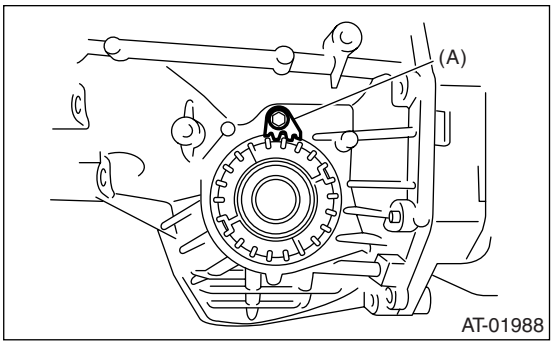
1) When installing the differential assembly to case, be careful not to damage the inside of case (particularly, the differential side retainer mating surface).



(A) Differential ASSY

2) Install the O-ring to left and right side retainer.
3) Using the ST, install the side retainer. <Ref. to 5AT-86, REMOVAL, 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 ft-lb)



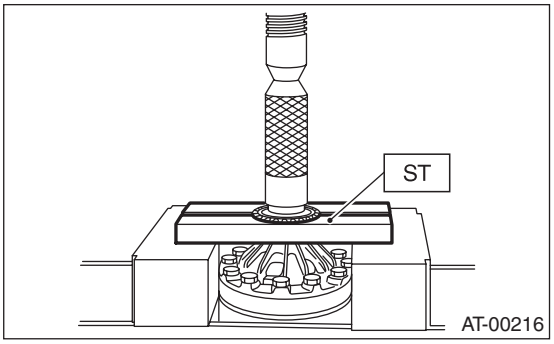
(A) Lock plate

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 filter pipe. <Ref. to 5AT-58, INSTALLATION, ATF Cooler Pipe & Hose.>
9) Install the oil charge pipe together with an O-ring. <Ref. to 5AT-61, INSTALLATION, Oil Charge Pipe.>
10) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
11) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

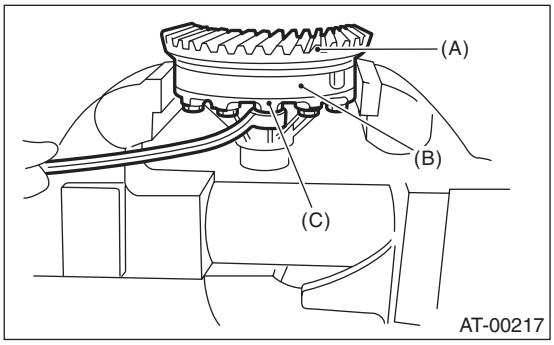
C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Remove the taper roller bearing using the ST and a press.
ST 498077000 REMOVER

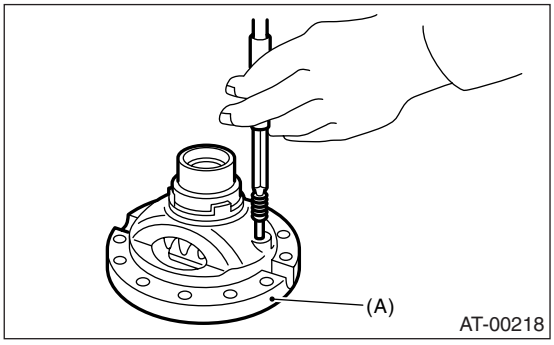


2) Secure the case in a vise, remove the hypoid driven gear tightening bolts, and then separate the hypoid driven gear into case (RH) and case (LH).



(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.

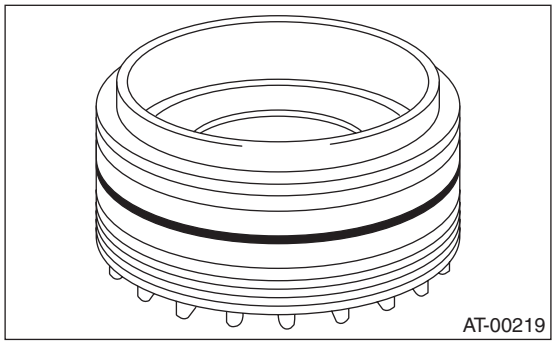


(A) Differential case (RH)

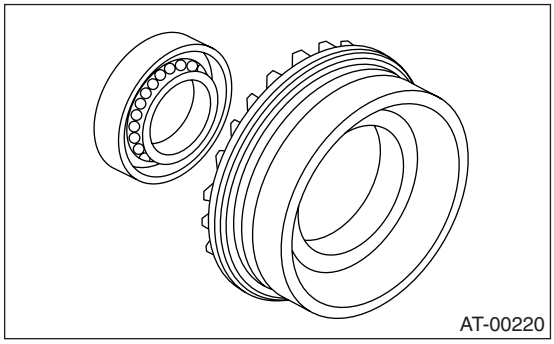
2. SIDE RETAINER

NOTE:
After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.

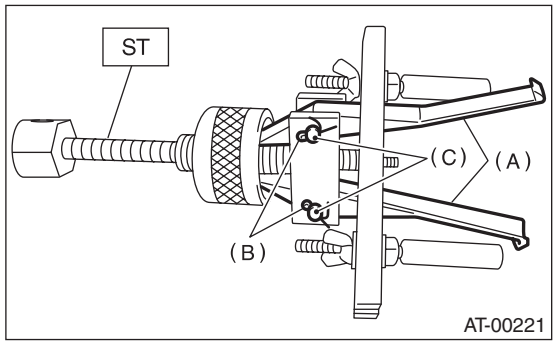
1) Remove the O-ring.



2) Remove the oil seal.

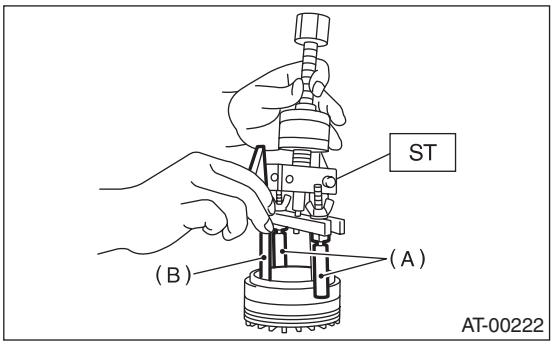


3) Remove the split pin, and then remove the claw.
ST 398527700 PULLER



(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

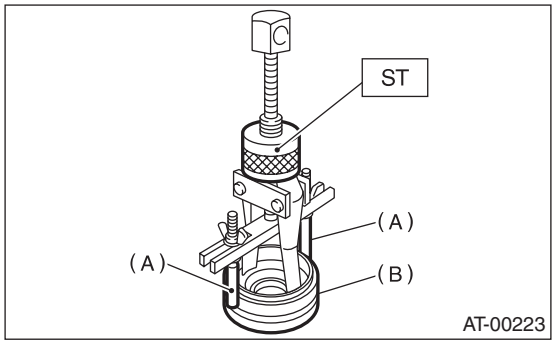


(A) Shaft
(B) Claw

5) Restore the removed claws to original position, and install the pin and split pin.

6) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.
ST 398527700 PULLER

NOTE:
Replace the bearing inner and outer races as a single unit.

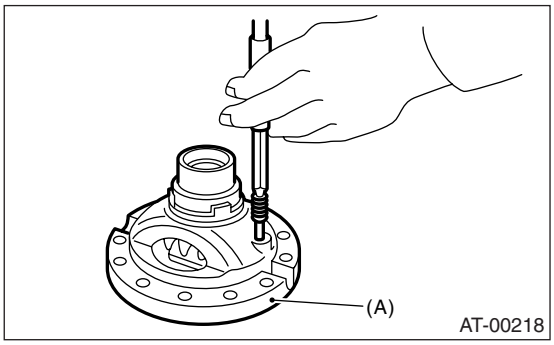


(A) Shaft
(B) Side retainer

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

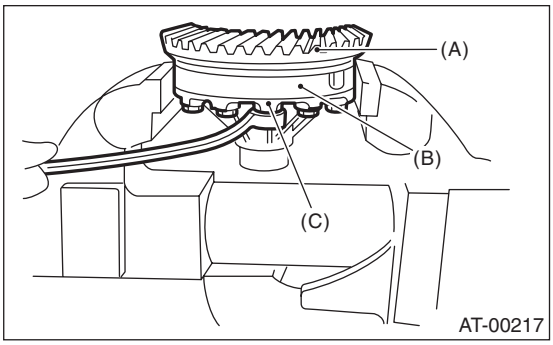
1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft.
2) Attach the straight pin in the reverse direction.



(A) Differential case (RH)

3) Install the washer and differential bevel gear to differential case (LH). Put the differential case (RH) on the case, and then assemble the 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)

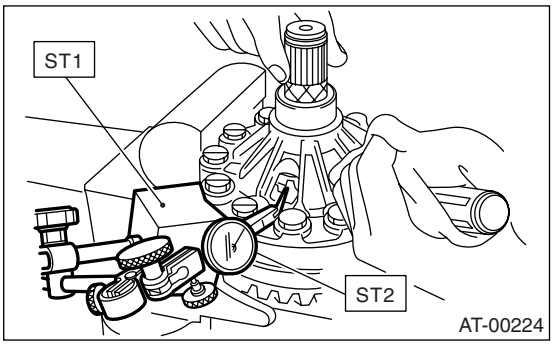


(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

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 the ST2 though the access window of case.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

NOTE:
• Measure the backlash by applying a pinion tooth between two bevel gear teeth.
• Fix the bevel pinion gear in place with a screwdriver 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)

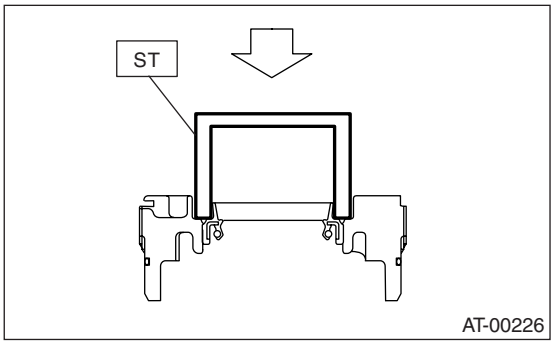
6) Using the ST, install the taper roller bearing.
ST 398487700 DRIFT

2. SIDE RETAINER

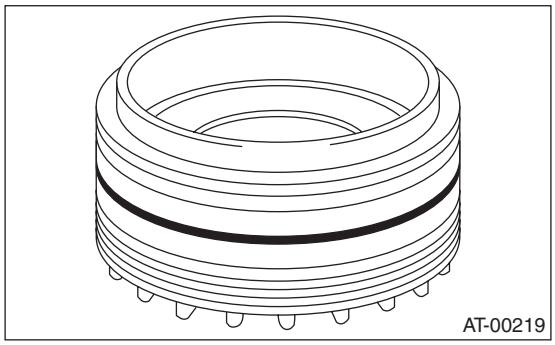
NOTE:
Install the oil seal and O-ring of side retainer after the adjustment of backlash and tooth contact.

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.



E: INSPECTION

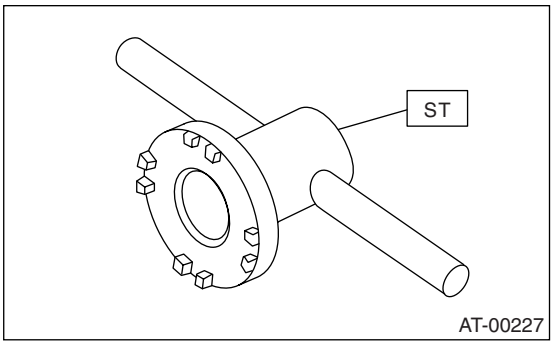
• Check each component for scratches, damage or other faults.
• Measure the backlash, and then adjust it to be within specification.
<Ref. to 5AT-89, ADJUSTMENT, Front Differential Assembly.>

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

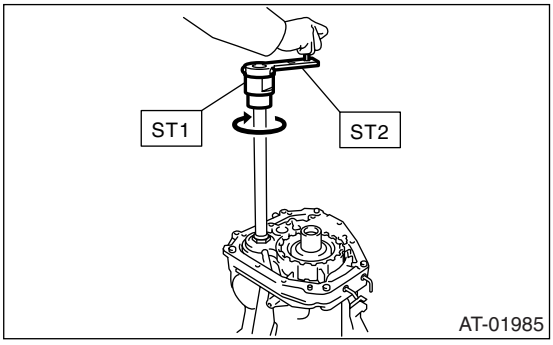


2) Remove the oil pump cover.
3) Remove the liquid gasket from the mating surface completely.
4) Install the oil pump cover to converter case, and secure them with tightening four bolts evenly.

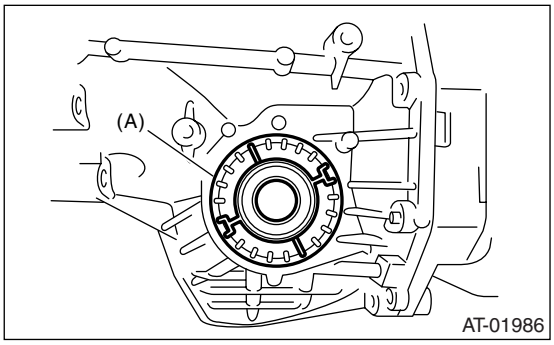
NOTE:
Use an old gasket or aluminum washer to prevent damaging the mating surface of the housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

5) Rotate the drive pinion ten times or more using ST1 and ST2.
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH

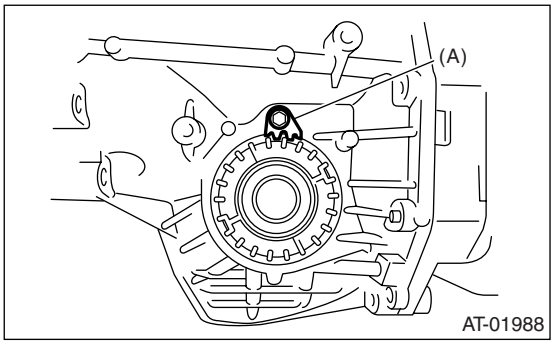


6) Tighten the LH retainer by rotating the shaft until resistance is felt. Then loosen the retainer RH. Keep tightening the retainer LH, and loosening the retainer RH until the pinion shaft no longer be turned. This is the “zero” state.



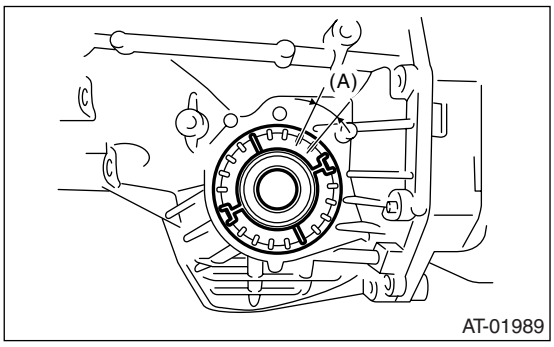
(A) Retainer

7) After the “zero” state is established, back off the retainer LH 3 notches and secure it with the lock plate. Then back off 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) Turn the drive pinion several times using ST1, and check to see if the backlash is within the specification using ST2, ST3, ST4 and ST5.

ST1	499787700	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499787500	ADAPTER
ST5	498255400	PLATE

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)

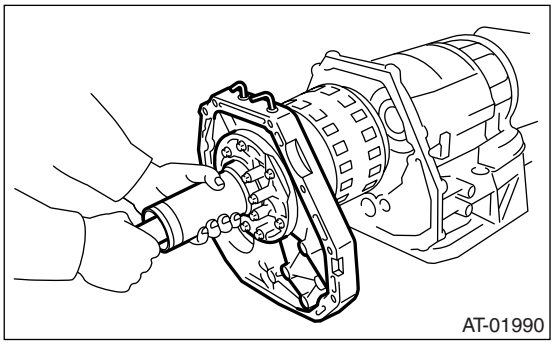
9) Adjust the teeth contact of the front differential and drive shaft. <Ref. to 5AT-83, ADJUSTMENT, Drive Pinion Shaft Assembly.>

34.AT Main Case

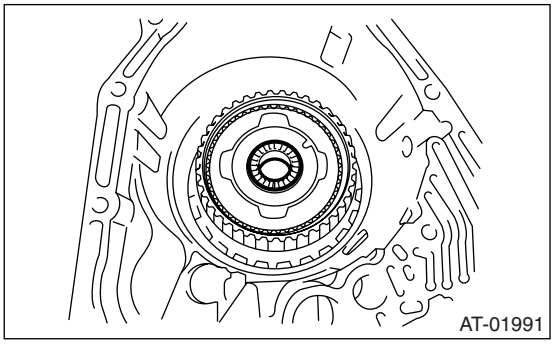
A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-62, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Disconnect the air breather hose.
5) Remove the oil charge pipe. <Ref. to 5AT-61, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-57, REMOVAL, ATF Cooler Pipe & Hose.>
7) Remove the extension case. <Ref. to 5AT-63, REMOVAL, Extension Case.>
8) Remove the center differential carrier. <Ref. to 5AT-71, REMOVAL, Center Differential Carrier.>
9) Remove the reduction driven gear. <Ref. to 5AT-68, REMOVAL, Reduction Driven Gear.>
10) Separate the converter case from the transmission case. <Ref. to 5AT-75, REMOVAL, Converter Case.>
11) Remove the control valve body. <Ref. to 5AT-53, REMOVAL, Control Valve Body.>
12) Remove the oil pump cover.
<Ref. to 5AT-77, REMOVAL, Oil Pump Cover.>

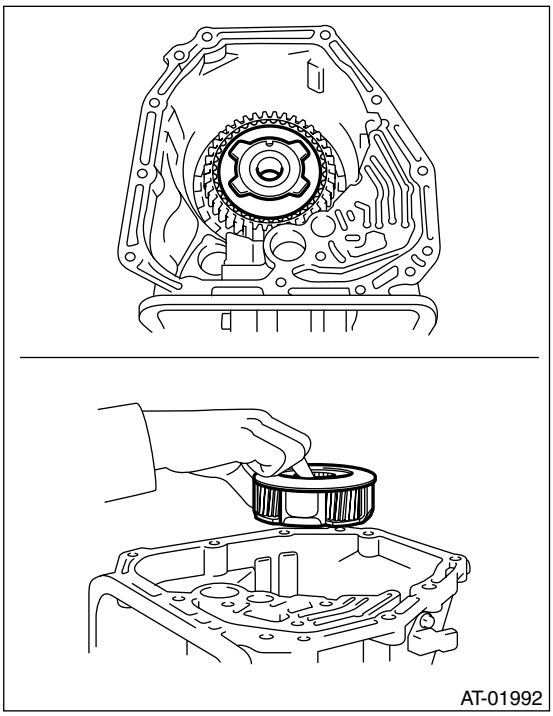
NOTE:
The input clutch pack assembly and front sun gear assembly are also removed together.


AT-01990

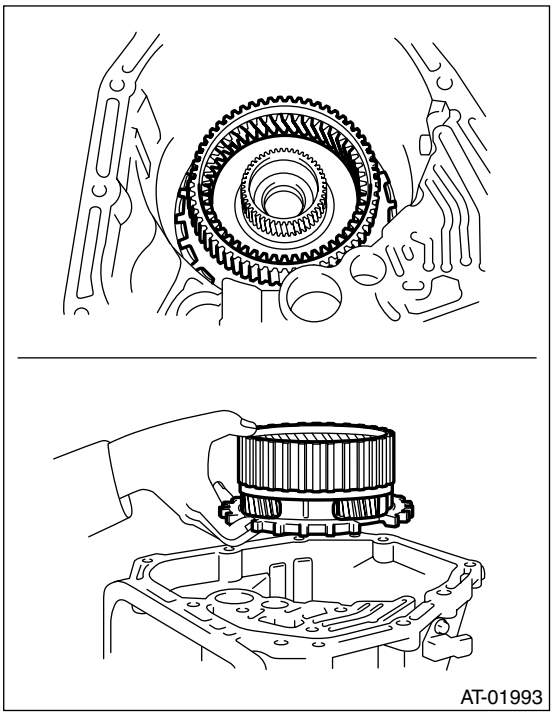
13) Remove the needle bearing of the middle carrier assembly.


AT-01991

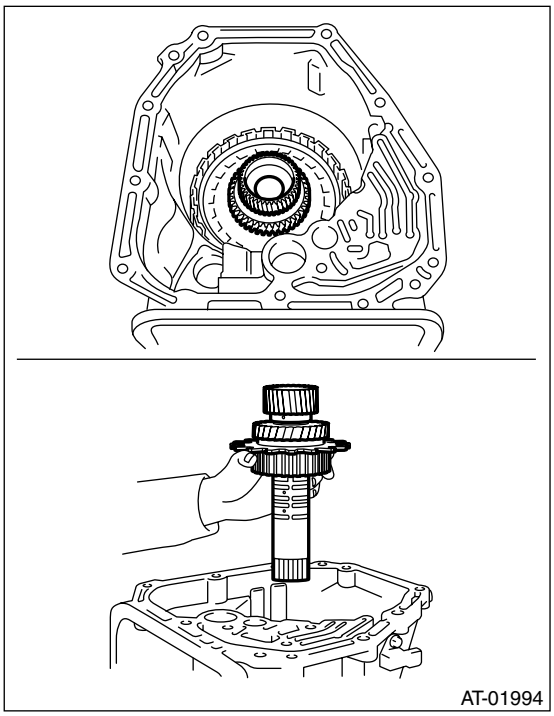
14) Remove the middle carrier assembly.


AT-01992

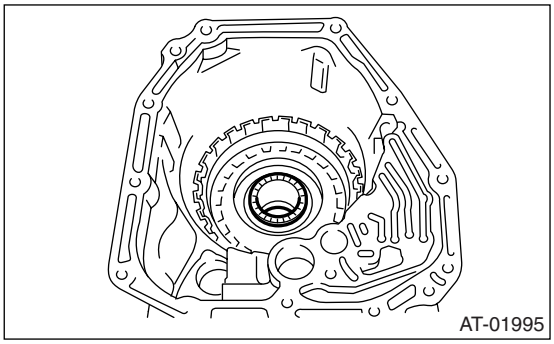
15) Remove the rear carrier assembly.


AT-01993

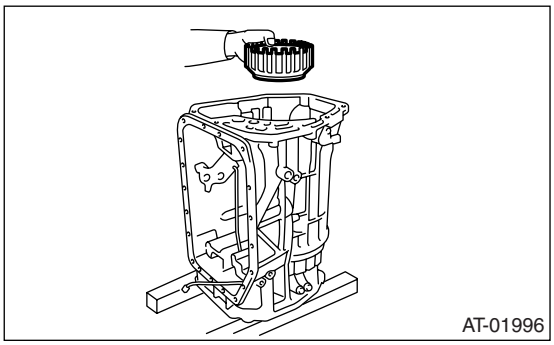
16) Remove the middle & rear sun gear assembly.



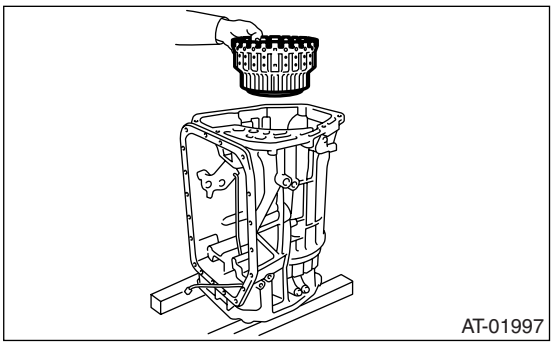
17) Remove the thrust needle bearing of high & low reverse clutch.



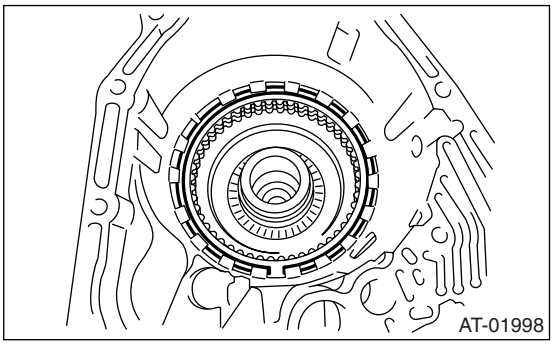
18) Remove the high & low reverse clutch assembly.



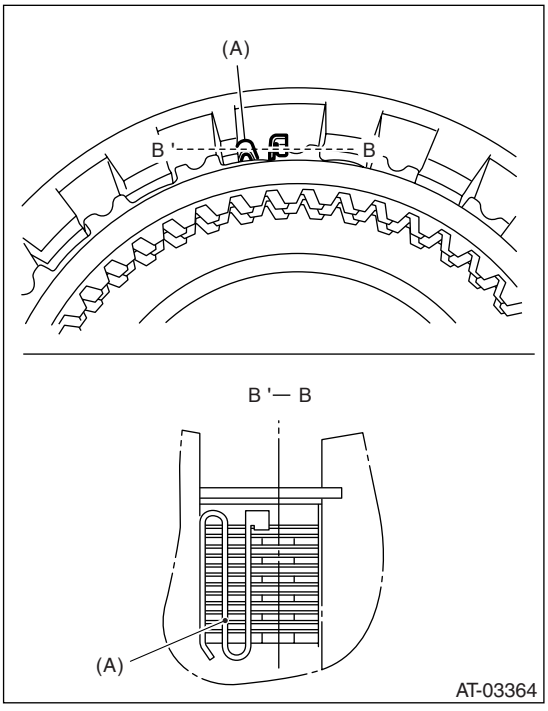
19) Remove the direct clutch assembly.



20) Remove the snap ring of reverse brake.



21) Remove the retaining plate.
22) Remove the leaf spring.

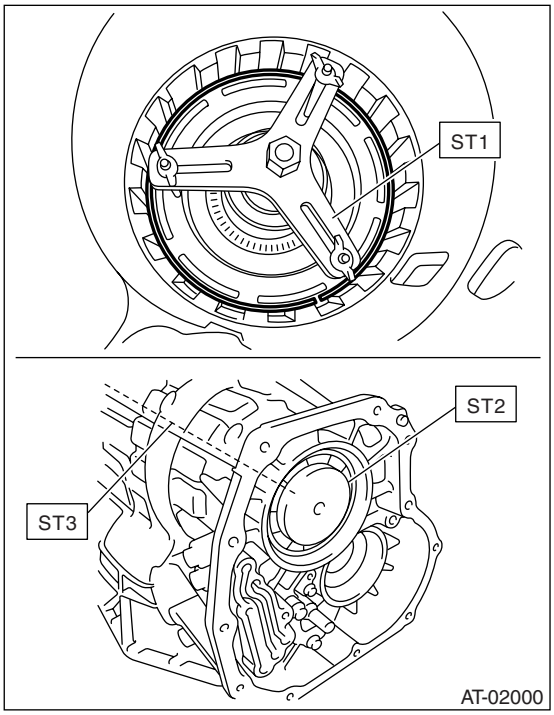


(A) Leaf spring

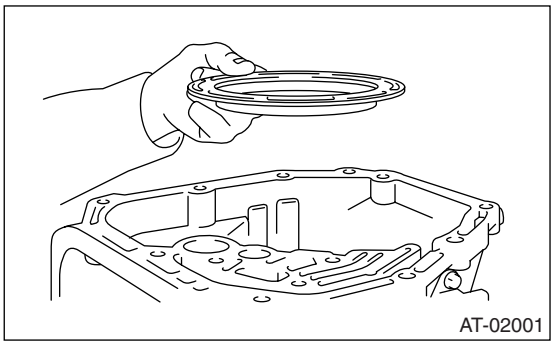
23) Take out the drive plate, driven plate and dish plate.

24) Remove the snap ring of the reverse brake spring retainer.

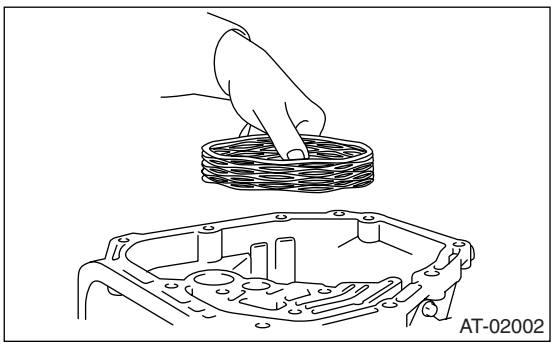
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT



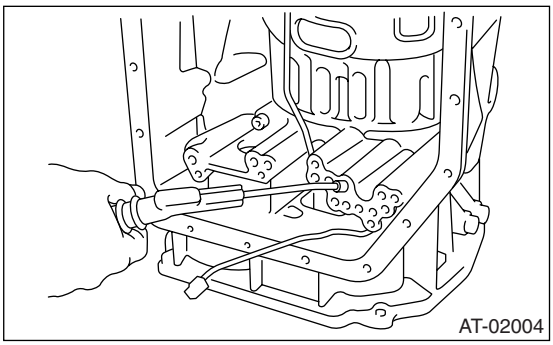
25) Remove the spring retainer.



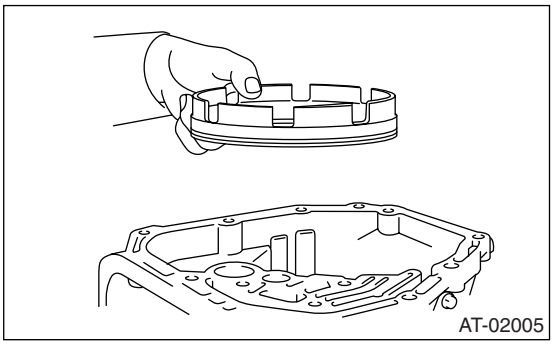
26) Remove the return spring.



27) Apply compressed air.



28) Remove the reverse brake piston.



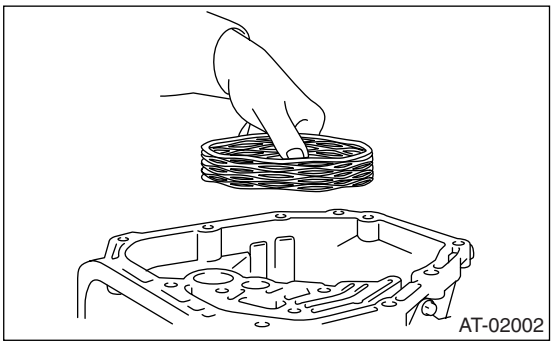
B: INSTALLATION

1) Install the reverse brake piston.

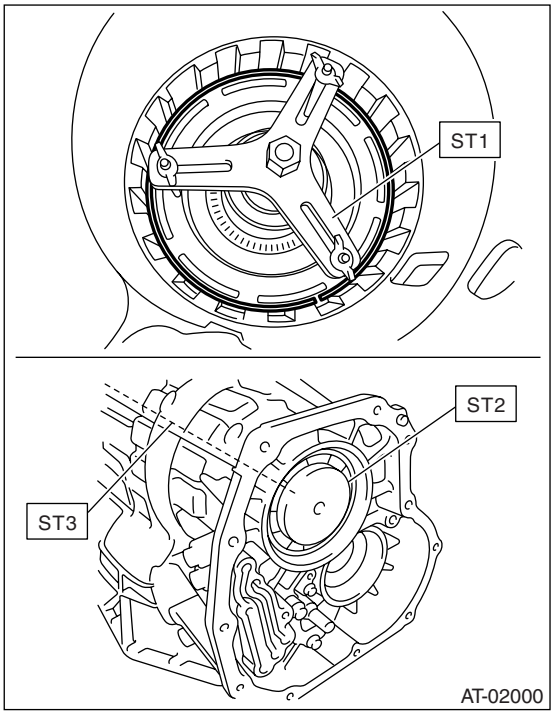
NOTE:
Apply ATF onto the piston sliding surface.

ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT

2) Install the return spring.



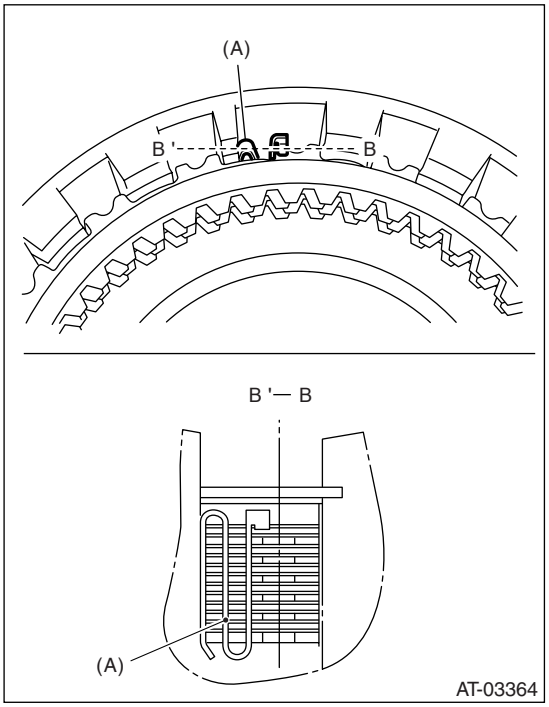
3) Install the spring retainer and snap ring.
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT



4) Install the dish plate.

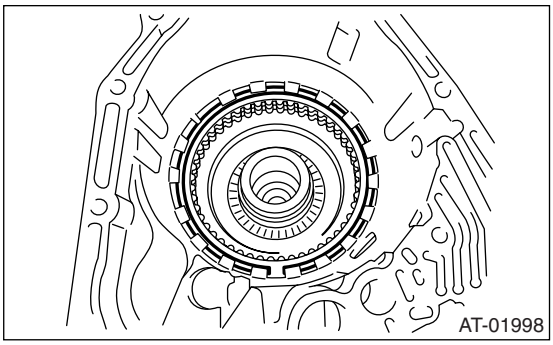
NOTE:
When installing, make sure that the identification mark is facing the front side of transmission.

5) Install the drive plate and driven plate.
6) Install the leaf spring.



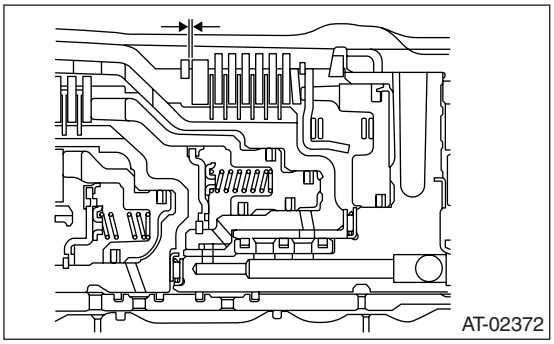
(A) Leaf spring

7) Install the retaining plate.
8) Install the snap ring of the reverse brake.



9) Perform the clearance check of reverse brake.
(1) Measure the clearance between retainer plate and snap ring using thickness gauge.

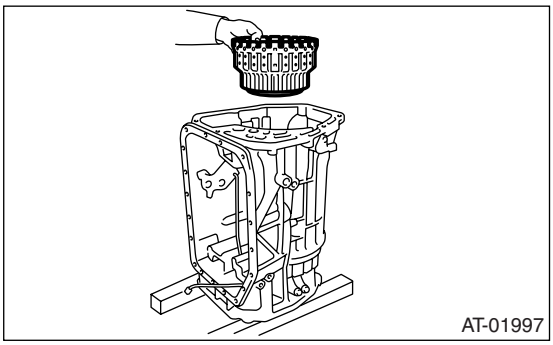
Specification:
0.7 — 1.1 mm (0.028 — 0.043 in)



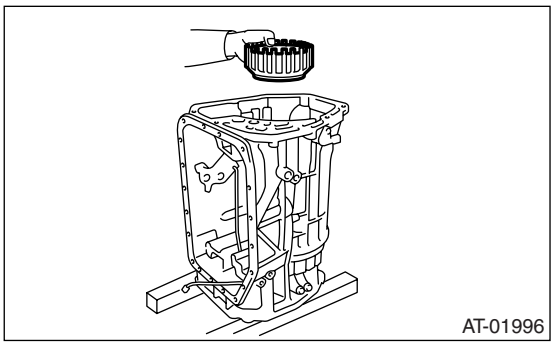
(2) If it is out of specification, select a suitable retainer plate from the following table and assemble it.

Retainer 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)

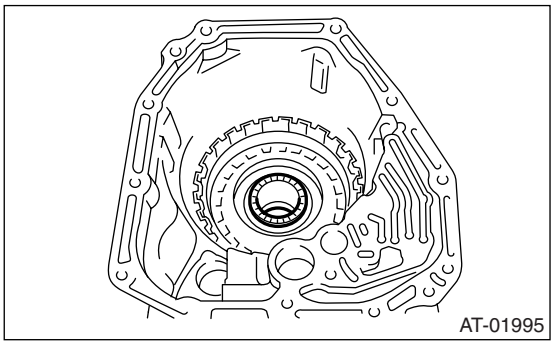
10) Install the direct clutch assembly.



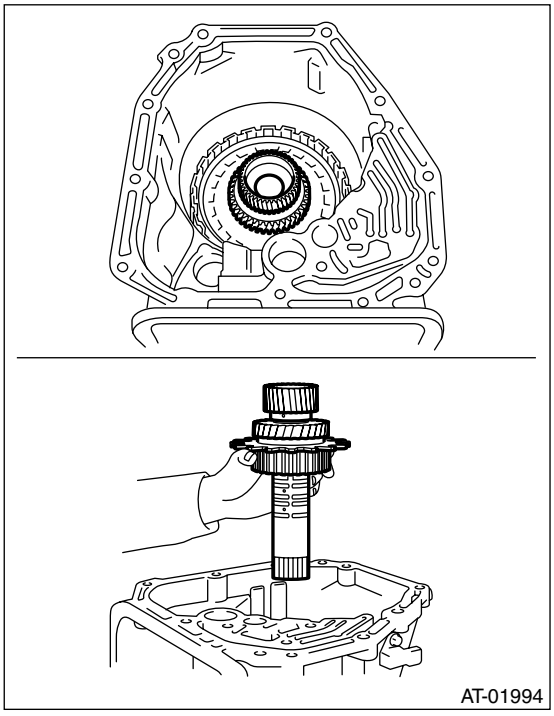
11) Install the high & low reverse clutch assembly.



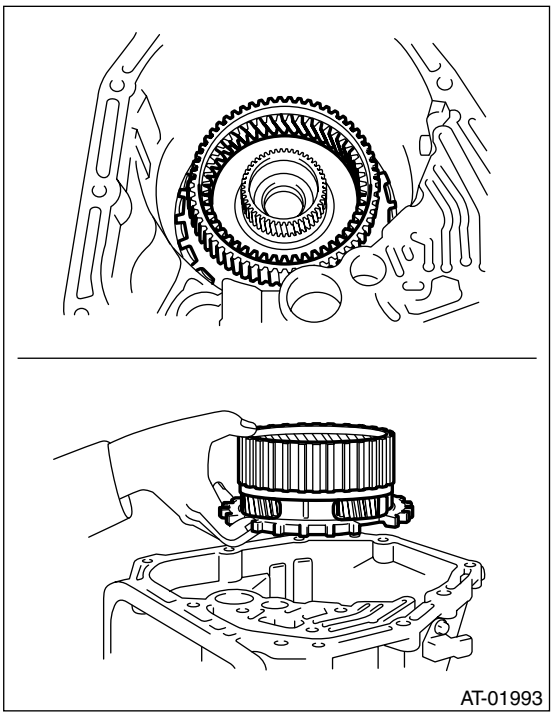
12) Install the thrust needle bearing of the high & low reverse clutch.



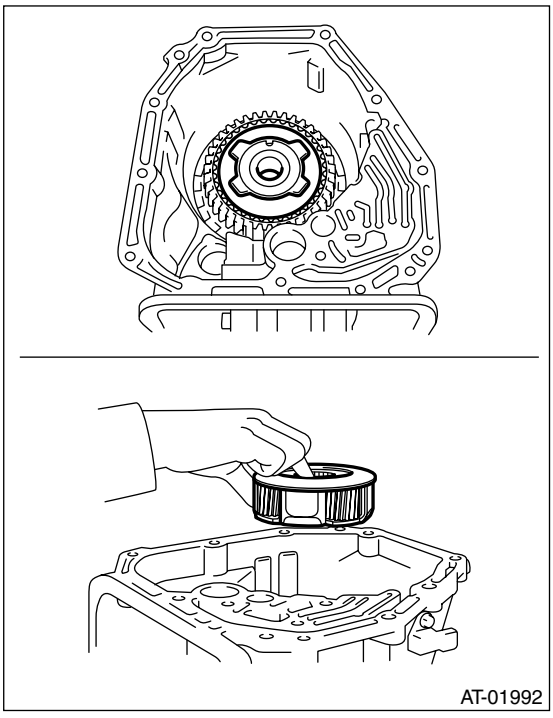
13) Install the middle & rear sun gear assembly.



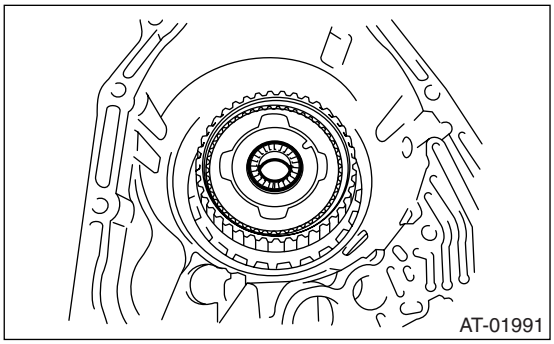
14) Install the rear carrier assembly.



15) Install the middle carrier assembly.

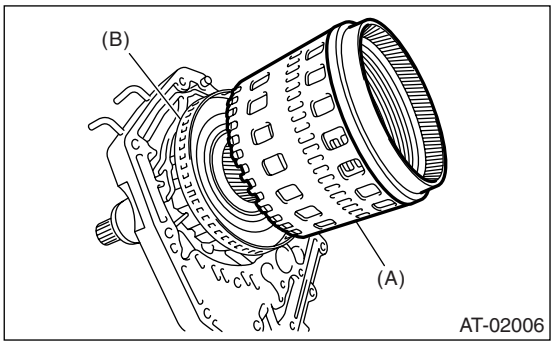


16) Install the thrust needle bearing of middle carrier assembly.



17) Measure the total end play, and select the bearing. <Ref. to 5AT-99, ADJUSTMENT, AT Main Case.>

18) Install the impact clutch pack assembly to oil pump cover.



(A) Impact clutch pack ASSY
(B) Front sun gear ASSY

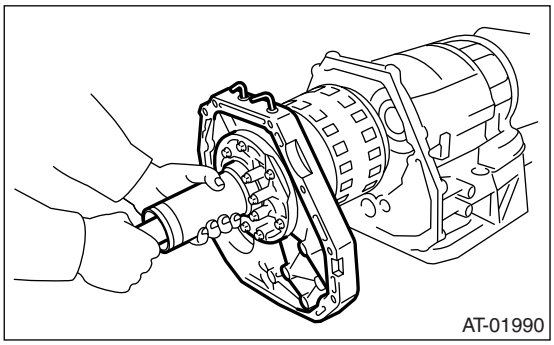
19) Install the thrust needle bearing.

20) Turn the transmission sideways.

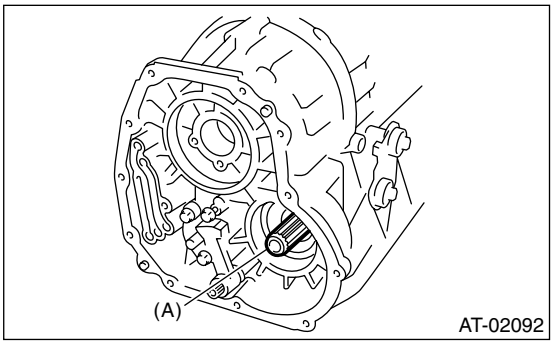
21) Install the oil pump cover.

(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.



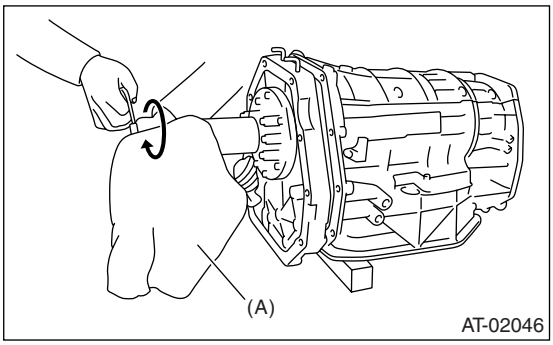
(3) Make sure the rear end of drive pinion shaft is engaged to the spline of reduction driven gear.



(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.

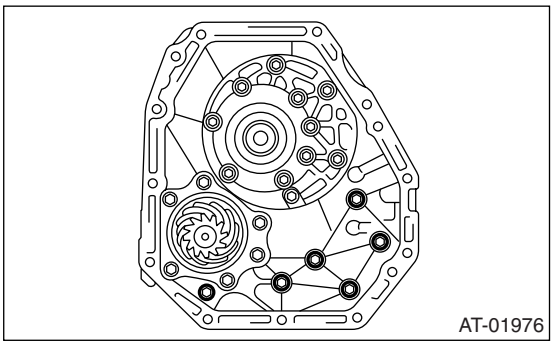
NOTE:
Work with pressing the oil pump cover.



(A) Cloth

(5) Combine the oil pump cover with transmission main case.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



22) Install the center differential carrier. <Ref. to 5AT-71, INSTALLATION, Center Differential Carrier.>

23) Install the reduction driven gear. <Ref. to 5AT-68, INSTALLATION, Reduction Driven Gear.>

24) Install the extension case. <Ref. to 5AT-63, INSTALLATION, Extension Case.>
25) Install the control valve body. <Ref. to 5AT-53, INSTALLATION, Control Valve Body.>
26) Install the converter case assembly to the transmission case assembly. <Ref. to 5AT-75, INSTALLATION, Converter Case.>
27) Install the air breather hose. <Ref. to 5AT-60, INSTALLATION, Air Breather Hose.>
28) Install the ATF filter pipe. <Ref. to 5AT-58, INSTALLATION, ATF Cooler Pipe & Hose.>
29) Install the oil charge pipe together with an O-ring. <Ref. to 5AT-61, INSTALLATION, Oil Charge Pipe.>
30) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
31) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>
32) Perform Clear Memory 2 operation. <Ref. to 5AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
33) Perform the inspection with driving the vehicle at the end of repair work, and make sure there is no faulty as below;

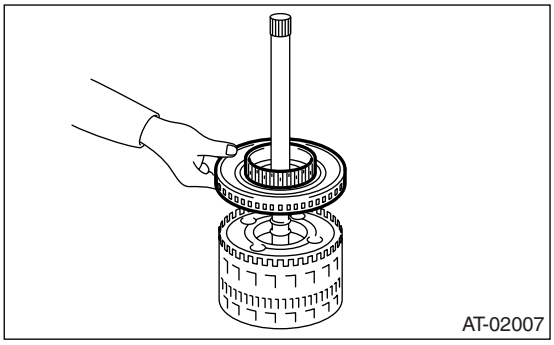
- Excessive shift shock
- Oil leakage from the transmission body, etc.
- Occurrence of noise caused by interference etc.

NOTE:
If excessive shift shock is felt, execute advance operation of learning control. <Ref. to 5AT(diag)-21, PROCEDURE, Learning Control.>

C: DISASSEMBLY

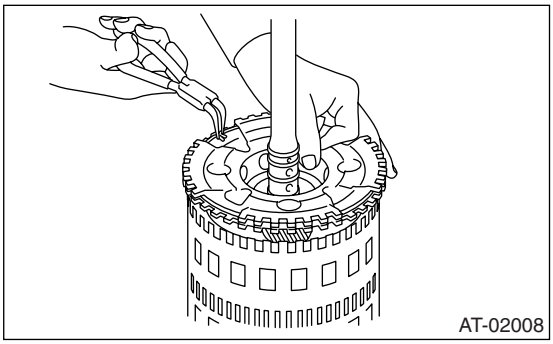
1. INPUT CLUTCH PACK ASSEMBLY

1) Remove the front sun gear.

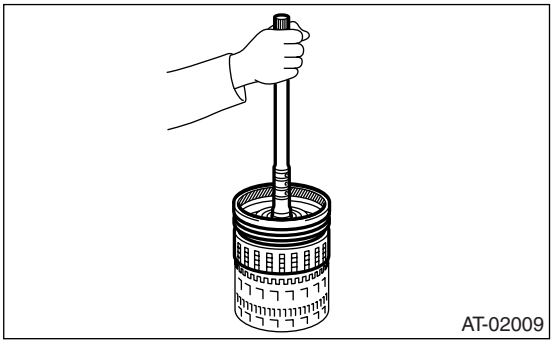

AT-02007

2) Remove the thrust bearing.

3) Remove the snap ring, and then remove the front carrier.


AT-02008

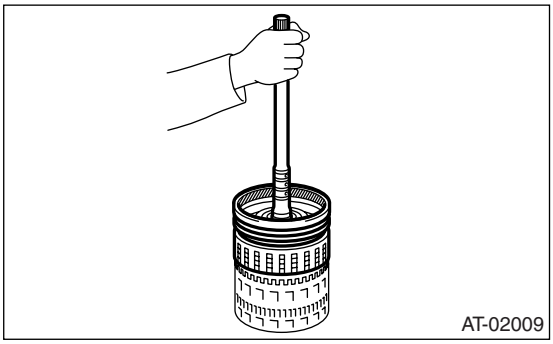
4) Remove the input clutch assembly from rear internal gear.


AT-02009

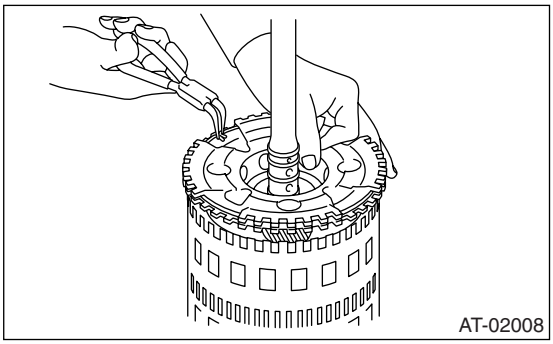
D: ASSEMBLY

1. INPUT CLUTCH PACK ASSEMBLY

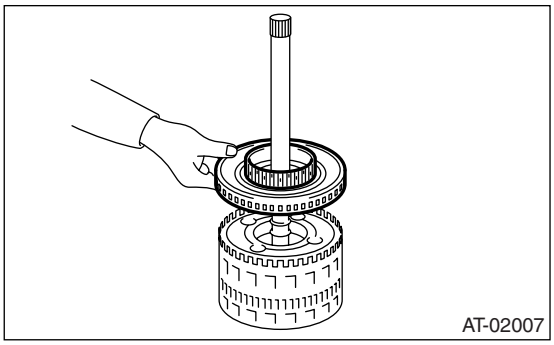
1) Assemble the input clutch assembly to rear internal gear.


AT-02009

2) Install the front carrier, and then install the snap ring.


AT-02008

3) Install the thrust needle bearing.
4) Install the front sun gear.



E: INSPECTION

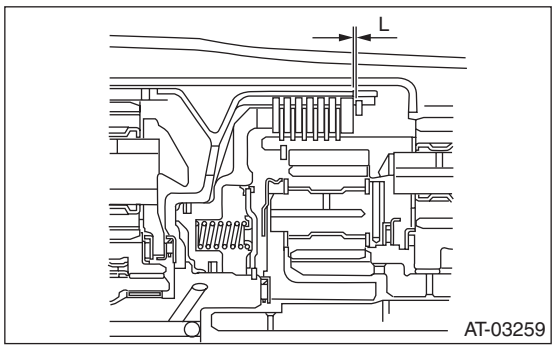
1. FRONT, MIDDLE & REAR PLANETARY CARRIER ASSEMBLY

Check the following items.
• Visually inspect the tooth surface of planetary gear, and replace with new one 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 direct clutch assembly.
• Check for damage on the drive plate, driven plate and snap ring, and replace the entire input clutch assembly if damaged.

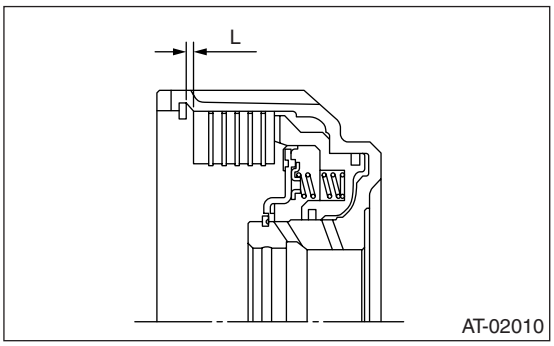
Specification:
0.7 — 1.1 mm (0.028 — 0.043 in)



3. HIGH & LOW REVERSE CLUTCH ASSEMBLY

• 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.

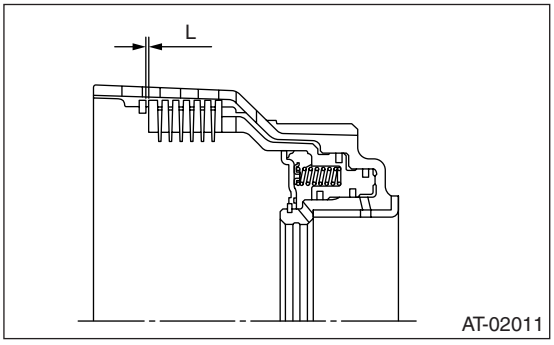
Specification:
1.8 — 2.2 mm (0.070 — 0.087 in)



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 them as direct clutch assembly.
• Check for damage on the drive plate, driven plate and snap ring, and replace the entire direct clutch assembly if damaged.

Specification:
0.6 — 1.0 mm (0.024 — 0.039 in)

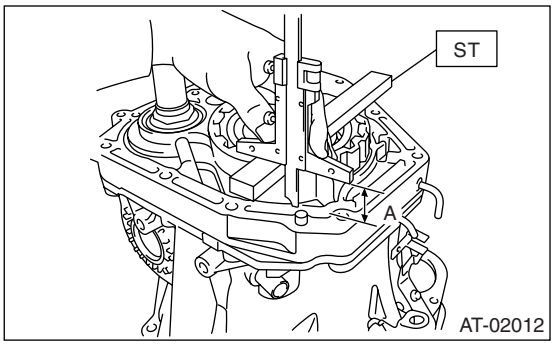


5. REVERSE BRAKE

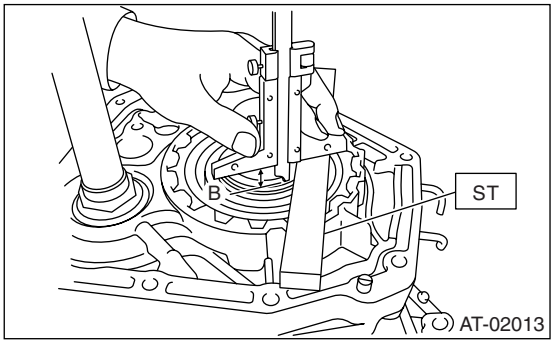
Check the following items.
• Drive plate facing for wear or damage
• Snap ring for wear, return spring for breakage, and spring retainer for deformation
• Lip seal and D-ring for damage
• Piston operation

F: ADJUSTMENT

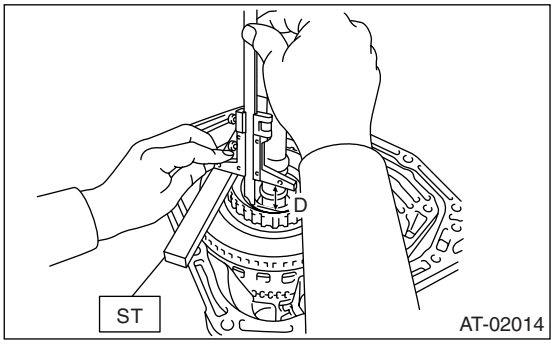
1) Using the ST, measure the height “A” from the AT main case mating surface to convex surface of oil pump cover.
ST 499575400 GAUGE



2) Using the ST, measure the depth “B” from the convex surface of oil pump cover to thrust bearing transferring surface.
ST 499575400 GAUGE



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



5) Set the value as “E” which subtract the thickness of ST (GAUGE) from the measured value on step 4).
Calculation formula: E (mm) = D – 15
[E (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 — 0.022 in).
When clearances are 0.25 mm (0.0098 in):
T (mm) = E – C + 0.03
[T (in) = E – C + 0.0012]
When clearances are 0.55 mm (0.022 in):
T (mm) = E – C – 0.27
[T (in) = E – C – 0.012]
T: Thrust needle 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

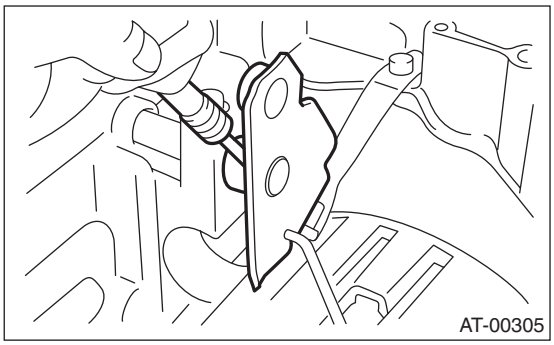
NOTE:
Calculation formula for “T” above is applied when measuring with the ST (499575400 GAUGE). In the calculation without using ST, substitute the thickness of collar used to calculate the value “E” on step 5).

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)

35.Transmission Control Device

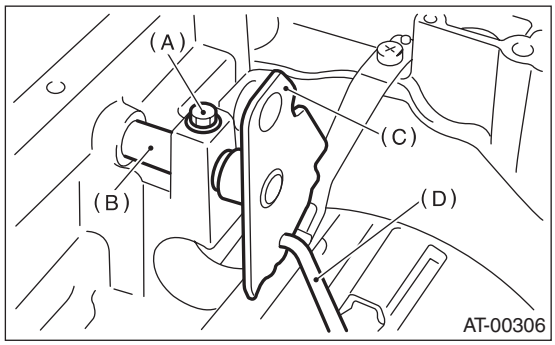
A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to 5AT-34, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-62, 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-60, 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-53, REMOVAL, Control Valve Body.>
8) Pull out the straight pin of manual plate.



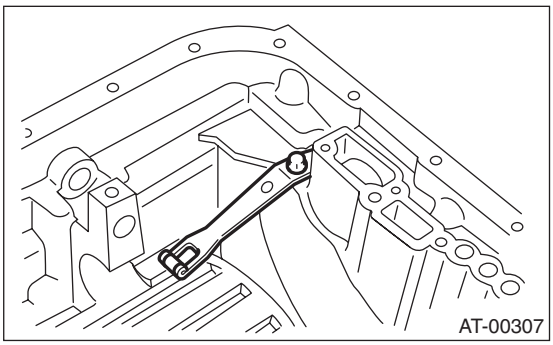
9) Remove the bolts securing select lever, and then remove the select lever, manual plate and parking rod.

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

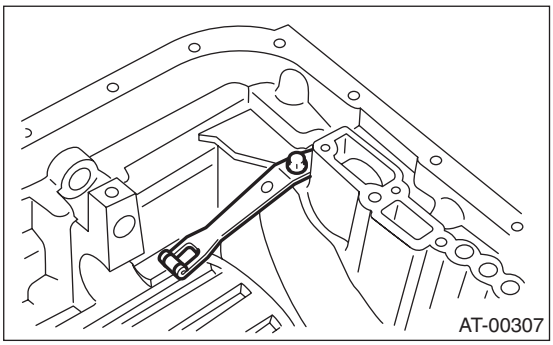
10) Remove the detention spring.



B: INSTALLATION

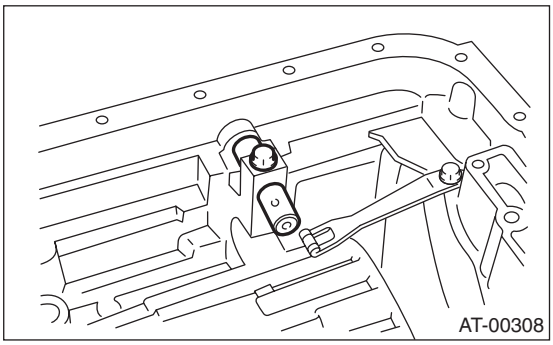
1) Install the detention spring to the transmission case.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

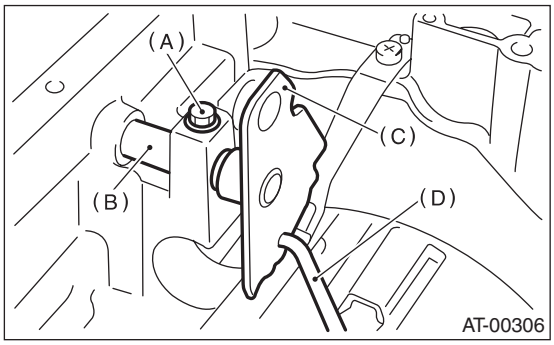


2) Insert the select lever, and then tighten the bolt.

Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)

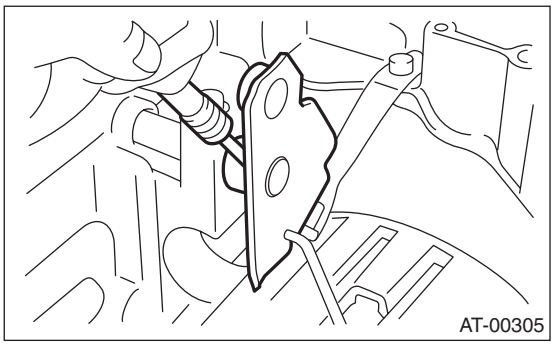


3) Insert the manual plate and parking rod.



(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 assembly. <Ref. to 5AT-53, INSTALLATION, Control Valve Body.>
6) Install the pitching stopper bracket.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

7) Insert the transmission connector to the stay.
8) Install the air breather hose. <Ref. to 5AT-60, INSTALLATION, Air Breather Hose.>
9) Install the torque converter assembly. <Ref. to 5AT-62, INSTALLATION, Torque Converter Assembly.>
10) Install the transmission assembly to the vehicle. <Ref. to 5AT-37, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Make sure the manual lever and detention spring are not worn or otherwise damaged.

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using the interview checklist. <Ref. to 5AT(diag)-4, Check List for Interview.> 2) Before performing diagnosis, inspect the following item which might influence the AT problems. • General inspection <Ref. to 5AT(diag)-5, INSPECTION, General Description.> • Oil leakage • Stall speed test <Ref. to 5AT-30, Stall Test.> • Line pressure test <Ref. to 5AT-32, Line Pressure Test.> • Transfer Clutch Pressure Test <Ref. to 5AT-33, Transfer Clutch Pressure Test.> • Time Lag Test <Ref. to 5AT-31, Time Lag Test.> • Road Test<Ref. to 5AT-29, Road Test.> • Inhibitor Switch <Ref. to 5AT-46, Inhibitor Switch.>	Is the unit that might influence the AT problem normal?	Go to step **2**.	Repair or replace each item.
2	**CHECK SPORT INDICATOR LIGHT.** After the ignition switch is turned to ON, wait for at least 2 seconds.	Does the SPORT indicator light illuminate?	Go to step **4**.	Go to step **3**.
3	**CHECK SPORT INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Check the SPORT indicator light. <Ref. to 5AT(diag)-23, INSPECTION, SPORT Indicator Light Display.> 3) After the ignition switch is turned to ON, wait for at least 2 seconds.	Does the SPORT indicator light blink?	Go to step **4**.	Go to step **5**.
4	**CHECK DTC.** 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)-25, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Subaru Select Monitor Communication.>	Is DTC displayed?	Go to step **6**. NOTE: Record all DTCs.	Go to step **5**.
5	**PERFORM GENERAL DIAGNOSTICS.** 1) Inspect using “Diagnostic Procedure without Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-120, 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 DTC.	Is DTC displayed?	Go to step **6**.	Inspect using “General Diagnostic Table”. <Ref. to 5AT(diag)-128, General Diagnostic Table.>

	Step	Check	Yes	No
6	**PERFORM THE DIAGNOSIS.** 1) Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-31, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC table, refer to “List of Diagnostic Trouble Code (DTC).” <Ref. to 5AT(diag)-28, List of Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform the clear memory mode. 4) Perform the inspection mode. <Ref. to 5AT(diag)-19, Inspection Mode.> 5) Display DTC.	Is DTC displayed?	Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-31, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Inspect using “General Diagnostic Table”. <Ref. to 5AT(diag)-128, General Diagnostic Table.>

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 sale			
Date of repair			
Transmission model	Transmission	V.I.N.	
Odometer reading	km (miles)		
Symptom	❑ No up-shift		
	❑ No down-shift		
	❑ No kick down		
	❑ Vehicle does not move (❑ Any position ❑ Particular position)		
	❑ Lock-up malfunction		
	❑ Noise or vibration		
	❑ Shift shock or slip		
	❑ Select lever does not move		
	❑ Others ( )		
Frequency	❑ Continuous ❑ Intermittent (times a day)		
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others ( )		
Place	❑ Highland ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Rough road ❑ Others ( )		
Ambient air temperature	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Vehicle speed	km/h (MPH)		
AT warning light (SPORT indicator light)	❑ Blinks continuously	❑ Not blink	
Select lever position	❑ P ❑ R ❑ N ❑ D ❑ Manual mode		
Driving condition	❑ Not affected ❑ At racing ❑ Reducing speed	❑ At starting ❑ Accelerating ❑ While turning (❑ RH/❑ LH)	❑ While idling ❑ While cruising
Manual mode	❑ ON ❑ OFF		

3. General Description

A: CAUTION

• SRS AIRBAG SYSTEM

The airbag system wiring harness is routed near the TCM.

CAUTION:

• All air bag 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.

• 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.

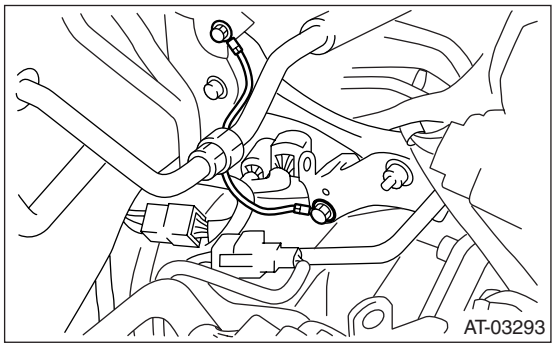
Standard voltage: 12 V or more

Specific gravity: 1.260 or more

2. TRANSMISSION GROUND

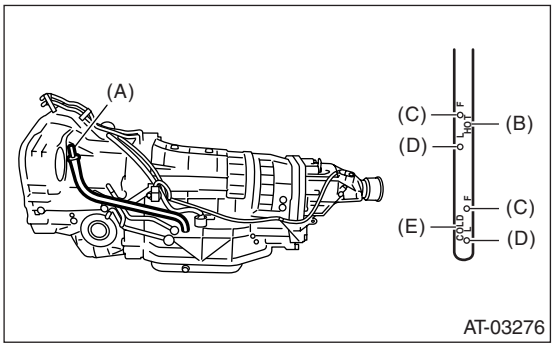
Make sure that the ground terminal bolt is tightened securely.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL

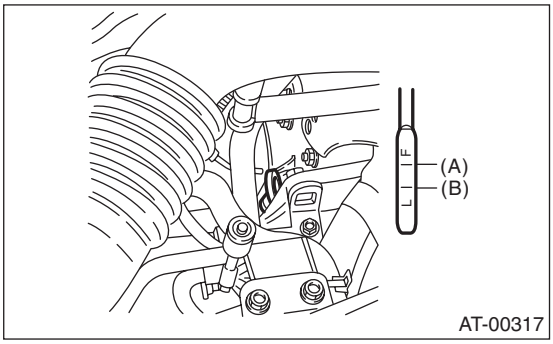
Make sure that ATF level is the specified amount. <Ref. to 5AT-26, INSPECTION, Automatic Transmission Fluid.>



(A) 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-28, INSPECTION, Differential Gear Oil.>

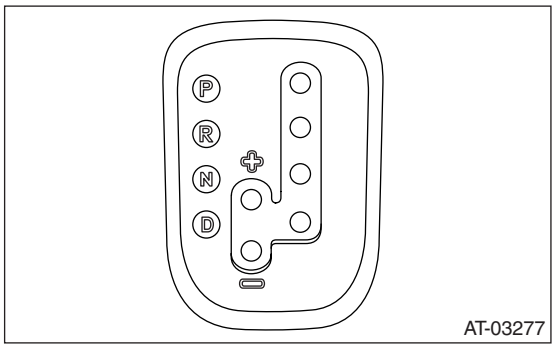


(A) Upper level
(B) Lower level

5. OPERATION OF SHIFT SELECT LEVER

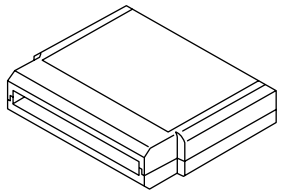
Make sure there is no noise, dragging or contact pattern in each select lever range.

WARNING:
Stop the engine while checking operation of the select lever.



C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system.

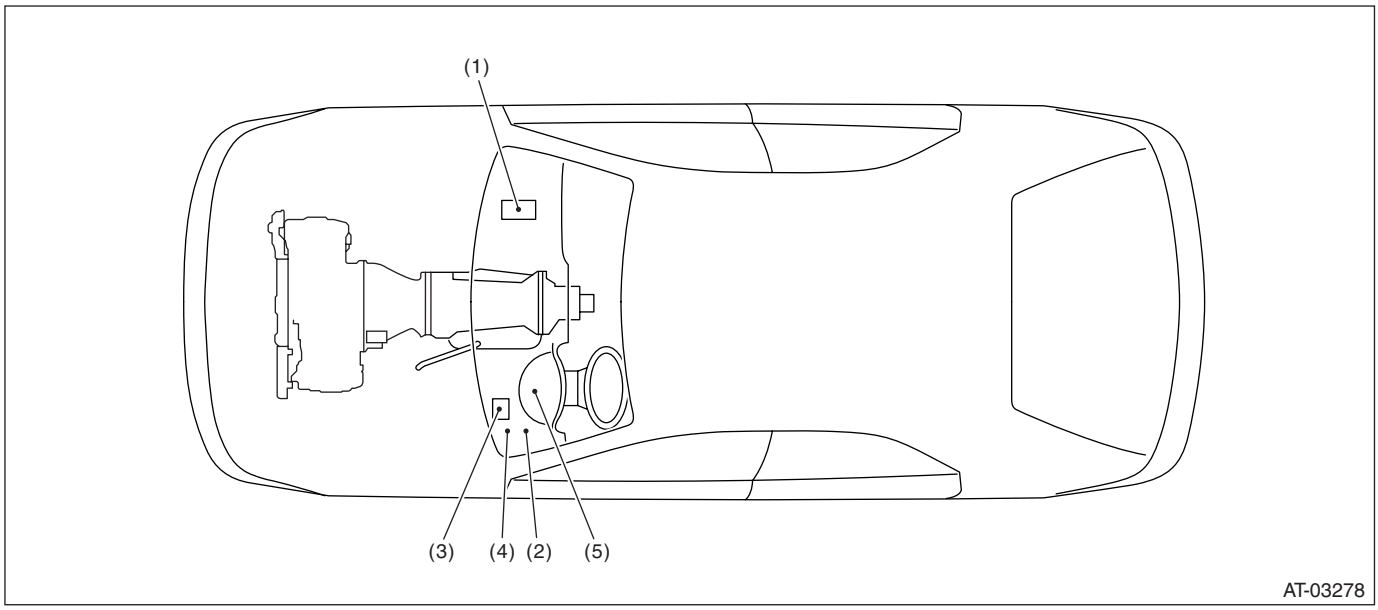
2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring sensor.

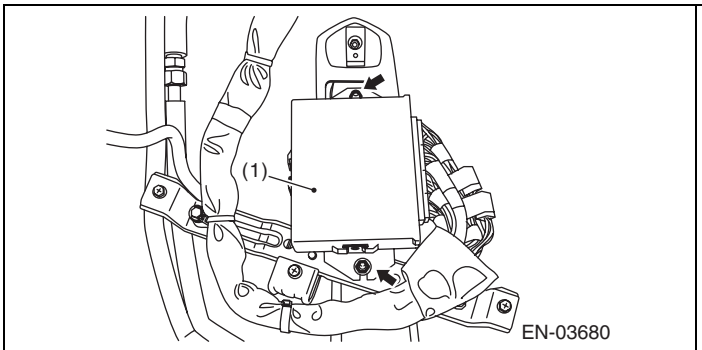
4. Electrical Component Location

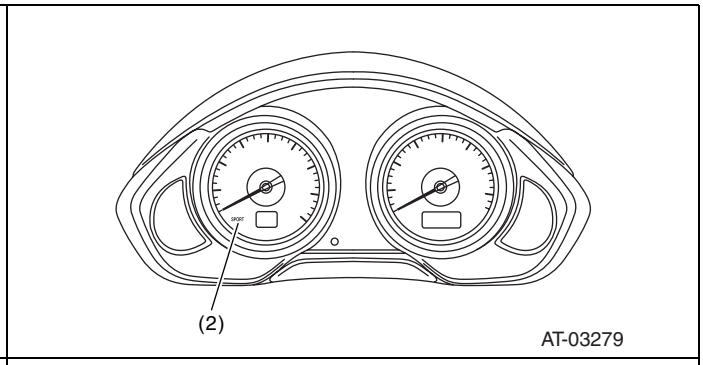
A: LOCATION

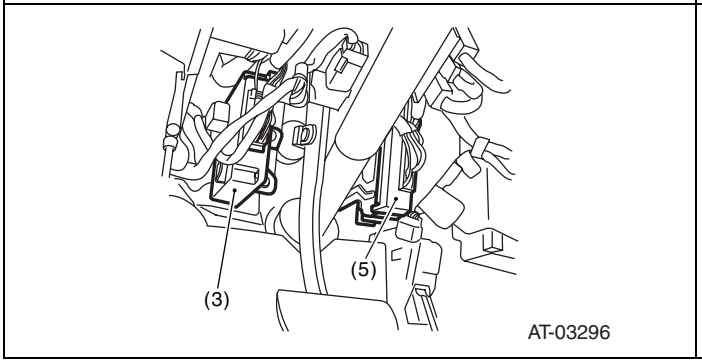
1. CONTROL MODULE

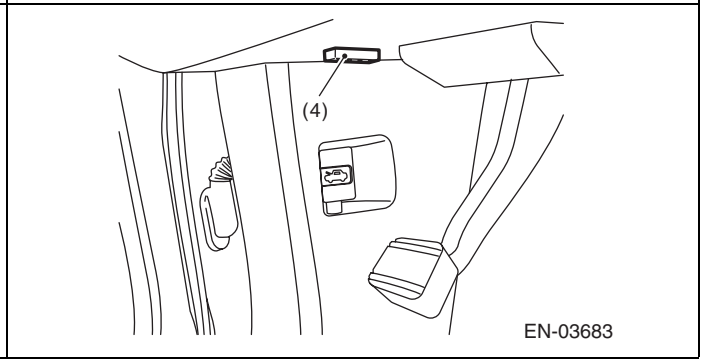


(1) Engine control module (ECM)
(2) SPORT indicator light (AT warning light)
(3) Transmission control module (TCM)
(4) Data link connector
(5) Body integrated unit

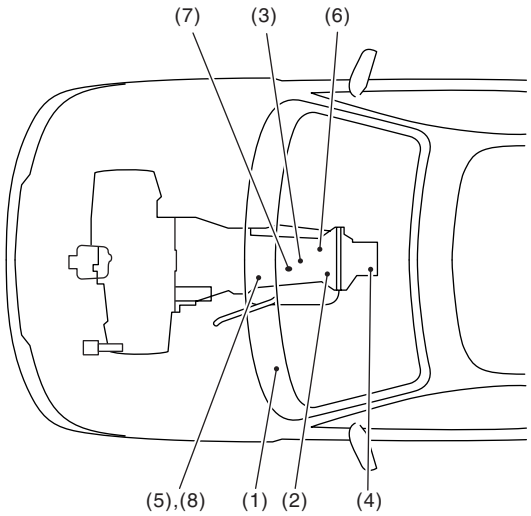






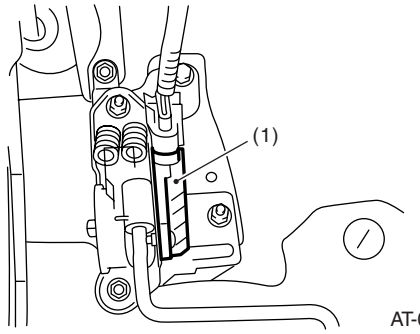


2. SENSOR

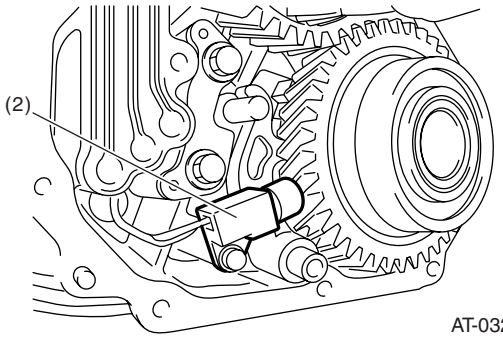


AT-03280

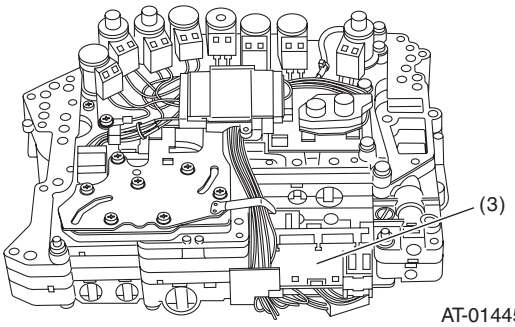
(1) Accelerator pedal position sensor
(2) Front vehicle speed sensor
(3) Inhibitor switch
(4) Rear vehicle speed sensor
(5) Turbine speed sensor 1
(6) ATF temperature sensor 1
(7) Turbine speed sensor 2
(8) ATF temperature sensor 2



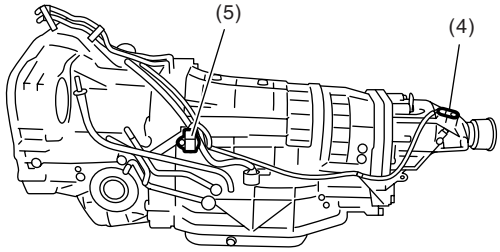
AT-00375



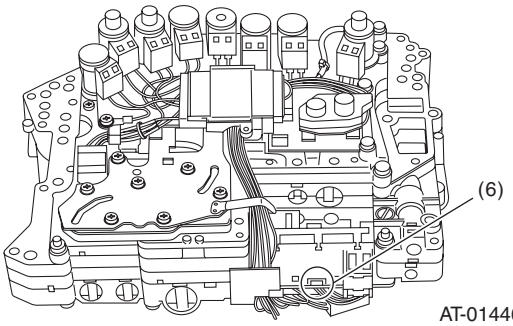
AT-03281



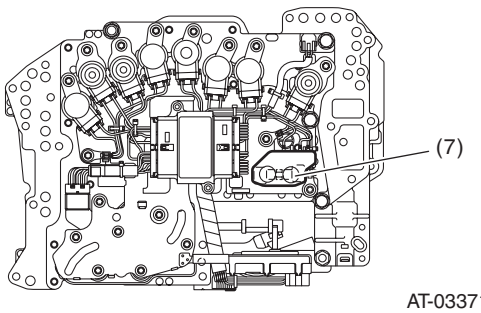
AT-01445



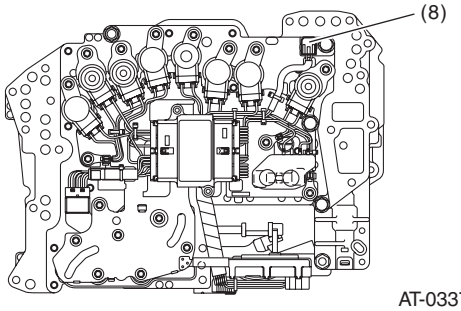
AT-03282



AT-01446

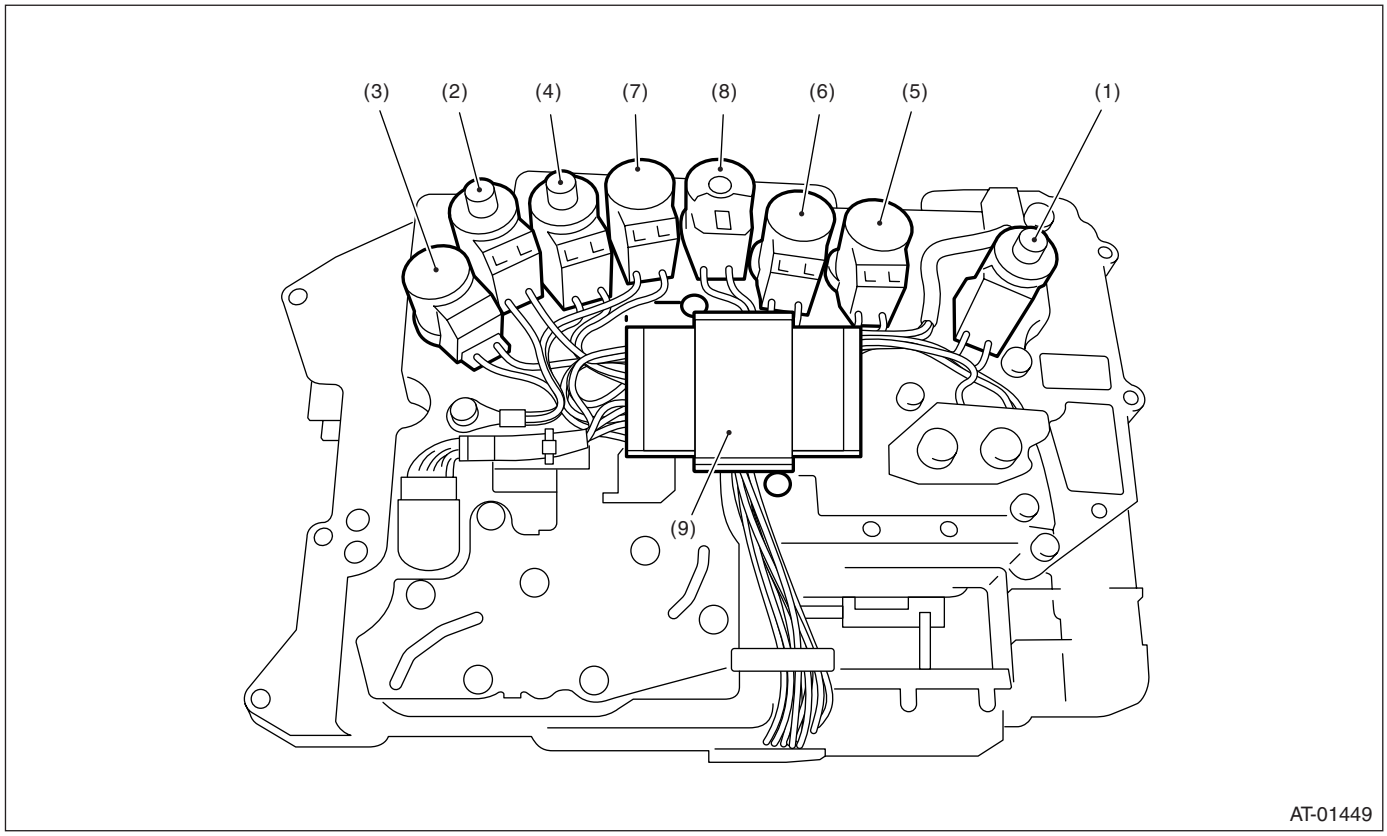


AT-03371



AT-03372

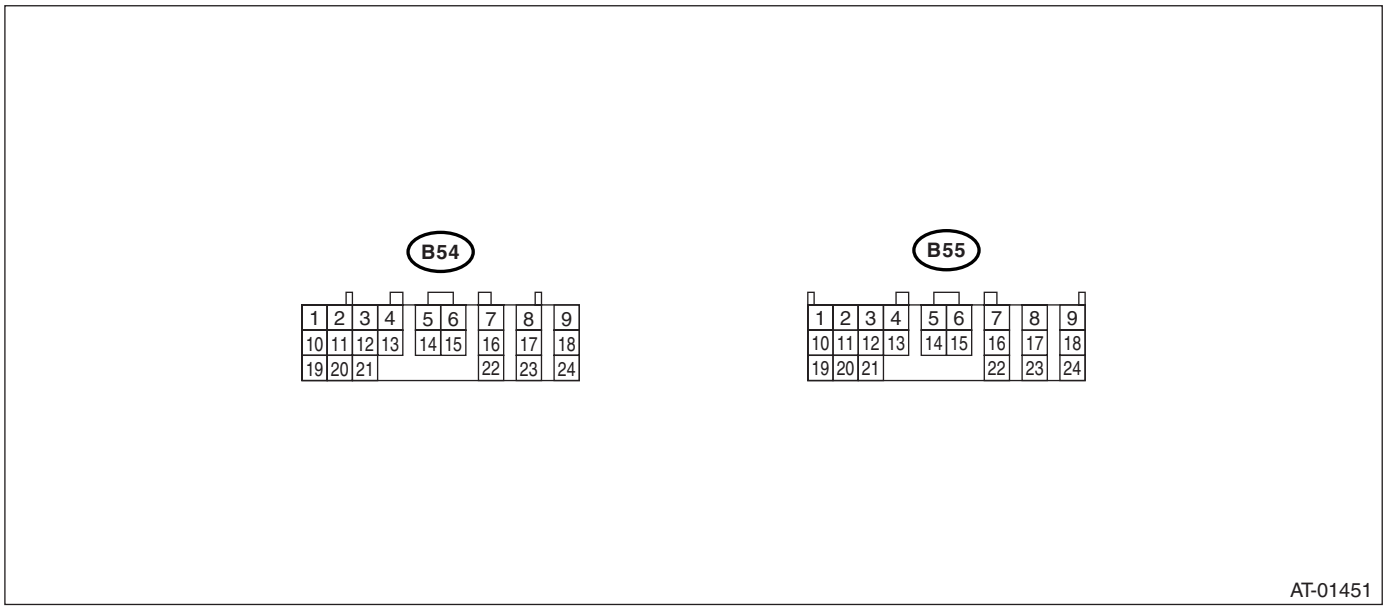
3. SOLENOID



(1) High & low reverse clutch solenoid
(2) Direct clutch solenoid
(3) Front brake solenoid
(4) Input clutch solenoid
(5) Line pressure solenoid
(6) Lock up solenoid
(7) Transfer solenoid
(8) Low coast brake solenoid
(9) Memory box

5. Transmission Control Module (TCM) I/O Signal

A: ELECTRICAL SPECIFICATION



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	9	Engine ON, "P" range, accelerator OFF, brake ON	Approx. 4.0 — 6.0 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			Manual mode 1st, accelerator OFF, brake ON	Approx. 2.0 — 4.0 V		
PVIGN power supply	B54	8	Ignition switch ON	Power supply voltage	—	
		7	Ignition switch ON	Power supply voltage	—	
I/C oil pressure switch input	B54	6	—	—	—	The condition of I/C oil pressure switch cannot be read by the tester.
Power GND	B54	5	Always	Approx. 0 V	—	
CAN communication line (+)	B54	4	—	—	—	
CAN communication line (–)	B54	3	—	—	—	
ATF temperature sensor 1 input	B54	2	Ignition switch ON	2.5 — 2.9 V (ATF temperature 20°C (68°F)) 0.8 — 1.0 V (ATF temperature 80°C (176°F))	4.0 — 5.0 kΩ (ATF temperature 20°C (68°F)) 0.7 — 0.9 kΩ (ATF temperature 80°C (176°F))	
Battery power supply	B54	1	Always	Power supply voltage	—	

Item	Connector No.	Terminal No.	Measuring condition	Measured value	Resistance between terminal and chassis ground	Remarks
I/C solenoid output	B54	18	While driving at 1st — 3rd of manual mode	Approx. 5.5 — 7.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 4th or 5th of manual mode	Approx. 0 V		
H & LR/C solenoid output	B54	17	While driving at 2nd of manual mode	Approx. 5.5 — 7.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 3rd — 5th of manual mode	Approx. 0 V		
Control valve power supply output	B54	16	Ignition switch ON	Power supply voltage	—	
			Ignition switch OFF	Approx. 0 V		
LC/B solenoid output	B54	15	While driving at 1st — 2nd of manual mode	Power supply voltage	5 — 17 Ω (ATF temperature 25°C (77°F))	
			While driving at 3rd — 5th of manual mode	Approx. 0 V		
Power GND	B54	14	Always	Approx. 0 V	—	
Analog GND (sensor GND)	B54	13	Always	Approx. 0 V	—	
LC/B oil pressure switch input	B54	12	—	—	—	The condition of LC/B oil pressure switch cannot be read by the tester.
ATF temperature sensor 2 input	B54	11	Ignition switch ON	2.3 — 2.7 V (ATF temperature 20°C (68°F)) 0.6 — 0.8 V (ATF temperature 80°C (176°F))	3.0 — 3.6 kΩ (ATF temperature 20°C (68°F)) 0.4 — 0.6 kΩ (ATF temperature 80°C (176°F))	
PVIGN power supply relay output	B54	10	Ignition switch ON	0 — 1.5 V	—	
Fr/B solenoid output	B54	24	While driving at other than 4th of manual mode	Approx. 4.5 — 6.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 4th of manual mode	Approx. 0 V		
L/U solenoid output	B54	23	When lock-up	Approx. 3.5 — 5.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			When not lock-up	Approx. 0 V		
D/C solenoid output	B54	22	While driving at 1st or 5th of manual mode	Approx. 5.5 — 7.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 2nd — 4th of manual mode	Approx. 0 V		
D/C oil pressure switch input	B54	21	—	—	—	The condition of D/C oil pressure switch cannot be read by the tester.
Subaru Select Monitor communication line	B54	20	—	—	—	
Control GND	B54	19	Always	Approx. 0 V	—	

Item	Connector No.	Terminal No.	Measuring condition	Measured value	Resistance between terminal and chassis ground	Remarks
H&LR/C oil pressure switch input	B55	8	While driving at 2nd of manual mode	Power supply voltage	—	
			While driving at 3rd — 5th of manual mode	Approx. 0 V		
Front vehicle speed sensor input	B55	7	While driving at 2nd and 20 km/h (12 MPH) of manual mode	Approx. 530 — 610 rpm	—	Use the Subaru Select Monitor.
			While driving at 4th and 80 km/h (50 MPH) of manual mode	Approx. 2160 — 2410 rpm		Use the Subaru Select Monitor.
Inhibitor switch 1 input	B55	4	Ignition switch ON, “P” range	4.0 — 5.0 V	—	
			Ignition switch ON, “N” range	Less than 1.5 V		
Inhibitor switch 2 input	B55	3	Ignition switch ON, “P” range	4.0 — 5.0 V	—	
			Ignition switch ON, “D” range	Less than 1.5 V		
Accessory power supply	B55	2	Accessory switch ON	Power supply voltage	—	
			Accessory switch OFF	Approx. 0 V		
Ignition power supply	B55	1	Ignition switch ON	Power supply voltage	—	
			Ignition switch OFF	Approx. 0 V		
Rear vehicle speed sensor input	B55	18	While driving at 2nd and 20 km/h (12 MPH) of manual mode	Approx. 530 — 610 rpm	—	Use the Subaru Select Monitor.
			While driving at 4th and 80 km/h (50 MPH) of manual mode	Approx. 2160 — 2410 rpm		Use the Subaru Select Monitor.
Fr/B oil pressure switch input	B55	17	Ignition switch ON, engine ON, while driving at other than 4th	Approx. 0 V	—	
			Ignition switch ON, engine ON, while driving at 4th	Power supply voltage		
Turbine speed sensor 1 input	B55	16	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.
Range lock solenoid output	B55	15	Ignition switch ON, while stopping at “D” range	Approx. Power Supply Voltage –1.2 V	7 — 21 Ω	
			Ignition switch ON, vehicle speed at least 20 km/h (12 MPH)	Approx. 0 V		
Inhibitor switch 3 input	B55	14	Ignition switch ON, “R” range	4.0 — 5.0 V	—	
			Ignition switch ON, “D” range	Less than 1.5 V		

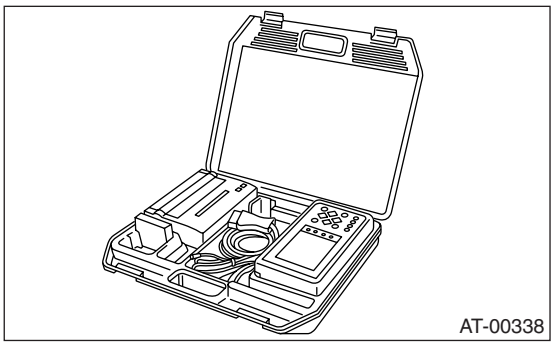
Item	Connector No.	Terminal No.	Measuring condition	Measured value	Resistance between terminal and chassis ground	Remarks
Inhibitor switch 4 input	B55	13	Ignition switch ON, “P” range	4.0 — 5.0 V	—	
			Ignition switch ON, “D” range	Less than 1.5 V		
Control valve communication line	B55	12	—	—	—	
Back-up light relay output	B55	11	Ignition switch ON, “R” range	1.5 V	90 — 110 Ω (ATF temperature 25°C (77°F))	
			Ignition switch ON, other than “R” range	Power supply voltage		
Ignition power supply	B55	10	Ignition switch ON	Power supply voltage	—	
			Ignition switch OFF	Approx. 0 V		
AWD solenoid output	B55	23	Engine ON, “P” range or “N” range, accelerator OFF	Approx. 0 V	3 — 9 Ω(ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			Engine ON, “D” range, accelerator OFF, brake ON	Approx. 2.0 — 3.0 V		
Turbine speed sensor 2 input	B55	22	2nd of manual mode, turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 1,300 — 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.
Control GND	B55	21	Always	Approx. 0 V	—	
Inhibitor switch 3 open circuit monitor input	B55	20	Ignition switch ON, “D” range	4.0 — 5.0 V	—	
			Ignition switch ON, “R” range	Less than 1.5 V		
PN signal output	B55	19	Ignition switch ON, Other than “P” range or “N” range	Power supply voltage	—	ECM should be connected correctly.
			Ignition switch ON, “P” range or “N” range	0 — 1.0 V	—	

6. Subaru Select Monitor

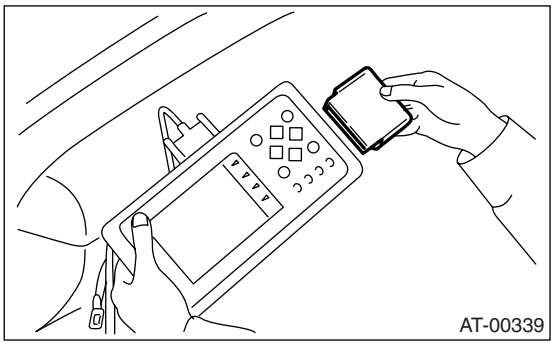
A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit.

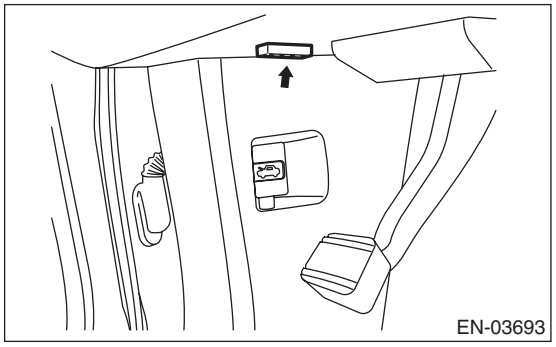


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to 5AT(diag)-6, PREPARATION TOOL, General Description.>



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

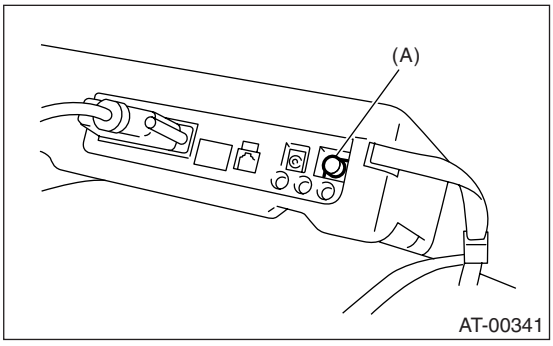
(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

NOTE:
Do not connect scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
8) Press the [YES] key after the information of transmission type is displayed.
9) On the «Transmission Diagnosis» screen, select the {DTC Display}, and then press the [YES] key.

NOTE:
• For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning the diagnostic trouble codes (DTC), refer to the List of DTC. <Ref. to 5AT(diag)-28, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
3) Press the [YES] key after the information of transmission type is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On the «Transmission Diagnosis» display screen, select the {Data Display} and press the [YES] key.
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 pedal position sensor	Acceleration 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
ATF temperature sensor 1 signal	ATF Temp.	°C
ATF temperature sensor 2 signal	ATF Temp. 2	°C
Turbine speed sensor 1 signal	Turbine Revolution Speed 1	rpm
Turbine speed sensor 2 signal	Turbine Revolution Speed 2	rpm
High & low reverse clutch solenoid indicator current	H&LR/C Solenoid Current	A
Direct clutch solenoid indicator current	D/C Solenoid Current	A
Front brake solenoid indicator current	F/B Solenoid Current	A
Input clutch solenoid indicator current	I/C Solenoid Current	A
Line pressure solenoid indicator current	P/L Solenoid Current	A
Lock-up solenoid indicator current	L/U Solenoid Current	A
Transfer solenoid indicator current	AWD Solenoid Current	A
High & low reverse clutch solenoid target oil pressure	H&LR/C Solenoid Target Pressure	kPa
Direct clutch solenoid target oil pressure	D/C Solenoid Target Pressure	kPa
Front brake solenoid target oil pressure	F/B Solenoid Target Pressure	kPa
Input clutch solenoid target oil pressure	I/C Solenoid Target Pressure	kPa
Line pressure solenoid target oil pressure	P/L Solenoid Target Pressure	kPa
Lock-up solenoid target oil pressure	L/U Solenoid Target Pressure	kPa
Transfer solenoid target oil pressure	AWD Solenoid Target Pressure	kPa
Ignition switch	Ignition SW	ON Input or OFF Input
Tip signal	Tip Mode SW	ON or OFF
Cruise control ON signal	Cruise Control Signal	ON or OFF
Tip down shift signal	Down SW	ON or OFF
Stop light switch signal	Stop Light SW	ON or OFF
Tip up shift signal	Up SW	ON or OFF
Drive range signal	D Range	ON or OFF
Reverse range signal	R Range	ON or OFF
Diagnosis light output signal	Diagnosis Lamp	ON or OFF
ATF temperature lamp signal	ATF Temperature Lamp	ON or OFF
Shift lock solenoid signal	Shift Lock Solenoid	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 SW1	High or Low
Inhibitor switch 2 input signal	Inhibitor SW2	High or Low
Inhibitor switch 3 input signal	Inhibitor SW3	High or Low
Inhibitor switch 4 input signal	Inhibitor SW4	High or Low
Inhibitor switch 3 monitor input signal	Inhibitor SW3 Monitor	High or Low
Backup light relay output signal	Back-up light relay	ON or OFF
High & low reverse clutch oil pressure switch input signal	H&LR/C Oil Pressure SW	ON or OFF
Direct clutch oil pressure switch input signal	D/C Oil Pressure SW	ON or OFF
Front brake oil pressure switch input signal	Fr/B Oil Pressure SW	ON or OFF
Input clutch oil pressure switch input signal	I/C Oil Pressure SW	ON or OFF
Low coast brake oil pressure switch input signal	LC/B Oil Pressure SW	ON or OFF
Low coast brake solenoid input signal	LC B Solenoid	ON or OFF

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

3. CLEAR MEMORY MODE

NOTE:
To clear the previous DTC, use {Clear Memory}, and to clear the learned value, use {Clear Memory 2}.

1) Check that the select lever is in “P” range.
2) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
3) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
4) Press the [YES] key after the information of transmission type is displayed.
5) On the «Transmission Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.

NOTE:
If {Clear Memory 2} is selected and performed, DTC are not cleared.

6) When ‘Done’ is shown on the display screen, turn off the Subaru Select Monitor and turn the ignition switch to OFF. To turn the ignition switch to ON again, wait for more than 10 seconds.

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

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.>

NOTE:
DTC can not be read by SPORT indicator light.

8. Inspection Mode

A: PROCEDURE

WARNING:
Observe the traffic law during driving on 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 more than 2 seconds.

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

Be sure to perform the {Clear Memory 2} only when the following services have been performed. And when the shifting shock is occurred during the total check with vehicle driving, perform the learning with following procedures. <Ref. to 5AT(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

- Replacement of TCM
- Replacement of transmission assembly
- Simultaneous replacement of TCM and transmission assembly
- Replacement of each clutch
- Replacement of control valve body

CAUTION:
When {Clear Memory 2} is executed, DTC may not be cleared.

B: PROCEDURE

1) Turn the ignition switch to ON.
2) Turn the air conditioner switch to OFF.
3) Turn the headlight switch to OFF.
4) Turn the rear defogger switch to OFF.
5) Start the engine.
6) Connect the Subaru Select Monitor to the vehicle.
7) Drive the vehicle for 5 — 10 km (3 — 6 mile) to warm up ATF temperature more than 70 °C (158 °F).
8) While checking that the throttle opening angle on Subaru Select Monitor is within the specified range, shift the gear from 1st → 2nd, 2nd → 3rd, and 3rd → 4th, while driving the vehicle at “D” range. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>

Acceleration opening angle:
12.5%±2%

9) While checking that the throttle opening angle on Subaru Select Monitor is within the specified range, upshift the gear from 4th → 5th while driving the vehicle at “D” range.

Acceleration opening angle:
15.5%±2%

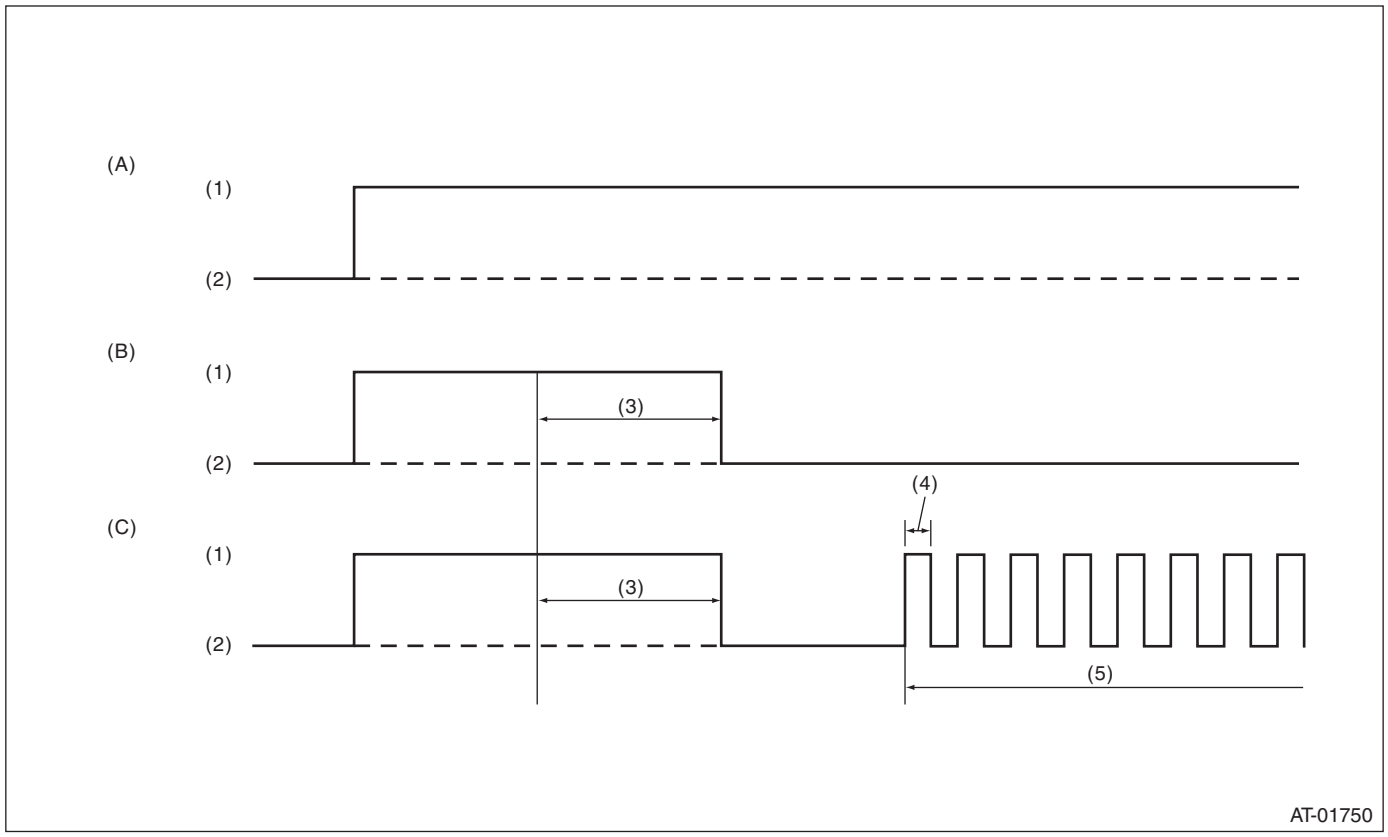
10) Repeat the steps 8) and 9) until the reducing effect of the shifting shock is felt.
11) If reducing of shifting shock is not felt after 5 cycles, recheck that the learning conditions (throttle opening angle, ATF temperature, etc.) are as specified and recheck that other parts are normal.

11.SPORT Indicator Light Display

A: OPERATION

When any on-board diagnostics item is malfunctioning, the SPORT indicator light blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or unit can be determined by a DTC during the on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the SPORT indicator light does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using Subaru Select Monitor. Indicator light signal patterns are shown in the figure.

When the SPORT indicator light does not operate normally but no DTC is stored, perform the SPORT indicator light inspection. <Ref. to 5AT(diag)-23, INSPECTION, SPORT Indicator Light Display.>



(A)	Ignition switch (Engine OFF)	(B)	Normal (Engine ON)	(C)	Faulty (Engine ON)
(1)	ON	(3)	2 seconds	(5)	Blink
(2)	OFF	(4)	0.25 seconds		

B: INSPECTION

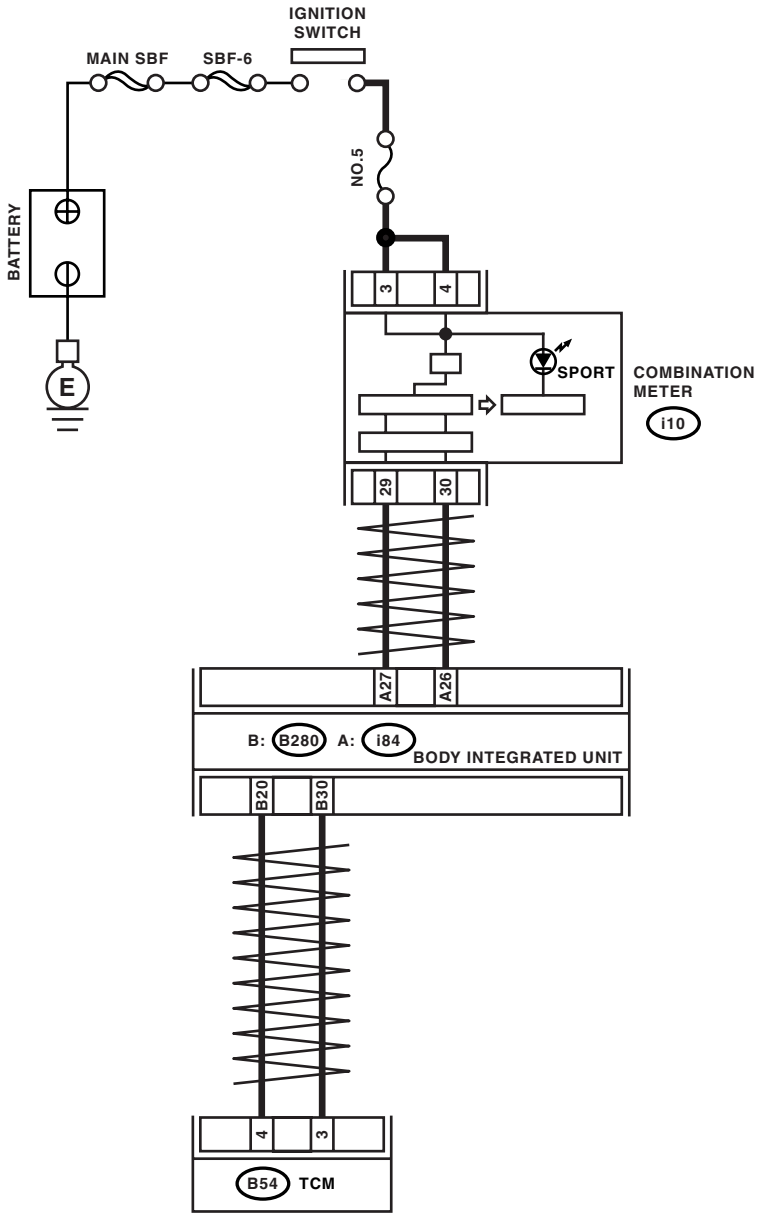
DIAGNOSIS:

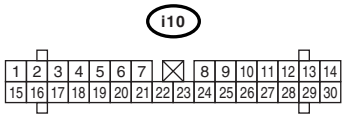
SPORT indicator light circuit is open or shorted.

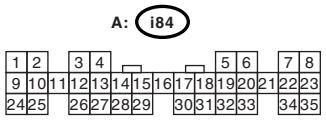
TROUBLE SYMPTOM:

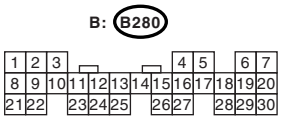
When the ignition switch is turned to ON (engine OFF), SPORT indicator light does not illuminate.

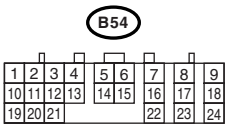
WIRING DIAGRAM:











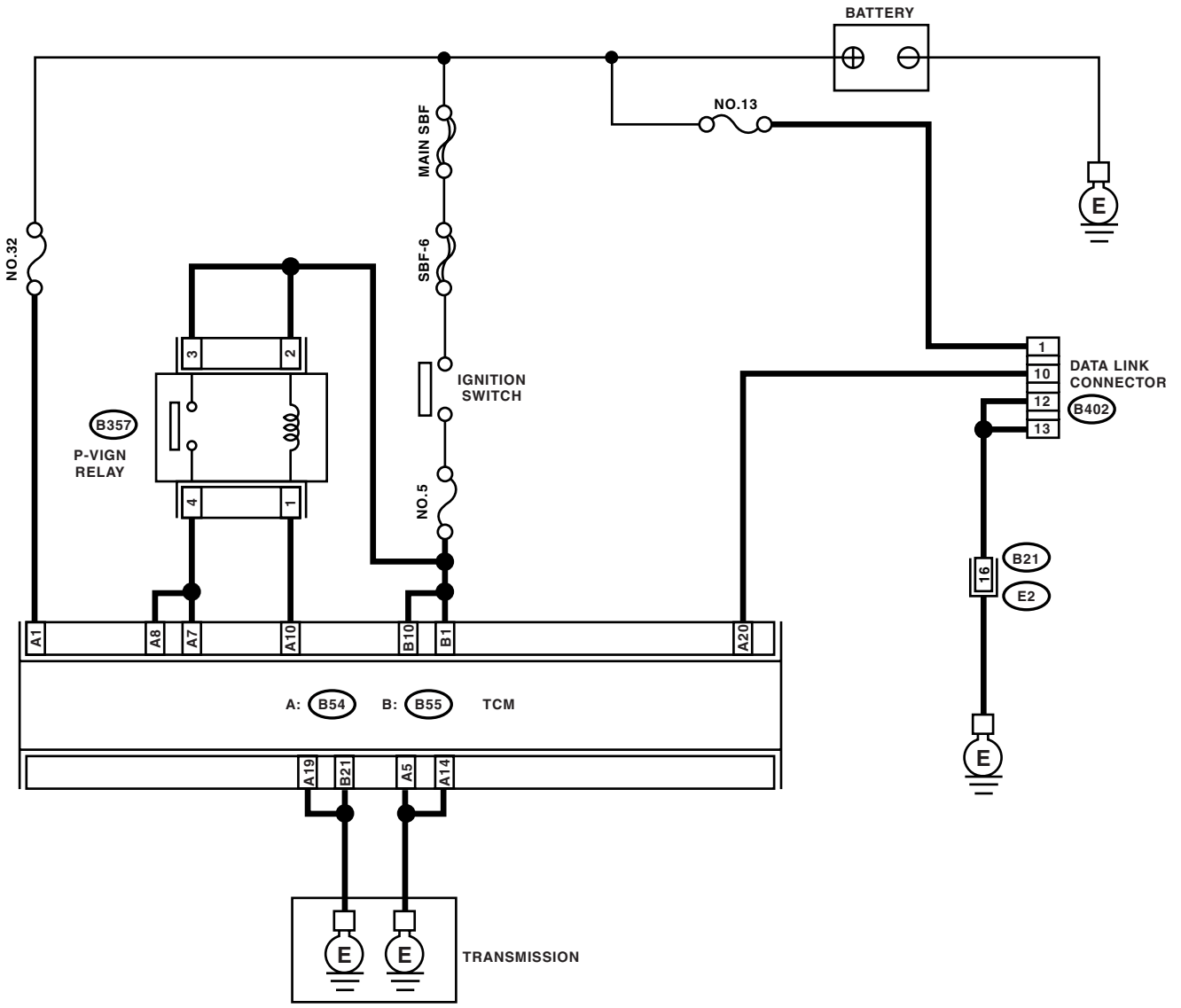
AT-03284

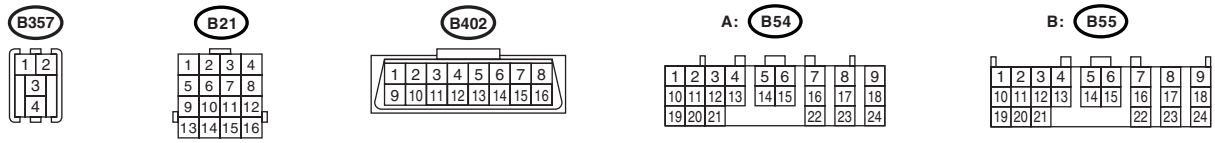
	Step	Check	Yes	No
1	**CHECK SPORT INDICATOR LIGHT.** Turn the ignition switch to ON.	Does the SPORT indicator light illuminate?	Go to step **2**.	Perform the self-diagnosis of combination meter.
2	**CHECK SPORT INDICATOR LIGHT.** After the ignition switch is ON, wait for at least 2 seconds.	Does the SPORT indicator light illuminate?	Go to step **3**.	Go to step **4**.
3	**CHECK SPORT INDICATOR LIGHT.** Start the engine.	Does the SPORT indicator light go off?	Normal. Go back to “Basic Diagnostic Procedure”. <Ref. to 5AT(diag)-2, Basic Diagnostic Procedure.>	Go to step **7**.
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 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)-25, Diagnostic Procedure for Subaru Select Monitor Communication.>
5	**CHECK TCM.** Display the current data of TCM using Subaru Select Monitor.	Is the “Diagnosis Lamp” output signal “ON”?	Go to step **6**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
6	**CHECK THE BODY INTEGRATED UNIT.** Display the current data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the “SPORT Lamp” input signal “Illuminate”?	Replace the combination meter assembly. <Ref. to IDI-11, Combination Meter.>	Check DTC of body integrated unit. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>
7	**CHECK TCM.** 1) Start the engine. 2) Display the current data of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is the “Diagnosis Lamp” output signal “ON”?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Go to step **8**.
8	**CHECK THE BODY INTEGRATED UNIT.** Display the current data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is the “SPORT Lamp” input signal “Illuminate”?	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.>

12.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-03285

	Step	Check	Yes	No
1	**CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT.** Measure the voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B402) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2**.	Repair the harness connector between battery and data link connector, and poor contact of connector.
2	**CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.** Measure the resistance of harness between data link connector and chassis ground. ***Connector & terminal*** ***(B402) No. 12 — Chassis ground:*** ***(B402) No. 13 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between data link connector and ground terminal, and poor contact of connector.
3	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to transmission system can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step **8**.	Go to step **4**.
4	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Turn the ignition switch to ON. 4) Check whether communication to engine system can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step **6**.	Go to step **5**.
5	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 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 whether communication to transmission system can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Inspect the ECM.	Go to step **6**.
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and ECM connector. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B402) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Check harness and connector between each control module and data link connector.
7	**CHECK OUTPUT SIGNAL OF TCM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B402) No. 10 (+) — Chassis ground (–):***	Is the voltage more than 1 V?	Check harness and connector between each control module and data link connector.	Go to step **8**.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.** Measure the resistance between TCM connector and data link connector. ***Connector & terminal*** ***(B54) No. 20 — (B402) No. 10:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the harness and connector between TCM and data link connector.
9	**CHECK INSTALLATION OF TCM CONNECTOR.** Turn the ignition switch to OFF.	Is TCM connector connected to TCM?	Go to step **10**.	Connect the TCM connector to TCM.

	Step	Check	Yes	No
10	**CHECK INSTALLATION OF TRANSMISSION HARNESS CONNECTOR.**	Is the transmission harness connector connected to bulkhead harness connector?	Go to step **11**.	Connect the bulkhead harness connector to transmission harness connector.
11	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in control module power supply and data link connector?	Repair the poor contact.	Go to step **12**.
12	**CHECK POWER SUPPLY OF TCM.** 1) Disconnect the connector from TCM. 2) Turn the ignition switch to ON. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **15**.	Go to step **13**.
13	**CHECK FUSE (No. 32).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 32).	Is the fuse (No. 32) blown out?	Replace the fuse (No. 32).	Go to step **14**.
14	**CHECK HARNESS.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the fuse (No. 32). If the replaced fuse (No. 32) has blown out easily, repair the short circuit of harness between fuse (No. 32) and TCM.	Go to step **15**.
15	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition power supply voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 1 (+) — Chassis ground (–):*** ***(B55) No. 10 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **17**.	Go to step **16**.
16	**CHECK FUSE (No. 5).** Remove the fuse (No. 5).	Is the fuse (No. 5) blown out?	Replace the fuse (No. 5). If the replaced fuse (No. 5) blows out easily, repair the short circuit of harness between fuse (No. 5) and TCM.	Go to step **17**.
17	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B54) No. 19 — Transmission ground:*** ***(B55) No. 21 — Transmission ground:*** ***(B54) No. 5 — Transmission ground:*** ***(B54) No. 14 — Transmission ground:***	Is the resistance more than 1 MΩ?	Repair the short circuit of harness between TCM and transmission harness connector, and poor contact of connector.	Go to step **18**.
18	**CHECK POOR CONTACT OF CONNECTORS.**	Is there poor contact in TCM power supply, ground and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

13.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Reference target
P0705	Transmission Range Sensor Circuit (PRNDL Input)	Inhibitor switch malfunction, open or short circuit	<Ref. to 5AT(diag)-31, 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 input signal circuit	<Ref. to 5AT(diag)-35, 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, short input signal circuit	<Ref. to 5AT(diag)-38, 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, short input signal circuit	<Ref. to 5AT(diag)-41, DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0719	Torque Converter/Brake Switch “B” Circuit Low	Brake switch malfunction, open input signal circuit, body integrated unit malfunction, CAN communication malfunction	<Ref. to 5AT(diag)-44, DTC P0719 TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	Output Speed Sensor Circuit	Front wheel speed sensor is faulty or input signal circuit, ground, power supply is open or shorted.	<Ref. to 5AT(diag)-46, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0724	Torque Converter/Brake Switch “B” Circuit High	Brake switch malfunction, short circuit of input signal, body integrated unit, CAN communication malfunction	<Ref. to 5AT(diag)-50, DTC P0724 TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0725	Engine Speed Input Circuit	Open or short engine speed output signal circuit, ECM malfunction, CAN communication malfunction	<Ref. to 5AT(diag)-52, DTC P0725 ENGINE SPEED INPUT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 Incorrect Ratio	Vehicle sensor, turbine speed sensor, control valve malfunction or shift clutch malfunction	<Ref. to 5AT(diag)-52, DTC P0731 GEAR 1 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 Incorrect Ratio	Vehicle sensor, turbine speed sensor, control valve malfunction or shift clutch malfunction	<Ref. to 5AT(diag)-52, DTC P0732 GEAR 2 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 Incorrect Ratio	Vehicle sensor, turbine speed sensor or shift clutch malfunction	<Ref. to 5AT(diag)-52, DTC P0733 GEAR 3 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 Incorrect Ratio	Vehicle sensor, turbine speed sensor or shift clutch malfunction	<Ref. to 5AT(diag)-52, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0735	Gear 5 Incorrect Ratio	Vehicle sensor, turbine speed sensor or shift clutch malfunction	<Ref. to 5AT(diag)-52, DTC P0735 GEAR 5 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0736	Reverse Incorrect Ratio	Vehicle sensor, turbine speed sensor or shift clutch malfunction	<Ref. to 5AT(diag)-53, 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)-54, DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference target
P0743	Torque Converter Clutch Circuit Electrical	L/U solenoid circuit malfunction or L/U solenoid body malfunction	<Ref. to 5AT(diag)-56, DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0748	Pressure Control Solenoid “A” Electrical	Line pressure solenoid circuit malfunction or line pressure solenoid body malfunction	<Ref. to 5AT(diag)-59, 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 Function Malfunction	<Ref. to 5AT(diag)-61, 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 malfunction or Fr/B solenoid body malfunction	<Ref. to 5AT(diag)-64, DTC P0753 SHIFT SOLENOID “A” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0756	Shift Solenoid “B” Performance or Stuck Off	Shift Solenoid “B” Performance malfunction	<Ref. to 5AT(diag)-67, 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 malfunction or I/C solenoid body malfunction	<Ref. to 5AT(diag)-70, 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)-72, 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 malfunction or H&LR/C solenoid body malfunction	<Ref. to 5AT(diag)-75, 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)-77, 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 malfunction or D/C solenoid body malfunction	<Ref. to 5AT(diag)-80, DTC P0768 SOLENOID “D” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0771	Shift Solenoid “E” Performance or Stuck Off	LC/B solenoid malfunction	<Ref. to 5AT(diag)-82, DTC P0771 SHIFT SOLENOID “E” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0773	Shift Solenoid “E” Electrical	• LC/B solenoid circuit malfunction or LC/B solenoid body malfunction • OFF malfunction of PVIGN relay circuit or relay body	<Ref. to 5AT(diag)-85, DTC P0773 SHIFT SOLENOID “E” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0801	Reverse Inhibit Control Circuit	• Shift lock solenoid is faulty or output signal circuit is open or shorted. • Blown out of TCM+B fuse	<Ref. to 5AT(diag)-88, DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0817	Starter Disable Circuit	• PN signal output circuit is open or shorted. • ECM Source Voltage Is Abnormal • Blown out of TCM+B fuse	<Ref. to 5AT(diag)-91, DTC P0817 STARTER DISABLE CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0882	TCM Power Input Signal Low	PVIGN relay output circuit is open, shorted or relay malfunction	<Ref. to 5AT(diag)-93, DTC P0882 TCM POWER INPUT SIGNAL LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference target
P0957	Backup Light Relay Circuit Low	Back-up relay output circuit is open, shorted or relay OFF malfunction	<Ref. to 5AT(diag)-95, DTC P0957 BACKUP LIGHT RELAY CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0958	Backup Light Relay Output Circuit High	Back-up relay output circuit is open, shorted or relay ON malfunction	<Ref. to 5AT(diag)-97, DTC P0958 BACKUP LIGHT RELAY CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1601	TCM Data Communication Failure	Communication Failure between TCM and Memory Box	<Ref. to 5AT(diag)-99, DTC P1601 TCM DATA COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1706	AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Rear wheel speed sensor is faulty or input circuit, ground, power supply is open or shorted.	<Ref. to 5AT(diag)-101, DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1707	AT AWD Solenoid Valve Circuit Malfunction	AWD solenoid circuit malfunction or AWD solenoid body malfunction	<Ref. to 5AT(diag)-104, DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1710	Torque Converter Turbine 2 Speed Signal Circuit 2 Malfunction	Torque converter sensor 2 malfunction, input circuit, ground, power open, short circuit	<Ref. to 5AT(diag)-107, DTC P1710 TORQUE CONVERTER TURBINE 2 SPEED SIGNAL CIRCUIT 2 MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1716	ATF Temp. Sensor 2 Circuit Low	ATF temperature sensor 2 malfunction, or open input signal circuit	<Ref. to 5AT(diag)-110, DTC P1716 ATF TEMP. SENSOR 2 CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1717	ATF Temp. Sensor 2 Circuit High	ATF temperature sensor 2 malfunction, short input signal circuit	<Ref. to 5AT(diag)-113, DTC P1717 ATF TEMP. SENSOR 2 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1718	AT CAN Communication Circuit	CAN communication line bus off is open, EUM short circuit, ABS/VDCCM, integrated CU malfunction	<Ref. to 5AT(diag)-115, DTC P1718 AT CAN COMMUNICATION CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1798	Gear 1 Engine Brake	Malfunction of clutch oil pressure related to 1st engine brake, solenoid current malfunction	<Ref. to 5AT(diag)-115, DTC P1798 GEAR 1 ENGINE BRAKE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1799	Interlock	Malfunction of clutch oil pressure which emit interlock, solenoid current malfunction	<Ref. to 5AT(diag)-116, DTC P1799 INTERLOCK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1817	SPORT Mode Switch Circuit (Manual Switch)	Manual mode switch is open or shorted, or switch malfunction	<Ref. to 5AT(diag)-117, DTC P1817 SPORT MODE SWITCH CIRCUIT (MANUAL SWITCH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1840	Transmission Fluid Pressure Sensor/Switch A Circuit	Fr/B oil pressure switch is open or shorted, or switch malfunction	<Ref. to 5AT(diag)-119, DTC P1840 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH A CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1842	Transmission Fluid Pressure Sensor/Switch C Circuit	I/C oil pressure switch is open or shorted, or switch malfunction.	<Ref. to 5AT(diag)-119, DTC P1842 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH C CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1843	Transmission Fluid Pressure Sensor/Switch D Circuit	D/C oil pressure switch is open or shorted, or switch malfunction.	<Ref. to 5AT(diag)-119, DTC P1843 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH D CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1844	Transmission Fluid Pressure Sensor/Switch E Circuit	H&LR/C oil pressure switch is open or shorted, or switch malfunction.	<Ref. to 5AT(diag)-119, DTC P1844 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH E CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

14.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT)

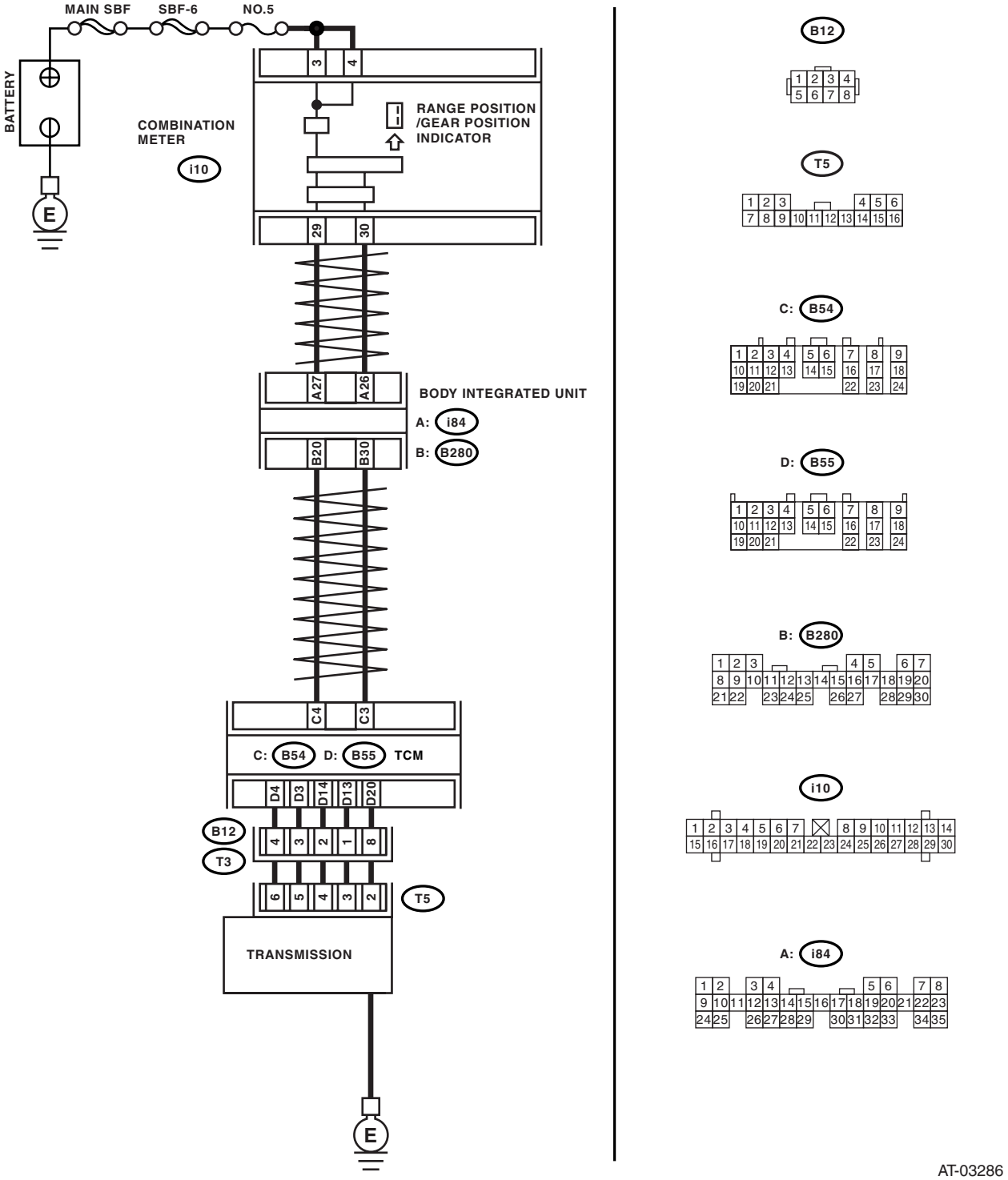
DTC DETECTING CONDITION:

The inhibitor switch is open or short.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Shift indicator light does not match with select lever.
- Shift indicator light does not illuminate.
- N-D, N-R shock occur.

WIRING DIAGRAM:



AT-03286

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**.

	Step	Check	Yes	No
2	**CHECK INHIBITOR SWITCH.** 1) Shift the select lever to shift to the "P" range. 2) Check input signal of inhibitor SW 1 — 4 and inhibitor SW 3 monitor using Subaru Select Monitor.	Are all indications High?	Go to step **4**.	Go to step **3**.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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 about the item which indicated Low on step 3. ***Connector & terminal*** ***(B55) No. 4 — Chassis ground:*** ***(B55) No. 3 — Chassis ground:*** ***(B55) No. 14 — Chassis ground:*** ***(B55) No. 13 — Chassis ground:*** ***(B55) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair the short circuit of harness between TCM connector and chassis ground.
4	**CHECK INHIBITOR SWITCH.** 1) Shift the select lever to "D" range. 2) Check input signal of inhibitor SW 1 — 4 and inhibitor SW 3 monitor using Subaru Select Monitor.	Are all indications Low?	Go to step **6**.	Go to step **5**.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector about the item which indicated High on step 5. ***Connector & terminal*** ***(B55) No. 4 — (B12) No. 4:*** ***(B55) No. 3 — (B12) No. 3:*** ***(B55) No. 14 — (B12) No. 2:*** ***(B55) No. 13 — (B12) No. 1:*** ***(B55) No. 20 — (B12) No. 8:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between TCM connector and transmission connector.
6	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Turn the ignition switch to OFF. 2) Disconnect the transmission connector (B12). 3) Connect the TCM connector. 4) Turn the ignition switch to ON. 5) Measure the voltage between TCM terminals. ***Connector & terminal*** ***(B55) No. 4 — (B54) No. 19:*** ***(B55) No. 3 — (B54) No. 19:*** ***(B55) No. 14 — (B54) No. 19:*** ***(B55) No. 13 — (B54) No. 19:*** ***(B55) No. 20 — (B54) No. 19:***	Is the voltage 4 — 6 V for the inhibitor SW 1 — 4? Is the voltage 3.5 — 5.5 V for the inhibitor SW 3 monitor?	Go to step **8**.	Go to step **7**.

	Step	Check	Yes	No
7	**CHECK TCM I/O SIGNAL.** Check I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-11, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC for PVIGN power supply relay.
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T3) No. 4 — (T5) No. 6:*** ***(T3) No. 3 — (T5) No. 5:*** ***(T3) No. 2 — (T5) No. 4:*** ***(T3) No. 1 — (T5) No. 3:*** ***(T3) No. 8 — (T5) No. 2:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the open circuit of harness between control valve body connector and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T5) No. 6 — Transmission ground:*** ***(T5) No. 5 — Transmission ground:*** ***(T5) No. 4 — Transmission ground:*** ***(T5) No. 3 — Transmission ground:*** ***(T5) No. 2 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **10**.	Repair the short circuit of harness between control valve body connector and transmission connector.
10	**CHECK POOR CONTACT.**	Is there any poor contact in inhibitor SW 1 — 4 or inhibitor SW 3 monitor circuit?	Repair the poor contact.	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>

B: DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT

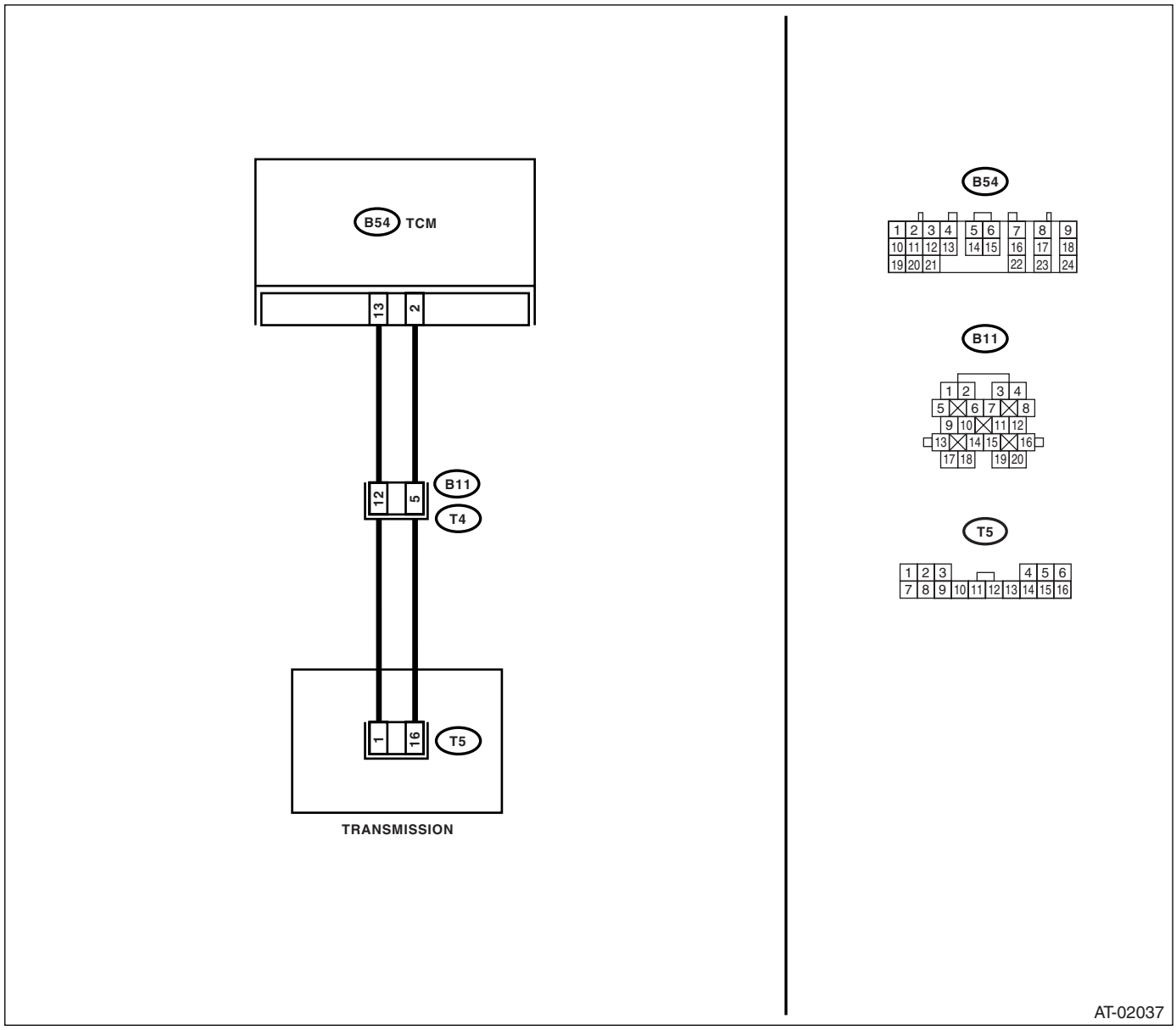
DTC DETECTING CONDITION:

Input signal circuit to ATF temperature sensor 1 is open.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:

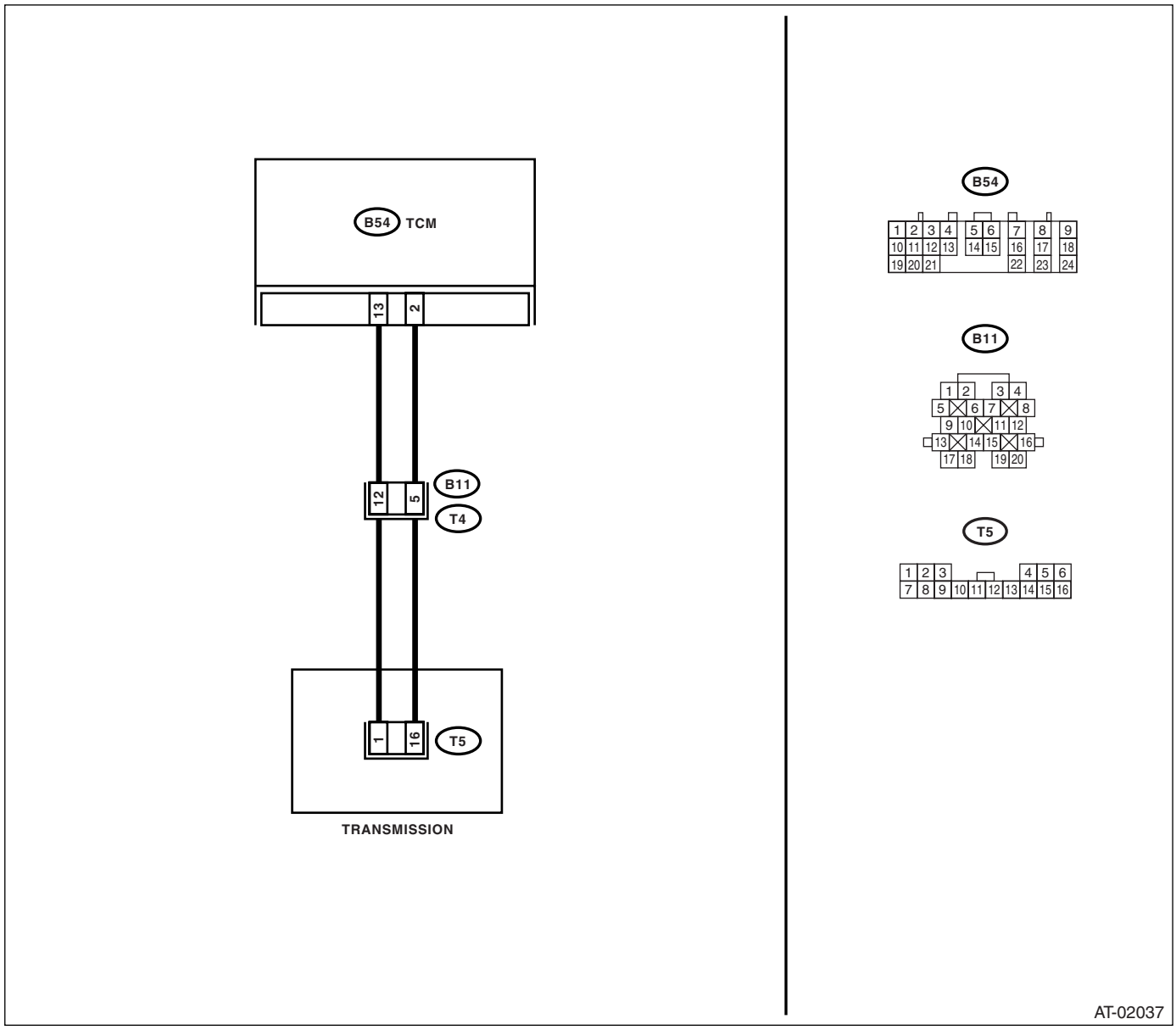


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 13 — (B11) No. 12:*** ***(B54) No. 2 — (B11) No. 5:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature reaches to 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No.12:***	Is the resistance between 500 — 1,200 Ω?	Go to step **3**.	Go to step **5**.
3	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No.12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4**.	Go to step **5**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON. (Engine OFF) 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Go to step **6**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 12 — (T5) No. 1:*** ***(T4) No. 5 — (T5) No. 16:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Repair the open circuit of harness between transmission connector and control valve body connector.
6	**CHECK POOR CONTACT.**	Is there poor contact in ATF temperature sensor 1 circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

C: DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:
Input signal circuit to ATF temperature sensor 1 is shorted.
TROUBLE SYMPTOM:
Excessive shift shock
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B54) No. 13 — Chassis ground:*** ***(B54) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **2**.	Repair the short circuit of harness between TCM and transmission connector.
2	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature reaches to 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No.12:***	Is the resistance between 500 — 1,200 Ω?	Go to step **3**.	Go to step **5**.
3	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No.12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4**.	Go to step **5**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON. (Engine OFF) 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Go to step **6**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T5) No. 1 — Chassis ground:*** ***(T5) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Repair the short circuit of harness between transmission connector and control valve body connector.
6	**CHECK POOR CONTACT.**	Is there poor contact in ATF temperature sensor 1 circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

D: DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT

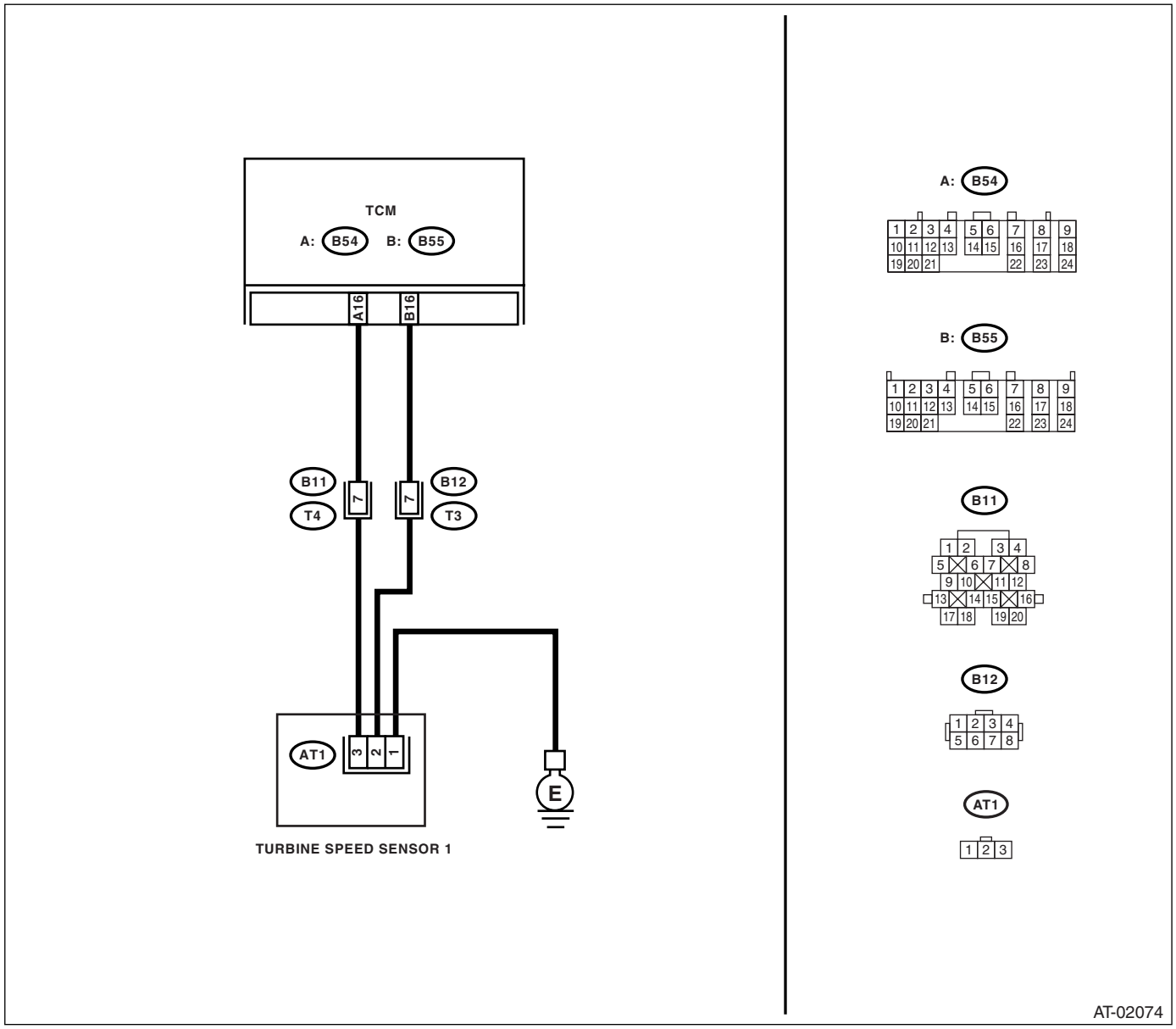
DTC DETECTING CONDITION:

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
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B55) No. 16 — (B12) No. 7:*** ***(B54) No. 16 — (B11) No. 7:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 16 — Chassis ground:*** ***(B54) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM and chassis ground.
3	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the TCM connector. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (Engine OFF) 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **4**.	Go to step **5**.
4	**CHECK TURBINE SPEED SENSOR INPUT CIRCUIT OF TCM.** Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 16 (+) — (B54) No. 19 (–):***	Is the voltage 4 — 6 V?	Go to step **6**.	Go to step **5**.
5	**CHECK TCM I/O SIGNAL.** Check I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-11, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC for PVIGN power supply relay.
6	**CHECK HARNESS ASSEMBLY (TURBINE SPEED SENSOR GROUND).** 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-34, Automatic Transmission Assembly.>

	Step	Check	Yes	No
7	**CHECK HARNESS ASSEMBLY.** 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. ***Connector & terminal*** ***(T4) No. 7 — (AT1) No. 3:*** ***(T3) No. 7 — (AT1) No. 2:*** ***(AT1) No. 1 — Chassis ground:***	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.
8	**CHECK HARNESS ASSEMBLY.** Measure the resistance between transmission connector and chassis ground. ***Connector & terminal*** ***(T4) No. 7 — Chassis ground:*** ***(T3) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Repair the short circuit of harness between TCM and transmission connector.
9	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and set the vehicle in 4th speed driving condition of manual mode. NOTE: Turbine speed sensor 1 signal can be measured only on 4th speed. 4) Read the current data of turbine speed sensor 1 using the Subaru Select Monitor. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the VDC memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-24, Clear Memory Mode.>	Does the value of the turbine speed sensor 1 change depending on the acceleration, deceleration and shifting range of the vehicle?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Replace the turbine speed sensor 1. <Ref. to 5AT-52, Turbine Speed Sensor 1.>

E: DTC P0719 TORQUE CONVERTER/BRAKE SWITCH "B" CIRCUIT LOW

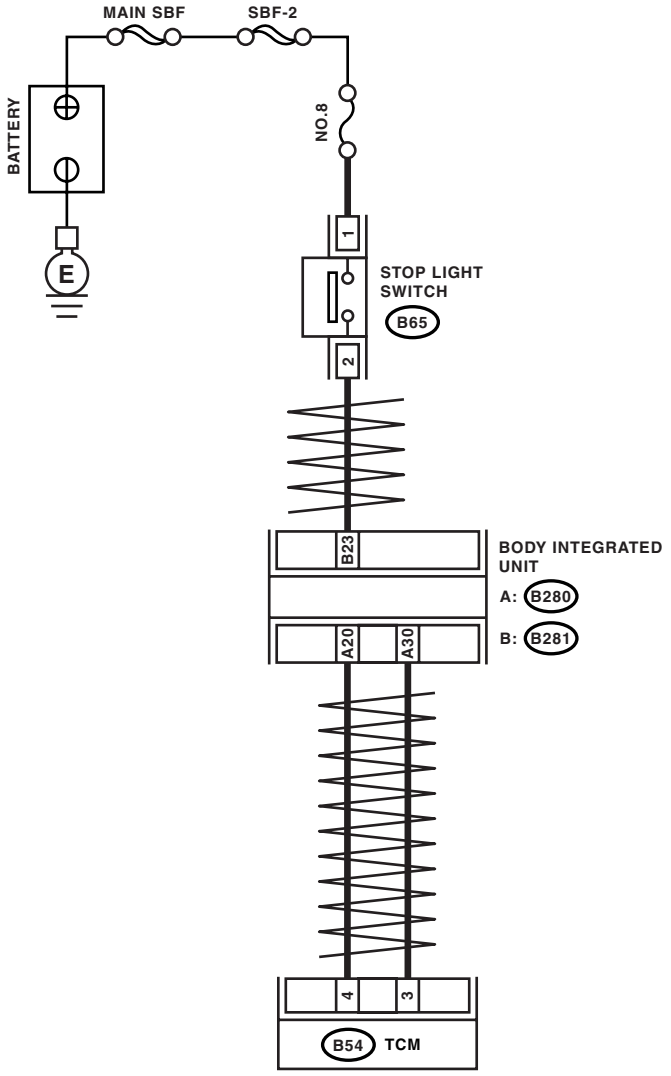
DTC DETECTING CONDITION:

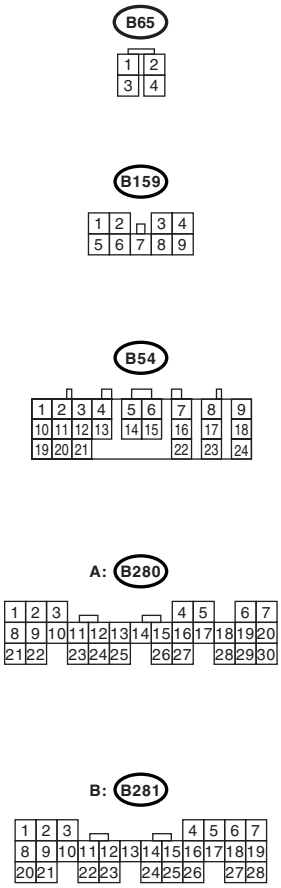
Brake switch malfunction, open input signal circuit

TROUBLE SYMPTOM:

Brake down control is not operated at SPORT mode.

WIRING DIAGRAM:





AT-03287

	Step	Check	Yes	No
1	**CHECK DTC.**	Is any of following DTC displayed? / AT CAN Communication Circuit / Output Speed Sensor Circuit / AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK THE BODY INTEGRATED UNIT.** 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) Turn the Subaru Select Monitor switch to ON. 5) Depress the brake pedal. 6) Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to step **3**.	Go to step **4**.
3	**CHECK TCM.** Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to 5AT(diag)-15, 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-56, Transmission Control Module (TCM).>
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 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. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7**.	Go to step **5**.
5	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** 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. ***Connector & terminal*** ***(B281) No. 23 — (B64) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between body integrated unit and stop light switch.
6	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** Measure the resistance of harness between body integrated unit connector and stop light switch. ***Connector & terminal*** ***(B281) No. 23 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Repair the short circuit of harness between body integrated unit and stop light switch.
7	**CHECK POOR CONTACT.**	Is there poor contact in input signal of brake switch?	Repair the poor contact.	Check the body integrated unit.

F: DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

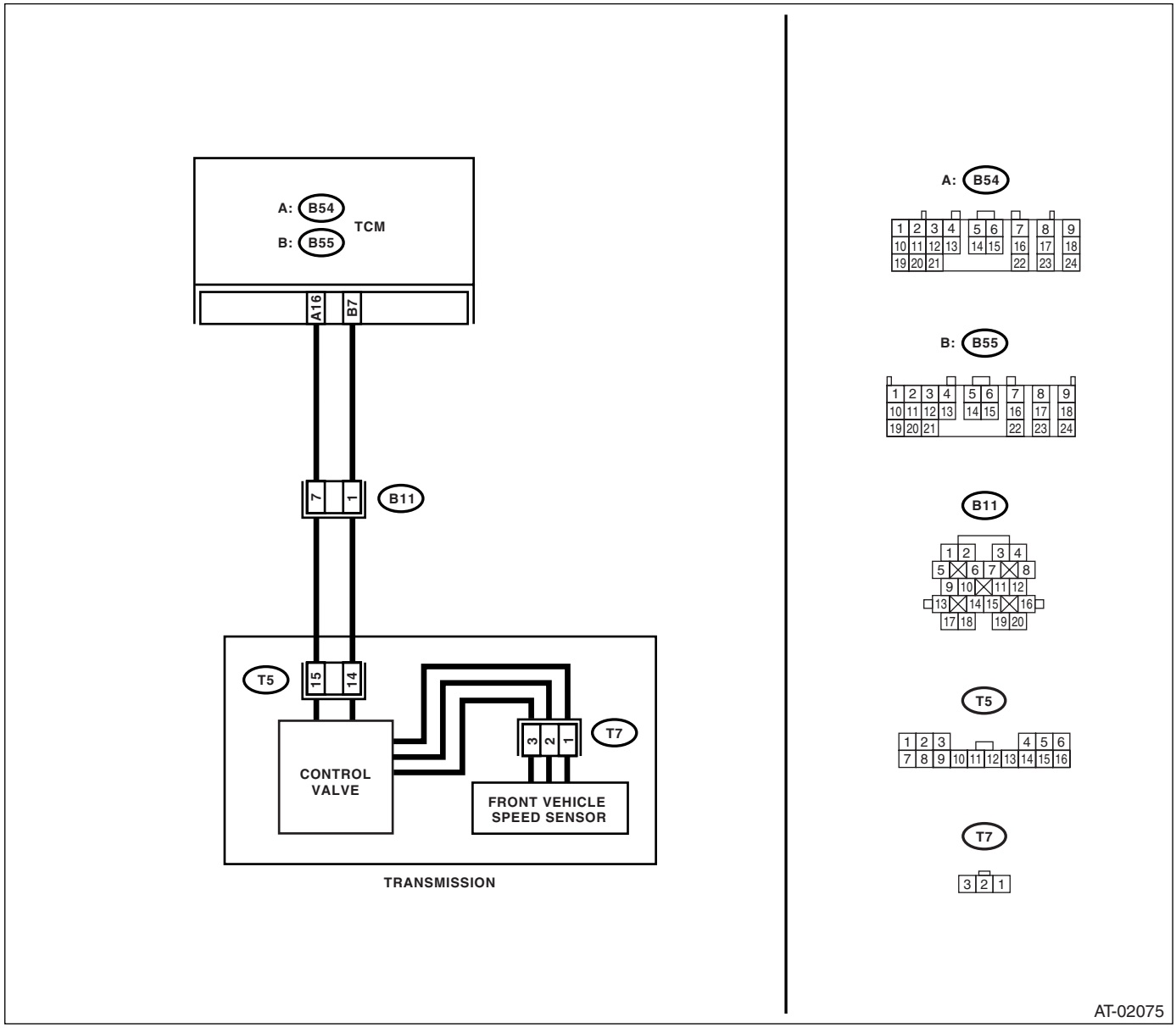
DTC DETECTING CONDITION:

- AT vehicle speed signal is abnormal.
- The harness connector between TCM and vehicle speed sensor is shorted or open.

TROUBLE SYMPTOM:

- Deterioration of shifting quality.
- Driving performance is poor.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B54) No. 16 — (B11) No. 7:*** ***(B55) No. 7 — (B11) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 — Chassis ground:*** ***(B55) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM and chassis ground.
3	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to TCU. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (Engine OFF) 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **4**.	Go to step **5**.
4	**CHECK TURBINE SPEED SENSOR INPUT CIRCUIT OF TCM.** Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 7 (+) — (B54) No. 19 (–):***	Is the voltage 4 — 6 V?	Go to step **6**.	Go to step **5**.
5	**CHECK TCM I/O SIGNAL.** Check I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-11, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC for PVIGN power supply relay.

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and drive it. 4) Read the current data of front wheel speed using Subaru Select Monitor. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the VDC memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>	Does the value of the front wheel speed change depending on the acceleration and deceleration of the vehicle?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Go to step **7**.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(B11) No. 7 — (T5) No. 15:*** ***(B11) No. 1 — (T5) No. 14:***	Is the resistance less than 1 Ω?	Go to step **8**.	Repair the open circuit of harness between control valve body connector and transmission connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T5) No. 15 — Transmission ground:*** ***(T5) No. 14 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **9**.	Repair the short circuit of harness between transmission connector and transmission ground.

	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN CONTROL VALVE BODY AND VEHICLE SPEED SENSOR.** 1) Disconnect the connector from vehicle speed sensor. 2) Measure the resistance of harness between control valve body connector and vehicle speed sensor connector. ***Connector & terminal*** ***(T5) No. 15 — (T7) No. 3:*** ***(T5) No. 14 — (T7) No. 2:*** ***(T7) No. 1 — Transmission ground:***	Is the resistance less than 1 Ω?	Go to step **10**.	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>
10	**CHECK HARNESS CONNECTOR BETWEEN CONTROL VALVE BODY AND VEHICLE SPEED SENSOR.** Measure the resistance of harness between control valve body connector and transmission ground. ***Connector & terminal*** ***(T5) No. 15 — Transmission ground:*** ***(T5) No. 14 — Transmission ground:***	Is the resistance more than 1 MΩ?	Replace the vehicle speed sensor.	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>

G: DTC P0724 TORQUE CONVERTER/BRAKE SWITCH "B" CIRCUIT HIGH

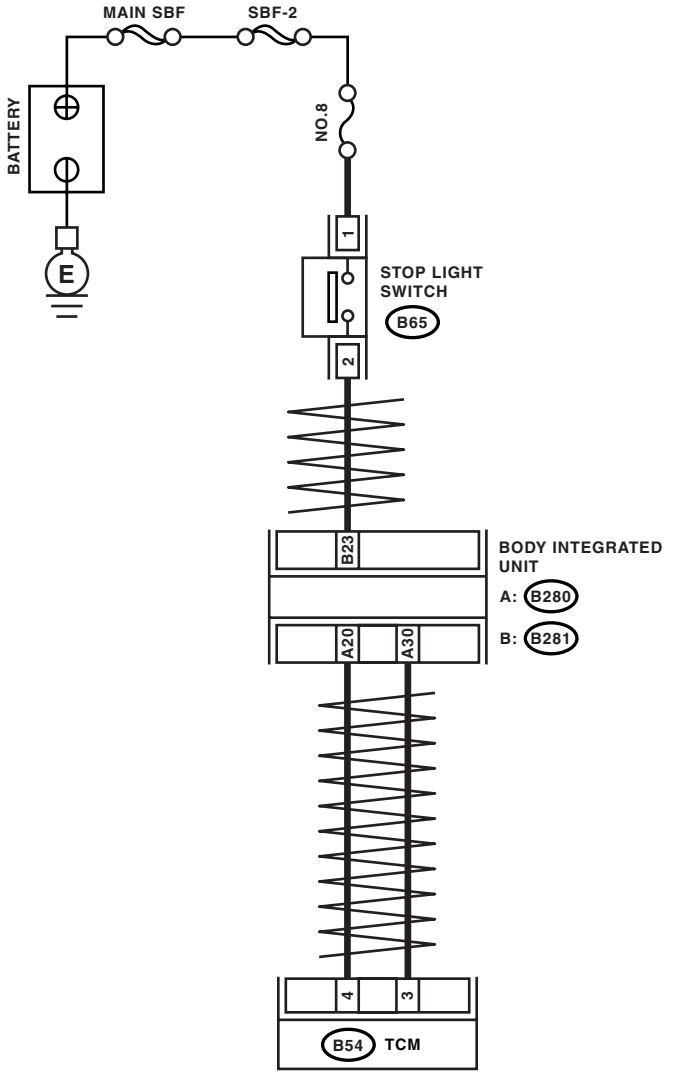
DTC DETECTING CONDITION:

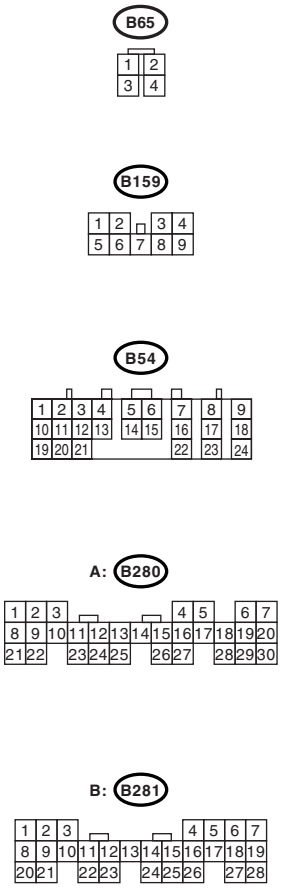
Brake switch malfunction, open input signal circuit

TROUBLE SYMPTOM:

Gear is not shifted down when climbing a hill.

WIRING DIAGRAM:





AT-03287

	Step	Check	Yes	No
1	**CHECK DTC.**	Is any of following DTC detected? / AT CAN Communication Circuit / Output Speed Sensor Circuit / AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK THE BODY INTEGRATED UNIT.** 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) Turn the Subaru Select Monitor switch to ON. 5) Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	Go to step **3**.	Go to step **4**.
3	**CHECK TCM.** Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to 5AT(diag)-15, 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-56, Transmission Control Module (TCM).>
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Disconnect the connector from body integrated unit. 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5**.	Go to step **7**.
5	**CHECK STOP LIGHT SWITCH.** 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. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Replace the stop light switch.
6	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** 1) Turn the ignition switch to ON. 2) Measure the voltage of harness between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **7**.	Repair the short circuit of harness between TCM and stop light switch.
7	**CHECK POOR CONTACT.**	Is there poor contact in input signal of brake switch?	Repair the poor contact.	Check the body integrated unit.

H: DTC P0725 ENGINE SPEED INPUT CIRCUIT

DTC DETECTING CONDITION:
Information of engine speed is not correctly received from ECM.
TROUBLE SYMPTOM:
No lock-up occurs. (After engine is warmed-up)

	Step	Check	Yes	No
1	**CHECK DTC OF ECM.**	Is DTC of AT CAN communication circuit detected?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK DTC OF TCM.**	Is DTC of AT CAN communication circuit detected?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK DTC OF TCM.**	Is any of following DTC detected?/Output Speed Sensor Circuit/AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Perform the diagnosis according to DTC.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

I: DTC P0731 GEAR 1 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-53, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

J: DTC P0732 GEAR 2 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-53, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC P0733 GEAR 3 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-53, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC P0734 GEAR 4 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-53, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

M: DTC P0735 GEAR 5 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-53, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

N: 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
1	**CHECK DTC OF TCM.**	Is any DTC of the followings detected? P0715, P0720, P0753, P0758, P0763, P0768, P0773, P0751, P0756, P0761, P0766, P0771, P1706, P1710, P1798, P1799	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK TURBINE SPEED SENSOR USING SUBARU SELECT MONITOR.** 1) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 2) Start the engine, and drive it. 3) Read the current data of torque converter turbine speed using Subaru Select Monitor. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the VDC memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>	Does the displayed value of the Subaru Select Monitor change according to engine speed and shifting?	Go to step **3**.	Perform the diagnosis according to DTC P0715, P1710.
3	**CHECK FRONT AND REAR VEHICLE SPEED SENSORS.**	Do the values displayed for each of the Subaru Select Monitor and the speedometer substantially match?	Go to step **4**.	Perform the diagnosis according to DTC P0720, P1706.
4	**CHECK INHIBITOR SWITCH.**	Do the values displayed for the Subaru Select Monitor and the meter indicator match?	Go to step **5**.	Perform the diagnosis according to DTC P0705.
5	**DRIVING CHECK.** 1) Turn the ignition switch to OFF. 2) After restarting the engine, check that the SPORT indicator light is not blinking, and perform a drive check based on the inspection mode. <Ref. to 5AT(diag)-19, PROCEDURE, Inspection Mode.>	Is DTC displayed again?	Check the DTC. Then, when proceeded again to step 5, go to step 6.	Go to step **6**.
6	**CHECK AFTER REPAIR.**	Is the trouble symptom inrepairable (malfunction in shifting such as excessive shift shock, engine speed increases excessively when shifting)?	Replace the transmission assembly.	Temporary poor contact occurs. Check that the harness connector is not faulty.

O: DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION:

- Defective lock-up clutch or 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	**CHECK DTC OF TCM.**	Is any DTC of the followings detected? P0715, P0725, P0753, P0758, P0763, P0768, P0773, P0751, P0756, P0761, P0766, P0771, P1710, P1718, P1798, P1799	Perform the diagnosis according to each DTC.	Go to step **2**.
2	**DRIVING CHECK FOR LOCK-UP CONDITION** 1) Perform a drive check based on the inspection mode with the following conditions. <Ref. to 5AT(diag)-19, PROCEDURE, Inspection Mode.> (1) Read the current data of throttle opening angle using Subaru Select Monitor. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (2) Keep the same vehicle speed at 60 km/h with 10% or less throttle opening angle which is read currently on Subaru Select Monitor. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (3) Read the current data of L/U solenoid target pressure using Subaru Select Monitor. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (4) Check the engine speed and turbine speed when the L/U solenoid target value displayed on Subaru Select Monitor is 500 kPa or more.	Are the engine speed and turbine speed almost the same?	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.	Go to step **3**.

	Step	Check	Yes	No
3	**DRIVING CHECK FOR LOCK-UP CONDITION** 1) Clear the memory. <Ref. to 5AT(diag)-17, OPERATION, Subaru Select Monitor.> 2) Perform a drive check based on the inspection mode with the following conditions. <Ref. to 5AT(diag)-19, PROCEDURE, Inspection Mode.> (1) Read the current data of throttle opening angle using Subaru Select Monitor. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (2) Keep the same vehicle speed at 60 km/h with 10% or less throttle opening angle which is read currently on Subaru Select Monitor. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (3) Read the current data of L/U solenoid target pressure using Subaru Select Monitor. <Ref. to 5AT(diag)-15, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> (4) Drive the vehicle continuously for one minutes or more with the L/U solenoid target value displayed on Subaru Select Monitor at 500 kPa or more. 3) Turn the ignition switch to OFF. 4) Turn the ignition switch to ON. (Engine ON) 5) Perform the step 2) again.	Is DTC P0741 displayed with the SPORT indicator light blinking?	Replace the transmission assembly when DTC P0741 is displayed. When DTC other than P0741 is displayed, perform the diagnosis corresponding to the DTC.	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

P: DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL

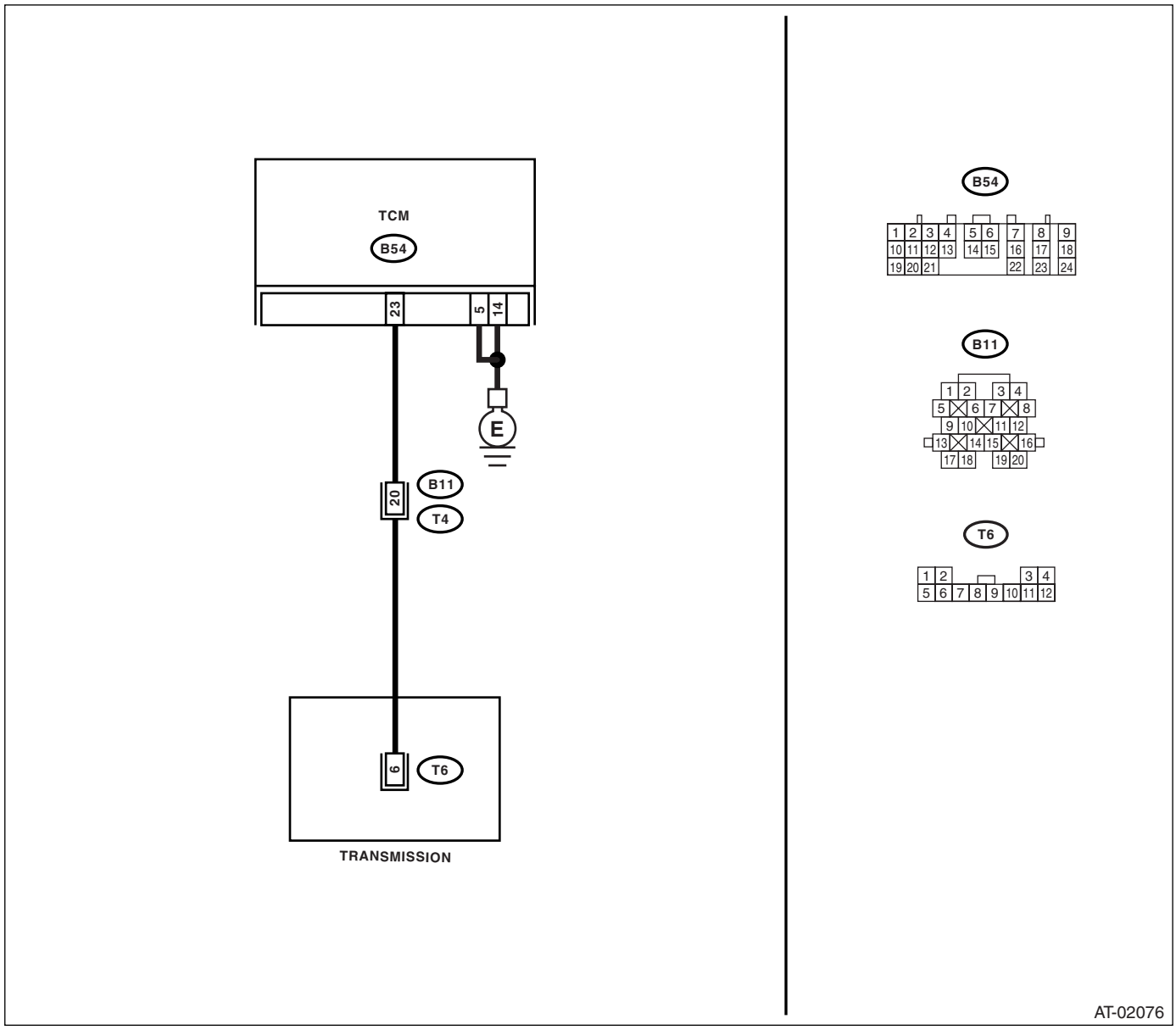
DTC DETECTING CONDITION:

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
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B54) No. 23 — (B11) No. 20:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — 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.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 23 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. NOTE: Do not drain ATF until it cools down. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 20 — (T6) No. 6:***	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.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK LOCK-UP SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 6 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>

	Step	Check	Yes	No
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

Q: DTC P0748 PRESSURE CONTROL SOLENOID "A" ELECTRICAL

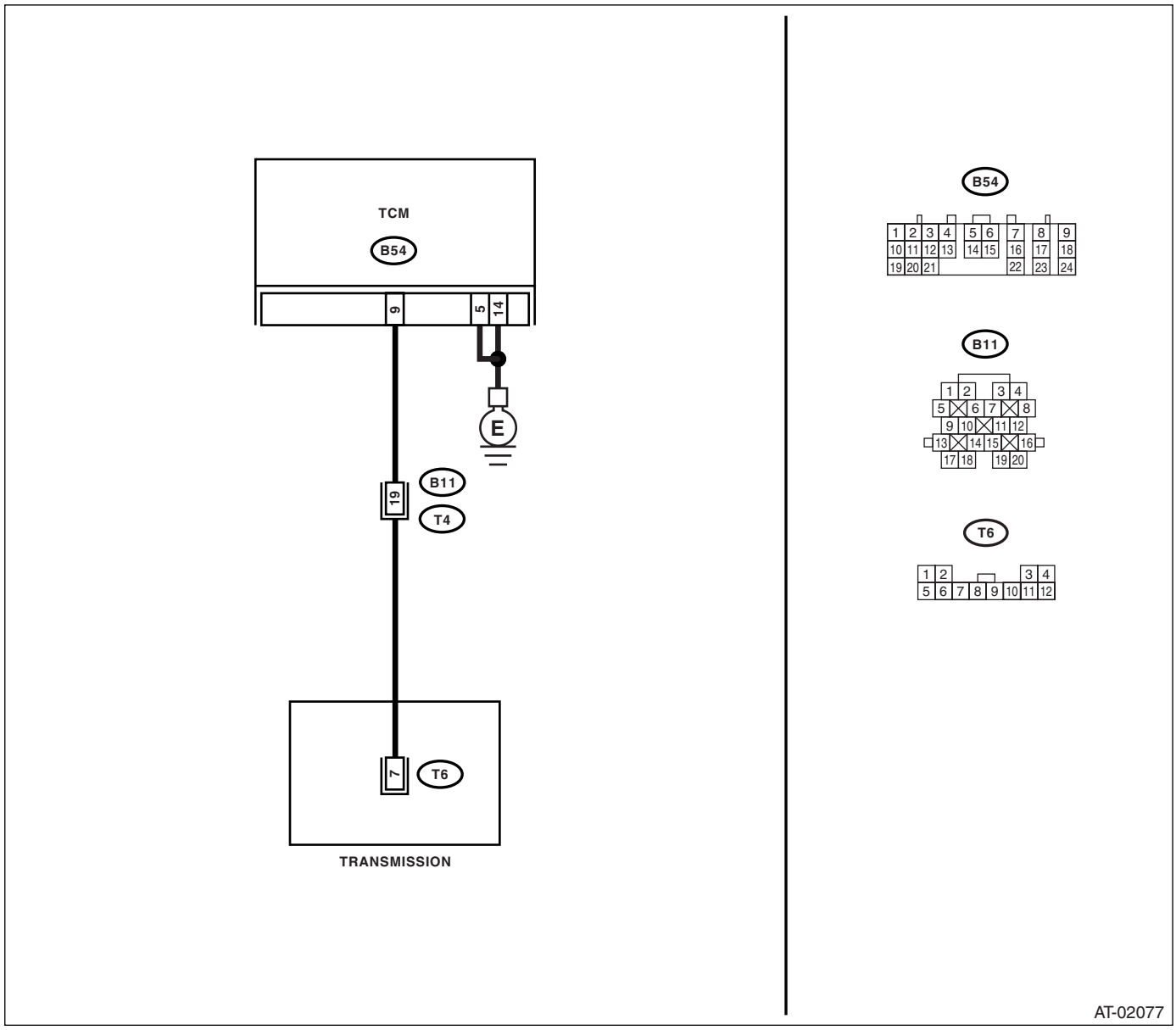
DTC DETECTING CONDITION:

Output signal circuit of line pressure solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B54) No. 9 — (B11) No. 19:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — 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.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 19 — (T6) No. 7:***	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.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK LINE PRESSURE SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 7 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

R: DTC P0751 SHIFT SOLENOID "A" PERFORMANCE OR STUCK OFF

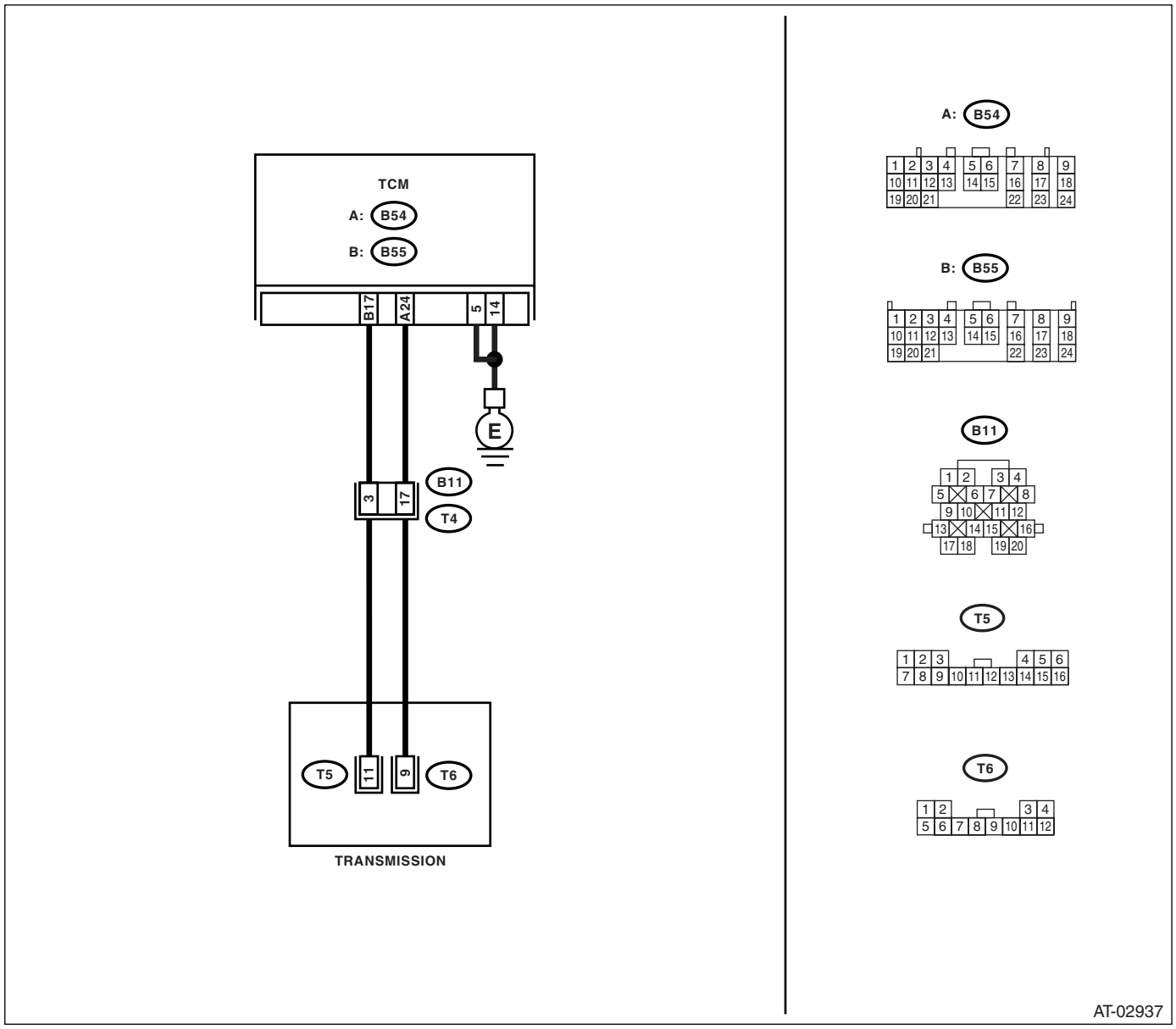
DTC DETECTING CONDITION:

Output signal of front brake solenoid does not match with oil pressure.

TROUBLE SYMPTOM:

Locked to 4th or 5th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 24 — (B11) No. 17:*** ***(B55) No. 17 — (B11) No. 3:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (Engine OFF) 3) Check input signal of Fr/B oil pressure SW.	Is OFF displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (Engine ON) 3) Shift to 1st speed while checking the current gear position using Subaru Select Monitor. 4) Check input signal of Fr/B oil pressure SW.	Is ON displayed?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(B11) No. 17 — (T6) No. 9:*** ***(B11) No. 3 — (T5) No. 11:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Replace the transmission harness assembly.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T4) No. 3 — Transmission ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Replace the transmission harness assembly.

S: DTC P0753 SHIFT SOLENOID “A” ELECTRICAL

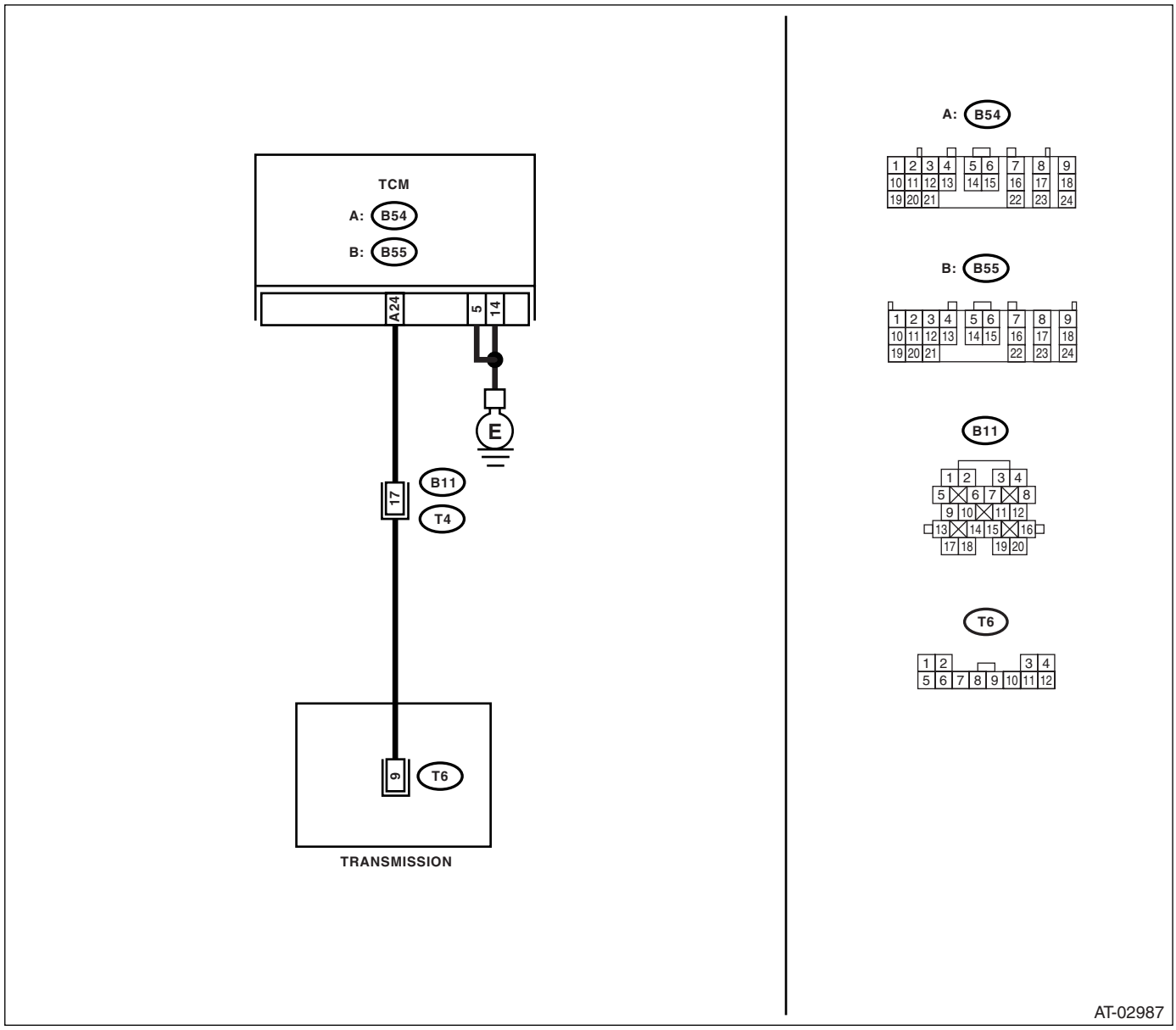
DTC DETECTING CONDITION:

Output signal circuit of front brake solenoid is open or shorted.

TROUBLE SYMPTOM:

Locked to 4th or 5th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B54) No. 24 — (B11) No. 17:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — 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.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 24 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 17 — (T6) No. 9:***	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.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 9 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the short circuit of harness between control valve body and transmission connector.
5	**CHECK FRONT BRAKE SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 9 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>

	Step	Check	Yes	No
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

T: DTC P0756 SHIFT SOLENOID "B" PERFORMANCE OR STUCK OFF

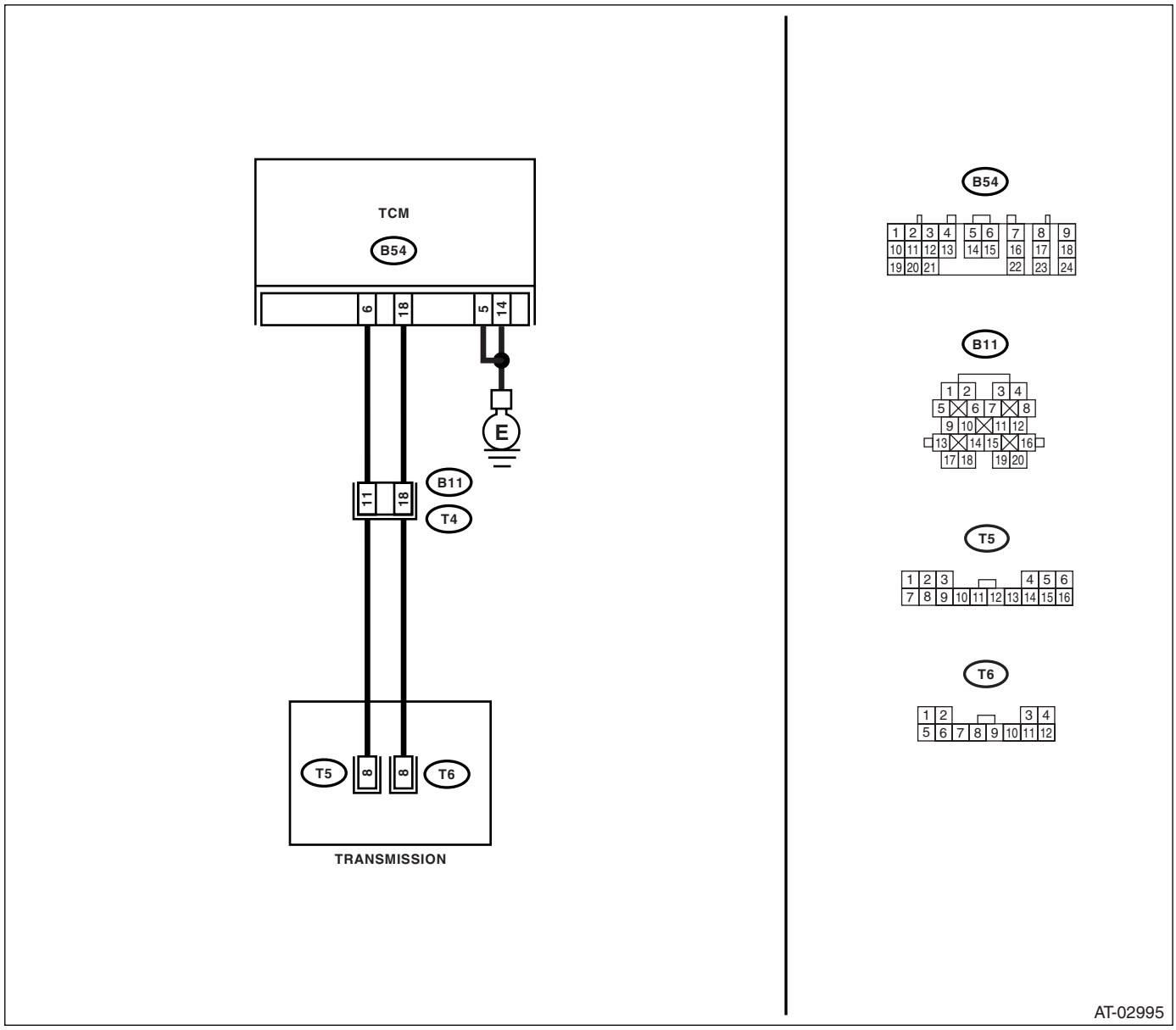
DTC DETECTING CONDITION:

Output signal value of input clutch solenoid and oil pressure does not match.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B54) No. 18 — (B11) No. 18:*** ***(B54) No. 6 — (B11) No. 11:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (Engine OFF) 3) Check input signal of I/C oil pressure SW.	Is OFF displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (Engine ON) 3) Drive the vehicle on 4th speed of “D” range with checking current gear position using Subaru Select Monitor. 4) Check input signal of I/C oil pressure SW.	Is ON displayed?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 18 — (T6) No. 8:*** ***(T4) No. 11 — (T5) No. 8:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Replace the transmission harness assembly.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Check the insulation of transmission harness assembly. ***Connector & terminal*** ***(T4) No. 11 — (T5) No. 13:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Replace the transmission harness assembly.

U: DTC P0758 SHIFT SOLENOID “B” ELECTRICAL

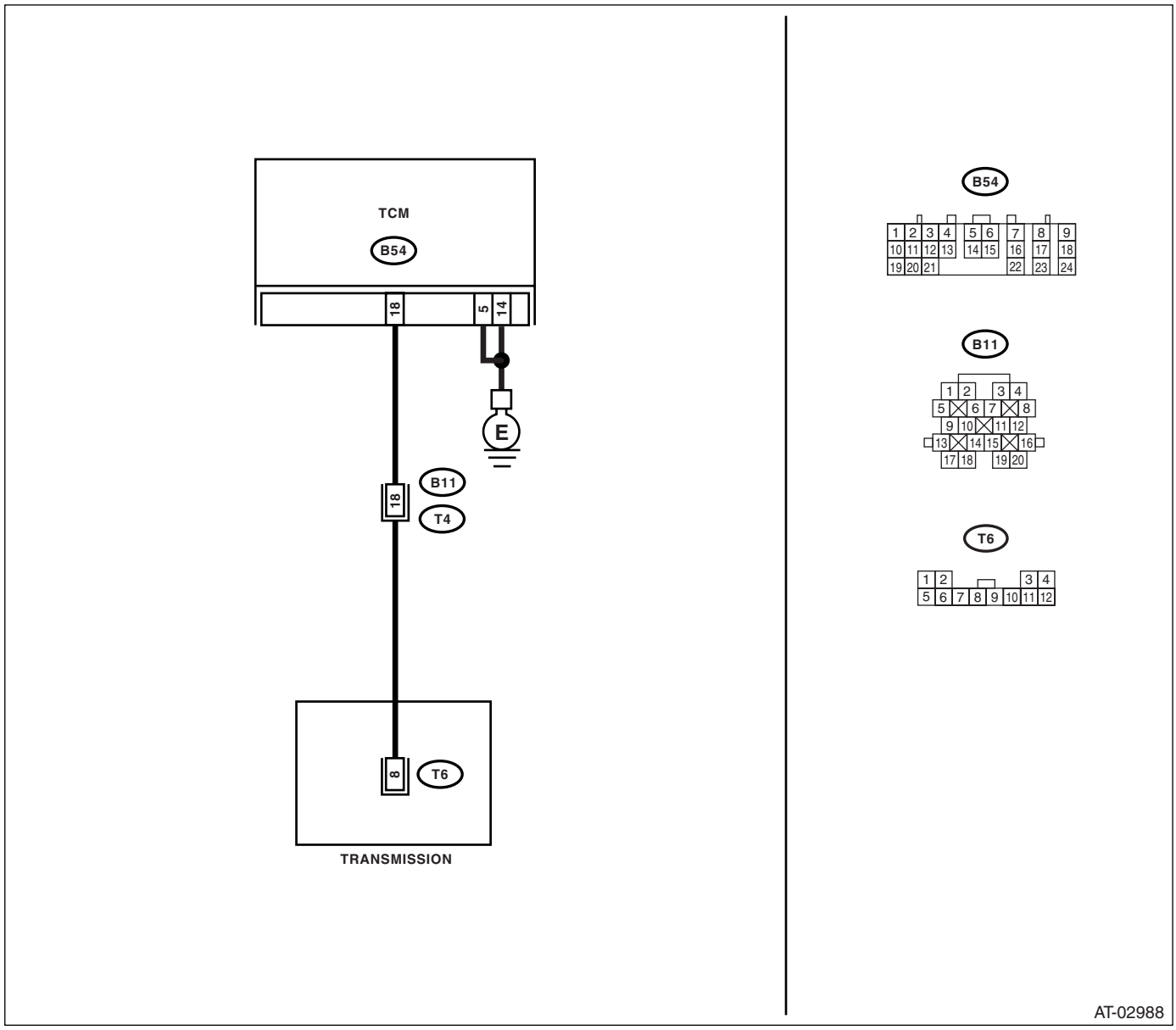
DTC DETECTING CONDITION:

Output signal circuit of input clutch solenoid is open or shorted.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 18 — (B11) No. 18:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.** Measure the resistance of harness between TCM connector and body harness. ***Connector & terminal*** ***(B54) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 18 — (T6) No. 8:***	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.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the short circuit of harness between transmission connector and control valve body connector.
5	**CHECK INPUT CLUTCH SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 8 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

V: DTC P0761 SHIFT SOLENOID “C” PERFORMANCE OR STUCK OFF

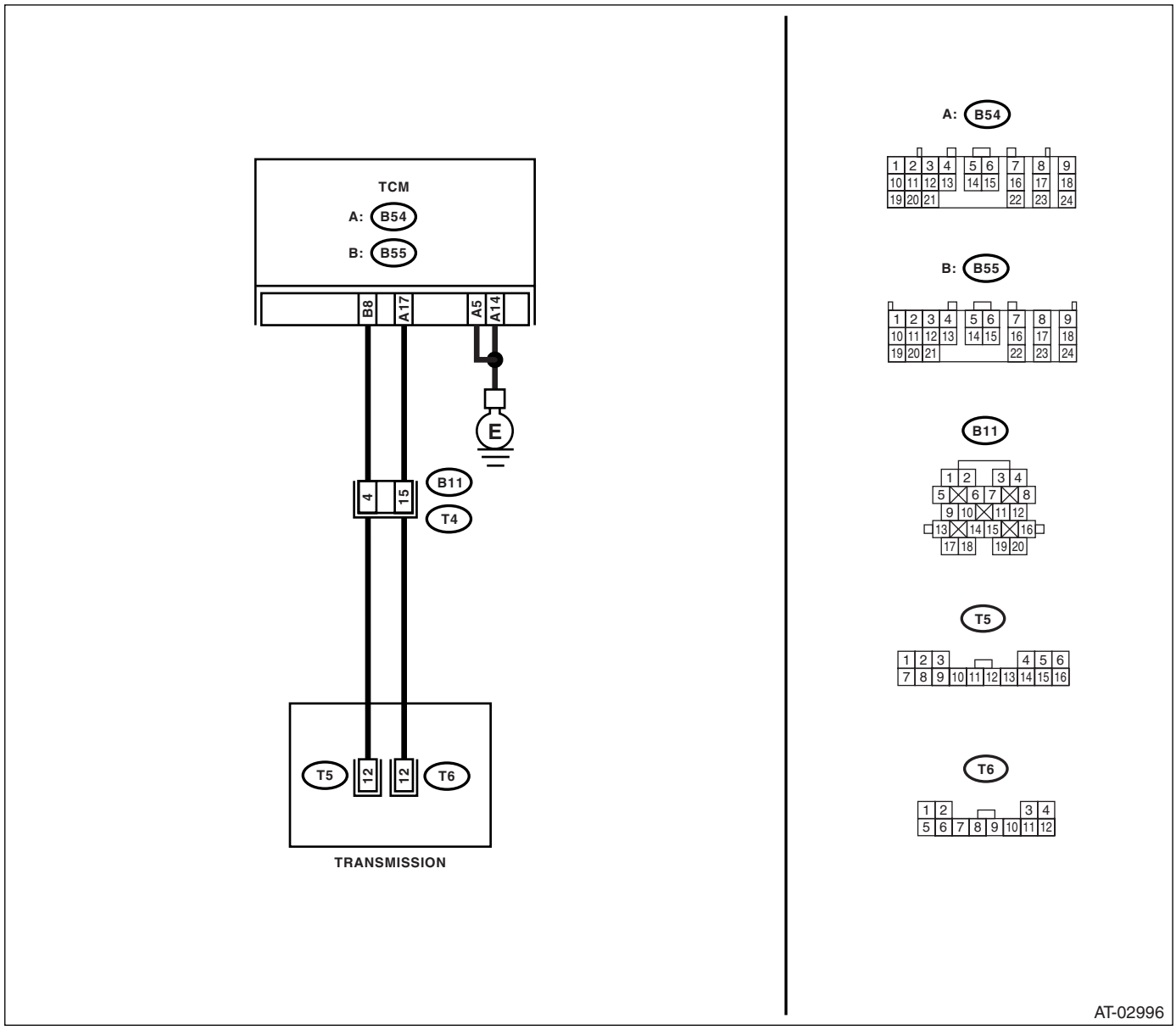
DTC DETECTING CONDITION:

Output signal value of high & low reverse clutch solenoid and oil pressure does not match.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 17 — (B11) No. 15:*** ***(B55) No. 8 — (B11) No. 4:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (Engine OFF) 3) Check the input signal of the H&LR/C oil pressure SW.	Is OFF displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (Engine ON) 3) Shift to “D” range and brake ON (1st) with checking current gear position using Subaru Select Monitor. 4) Check the input signal of the H&LR/C oil pressure SW.	Is ON displayed?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 15 — (T6) No. 12:*** ***(T4) No. 4 — (T5) No. 12:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Replace the transmission harness assembly.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Check the insulation of transmission harness assembly. ***Connector & terminal*** ***(T4) No. 4 — (T5) No. 13:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Replace the transmission harness assembly.

W: DTC P0763 SHIFT SOLENOID "C" ELECTRICAL

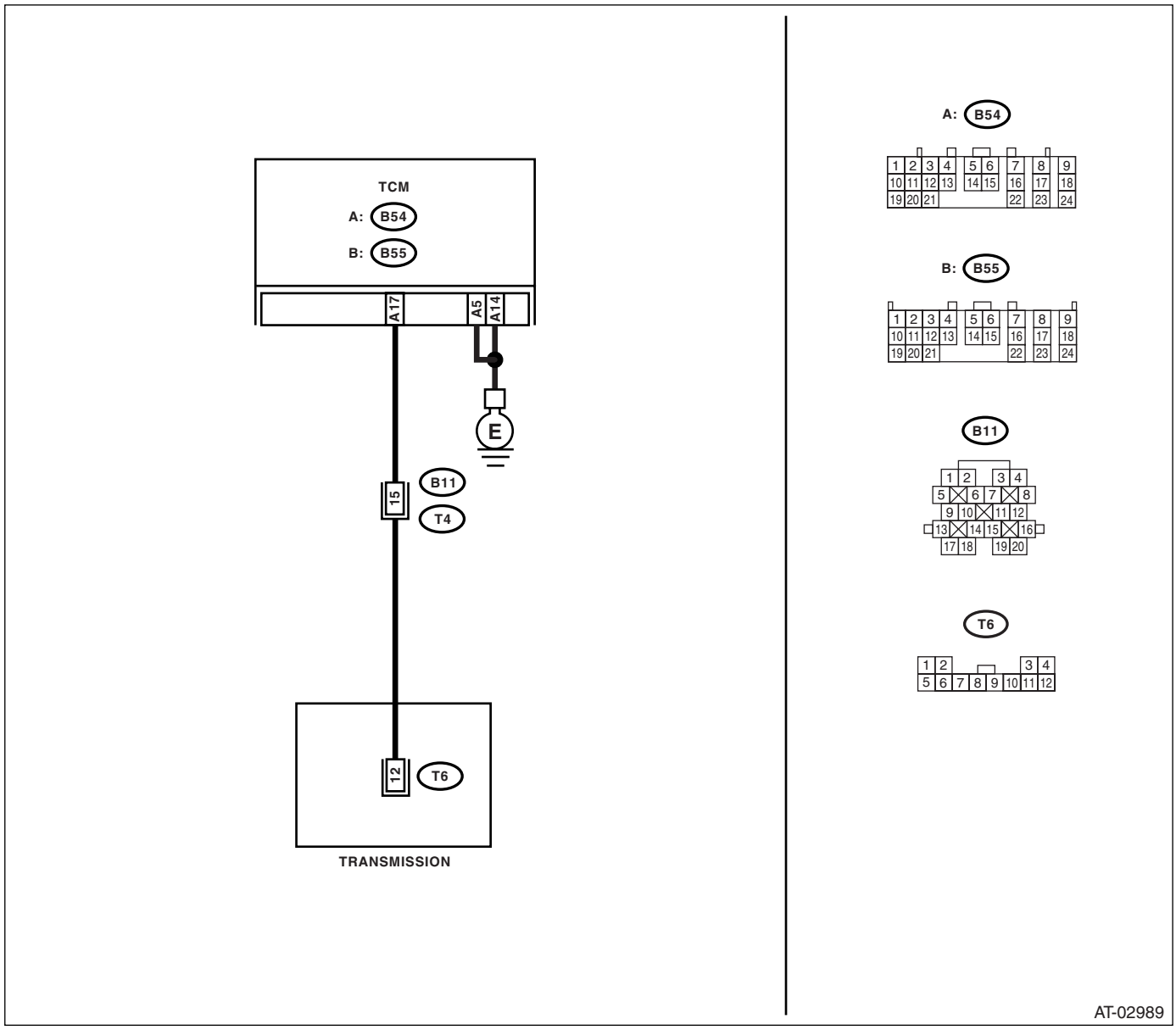
DTC DETECTING CONDITION:

Output signal circuit of high & low reverse clutch solenoid is open or shorted.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 17 — (B11) No. 15:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — 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.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 15 — (T6) No. 12:***	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.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance of harness connector between control valve body connector and chassis ground. ***Connector & terminal*** ***(T6) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the open circuit of harness between control valve body connector and transmission ground.
5	**CHECK HIGH & LOW REVERSE CLUTCH SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 12 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

X: DTC P0766 SHIFT SOLENOID "D" PERFORMANCE OR STUCK OFF

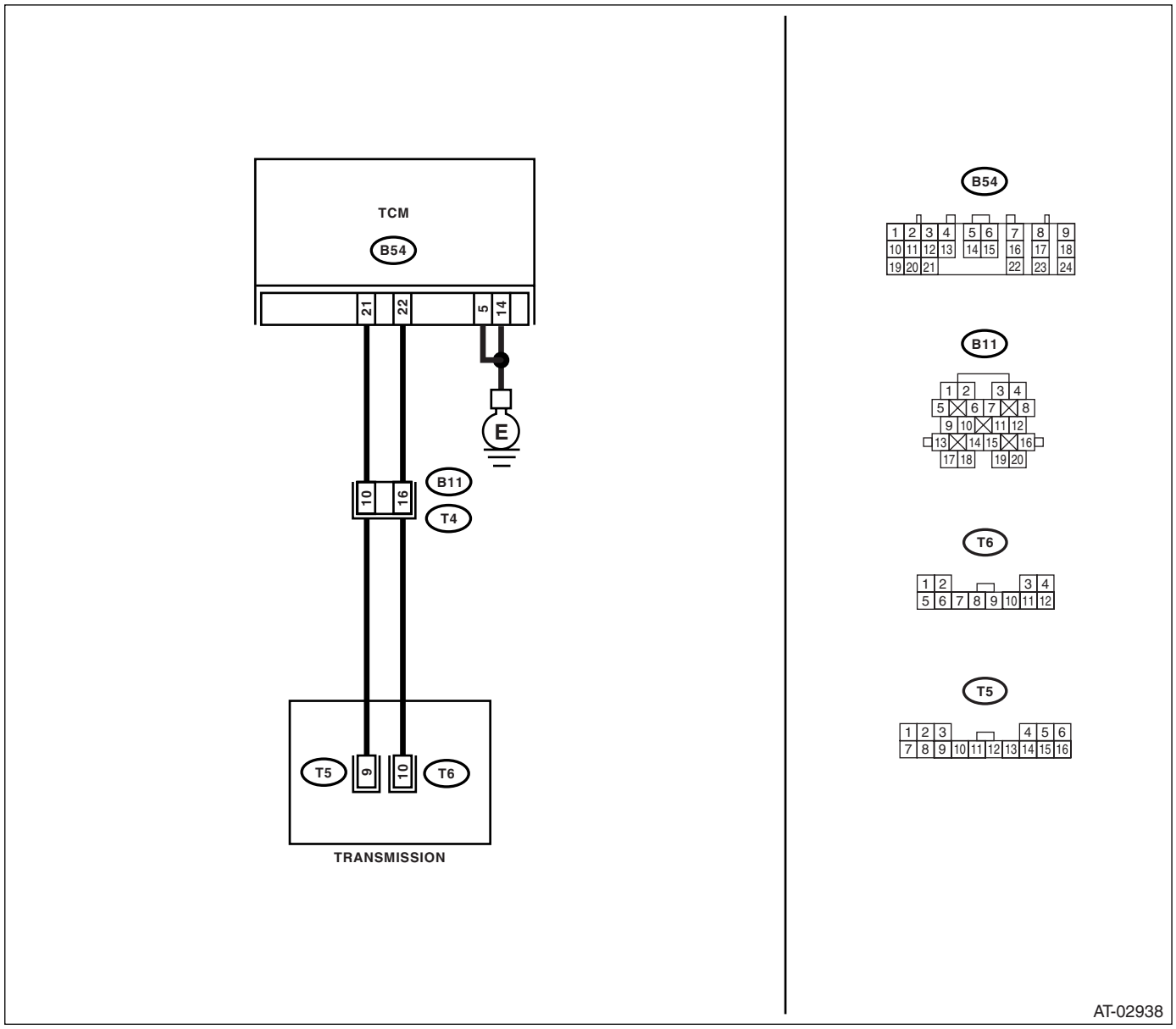
DTC DETECTING CONDITION:

Output signal value of direct clutch solenoid and oil pressure does not match.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — (B11) No. 16:*** ***(B54) No. 21 — (B11) No. 10:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.** Measure the resistance of harness between TCM connector and body harness. ***Connector & terminal*** ***(B54) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (Engine OFF) 3) Check input signal of D/C oil pressure SW.	Is OFF displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (Engine ON) 3) Shift to 2nd speed of manual mode and brake ON with checking current gear position using Subaru Select Monitor. 4) Check input signal of D/C oil pressure SW.	Is ON displayed?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 16 — (T6) No. 10:*** ***(T4) No. 10 — (T5) No. 9:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Replace the transmission harness assembly.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Check the insulation of transmission harness assembly. ***Connector & terminal*** ***(T4) No. 10 — (T5) No. 13:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Replace the transmission harness assembly.

Y: DTC P0768 SOLENOID “D” ELECTRICAL

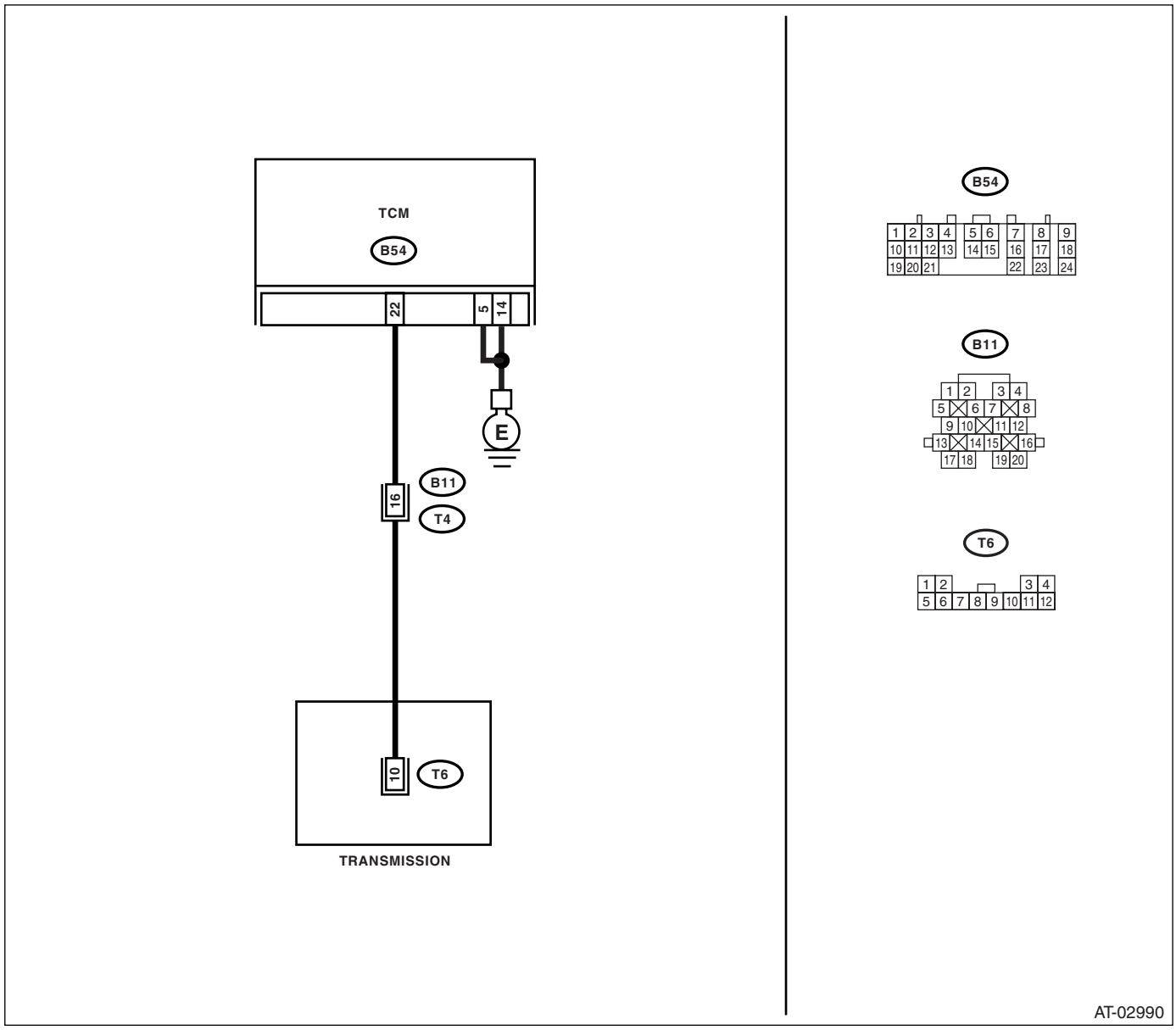
DTC DETECTING CONDITION:

The output signal circuit of direct clutch solenoid is open or shorted.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — (B11) No. 16:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — 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.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 16 — (T6) No. 10:***	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.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK DIRECT CLUTCH SOLENOID.** Measure the resistance of harness connector between control valve body connector and transmission ground. ***Connector & terminal*** ***(T6) No. 10 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

Z: DTC P0771 SHIFT SOLENOID "E" PERFORMANCE OR STUCK OFF

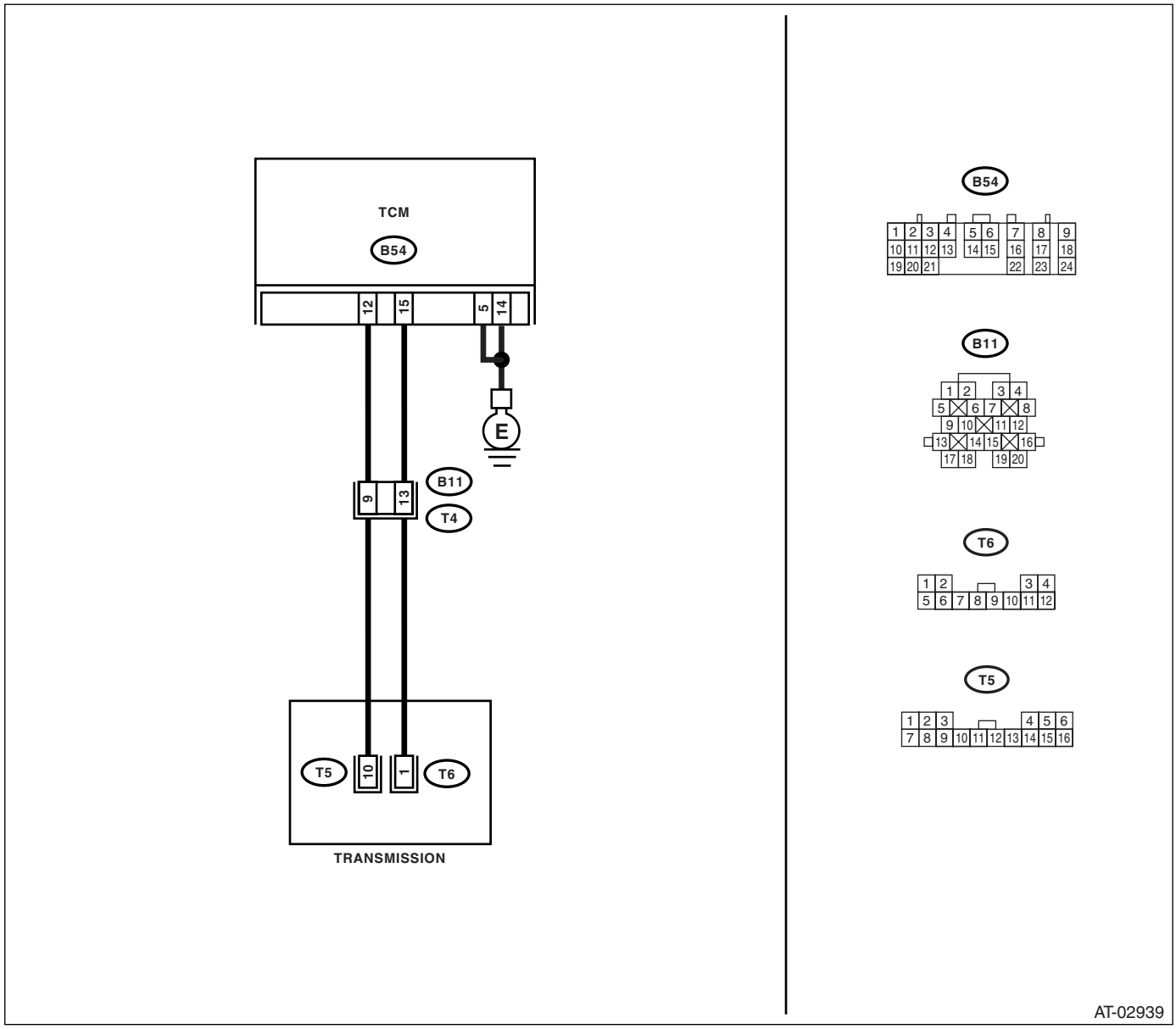
DTC DETECTING CONDITION:

Output signal value of low coast brake solenoid and oil pressure does not match.

TROUBLE SYMPTOM:

- Locked to 2nd gear.
- Engine brake does not function at 1st or 2nd of manual mode.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 15 — (B11) No. 13:*** ***(B54) No. 12 — (B11) No. 9:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (Engine OFF) 3) Check input signal of LC/B oil pressure SW.	Is OFF displayed?	Go to step **4**.	Go to step **6**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (Engine ON) 3) Drive the vehicle on 2nd speed of manual mode 15 km/h (9 MPH) with checking current gear position using Subaru Select Monitor. 4) Check input signal of LC/B oil pressure SW.	Is ON displayed?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **5**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 13 — (T6) No. 1:*** ***(T4) No. 9 — (T5) No. 10:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Replace the transmission harness assembly.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Check the insulation of transmission harness assembly. ***Connector & terminal*** ***(T4) No. 9 — (T5) No. 13:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Repair the short circuit of harness between transmission connector and control valve body connector.

AA:DTC P0773 SHIFT SOLENOID “E” ELECTRICAL

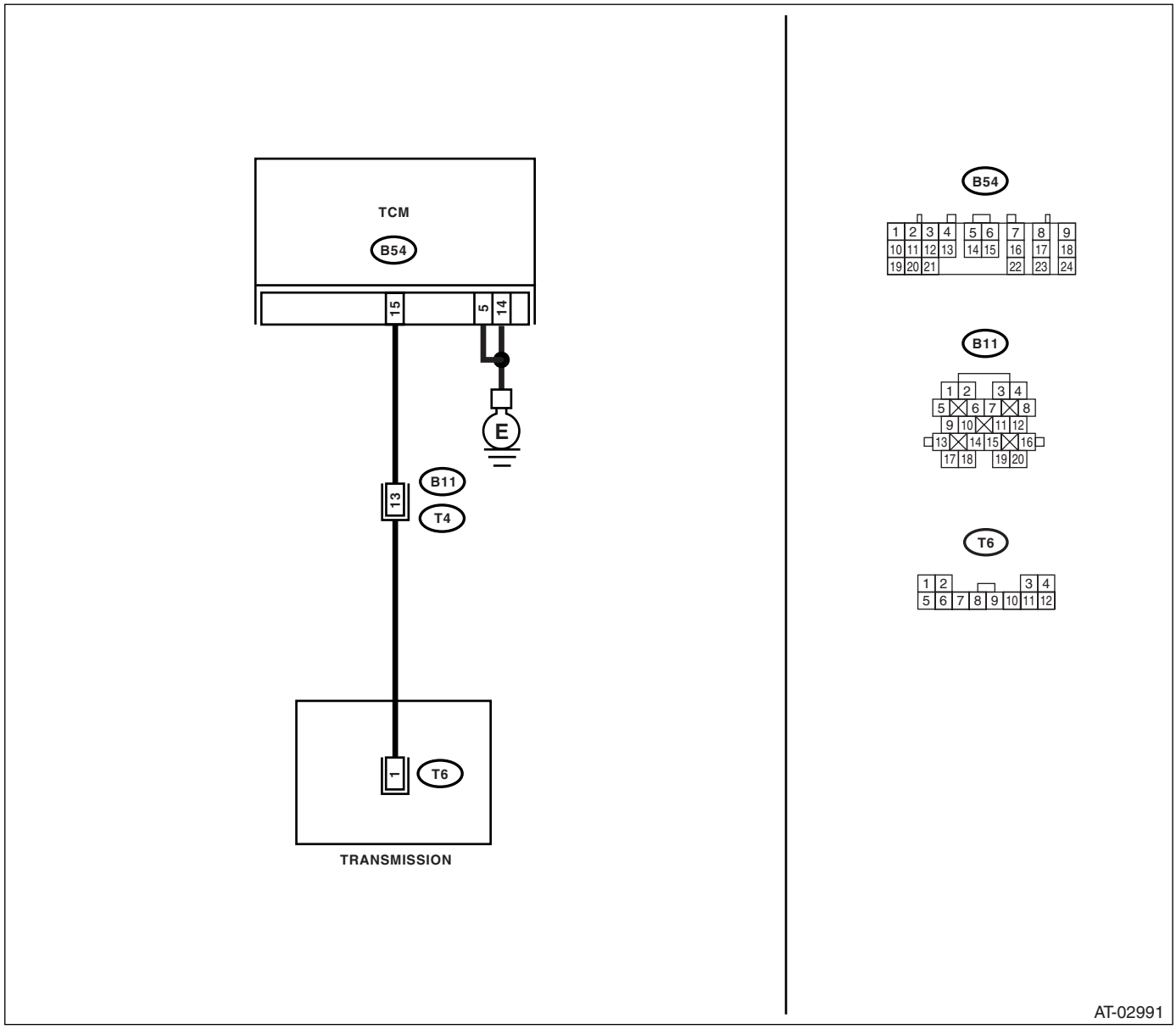
DTC DETECTING CONDITION:

Output signal circuit of low coast brake solenoid is open or shorted.

TROUBLE SYMPTOM:

- Locked to 2nd gear.
- Engine brake does not function at 1st or 2nd of manual mode.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC (P0802) of the PVIGN relay detected?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 15 — (B11) No. 13:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.** Measure the resistance of harness between TCM connector and body harness. ***Connector & terminal*** ***(B54) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair the short circuit of harness between TCM connector and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 13 — (T6) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between transmission connector and control valve body connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair the short circuit of harness between control valve body connector and transmission ground.
6	**CHECK LOW COAST BRAKE SOLENOID.** Measure the resistance of harness connector between control valve body connector and transmission ground. ***Connector & terminal*** ***(T6) No. 1 — Transmission ground:***	Is the resistance between 5 — 17 Ω?	Go to step **7**.	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>

	Step	Check	Yes	No
7	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **8**.
8	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Perform the P0882 diagnosis. <Ref. to 5AT(diag)-93, DTC P0882 TCM POWER INPUT SIGNAL LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AB:DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT

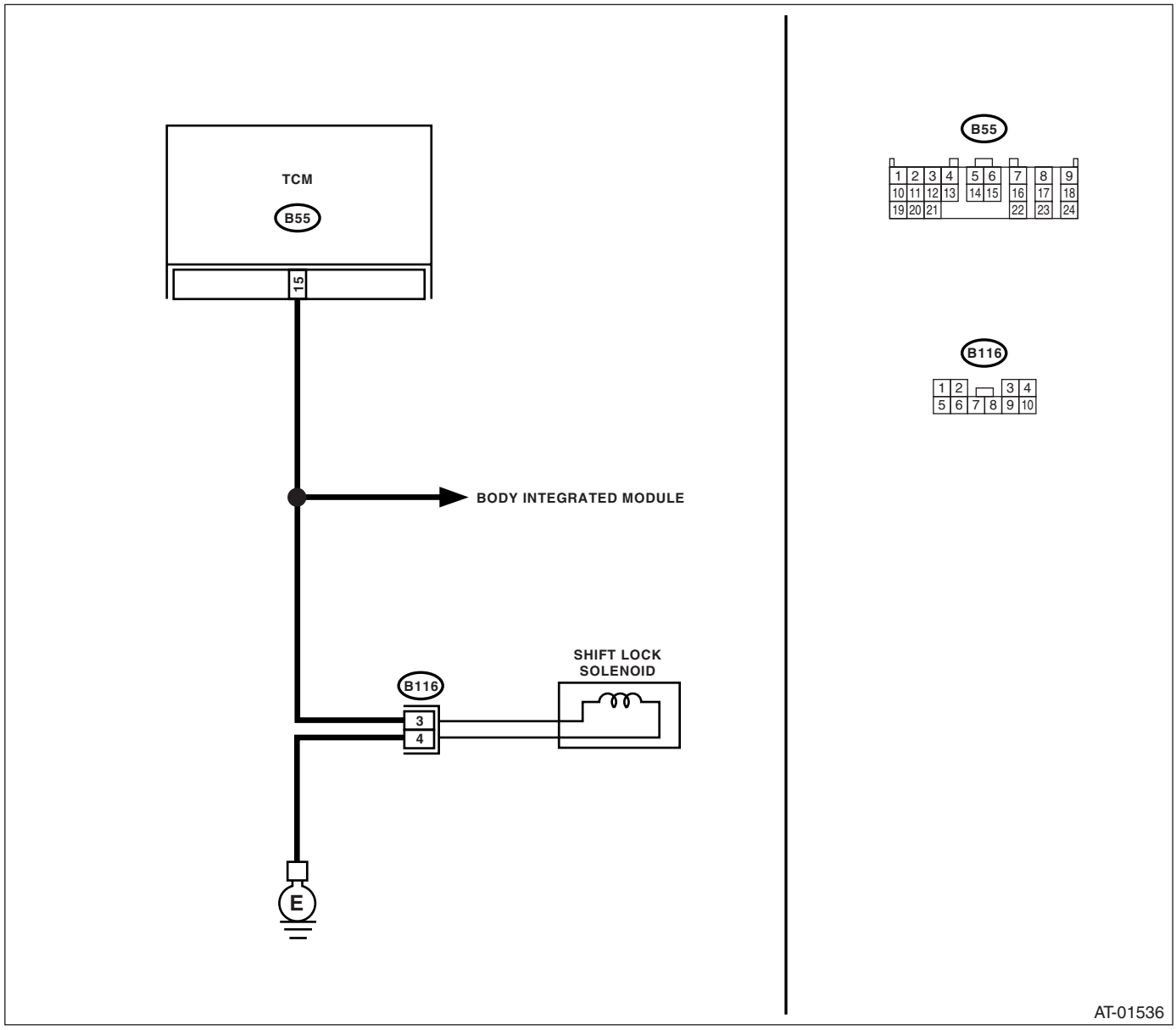
DTC DETECTING CONDITION:

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 (12MPH) or more.
- Gear can not be shifted from “N” range to “R” range though the vehicle is parked.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FUSE (No. 32).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 32).	Is the fuse (No. 32) blown out?	Replace the fuse (No. 32). If the replaced fuse has blown out easily, repair short circuit of harness between fuse (No. 32) and TCM.	Go to step **2**.
2	**CHECK OUTPUT SIGNAL OF TCM.** 1) Turn the ignition switch to ON. 2) With the brake pedal depressed, shift the select lever to "D" range. 3) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 15 (+) — Chassis ground (–):***	Is the voltage more than 10.5 V?	Go to step **3**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and shift lock solenoid. 3) Measure the resistance of harness between TCM and shift lock solenoid connector. ***Connector & terminal*** ***(B55) No. 15 — (B116) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness between TCM and shift lock solenoid connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the short circuit of harness between TCM and shift lock solenoid connector.
5	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND TERMINAL.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B116) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between chassis ground and shift lock solenoid connector.
6	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid terminals. ***Connector & terminal*** ***(B116) No. 3 — No. 4:***	Is the resistance between 7 — 21 Ω?	Go to step **7**.	Replace the shift lock solenoid.

	Step	Check	Yes	No
7	**CHECK OUTPUT SIGNAL OF TCM.** 1) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 2) Start the engine. 3) Shift the select lever to "D" range and slowly increase vehicle speed to 20 km/h (12 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the VDC memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 4) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Even if the SPORT indicator light up, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in reverse inhibitor control circuit.	Go to step **8**.
8	**CHECK POOR CONTACT.**	Is there poor contact in the reverse inhibitor control circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

AC:DTC P0817 STARTER DISABLE CIRCUIT

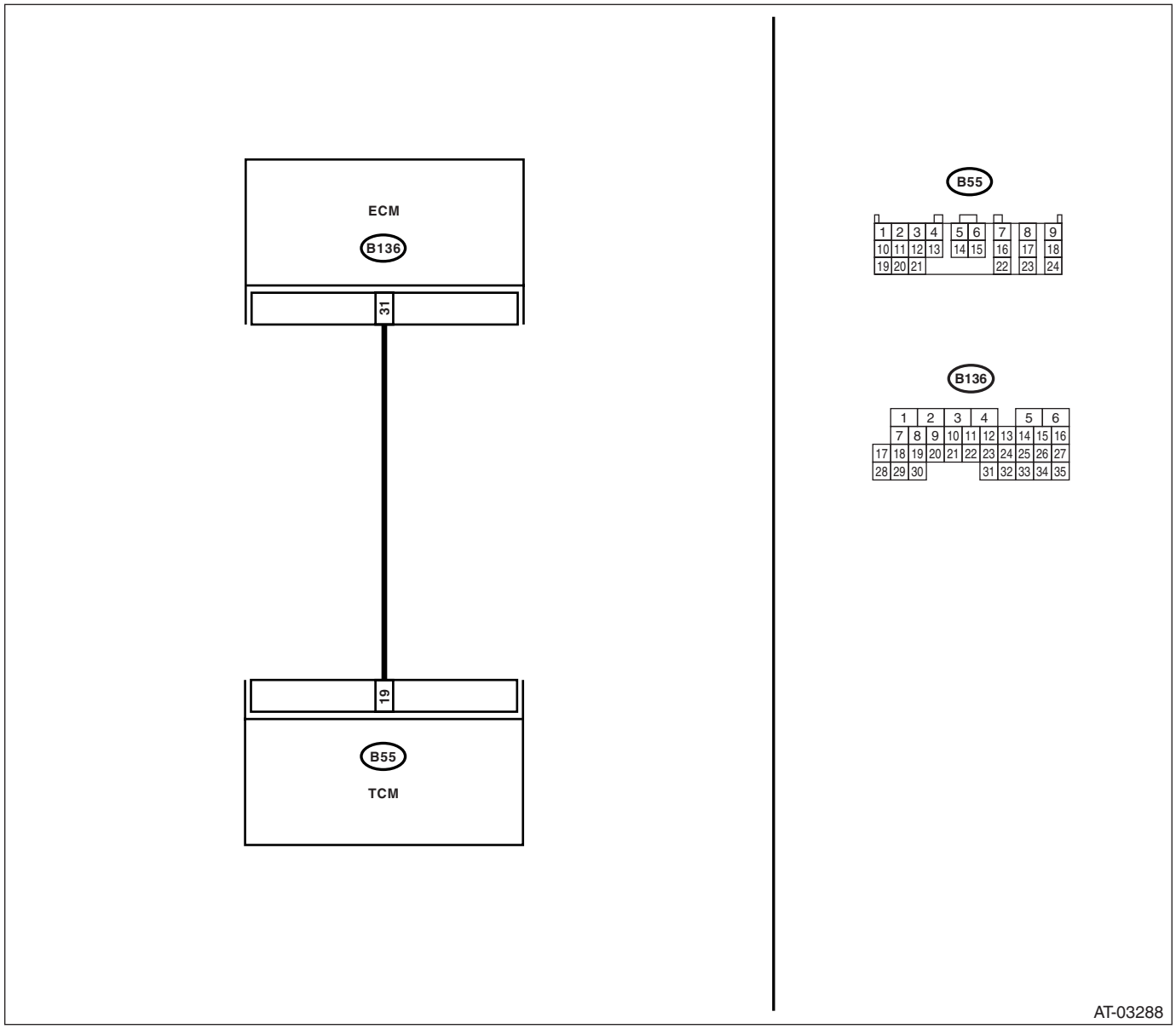
DTC DETECTING CONDITION:

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:



Step		Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) detected?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK ECM.**	Is the communication between Subaru Select Monitor and ECM normal?	Go to step **3**.	Perform the diagnosis according to DTC concerning ECM.

	Step	Check	Yes	No
3	**CHECK FUSE (No. 32).** 1) Turn the ignition switch to OFF. 2) Remove the fuse.	Is the fuse (No. 32) blown out?	Replace the fuse (No. 32). If the replaced fuse (No. 32) has blown out easily, repair the short circuit of harness between fuse (No. 32) and TCM.	Go to step **4**.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM connector and transmission connector. ***Connector & terminal*** ***(B55) No. 19 — (B136) No. 31:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair the short circuit of harness between transmission connector and chassis ground.
6	**CHECK TCM OUTPUT SIGNAL.** 1) Connect the TCM and ECM connector. 2) Turn the ignition switch to ON. (Engine OFF) 3) Shift the select lever to shift to the “P” range. 4) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 19 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **7**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
7	**CHECK TCM OUTPUT SIGNAL.** 1) Shift the select lever to “D” range. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
8	**CHECK POOR CONTACT.**	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 of ECM.

AD:DTC P0882 TCM POWER INPUT SIGNAL LOW

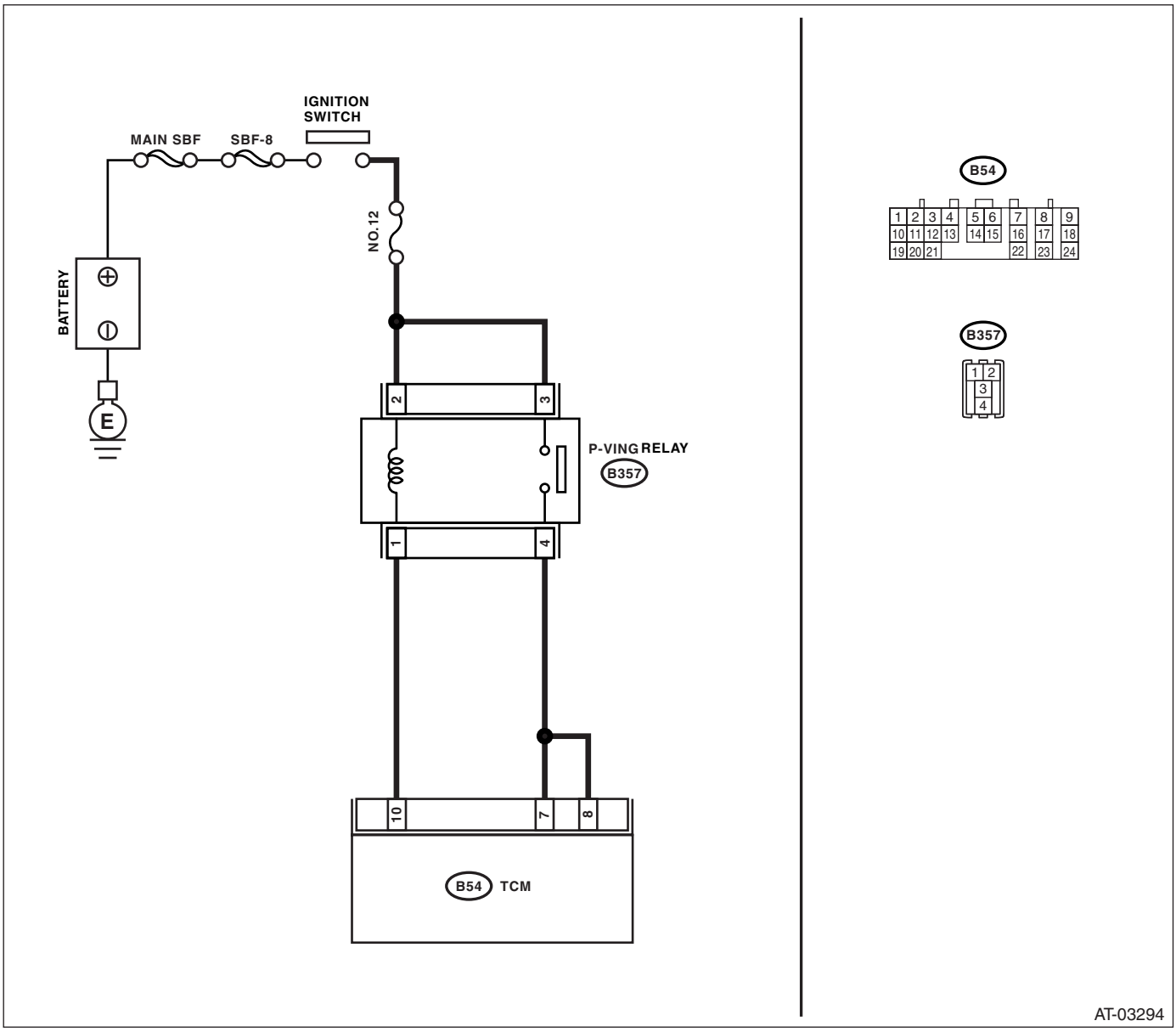
DTC DETECTING CONDITION:

Malfunction of PVIGN power supply relay or open, short circuit of PVIGN power supply circuit.

TROUBLE SYMPTOM:

Gear is not changed.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the MAIN SBF, SBF 8 and fuse (No. 12), and then check those are not blown out.	Is the fuse blown out?	Replace the fuse. If the replaced fuse has blown out easily, repair the short circuit of harness of each fuse.	Go to step **2**.

	Step	Check	Yes	No
2	**CHECK INPUT VOLTAGE FOR PVIGN RELAY.** Measure the voltage between PVIGN relay and chassis ground. ***Connector & terminal*** ***(B357) No. 2 (+) — Chassis ground (–):*** ***(B357) No. 3 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **3**.	Repair the open circuit of harness between fuse (No. 12) and PVIGN relay.
3	**CHECK HARNESS BETWEEN PVIGN RELAY OF TCM.** Measure the resistance between TCM connector and PVIGN relay connector. ***Connector & terminal*** ***(B54) No. 10 — (B357) No. 1:*** ***(B54) No. 7 — (B357) No. 4:*** ***(B54) No. 8 — (B357) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4**.	Repair the open circuit of harness.
4	**CHECK PVIGN POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. (Engine OFF) 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 7 (+) — Chassis ground (–):*** ***(B54) No. 8 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Temporary poor contact. Recheck the harness between TCM and relay. (Lightly move the harness and check that the open or short circuit is not occurred.)	Go to step **5**.
5	**CHECK PVIGN RELAY OUTPUT OF TCM.** Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (–):***	Is the voltage less than 1.5 V?	Replace the PVIGN relay.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

AE:DTC P0957 BACKUP LIGHT RELAY CIRCUIT LOW

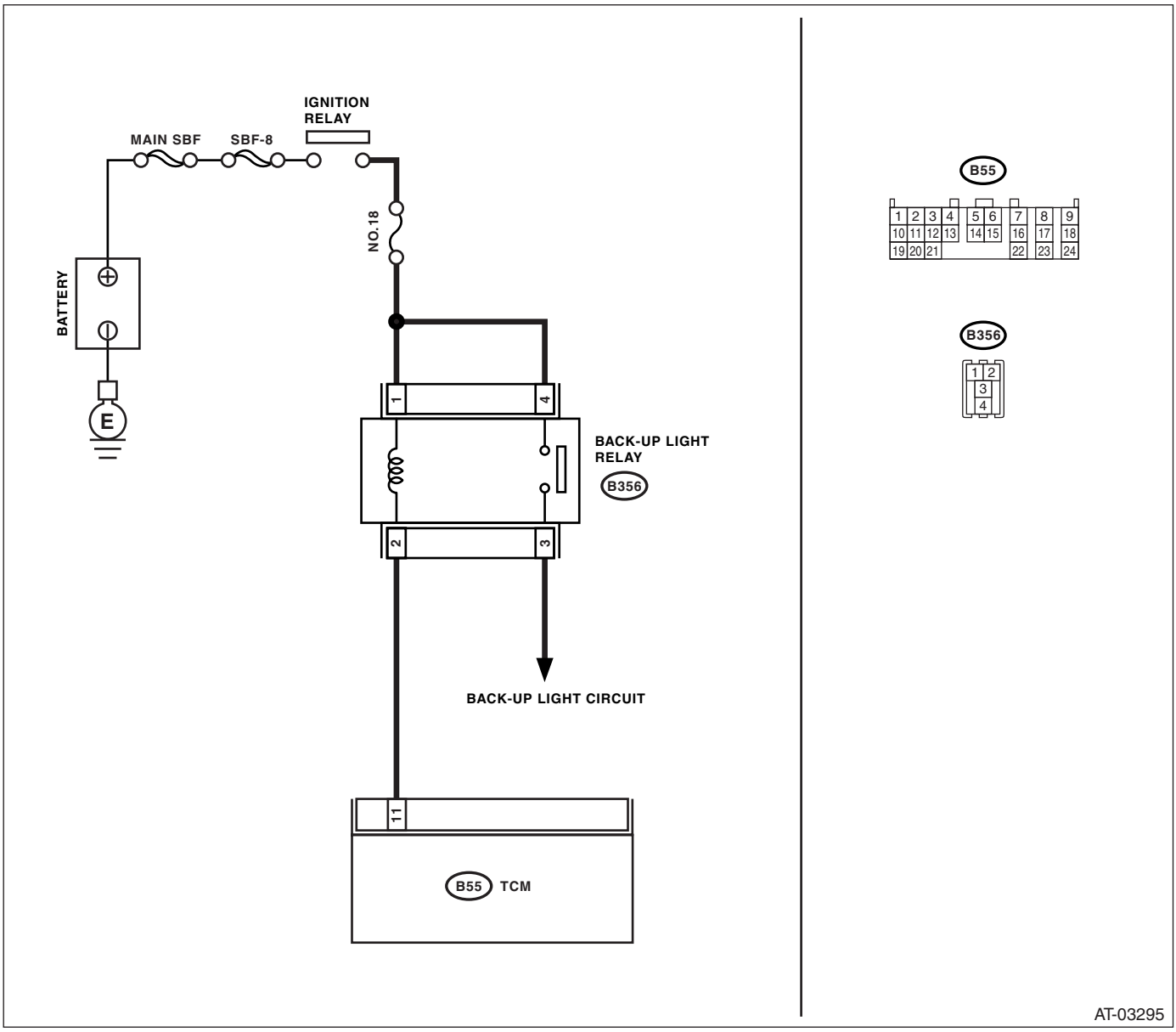
DTC DETECTING CONDITION:

Short circuit of back-up light relay output circuit

TROUBLE SYMPTOM:

Back-up light does not illuminate in “R” range.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) detected?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BACK-UP LIGHT RELAY.** 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. ***Connector & terminal*** ***(B55) No. 11 — (B356) No. 1:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.
4	**CHECK TCM OUTPUT SIGNAL.** 1) Turn the ignition switch to ON. (Engine OFF) 2) Move the select lever to “P” range. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the voltage more than 10 V?	Go to step **5**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
5	**CHECK TCM OUTPUT SIGNAL.** 1) Set the select lever to “R” range. 2) Is the voltage less than 1 V? 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the voltage 1.0 — 2.0 V?	Go to step **6**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
6	**CHECK INPUT VOLTAGE FOR BACK-UP LIGHT RELAY.** 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.

AF:DTC P0958 BACKUP LIGHT RELAY CIRCUIT HIGH

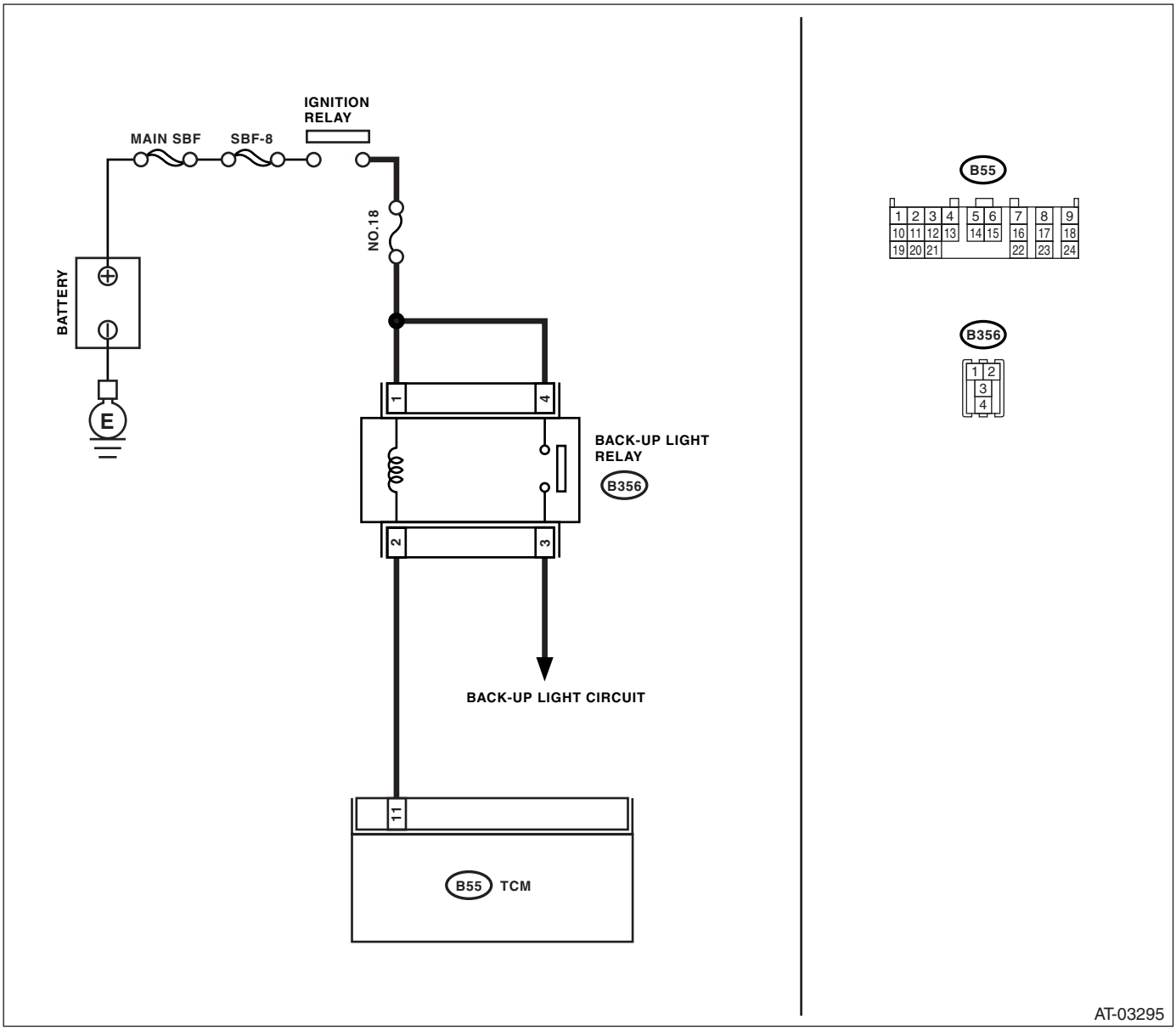
DTC DETECTING CONDITION:

Backup light relay malfunction, or open/short circuit in back-up light relay output circuit

TROUBLE SYMPTOM:

- Back-up light does not illuminate in “R” range.
- Back-up light always illuminate except in “R” range.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) detected?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BACK-UP LIGHT RELAY.** 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. ***Connector & terminal*** ***(B55) No. 11 — (B356) No. 1:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4**.	Repair the short circuit of harness between TCM and transmission connector.
4	**CHECK TCM OUTPUT SIGNAL.** 1) Turn the ignition switch to ON. (Engine OFF) 2) Move the select lever to “P” range. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the voltage more than 10 V?	Go to step **5**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
5	**CHECK TCM OUTPUT SIGNAL.** 1) Set the select lever to “R” range. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the voltage 1.0 — 2.0 V or below?	Go to step **6**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
6	**CHECK INPUT VOLTAGE FOR BACK-UP LIGHT RELAY.** 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.

AG:DTC P1601 TCM DATA COMMUNICATION FAILURE

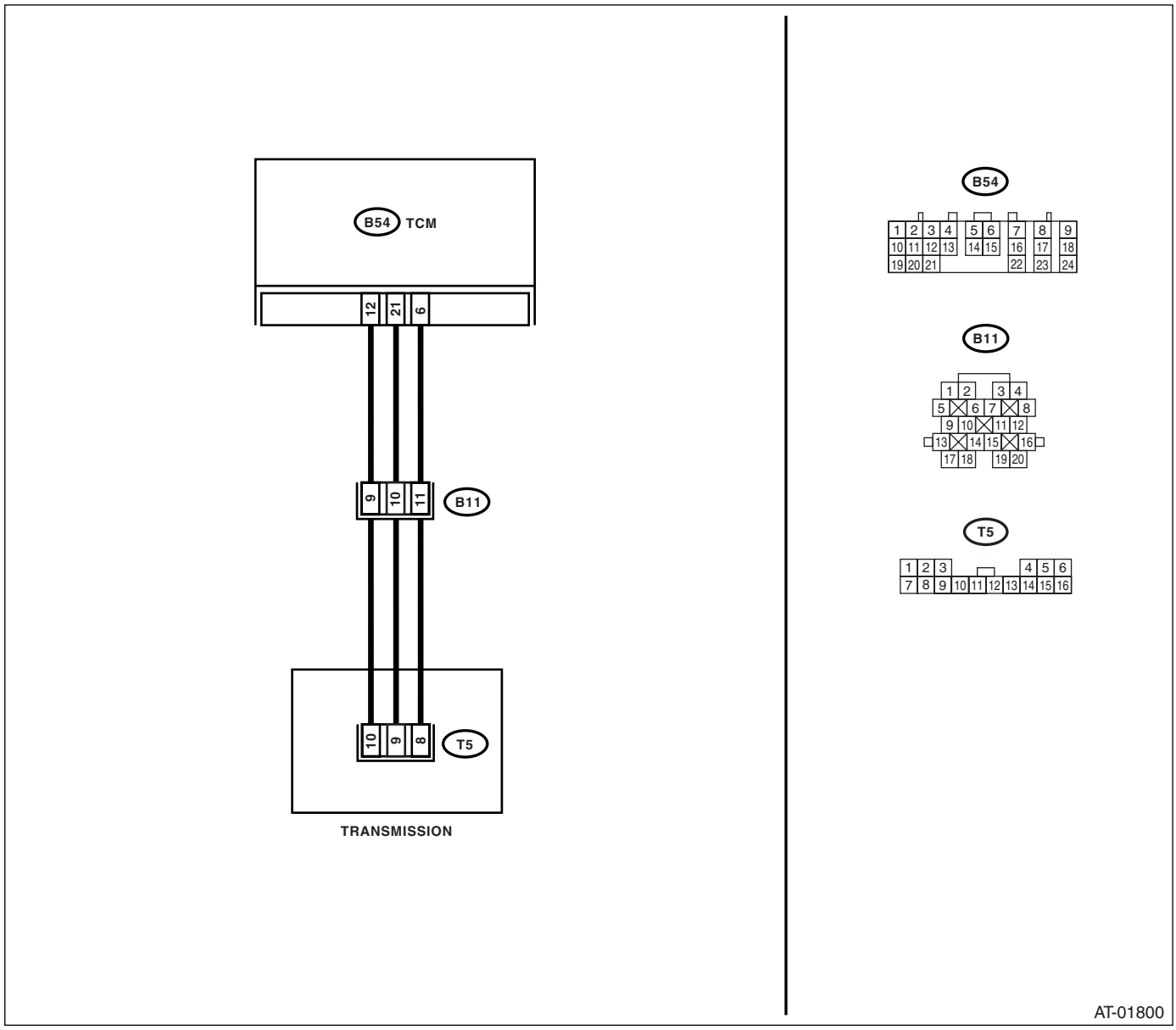
DTC DETECTING CONDITION:

Communication does not complete between control valve memory box.

TROUBLE SYMPTOM:

Shifting quality malfunction

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK IMPROPER CONNECTION OF TRANSMISSION CONNECTOR.** Check loose connection on TCM connector (B54).	Is there improper connection of connector?	Go to step **2**.	Connect it securely.
2	**CHECK DTC OF TCM.**	Is DTC of oil pressure switch detected?	Perform the diagnosis according to DTC.	Go to step **3**.

	Step	Check	Yes	No
3	**CHECK TCM OUTPUT SIGNAL.** 1) Turn the ignition switch to ON. (Engine OFF) 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **4**.	Go to step **5**.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B54) No. 12 — (B11) No. 9:*** ***(B54) No. 21 — (B11) No. 10:*** ***(B54) No. 6 — (B11) No. 11:***	Is the resistance less than 1 Ω?	Go to step **5**.	Repair the open circuit of harness between TCM and transmission connector, or poor contact of connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 12 — Chassis ground:*** ***(B54) No. 21 — Chassis ground:*** ***(B54) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6**.	Repair the short circuit of harness between TCM and transmission connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION CONNECTOR AND CONTROL VALVE BODY CONNECTOR.** Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(B11) No. 9 — (T5) No. 10:*** ***(B11) No. 10 — (T5) No. 9:*** ***(B11) No. 11 — (T5) No. 8:***	Is the resistance less than 1 Ω?	Go to step **7**.	Repair the open circuit of harness between transmission connector and control valve body connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION CONNECTOR AND CONTROL VALVE BODY CONNECTOR.** Measure the resistance between transmission connector and chassis ground. ***Connector & terminal*** ***(B11) No. 9 — Chassis ground:*** ***(B11) No. 10 — Chassis ground:*** ***(B11) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair the short circuit of harness between transmission connector and control valve body connector.
8	**CHECK POOR CONTACT.** NOTE: Data communication malfunction is detected when the malfunction occurred on inspection area above while transmission assembly is replacing or “Clear Memory 2” is performing. When the repair is performed with following diagnosis above, perform the “Clear Memory 2”, and then recheck that the DTC of TCM data communication malfunction is not detected.	Is there any open or poor contact of connector (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Replace the transmission assembly. <Ref. to 5AT-34, Automatic Transmission Assembly.>

AH:DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL)

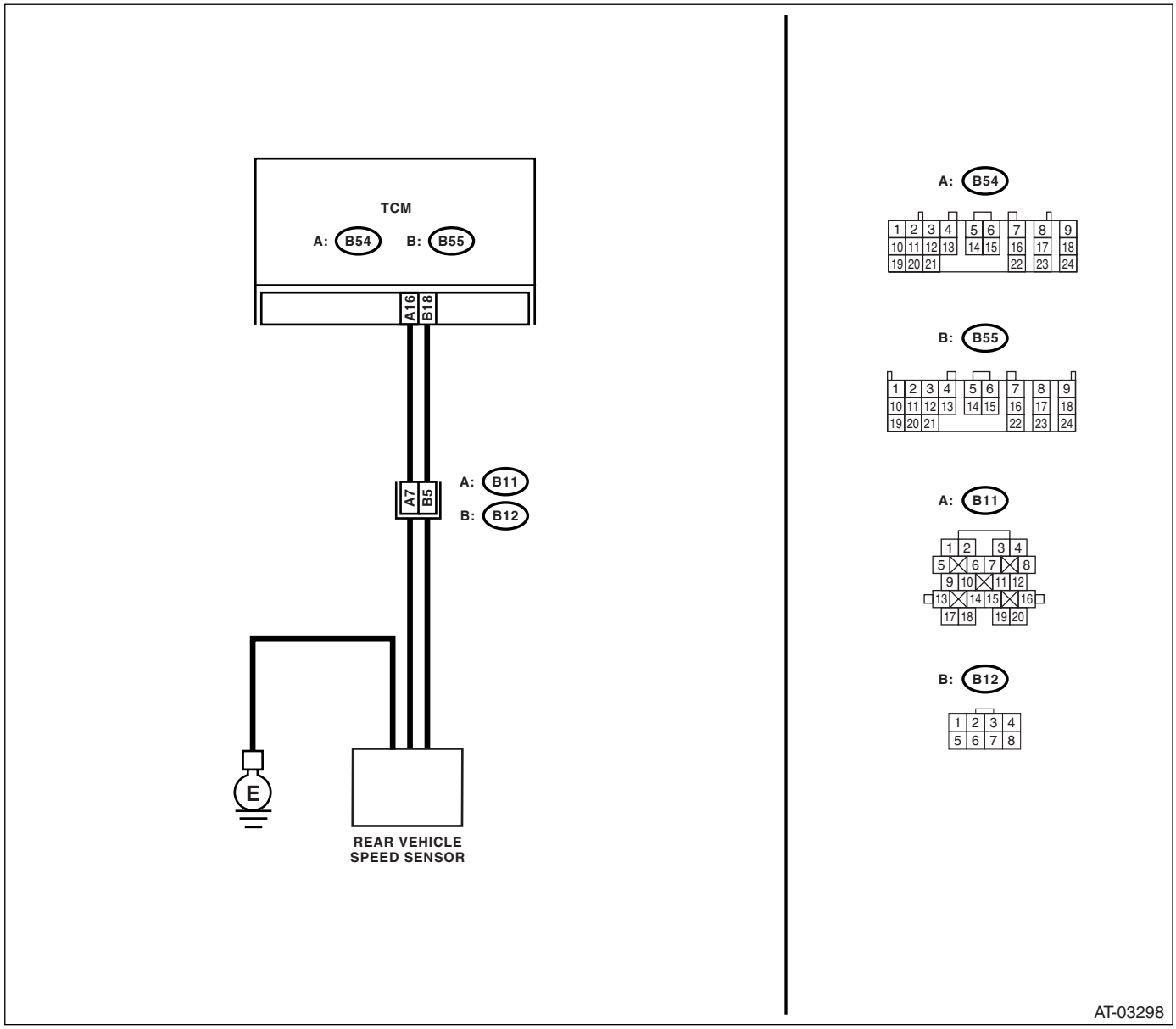
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

- Shifting quality malfunction
- Tight corner braking phenomenon is occurred.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B54) No. 16 — (B11) No. 7:*** ***(B55) No. 18 — (B12) No. 5:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 — Chassis ground:*** ***(B55) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM and chassis ground.
3	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (Engine OFF) 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **4**.	Go to step **5**.
4	**CHECK TURBINE SPEED SENSOR INPUT CIRCUIT OF TCM.** Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 18 (+) — (B54) No. 19 (–):***	Is the voltage 4 — 6 V?	Go to step **6**.	Go to step **5**.
5	**CHECK TCM I/O SIGNAL.** Check TCM I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-11, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC for PVIGN power supply relay.
6	**CHECK HARNESS ASSEMBLY (TURBINE SPEED SENSOR GROUND).** 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-34, Automatic Transmission Assembly.>

	Step	Check	Yes	No
7	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and drive the vehicle. 4) Read the current data of front wheel speed using Subaru Select Monitor. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the VDC memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>	Does the value of the front wheel speed depending on the acceleration and deceleration of the vehicle?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair poor contact of harness in ATF temperature sensor and transmission connector.	Replace the transmission harness.

AI: DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION

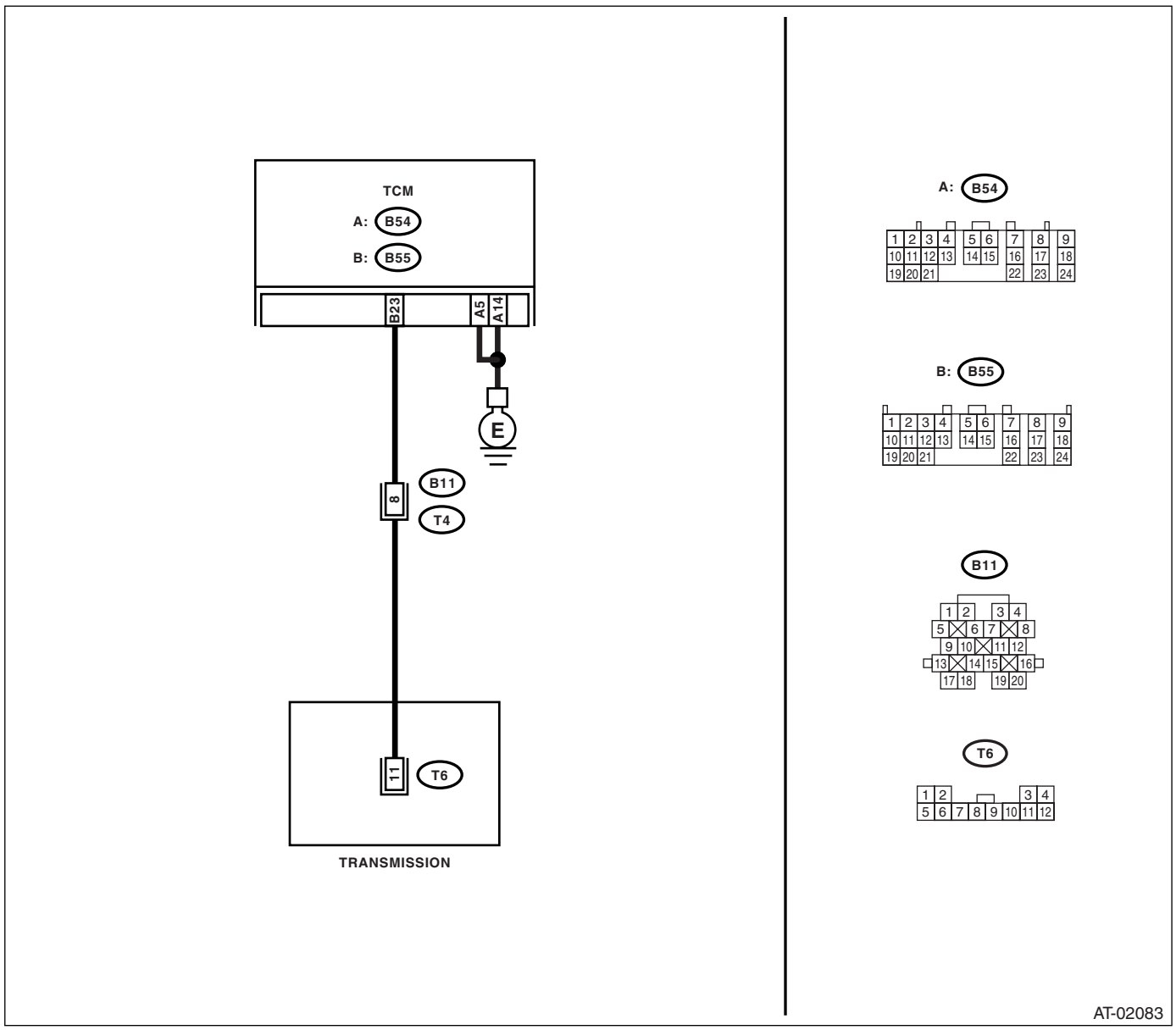
DTC DETECTING CONDITION:

Output signal circuit of transfer solenoid is open or shorted.

TROUBLE SYMPTOM:

- Tight corner braking phenomenon is occurred.
- Drivability getting worse.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 23 — (B11) No. 8:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — 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.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 23 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 8 — (T6) No. 11:***	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.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 11 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **5**.	Repair the short circuit of harness between control valve body connector and transmission ground.
5	**CHECK AWD SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 11 — Transmission ground:***	Is the resistance between 3 — 9 Ω?	Go to step **6**.	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>

	Step	Check	Yes	No
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7**.
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and check that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

AJ:DTC P1710 TORQUE CONVERTER TURBINE 2 SPEED SIGNAL CIRCUIT 2 MALFUNCTION

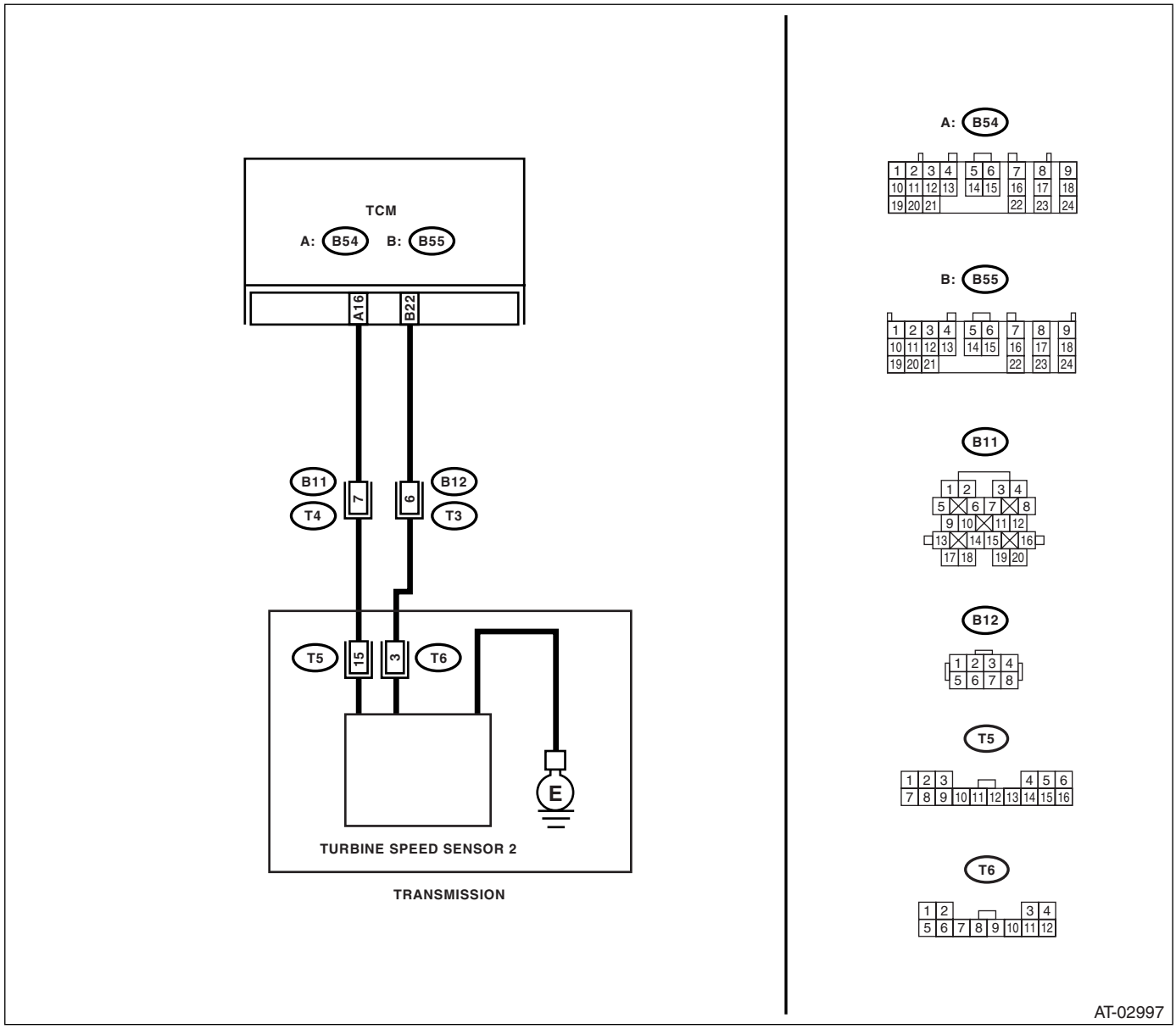
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

- Excessive shift shock
- Does not shift to 5th

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B55) No. 22 — (B12) No. 6:*** ***(B54) No. 16 — (B11) No. 7:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 22 — Chassis ground:*** ***(B54) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3**.	Repair the short circuit of harness between TCM and transmission connector.
3	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (Engine OFF) 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — (B54) No. 19 (–):***	Is the voltage 10 — 13 V?	Go to step **4**.	Go to step **5**.
4	**CHECK TURBINE SPEED SENSOR INPUT CIRCUIT OF TCM.** Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 22 (+) — (B54) No. 19 (–):***	Is the voltage 4 — 6 V?	Go to step **6**.	Go to step **5**.
5	**CHECK TCM I/O SIGNAL.** Check TCM I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-11, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is I/O signal OK?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC for PVIGN power supply relay.

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and set the vehicle in 1st speed driving condition of manual mode. 4) Read the current data of torque converter turbine speed 2 using Subaru Select Monitor. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the VDC memory clearance procedure of on-board diagnostics system. <Ref. to VDC(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>	Does the value of the turbine speed sensor 2 change depending on the acceleration, deceleration and shifting gear of the vehicle?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness of turbine speed sensor 2 and transmission connector.	Go to step **7**.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T3) No. 6 — (T6) No. 3:*** ***(T4) No. 7 — (T5) No. 15:***	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.
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 3 — Transmission ground:*** ***(T5) No. 15 — Transmission ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Repair the short circuit of harness between transmission connector and transmission ground.

AK:DTC P1716 ATF TEMP. SENSOR 2 CIRCUIT LOW

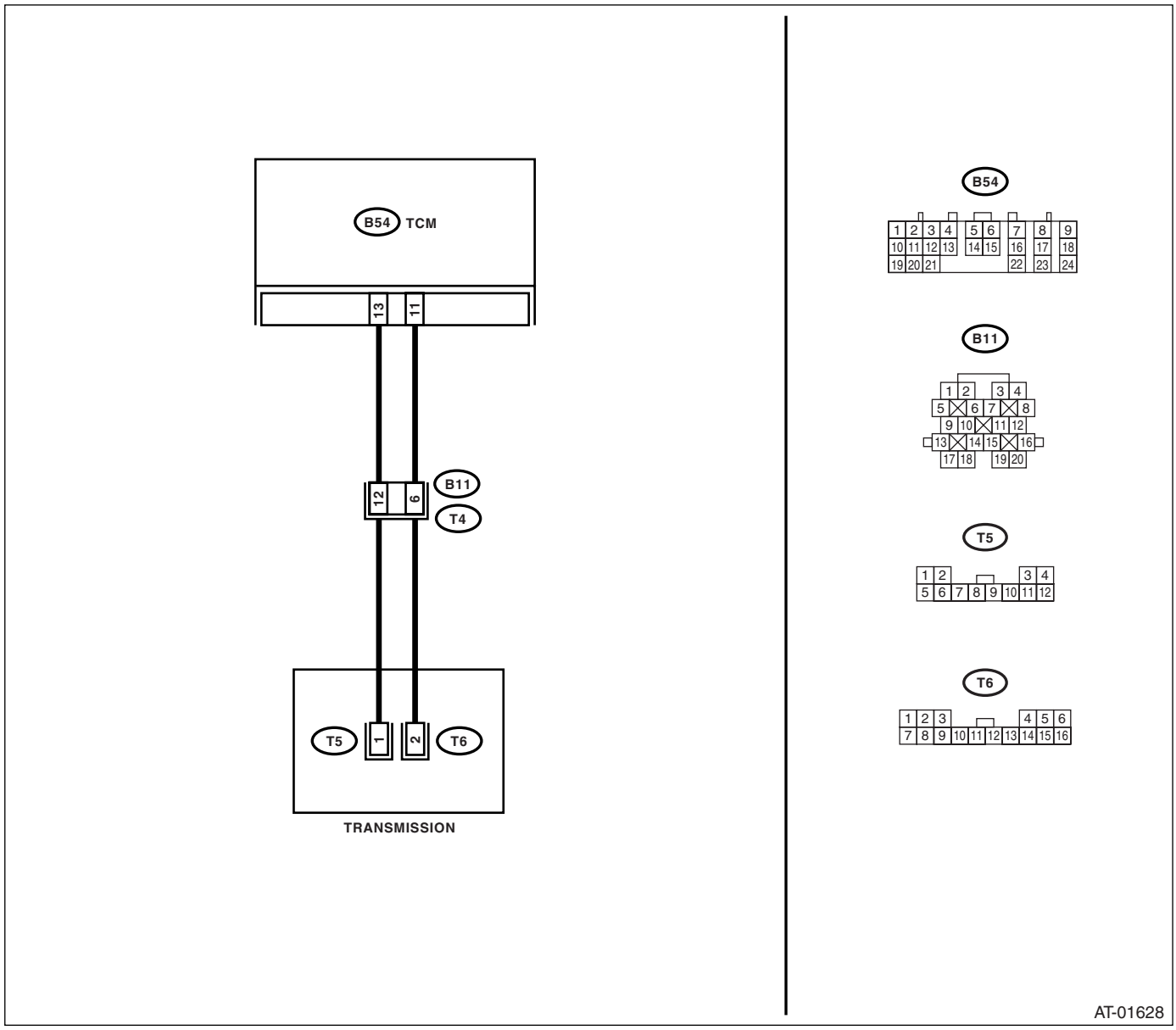
DTC DETECTING CONDITION:

Input signal circuit to ATF temperature sensor 2 is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 13 — (B11) No. 12:*** ***(B54) No. 11 — (B11) No. 6:***	Is the resistance less than 1 Ω?	Go to step **2**.	Repair the open circuit of harness between TCM and transmission connector.
2	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature reaches to 80°C (176°F). NOTE: If the ambient temperature falls below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — (T4) No.12:***	Is the resistance between 300 — 700 Ω?	Go to step **3**.	Go to step **5**.
3	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — (T4) No.12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4**.	Go to step **5**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON. (Engine OFF) 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contacts of harnesses of ATF temperature sensor and transmission connector.	Go to step **6**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 12 — (T5) No. 1:*** ***(T4) No. 6 — (T6) No. 2:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Repair the open circuit of harness between transmission connector and control valve body connector.
6	**CHECK POOR CONTACT.** Check poor contact of ATF temperature sensor 1 circuit.	Is there poor contact?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

AL:DTC P1717 ATF TEMP. SENSOR 2 CIRCUIT HIGH

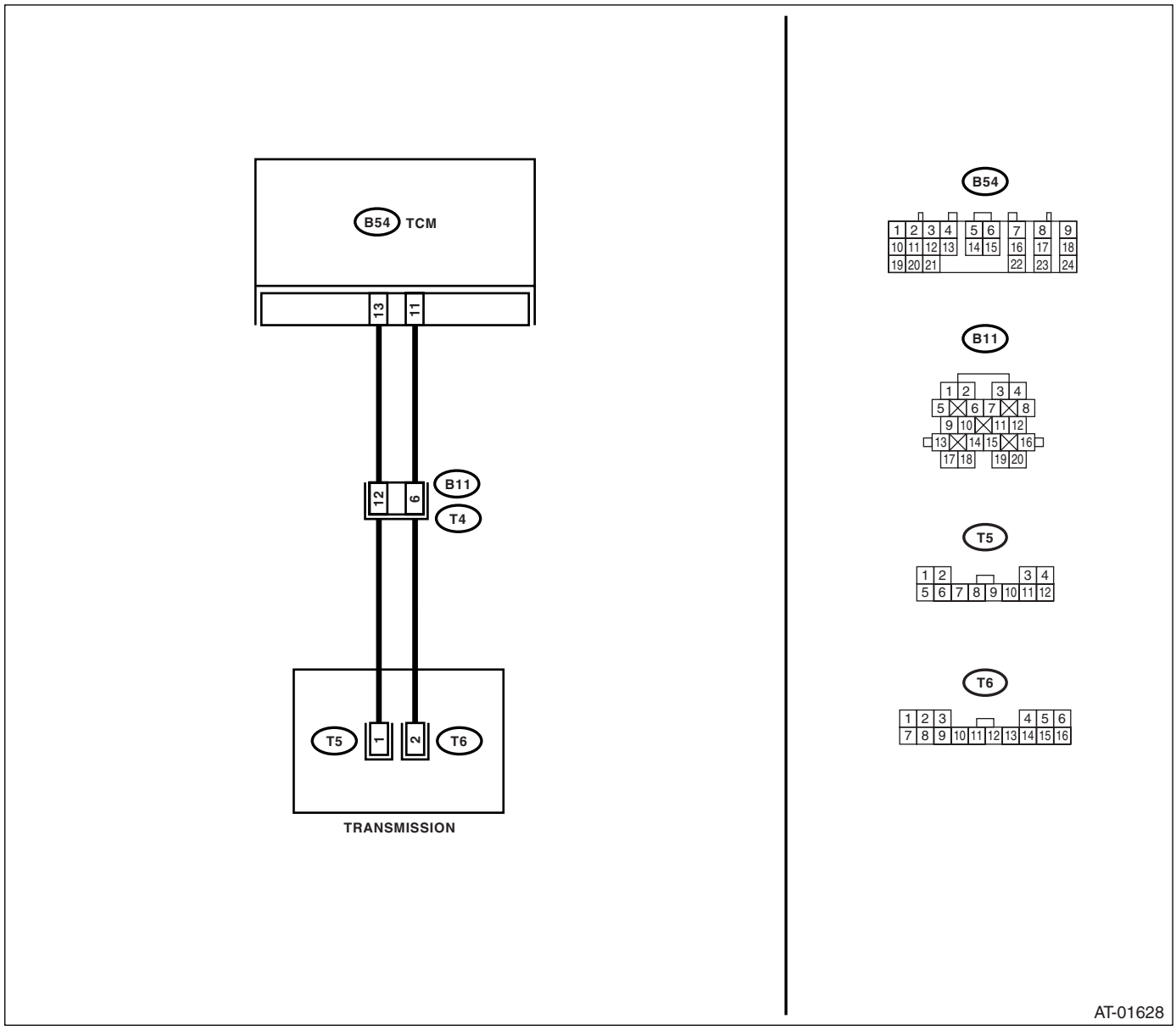
DTC DETECTING CONDITION:

Input signal circuit to ATF temperature sensor 2 is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 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. ***Connector & terminal*** ***(B54) No. 13 — (B11) No. 12:*** ***(B54) No. 11 — (B11) No. 6:***	Is the resistance more than 1 MΩ?	Go to step **2**.	Repair the short circuit of harness between TCM and transmission connector.
2	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature reaches to 80°C (176°F). NOTE: If the ambient temperature falls below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — (T4) No.12:***	Is the resistance between 300 — 700 Ω?	Go to step **3**.	Go to step **5**.
3	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — (T4) No.12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4**.	Go to step **5**.
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON. (Engine OFF) 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contacts of harnesses of ATF temperature sensor and transmission connector.	Go to step **6**.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 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 and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T5) No. 1 — Chassis ground:*** ***(T6) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-53, Control Valve Body.>	Repair the short circuit of harness between transmission connector and control valve body connector.
6	**CHECK POOR CONTACT.** Check poor contact of ATF temperature sensor 1 circuit.	Is there poor contact?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>

AM:DTC P1718 AT CAN COMMUNICATION CIRCUIT

NOTE:
DTC P1718 AT CAN communication circuit, refer to “LAN System”. <Ref. to LAN(diag)-12, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>

AN:DTC P1798 GEAR 1 ENGINE BRAKE

NOTE:
Refer to DTC P0771 for diagnostic procedure. <Ref. to 5AT(diag)-82, DTC P0771 SHIFT SOLENOID “E” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AO:DTC P1799 INTERLOCK

DTC DETECTING CONDITION:

Perform the interlock judgment when the oil pressure switch pattern detects the specified interlock patterns other than shifting.

TROUBLE SYMPTOM:

Locked to 2nd or 4th gear depending on the vehicle condition at the time of diagnosis.

	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is any DTC of the followings detected? P0751, P0753, P0756, P0758, P0761, P0763, P0766, P0768, P0771, P0773, P1798	Perform the diagnosis according to DTC.	Go to step **2**.
2	**DRIVING CHECK.** 1) Turn the ignition switch to OFF. 2) After starting the engine again, perform a drive check with the following conditions. (1) Keep the speed at 20 km/h with SPORT shift mode in 1st. (2) Read the I/C oil pressure switch data of TCM while driving using Subaru Select Monitor.	Is OFF displayed?	Go to step **3**.	Perform the diagnosis according to DTC P0756.
3	**DRIVING CHECK.** 1) Turn the ignition switch to OFF. 2) After starting the engine again, perform a drive check based on the inspection mode with the following conditions. <Ref. to 5AT(diag)-19, PROCEDURE, Inspection Mode.> (1) Keep the speed at 20 km/h with manual mode in 1st. (2) Read the D/C oil pressure switch data while driving using Subaru Select Monitor.	Is OFF displayed?	Go to step **4**.	Perform the diagnosis according to DTC P0766.
4	**DRIVING CHECK.** 1) Turn the ignition switch to OFF. 2) After starting the engine again, perform a drive check with the following conditions. (1) Drive the vehicle at the same speed with manual mode in 3rd, 4th and 5th. (2) Read the LC/B oil pressure switch data while driving using Subaru Select Monitor.	Is OFF displayed?	Go to step **5**.	Perform the diagnosis according to DTC P0771.
5	**DRIVING CHECK.** 1) Turn the ignition switch to OFF. 2) After restarting the engine, Perform a drive check based on the inspection mode. <Ref. to 5AT(diag)-19, PROCEDURE, Inspection Mode.>	Is DTC displayed?	Replace the control valve body.	Temporary poor contact occurs. Check that the harness connector is not faulty.

AP:DTC P1817 SPORT MODE SWITCH CIRCUIT (MANUAL SWITCH)

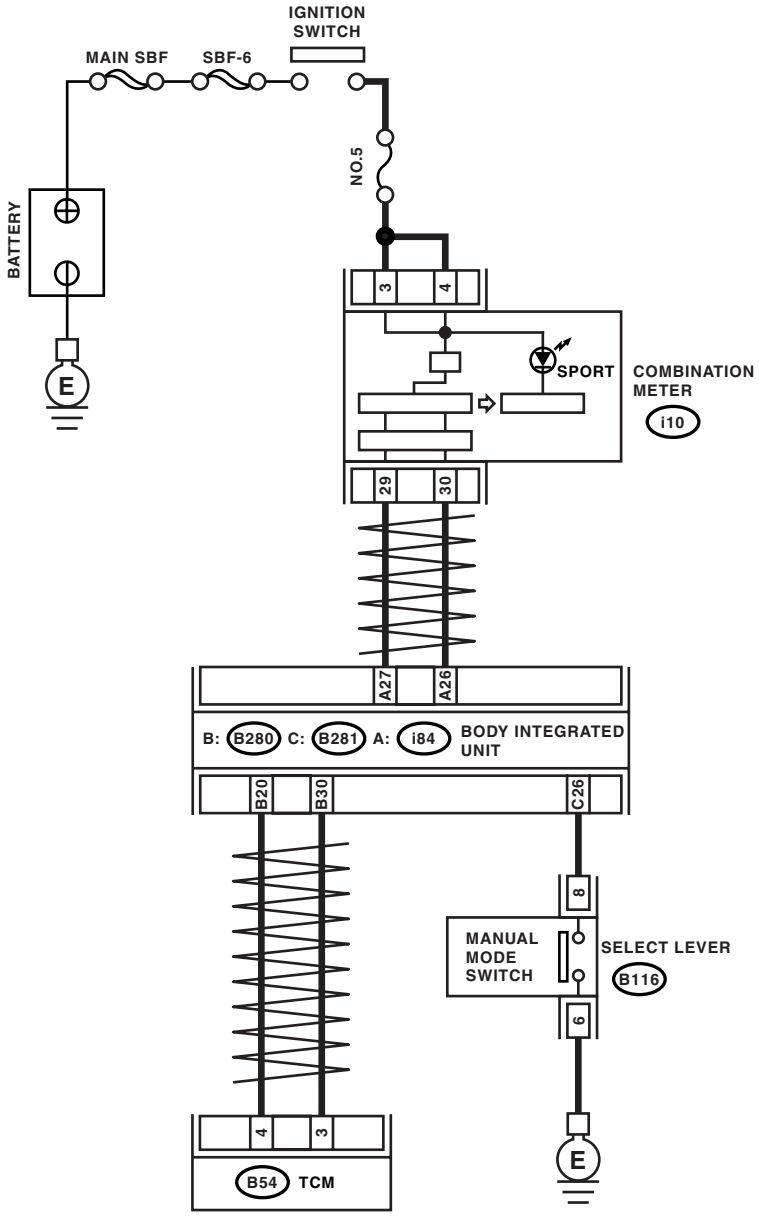
DTC DETECTING CONDITION:

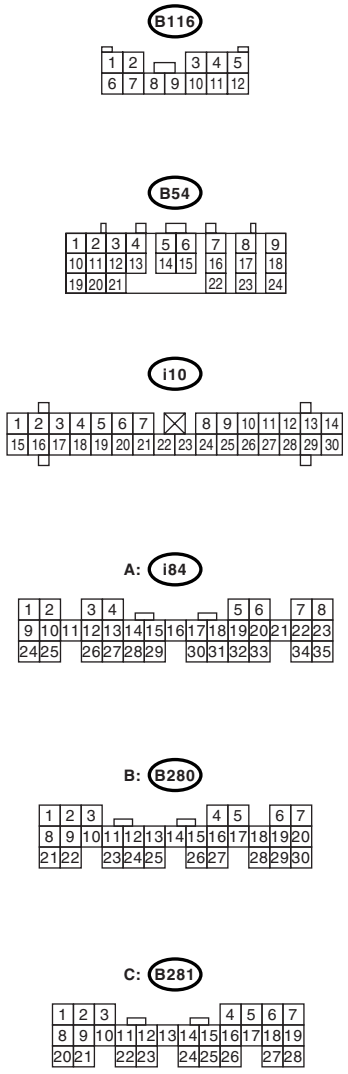
Input signal circuit of manual mode switch is open or shorted.

TROUBLE SYMPTOM:

- Manual mode can not be set.
- "SPORT" light illuminates when shifting to "N" → "D" range.

WIRING DIAGRAM:





AT-03292

	Step	Check	Yes	No
1	**CHECK THE BODY INTEGRATED UNIT.** 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)-12, OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever to shift to the “P” range. 2) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	Go to step **3**.	Go to step **7**.
3	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever from “P” to “D” range. 2) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, 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.>
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever to manual mode. 2) Shift the select lever to other than “D” range. 3) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	Go to step **5**.	Replace the select lever assembly. <Ref. to CS-19, Select Lever.>
5	**CHECK DTC OF TCM.**	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**.
6	**CHECK INPUT SIGNAL FROM TCM.** 1) Shift the select lever from “P” to “D” range. 2) Read the TIP mode SW data of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is the indication on each range OFF?	Even if the SPORT indicator light blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
7	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND MANUAL MODE SWITCH.** 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. ***Connector & terminal*** ***(B281) No. 27 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8**.	Repair the short circuit of harness between body integrated unit and manual mode.

	Step	Check	Yes	No
8	**CHECK MANUAL MODE SWITCH.** 1) Shift the select lever to shift to the "P" range. 2) Measure the resistance between harness connector terminals of manual mode switch. ***Terminals*** ***(B116) No. 7 — No. 8***	Is the resistance more than 1 MΩ?	Check the body integrated unit.	Replace the select lever assembly. <Ref. to CS-19, Select Lever.>

AQ: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)-61, DTC P0751 SHIFT SOLENOID "A" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AR: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)-67, DTC P0756 SHIFT SOLENOID "B" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AS: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)-77, DTC P0766 SHIFT SOLENOID "D" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AT:DTC P1844 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH E CIRCUIT

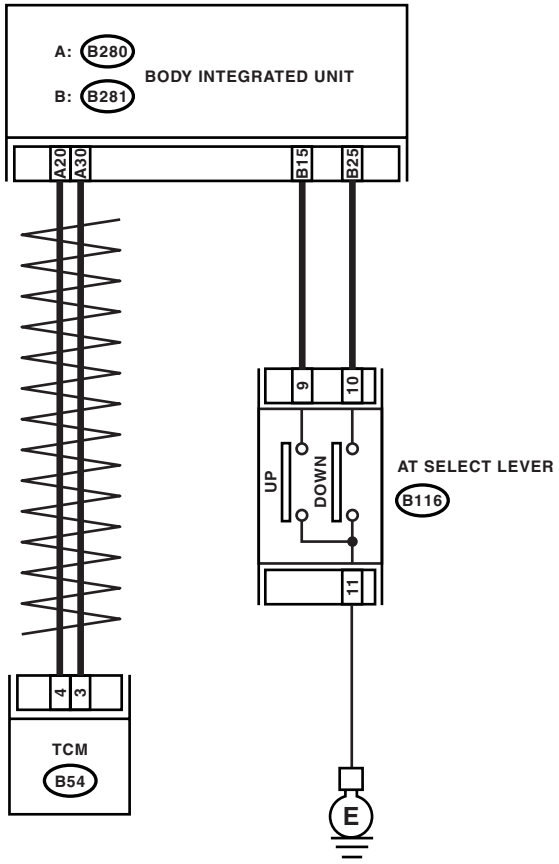
DTC DETECTING CONDITION:
High & low reverse clutch oil pressure switch malfunction.
TROUBLE SYMPTOM:
Excessive shift shock

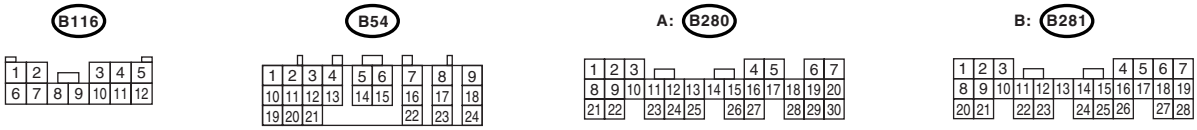
NOTE:
Refer to DTC P0761 for diagnostic procedure. <Ref. to 5AT(diag)-72, DTC P0761 SHIFT SOLENOID "C" PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

15.Diagnostic Procedure without Diagnostic Trouble Code (DTC)

A: CHECK UP/DOWN SWITCH

DIAGNOSIS:
Input signal circuit of the UP/DOWN switch is open or shorted.
TROUBLE SYMPTOM:
Does not shift on manual mode.
WIRING DIAGRAM:





AT-03289

	Step	Check	Yes	No
1	**CHECK UP/DOWN SWITCH.** 1) Move the select lever to manual mode. 2) Shift and hold the select lever to up side. 3) Read the "Up Switch" data of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to step **2**.	Go to step **3**.
2	**CHECK UP/DOWN SWITCH.** 1) Move the select lever to manual mode. 2) Shift and hold the select lever to down side. 3) Read the "Down Switch" data of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-15, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to the procedure for "CHECK RANGE POSITION/GEAR POSITION INDICATOR LIGHT". <Ref. to 5AT(diag)-124, CHECK RANGE POSITION/GEAR POSITION INDICATOR LIGHT, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **12**.
3	**CHECK THE BODY INTEGRATED UNIT.** 1) Turn the ignition switch to ON. 2) Shift and hold the select lever to up side. 3) Read the "TIP UP SW" data of body integrated unit using Subaru Select Monitor.	Is ON displayed?	Go to step **4**.	Go to step **5**.
4	**CHECK THE BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Check the TCM.
5	**CHECK UP/DOWN SWITCH GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the up/down switch. 3) Measure the resistance of harness between the up/down switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 11— Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6**.	Repair the open circuit of harness between the up/down switch connector and chassis ground.
6	**CHECK UP/DOWN SWITCH.** Measure the up/down switch resistance. ***Connector & terminal*** ***(B116) No. 10 — No. 11:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Replace the guide plate assembly.
7	**CHECK UP/DOWN SWITCH.** 1) Shift and hold the select lever to up side. 2) Measure the up/down switch resistance. ***Connector & terminal*** ***(B116) No. 10 — No. 11:***	Is the resistance less than 1 Ω?	Go to step **8**.	Replace the guide plate assembly.
8	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND UP/DOWN SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of the harness between body integrated unit and up/down switch connector. ***Connector & terminal*** ***(B116) No. 10 — (B281) No. 25:*** ***(B116) No. 9 — (B281) No. 15:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the open circuit of harness between the up/down switch connector and body integrated unit connector, or poor contact of connector.

	Step	Check	Yes	No
9	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON (Engine OFF). 3) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 25 — Chassis ground:***	Is the voltage 1.5 — 8 V?	Go to step **11**.	Go to step **10**.
10	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Hold the select lever to the up side. 2) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 25 — Chassis ground:***	Is the voltage less than 1V?	Go to step **20**.	Replace the body integrated unit.
11	**CHECK THE BODY INTEGRATED UNIT.** 1) Turn the ignition switch to ON. 2) Shift and hold the select lever to down side. 3) Read the “TIP DOWN SW” data of body integrated unit using Subaru Select Monitor.	Is ON displayed?	Go to step **12**.	Go to step **13**.
12	**CHECK THE BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Check the TCM.
13	**CHECK UP/DOWN SWITCH GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the up/down switch. 3) Measure the resistance of harness between the up/down switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 9 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **14**.	Repair the open circuit of harness between the up/down switch and chassis ground.
14	**CHECK UP/DOWN SWITCH.** Measure the up/down switch terminal resistance. ***Connector & terminal*** ***(B116) No. 11 — No. 9:***	Is the resistance more than 1 MΩ?	Go to step **15**.	Replace the guide plate assembly.
15	**CHECK UP/DOWN SWITCH.** 1) Shift and hold the select lever to down side. 2) Measure the up/down switch terminal resistance. ***Connector & terminal*** ***(B116) No. 11 — No. 9:***	Is the resistance less than 1 Ω?	Go to step **16**.	Replace the guide plate assembly.
16	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND UP/DOWN SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of the harness between body integrated unit and up/down switch connector. ***Connector & terminal*** ***(B116) No. 11 — (B281) No. 15:***	Is the resistance less than 1 Ω?	Go to step **17**.	Repair the open circuit of harness between the up/down switch connector and body integrated unit connector, or poor contact of connector.

	Step	Check	Yes	No
17	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND UP/DOWN SWITCH.** Measure the resistance of harness connector between the up/down switch and chassis ground. ***Connector & terminal*** ***(B116) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **18**.	Repair the short circuit of the harness between the up/down switch connector and TCM connector.
18	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON (engine OFF). 3) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 15 — Chassis ground:***	Is the voltage 1.5 — 8 V?	Go to step **19**.	Go to step **20**.
19	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Shift and hold the select lever to down side. 2) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 15 — Chassis ground:***	Is the voltage less than 1 V?	Go to step **20**.	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>
20	**CHECK POOR CONTACT.**	Is there poor contact in the up/down switch circuit?	Repair the poor contact.	A temporary poor contact of the up/down switch circuit connector or harness

B: CHECK RANGE POSITION/GEAR POSITION INDICATOR LIGHT

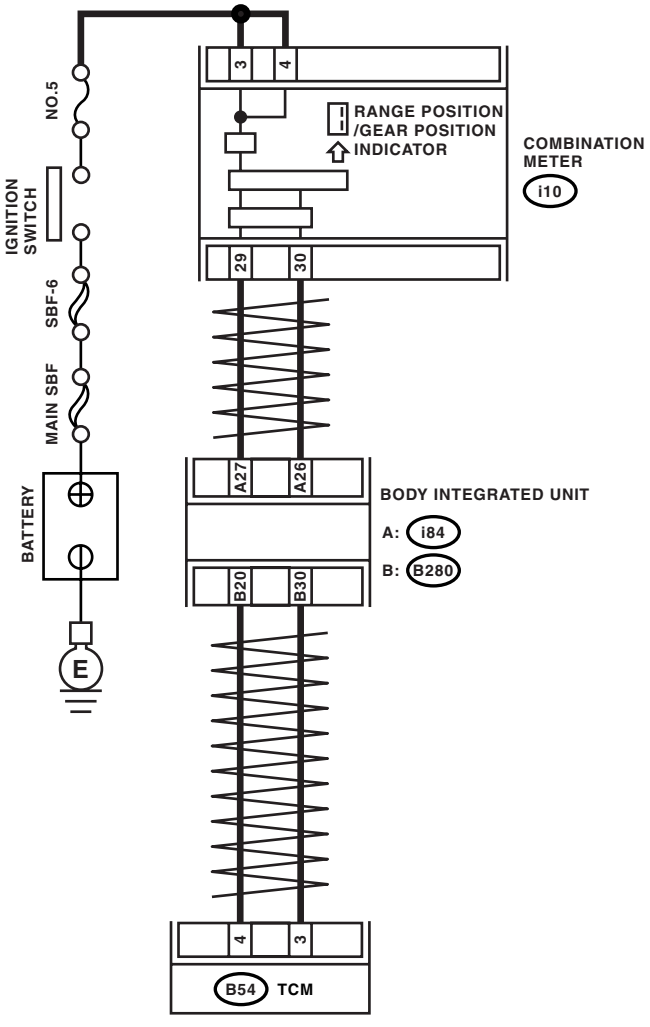
DIAGNOSIS:

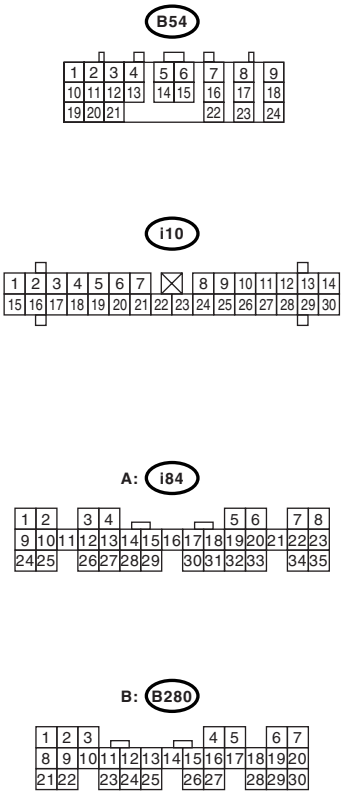
Output signal circuit of the range position/gear position indicator light is open or shorted.

TROUBLE SYMPTOM:

- Range position/gear position indicator light does not illuminate or remains illuminated.
- Cannot understand range position/gear position indicator light display.

WIRING DIAGRAM:



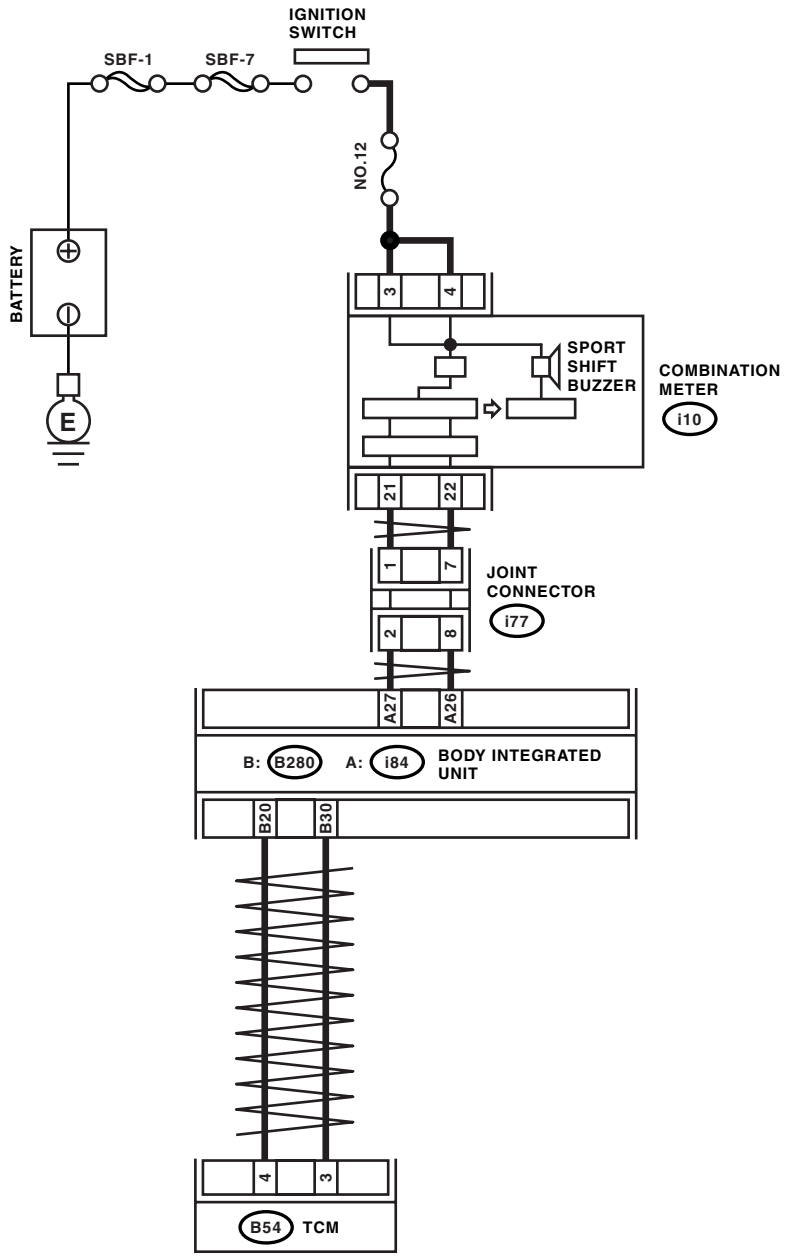


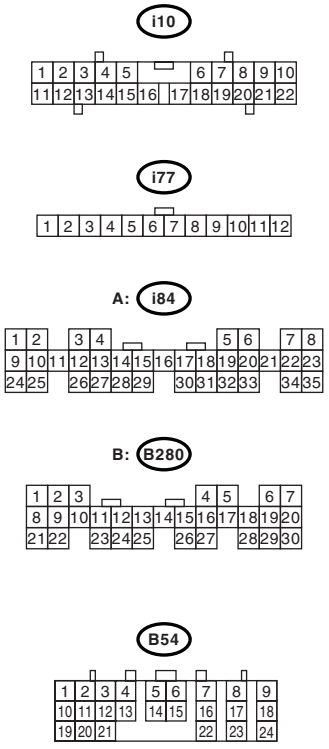
AT-03290

	Step	Check	Yes	No
1	**CHECK THE BODY INTEGRATED UNIT.** 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	**CHECK TCM.** Check DTC of TCM.	Is DTC of AT CAN communication circuit displayed?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK TCM.** 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) Turn the Subaru Select Monitor switch to ON. 5) Shift the select lever to manual mode side, and then shift down the select lever. 6) Read the indicator.	Is gear position 1 and "▲" displayed?	Go to step **4**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
4	**CHECK TCM.** 1) Shift up the select lever. 2) Read the indicator.	Is the gear position 2, and is "▼" displayed?	Go to step **5**.	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>
5	**CHECK THE BODY INTEGRATED UNIT.** Read the data of gear position using Subaru Select Monitor.	Is SPORT shift gear position 2?	Go to step **6**.	Check the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>
6	**CHECK COMBINATION METER.**	Is the range position/gear position indicator light normal?	Refer to "Symptom Related Diagnostic". <Ref. to 5AT(diag)-128, General Diagnostic Table.>	Replace the combination meter assembly. <Ref. to IDI-11, Combination Meter.>

C: CHECK BUZZER

DIAGNOSIS:
Output signal circuit of buzzer is open or shorted.
TROUBLE SYMPTOM:
Buzzer remains beeping.
WIRING DIAGRAM:





AT-02940

	Step	Check	Yes	No
1	**CHECK THE BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **2**.
2	**CHECK TCM.** Check DTC of TCM.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **3**.
3	**CHECK BUZZER STOP.** Disconnect the connector (B54).	Does the buzzer stop?	Replace the TCM. <Ref. to 5AT-56, Transmission Control Module (TCM).>	Go to step **4**.
4	**CHECK THE BODY INTEGRATED UNIT.** 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) Turn the Subaru Select Monitor switch to ON. 5) Read the data of SPORT shift buzzer using Subaru Select Monitor.	Is the SPORT shift buzzer display “ON”?	Replace the body integrated unit. <Ref. to SL-52, Body Integrated Unit.>	Go to step **5**.
5	**CHECK COMBINATION METER.**	Is the buzzer OK?	Refer to “Symptom Related Diagnostic”. <Ref. to 5AT(diag)-128, General Diagnostic Table.>	Replace the combination meter assembly. <Ref. to IDI-11, Combination Meter.>

16.General Diagnostic Table

A: INSPECTION

Symptom	Problem parts
Shifting vehicle speed is low on “D” range.	• Vehicle speed sensor 1 and vehicle speed sensor 2 • Accelerator pedal position sensor • Throttle position sensor • ATF temperature sensor • CAN communication signal
Shifting vehicle speed is high on “D” range.	• Vehicle speed sensor 1 and vehicle speed sensor 2 • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Brake switch signal • ATF temperature sensor
Excessive shock. (“N”→“D” range)	• Engine idle speed • Engine speed signal • Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • ATF temperature sensor • Oil pressure switch 1 and front brake solenoid valve • CAN communication signal • Fluid level and condition • TCM power supply • PVIGN relay
Excessive shift shock on 1st of “D” range → 2nd of “D” range or “1st of manual mode” → “2nd of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 4 and direct clutch solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Vehicle speed sensor 1 and vehicle speed sensor 2 • Fluid level and condition
Excessive shift shock on 2nd of “D” range → 3rd of “D” range or “2nd of manual mode” → “3rd of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 5 and high & low reverse clutch solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Vehicle speed sensor 1 and vehicle speed sensor 2 • Fluid level and condition
Excessive shift shock on 3rd of “D” range → 4th of “D” range or “3rd of manual mode” → “4th of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 3 and input clutch solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Vehicle speed sensor 1 and vehicle speed sensor 2 • Fluid level and condition

Symptom	Problem parts
Excessive shift shock on 4th of “D” range → 5th of “D” range or “4th of manual mode” → “5th of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 1 and front brake solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Vehicle speed sensor 1 and vehicle speed sensor 2 • Fluid level and condition
Excessive shock at kick down.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • CAN communication signal • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Vehicle speed sensor 1 and vehicle speed sensor 2 • Fluid level and condition
Excessive shock at shift up.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Engine speed signal • CAN communication signal • Turbine speed sensor 1 and turbine speed sensor 2 • Vehicle speed sensor 1 and vehicle speed sensor 2 • Fluid level and condition
Excessive shock at lock up.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Engine speed signal • CAN communication signal • Turbine speed sensor 1 and turbine speed sensor 2 • Lock up solenoid valve • Vehicle speed sensor 1 and vehicle speed sensor 2 • Fluid level and condition
Excessive shock at engine brake.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • CAN communication signal • Fluid level and condition • Line pressure • Low coast brake solenoid valve
Judder is occurred at lock up.	• Fluid level and condition • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Vehicle speed sensor 1 and vehicle speed sensor 2 • Accelerator pedal position sensor • Throttle position sensor • Lock up solenoid valve • ATF temperature sensor 1 and 2
Noise at “R”, “N” and “D” range.	• Fluid level and condition • Engine speed signal • ATF temperature sensor 1 and 2
Hold at “D” range or 1st on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Direct clutch solenoid valve • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor

Symptom	Problem parts
Hold at “D” range or 2nd on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Low coast brake solenoid valve • Line pressure • Up switch signal • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Hold at “D” range or 3rd on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Line pressure • Up switch signal • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Hold at “D” range or 4th on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 3 and input clutch solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Oil pressure switch 5 and high & low reverse clutch solenoid valve • Low coast brake solenoid valve • Front brake solenoid valve • Line pressure • Up switch signal • Down switch signal • CAN communication signal • Accelerator pedal position sensor • TCM power supply • PVIGN relay
Hold at “D” range or 5th on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 1 and front brake solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift 1st of “D” range → 2nd of “D” range or “1st of manual mode” → “2nd of manual mode”.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Up switch • CAN communication signal • Accelerator pedal position sensor
Gear does not shift 2nd of “D” range → 3rd of “D” range or “2nd of manual mode” → “3rd of manual mode”.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 5 and high & low reverse clutch solenoid valve • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift 3rd of “D” range → 4th of “D” range or “3rd of manual mode” → “4th of manual mode”.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 3 and input clutch solenoid valve • Oil pressure switch 1 and front brake solenoid valve • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor

Symptom	Problem parts
Gear does not shift 4th of “D” range → 5th of “D” range or “4th of manual mode” → “5th of manual mode”.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 1 and front brake solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Turbine speed sensor 1 and turbine speed sensor 2 • ATF temperature sensor • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift down to 4th on “D” range or manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 1 and front brake solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift down to 3rd on “D” range or manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 3 and input clutch solenoid valve • Oil pressure switch 1 and front brake solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor • TCM power supply • PVIGN relay
Gear does not shift down to 2nd on “D” range or manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 5 and high & low reverse clutch solenoid • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift down to 1st on “D” range or manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
No lock-up occurs.	• Fluid level and condition • Line pressure • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Lock up solenoid valve • CAN communication signal • ATF temperature sensor 1 and 2 • Accelerator pedal position sensor • Brake switch signal • Range signal
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.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • CAN communication signal

General Diagnostic Table

Symptom	Problem 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.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 5 and high & low reverse clutch solenoid valve • Line pressure • CAN communication signal
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.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 3 and input clutch solenoid valve • Oil pressure switch 1 and front brake solenoid valve • Line pressure • CAN communication signal
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.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 1 and front brake solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 5th of “D” range → 4th of “D” range or “5th of manual mode” → “4th of manual mode”. Or slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 1 and front brake solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 4th of “D” range → 3rd of “D” range or “4th of manual mode” → “3rd of manual mode”. Or slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 3 and input clutch solenoid valve • Oil pressure switch 1 and front brake solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 3rd of “D” range → 2nd of “D” range or “3rd of manual mode” → “2nd of manual mode”. Or slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 5 and high & low reverse clutch solenoid valve • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 2nd of “D” range → 1st of “D” range or “2nd of manual mode” → “1st of manual mode”. Or slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and vehicle speed sensor 2 • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine brake does not function at 5th → 4th of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 1 • Down switch signal
Engine brake does not function at 4th → 3rd of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 1 and oil pressure switch 3 • Down switch signal

Symptom	Problem parts
Engine brake does not function at 3rd → 2nd of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 5 • Low coast brake solenoid valve
Engine brake does not function at 2nd → 1st of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 4 • Low coast brake solenoid valve
Excessive acceleration failure on “D” range.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Inhibitor switch • Control cable adjustment • Vehicle speed sensor 1, 2
Excessive acceleration failure in “R” range.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • Oil pressure switch 5 and high & low reverse clutch solenoid valve • CAN communication signal • Inhibitor switch • Control cable adjustment • Vehicle speed sensor 1, 2
Engine skids when start driving (1st) the vehicle. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal
Engine skids when driving at 2nd. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 4 and direct clutch solenoid valve
Engine skids when driving at 3rd. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 5 and high & low reverse clutch solenoid valve
Engine skids when driving at 4th. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 3 and input clutch solenoid valve
Engine skids when driving at 5th. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 1 and front brake solenoid valve

General Diagnostic Table

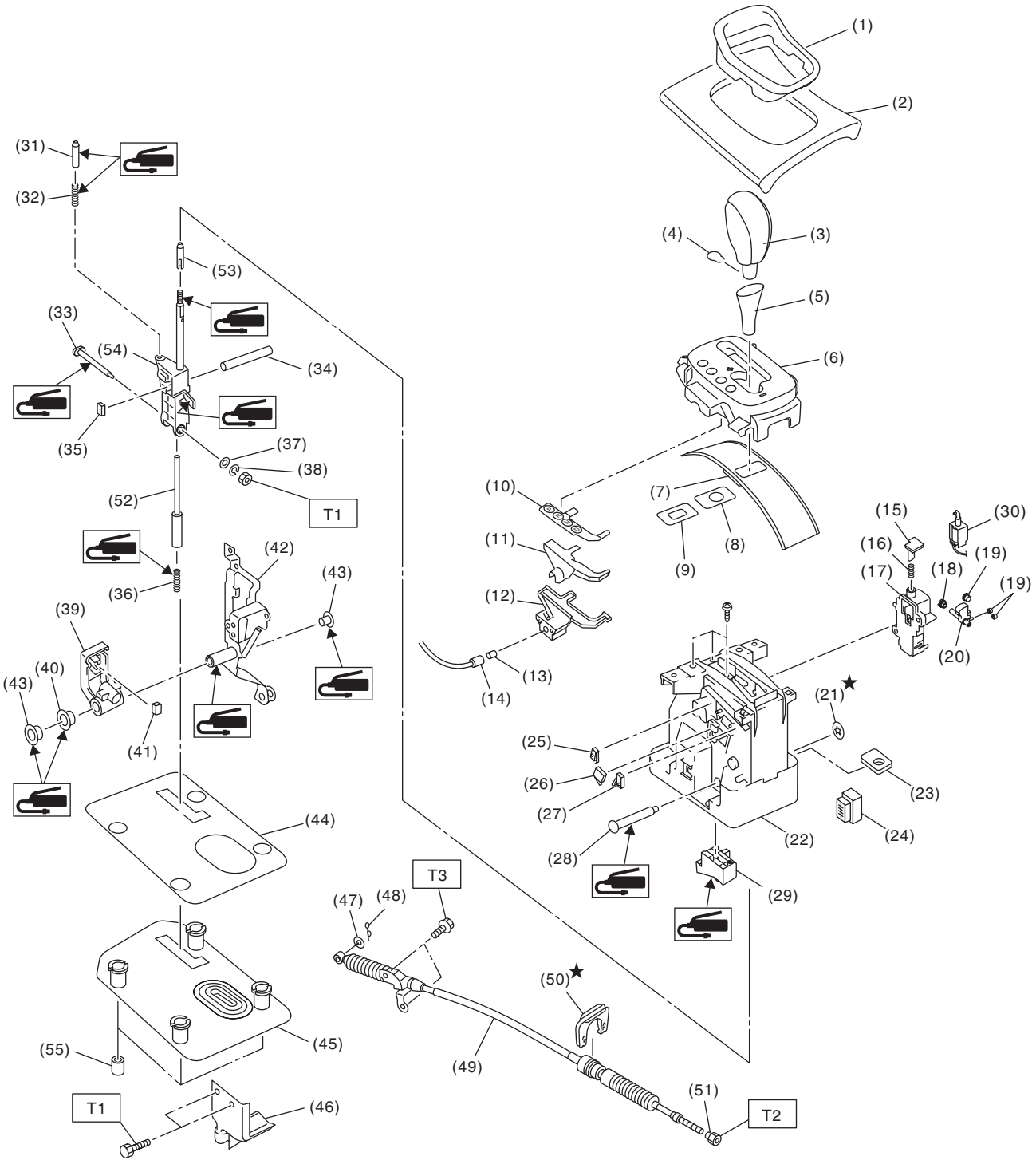
Symptom	Problem parts
Slip at lock up.	• Fluid level and condition • Line pressure • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Lock up solenoid valve • CAN communication signal
Maximum vehicle speed is low.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Direct clutch solenoid valve • Vehicle speed sensor 1 and 2
There is completely no creep.	• Fluid level and condition • Engine speed signal • CAN communication signal • Oil pressure switch 4 and direct clutch solenoid valve • Line pressure
Excessive large creep.	• Engine speed signal • CAN communication signal • Oil pressure switch 4
Vehicle cannot be parking condition on “P” range. Parking condition is not released though shifting to other ranges.	• Inhibitor switch • Control cable adjustment
Vehicle can drive on “P” range.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Line pressure
Vehicle can drive on “N” range.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Line pressure
Vehicle cannot drive at any range.	• Fluid level and condition • Line pressure • Inhibitor switch • Control cable adjustment • Loosing or damaging of propeller shaft. • Loosing or damaging of drive shaft.
Vehicle cannot drive on “D” range.	• Fluid level and condition • Line pressure • Inhibitor switch • Control cable adjustment • Loosing or damaging of propeller shaft. • Loosing or damaging of drive shaft.
Vehicle cannot drive on “R” range.	• Fluid level and condition • Line pressure • Inhibitor switch • Control cable adjustment • Loosing or damaging of propeller shaft. • Loosing or damaging of drive shaft.
Engine cannot start on “P” or “N” range	• Key switch and starter • Control cable adjustment • Inhibitor switch • CAN communication line • TCM
Engine start other than “N” or “P” range	• Key switch and starter • Control cable adjustment • Inhibitor switch • TCM

Symptom	Problem parts
Engine stalls.	• Fluid level and condition • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Lock up solenoid valve • Line pressure
Engine stalls when shifting to “N” → “D” and “R” range.	• Fluid level and condition • Engine speed signal • Turbine speed sensor 1 and turbine speed sensor 2 • Lock up solenoid valve • Line pressure

1. General Description

A: COMPONENT

1. AT SELECT LEVER



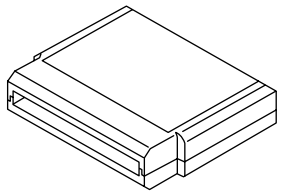
CS-00594

(1) Ring indicator
(2) Front cover
(3) Grip ASSY
(4) Grip pin
(5) Grip cover
(6) Indicator ASSY
(7) Shift blind
(8) Blind A
(9) Blind B
(10) Position plate
(11) Plate lamp guide
(12) Valve case
(13) Indicator bulb
(14) Valve harness
(15) Release rod
(16) Spring
(17) Lock lever bracket
(18) Lock lever bushing
(19) Bushing
(20) Lock lever
(21) Clamp
(22) Base ASSY
(23) Spacer
(24) Harness connector
(25) Shift-up switch
(26) "P" range switch
(27) Shift-down switch
(28) Shaft
(29) Detent check block
(30) Shift lock solenoid
(31) Check sheet pole
(32) Spring
(33) Select shaft
(34) Shift position pin
(35) Shift button switch
(36) Spring
(37) Washer
(38) Spring washer
(39) Tube cross plate
(40) Bushing
(41) Air flow control switch
(42) Arm ASSY
(43) Bushing
(44) Dust cover bracket
(45) Dust cover
(46) Cable bracket
(47) Washer
(48) Cotter pin
(49) Select cable
(50) Clamp
(51) Adjusting nut A
(52) Button rod
(53) Pusher
(54) Selector arm ASSY
(55) Spacer

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5.1 (0.52, 3.8)
T2: 7.5 (0.76, 5.5)
T3: 18 (1.8, 13.3)

B: PREPARATION TOOL

1. SPECIAL TOOL

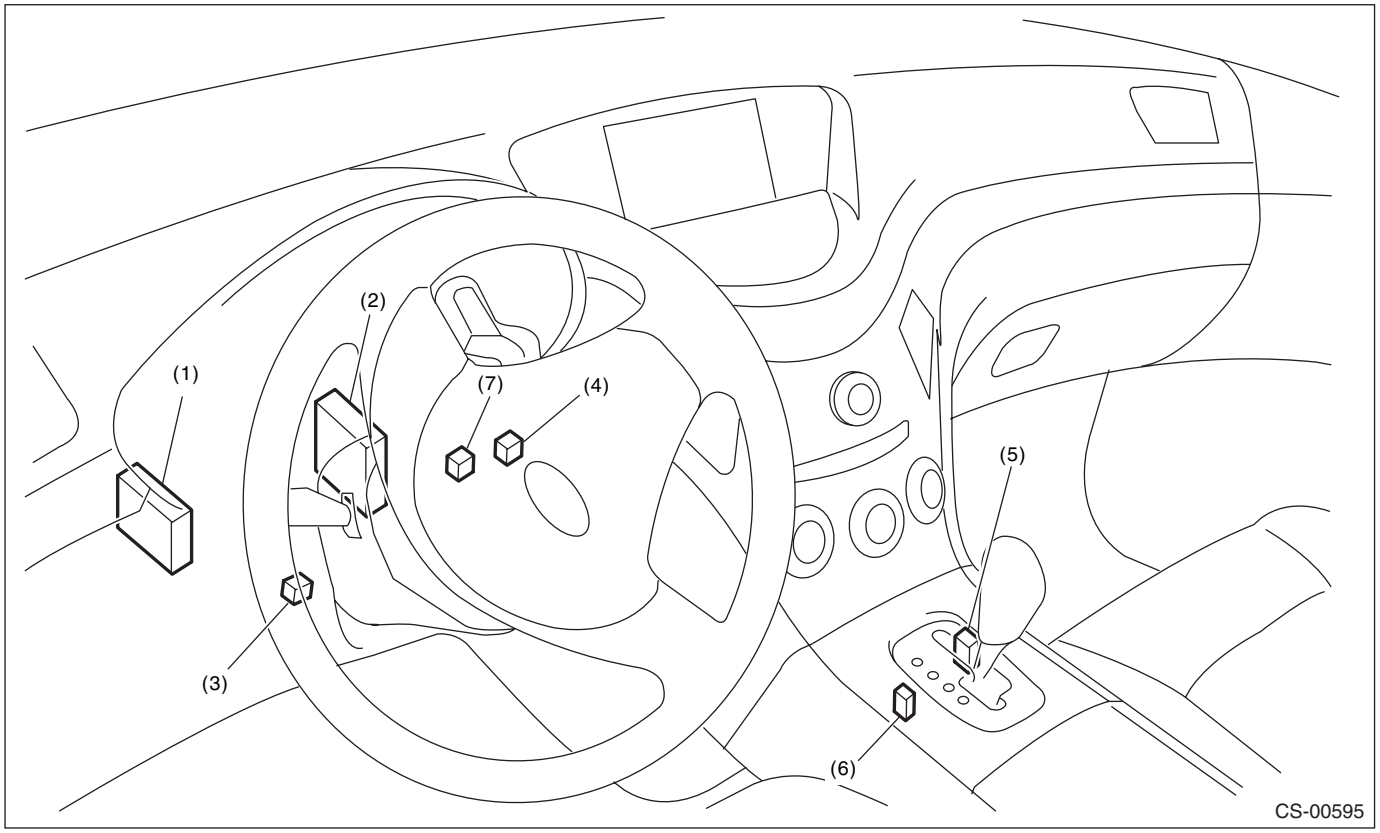
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA010	18482AA010	CARTRIDGE	Troubleshooting for the electrical system.
 ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for the electrical system.

C: CAUTION

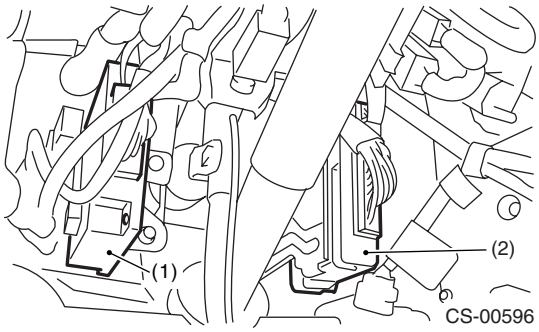
• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Use SUBARU genuine fluid, grease etc. or equivalent. Do not mix fluid, grease, etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply grease onto sliding or revolution surfaces before installation.
• Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
• Before securing a part 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.

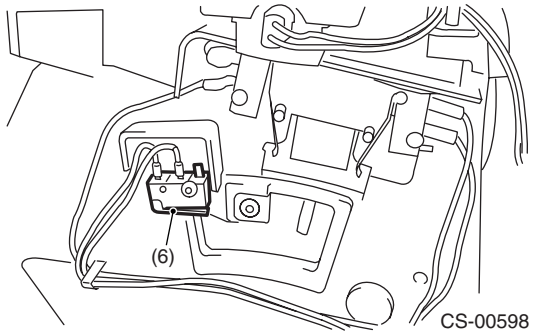
2. AT Shift Lock Control System

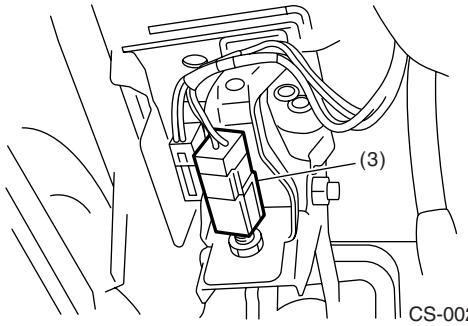
A: LOCATION

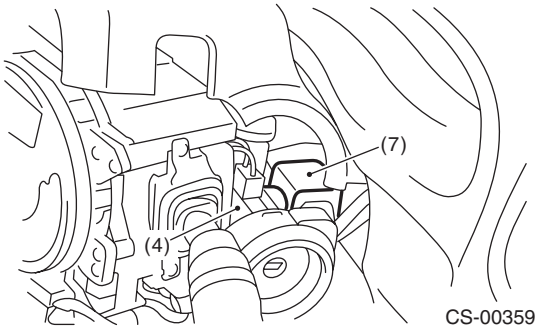


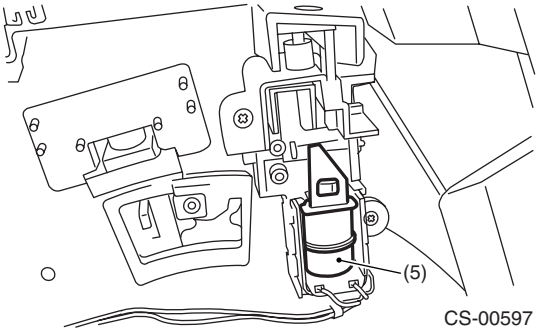
(1) TCM (“P” range)
(2) Body integrated unit
(3) Stop light switch
(4) Key cylinder (with built-in key warning switch)
(5) Shift lock solenoid ASSY
(6) “P” range switch
(7) Key lock solenoid


(1)
(2)
CS-00596

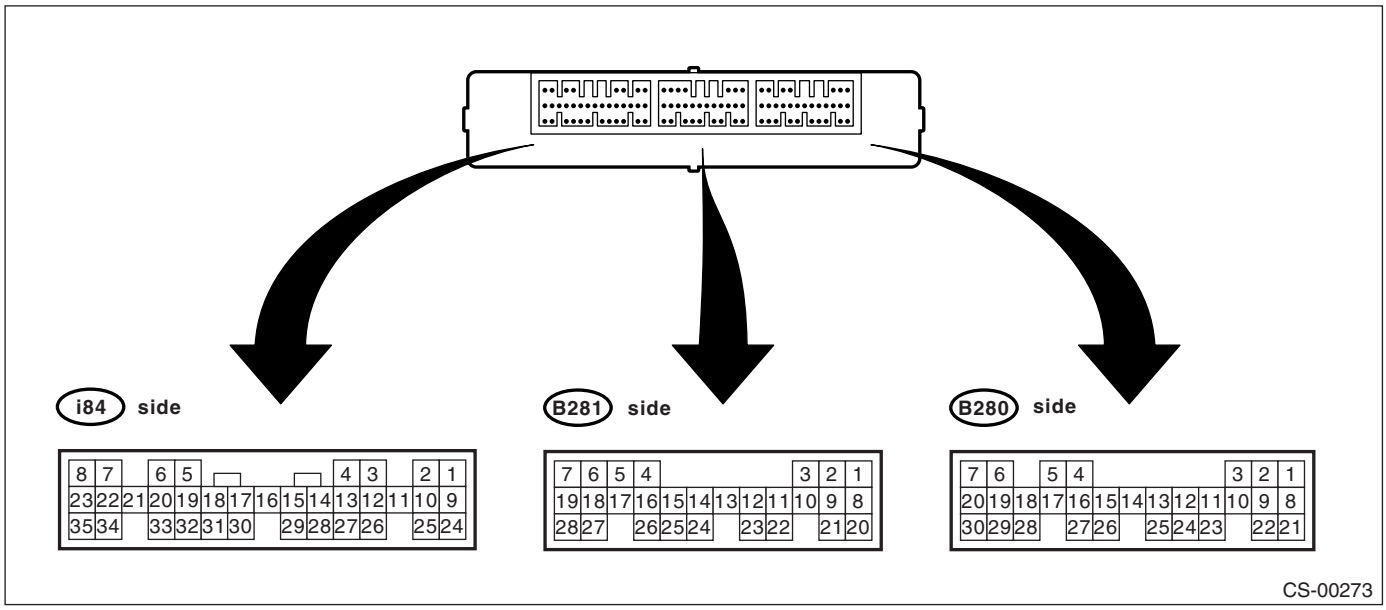

(6)
CS-00598


(3)
CS-00270


(7)
(4)
CS-00359

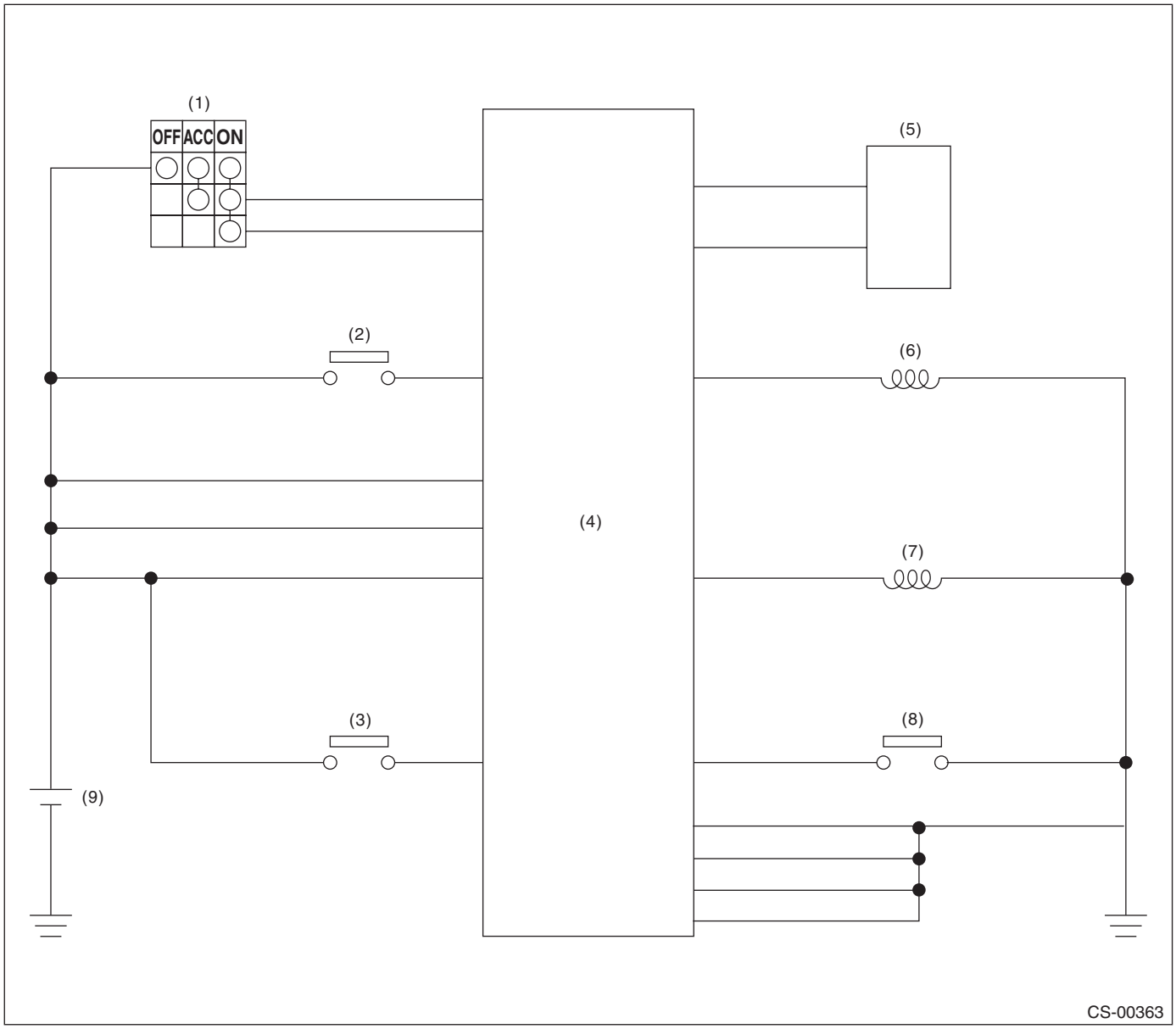

(5)
CS-00597

B: ELECTRICAL SPECIFICATION



Item	To connector No.	Terminal No.	Input/Output signal Measured value and measuring condition
Battery power supply	B281	1	9 — 16 V
		2	
	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	

C: WIRING DIAGRAM



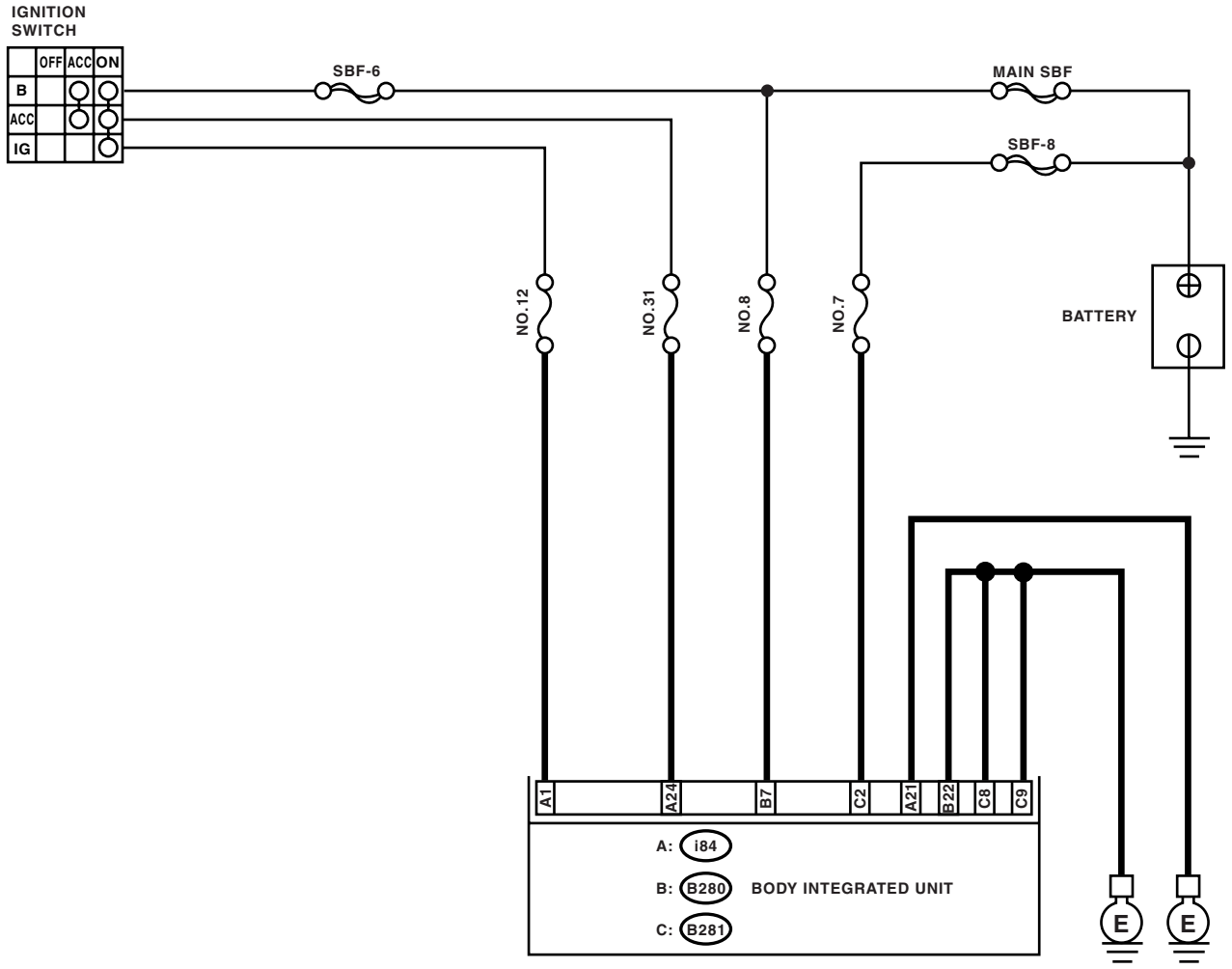
(1) Ignition switch
(2) Stop light switch
(3) Key warning switch
(4) Body integrated unit
(5) TCM (“P” range)
(6) Key lock solenoid
(7) Shift lock solenoid
(8) “P” range switch
(9) Battery

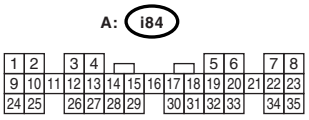
D: INSPECTION

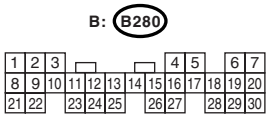
1. SHIFT LOCK OPERATION

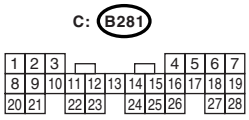
	Step	Check	Yes	No
1	**CHECK SHIFT LOCK.** 1) Turn the ignition switch to ON. 2) Shift the select lever to “P” range.	While brake pedal is not depressed, is it possible to move the select lever from the “P” range to other ranges?	Inspect “SELECT LEVER CANNOT BE SHIFT LOCKED”. <Ref. to CS-12, SELECT LEVER CANNOT BE SHIFTED, INSPECTION, AT Shift Lock Control System.>	Go to step **2**.
2	**CHECK SHIFT LOCK.**	While brake pedal is depressed, is it possible to move the select lever from the “P” range to other ranges?	Go to step **3**.	Inspect “SELECT LEVER SHIFT LOCK CANNOT BE RELEASED”. <Ref. to CS-14, SHIFT LOCK OF SELECT LEVER CANNOT BE RELEASED., INSPECTION, AT Shift Lock Control System.>
3	**CHECK KEY INTERLOCK.**	Can the ignition switch be turned to the “LOCK” position when the select lever is set to other than “P” range?	Go to step **4**.	Go to step **5**.
4	**CHECK BACKUP POWER SUPPLY.** Inspect the backup power supply circuit. <Ref. to CS-10, BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, AT Shift Lock Control System.>	Is the backup power supply circuit operating properly?	Inspect for “KEY INTERLOCK CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-14, SHIFT LOCK OF SELECT LEVER CANNOT BE RELEASED., INSPECTION, AT Shift Lock Control System.>	Repair the backup power supply circuit.
5	**CHECK KEY INTERLOCK.**	Can the ignition switch be turned to the LOCK position when the select lever is set to the “P” range?	AT shift lock system is normal.	Inspect for “KEY INTERLOCK CANNOT BE LOCKED OR RELEASED”. <Ref. to CS-14, SHIFT LOCK OF SELECT LEVER CANNOT BE RELEASED., INSPECTION, AT Shift Lock Control System.>

2. BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT





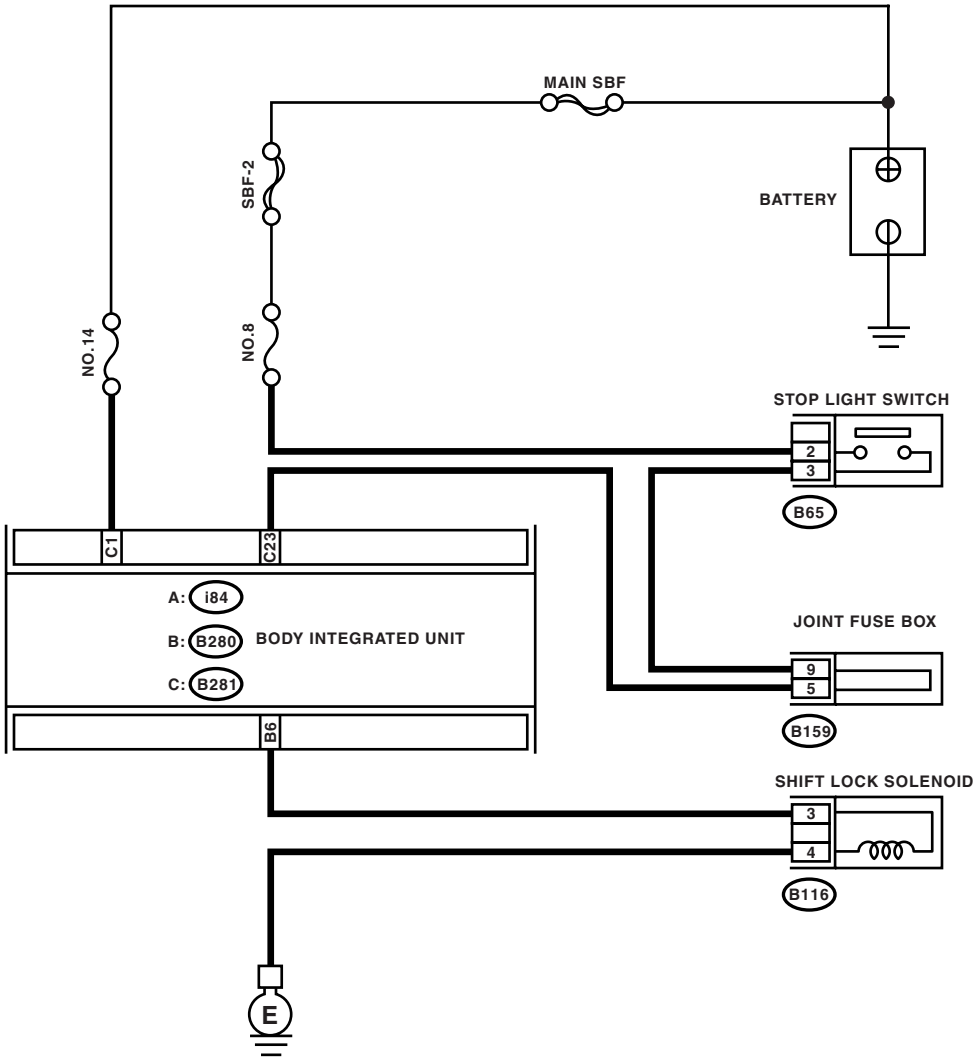


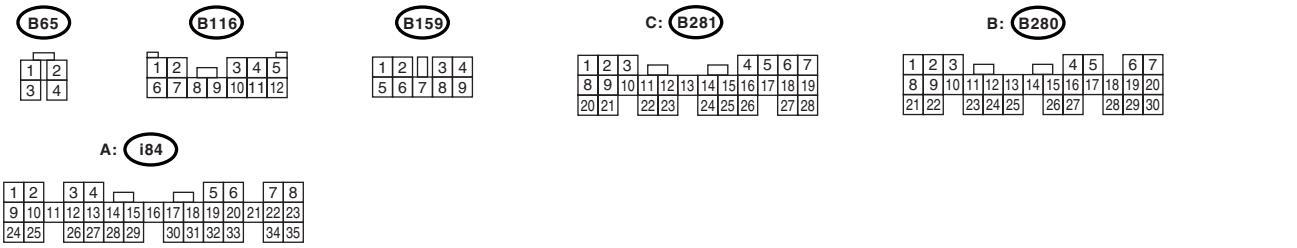


CS-00599

	Step	Check	Yes	No
1	**CHECK DTC OF BODY INTEGRATED UNIT.** Check DTC of the body integrated unit. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC of power line displayed on body integrated unit?	Repair or replace it according to the DTC.	Go to step **2**.
2	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Measure the harness resistance between the body integrated unit and chassis ground. ***Connector & terminal*** ***(i84) No. 21 — Chassis ground:*** ***(B280) No. 22 — Chassis ground:*** ***(B281) No. 8 — Chassis ground:*** ***(B281) No. 9 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3**.	Repair the open circuit of harness between the body integrated unit and chassis ground.
3	**CHECK POOR CONTACT.**	Is there poor contact in connector?	Repair the poor contact.	Check the body integrated unit.

3. SELECT LEVER CANNOT BE SHIFTED

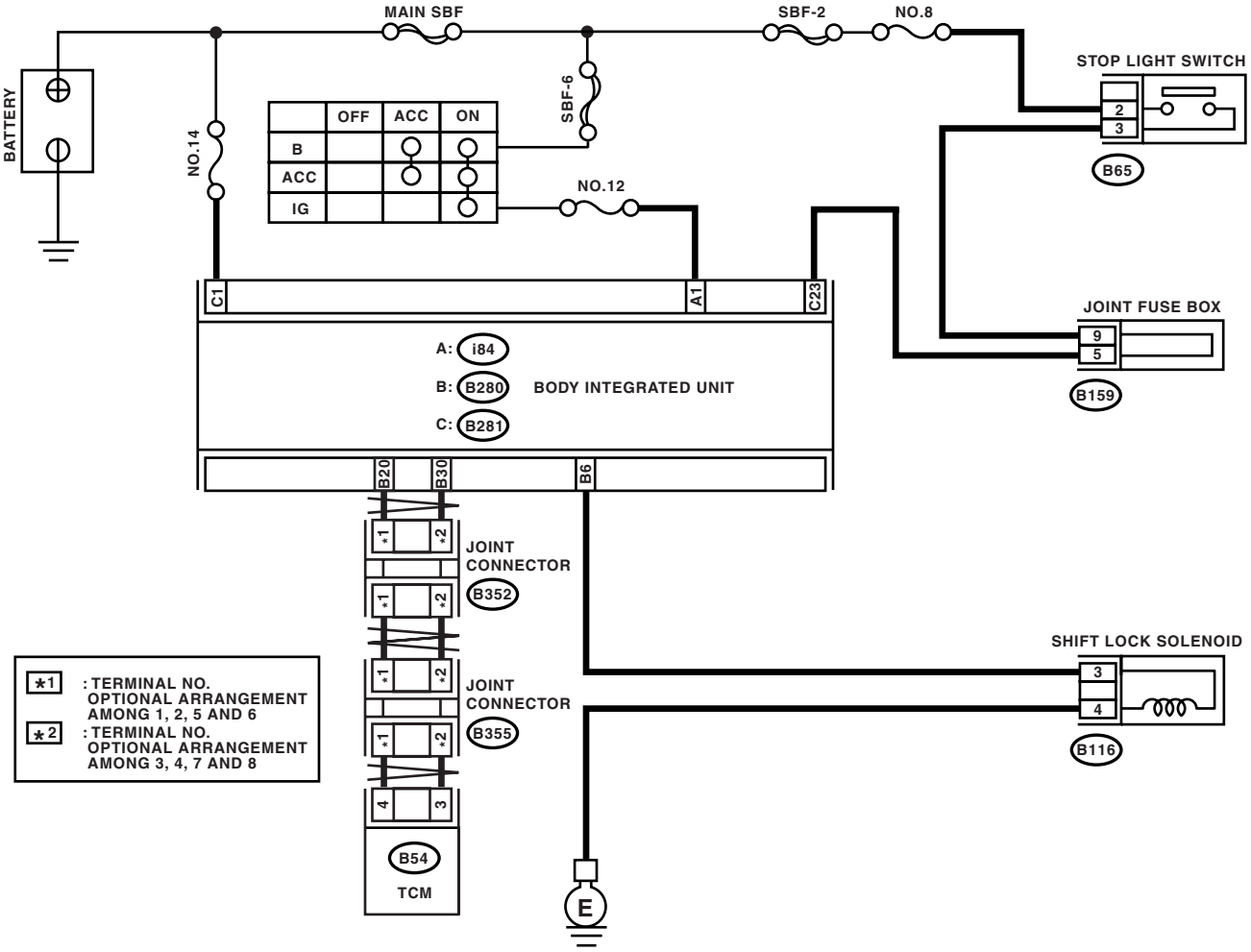


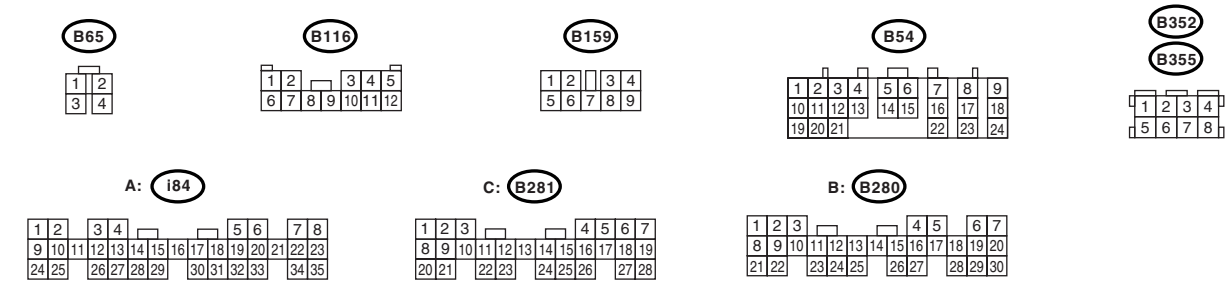


CS-00600

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch and Subaru Select Monitor to ON. 4) Depress the brake pedal. 5) Read the input signal of stop light switch from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "ON" displayed?	Go to step **2**.	Go to step **3**.
2	**CHECK DTC OF BODY INTEGRATED UNIT.** Check DTC of the body integrated unit. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC (B0106) displayed?	Repair or replace it according to the DTC.	Go to step **6**.
3	**CHECK STOP LIGHT SWITCH.** Depress the brake pedal.	Does the stop light illuminate?	Go to step **4**.	Check the stop light system.
4	**CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors of body integrated unit and stop light switch. 3) Measure the resistance of harness between stop light switch and body integrated unit. ***Connector & terminal*** ***(B65) No. 3 — (B281) No. 23:***	Is the resistance more than 1 MΩ?	Repair the open circuit of harness between the body integrated unit and stop light switch.	Go to step **5**.
5	**CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND BODY INTEGRATED UNIT.** Measure the resistance of harness between stop light switch and chassis ground. ***Connector & terminal*** ***(B65) No. 3 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair the short circuit of harness between the body integrated unit and stop light switch.	Go to step **7**.
6	**CHECK SHIFT LOCK SOLENOID.** 1) Disconnect the connector of shift lock solenoid. 2) Connect the battery to connector terminal of shift lock solenoid, and operate the solenoid. ***Terminals*** ***No. 3 (+) — No. 4 (–):***	Is the shift lock solenoid operating properly?	Go to step **7**.	Replace the shift lock solenoid.
7	**CHECK SHIFT LOCK OPERATION.** 1) Connect all the connectors. 2) Shift the select lever to "P" range. 3) Shift the select lever from "P" range to "R" range.	Can the select lever shift from "P" range to "R" range?	Check the body integrated unit.	A temporary poor contact of connector or harness may be the cause.

4. SHIFT LOCK OF SELECT LEVER CANNOT BE RELEASED.

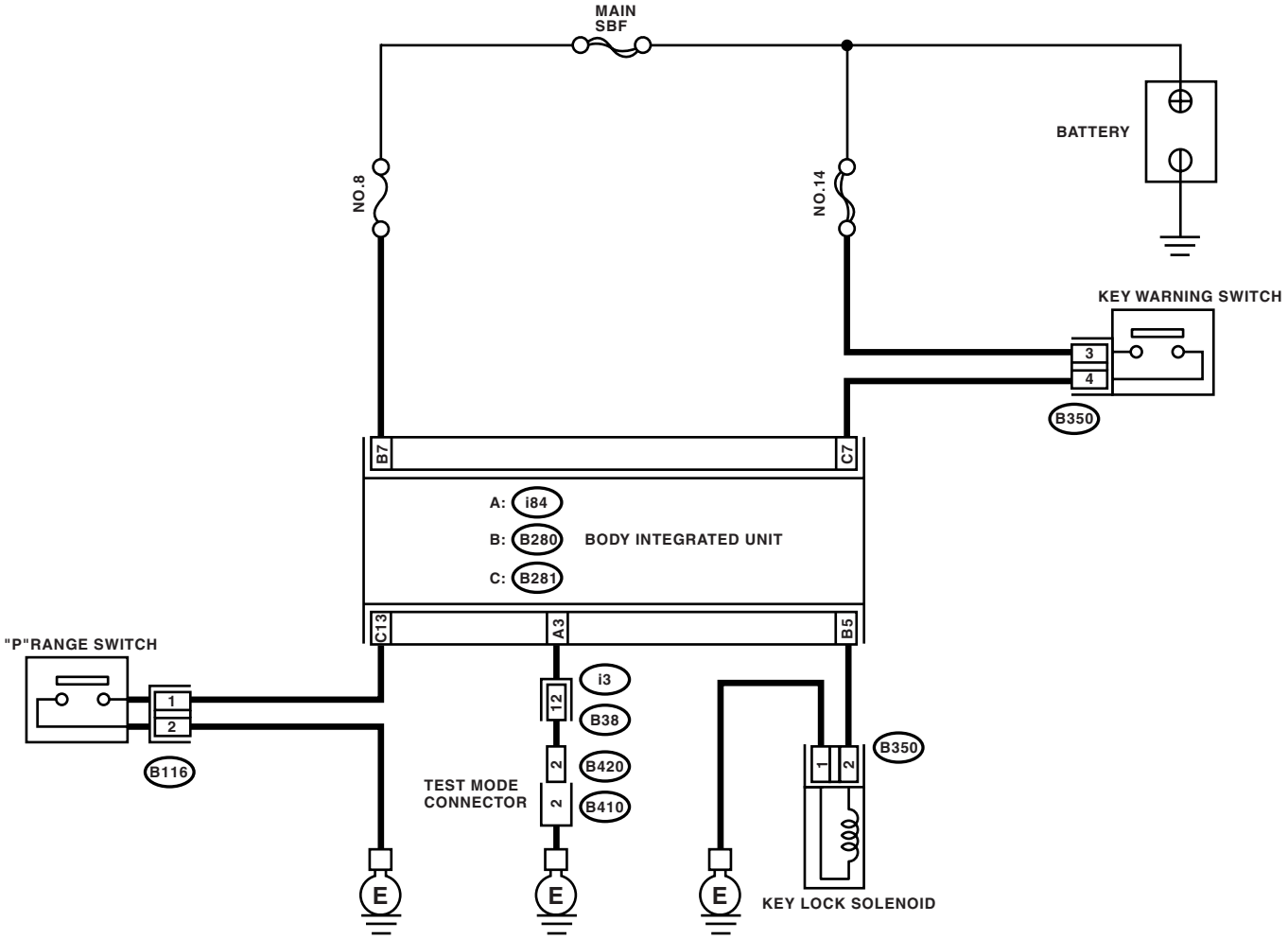


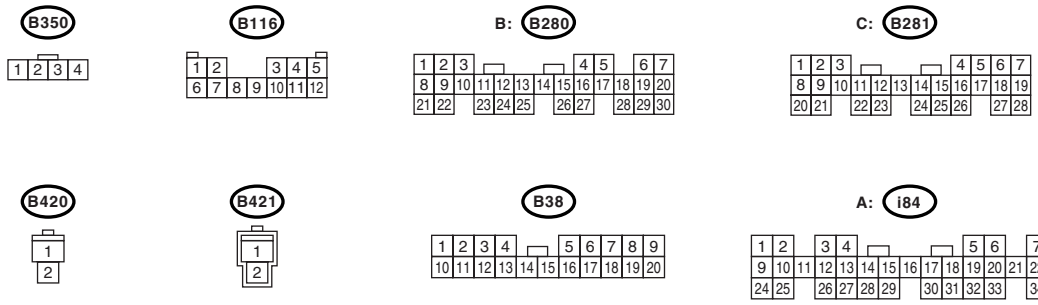


CS-00601

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch and Subaru Select Monitor to ON. 4) Read the input signal of shift position from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "7" displayed?	Go to step **2**.	Check the TCM and body integrated unit.
2	**CHECK INPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** Read the input signal of stop light switch from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "ON" displayed?	Go to step **5**.	Go to step **3**.
3	**CHECK STOP LIGHT SWITCH.** Depress the brake pedal.	Does the stop light illuminate?	Go to step **4**.	Check the stop light system.
4	**CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND BODY INTEGRATED UNIT.** 1) Depress the brake pedal. 2) Measure the voltage between body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 9 V?	Go to step **5**.	Repair the open or short circuit of harness between the body integrated unit and stop light switch.
5	**CHECK DTC OF BODY INTEGRATED UNIT.** Check DTC of the body integrated unit. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC (B0106) displayed?	Repair or replace it according to the DTC.	Go to step **6**.
6	**CHECK SHIFT LOCK SOLENOID.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of shift lock solenoid. 3) Connect the battery to connector terminal of shift lock solenoid, and operate the solenoid. ***Terminals*** ***No. 3 (+) — No. 4 (–):***	Is the shift lock solenoid operating properly?	Go to step **7**.	Replace the shift lock solenoid.
7	**CHECK OPERATION.** 1) Connect all the connectors. 2) Turn the ignition switch ON. (Engine OFF) 3) Shift the select lever to "P" range. 4) Depress the brake pedal. 5) Shift the select lever from "P" range to "R" range.	Can the select lever shift from "P" range to "R" range?	A temporary poor contact of connector or harness may be the cause.	Check the body integrated unit.

5. KEY INTERLOCK DOES NOT LOCK OR RELEASE





CS-00602

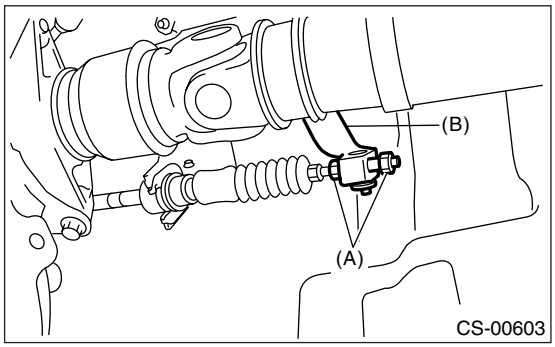
	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch and Subaru Select Monitor to ON. 4) Read the input signal of the key warning switch from the Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "ON" displayed?	Go to step **2**.	Go to step **4**.
2	**CHECK INPUT SIGNAL OF BODY INTEGRATED UNIT USING SUBARU SELECT MONITOR.** 1) Shift the select lever to "P" range. 2) Read the input signal of "P" range switch from Subaru Select Monitor. <Ref. to LAN(diag)-12, OPERATION, Subaru Select Monitor.>	Is "ON" displayed?	Go to step **3**.	Go to step **8**.
3	**CHECK DTC OF BODY INTEGRATED UNIT.** Check DTC of the body integrated unit. <Ref. to LAN(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC (B0105) displayed?	Repair or replace it according to the DTC.	Check the body integrated unit.
4	**CHECK HARNESS BETWEEN BATTERY AND KEY WARNING SWITCH.** 1) Disconnect the connector of key warning switch. 2) Measure the voltage of harness between key warning switch and chassis ground. ***Connector & terminal*** ***(B350) No. 3 (+) — Chassis ground (–):***	Is the voltage 9 — 16 V?	Go to step **5**.	Repair the open or short circuit of harness between battery and key warning switch.
5	**CHECK KEY WARNING SWITCH.** Measure the resistance between connector terminals of key warning switch. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance more than 1 MΩ?	Replace the key warning switch.	Go to step **6**.
6	**CHECK KEY WARNING SWITCH.** 1) Remove the key. 2) Measure the resistance between connector terminals of key warning switch. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance more than 1 MΩ?	Go to step **7**.	Replace the key warning switch.
7	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY WARNING SWITCH.** 1) Disconnect the connector of body integrated unit. 2) Measure the voltage between body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 7 (+) — Chassis ground (–):***	Is the voltage more than 9 V?	Go to step **8**.	Repair the open circuit of harness between body integrated unit and key warning switch.
8	**CHECK HARNESS BETWEEN "P" RANGE SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between "P" range switch and chassis ground. ***Connector & terminal*** ***(B116) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **9**.	Repair the short circuit of harness between "P" range switch and body integrated unit.

	Step	Check	Yes	No
9	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND "P" RANGE SWITCH.** 1) Disconnect the connector of the "P" range switch. 2) Measure the resistance of harness between the body integrated unit and the "P" range switch. ***Connector & terminal*** ***(B116) No. 1 — (B281) No. 13:***	Is the resistance more than 1 MΩ?	Repair the open circuit of harness between the body integrated unit and the "P" range switch.	Go to step **10**.
10	**CHECK HARNESS BETWEEN "P" RANGE SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between "P" range switch and chassis ground. ***Connector & terminal*** ***(B116) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the open circuit of harness between "P" range switch and chassis ground.	Go to step **11**.
11	**CHECK "P" RANGE SWITCH.** 1) Shift the select lever to "P" range. 2) Measure the resistance between "P" range switch connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 1 Ω?	Go to step **12**.	Replace the "P" range switch.
12	**CHECK "P" RANGE SWITCH.** 1) Shift the select lever to other than "P" range. 2) Measure the resistance between "P" range switch connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance more than 1 MΩ?	Go to step **13**.	Replace the "P" range switch.
13	**CHECK OPERATION.** Inspect the backup power supply circuit. <Ref. to CS-10, BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, AT Shift Lock Control System.>	Is the backup power supply circuit operating properly?	Go to step **14**.	Check the body integrated unit.
14	**CHECK TEST MODE CONNECTOR.** 1) Check that the test mode connector is disconnected. 2) Measure the resistance between body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No.11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **15**.	Repair the short circuit of the harness between body integrated unit and test mode connector.
15	**CHECK OPERATION.** 1) Connect all the connectors. 2) Operate the key lock solenoid.	Does the key lock solenoid operate normally?	A temporary poor contact of connector or harness may be the cause.	Check the body integrated unit.

3. Select Lever

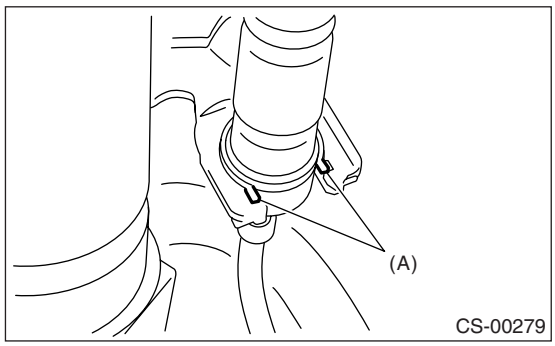
A: REMOVAL

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)-6, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Muffler.>
6) Remove the heat shield cover.
7) Remove the cable from arm assembly.



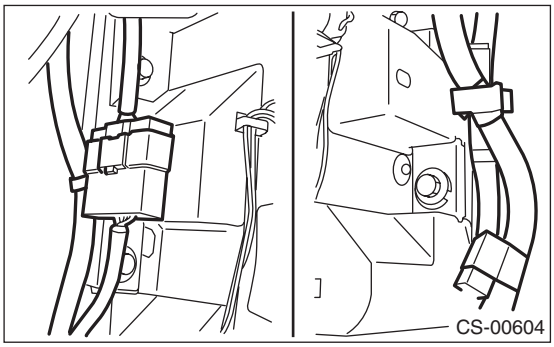
(A) Adjusting nut
(B) Arm ASSY

8) Raise the pawl of clamp to remove the cable.

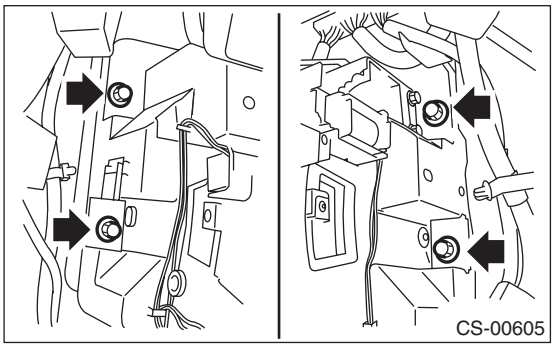


(A) Claw

9) Lower the vehicle.
10) Remove the console box. <Ref. to EI-38, REMOVAL, Console Box.>
11) Remove the center console. <Ref. to EI-39, REMOVAL, Center Console.>
12) Remove all harnesses from the select lever.



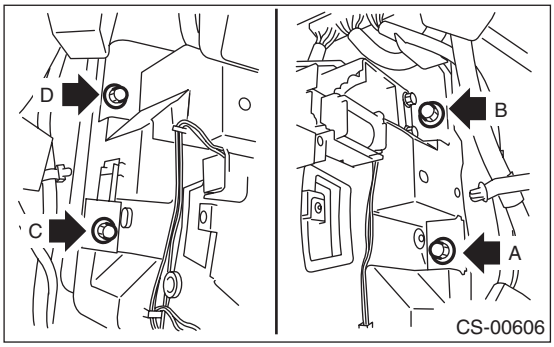
13) Disconnect the connectors, and then remove the four bolts to take out the select lever assembly from vehicle body.



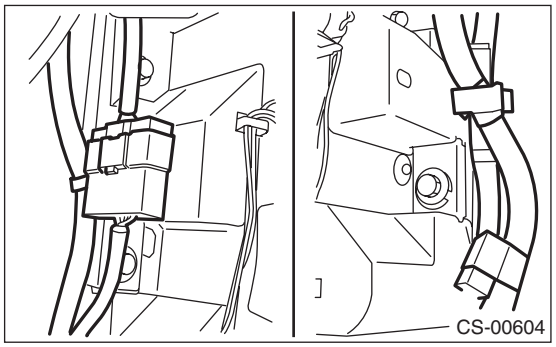
B: INSTALLATION

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)



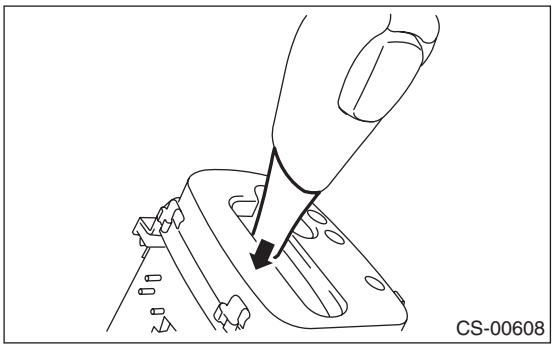
3) Install the shift select cable onto select lever.



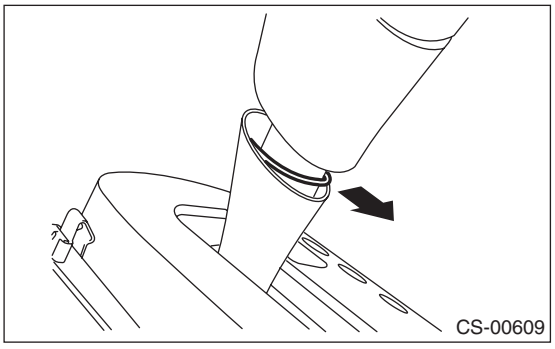
4) Install the center console. <Ref. to EI-39, INSTALLATION, Center Console.>
5) Install the console box. <Ref. to EI-38, INSTALLATION, Console Box.>
6) Shift the select lever to “N” range.
7) Lift–up the vehicle.
8) Shift the range select lever to the “N” range.
9) Secure the cable to the bracket. <Ref. to CS-26, 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)-8, 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

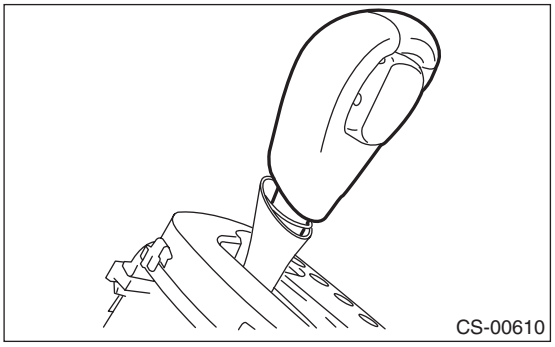
1) Shift the select lever to “N” range.
2) Lower the grip cover.



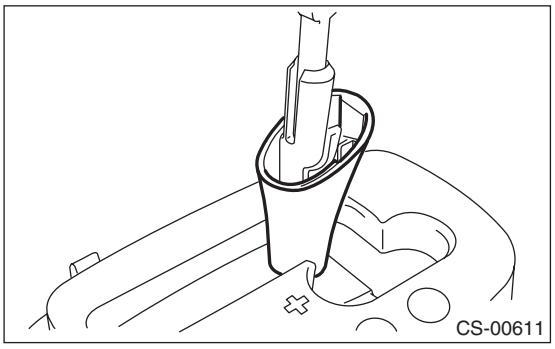
3) Remove the grip pin.



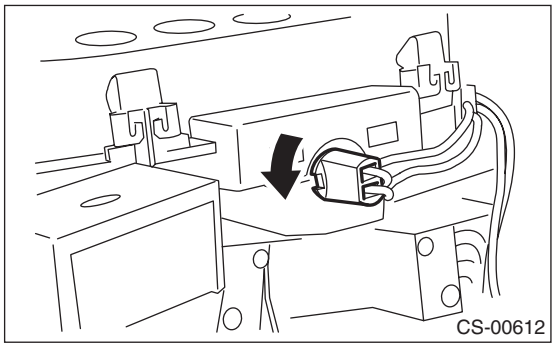
4) Remove the grip assembly.



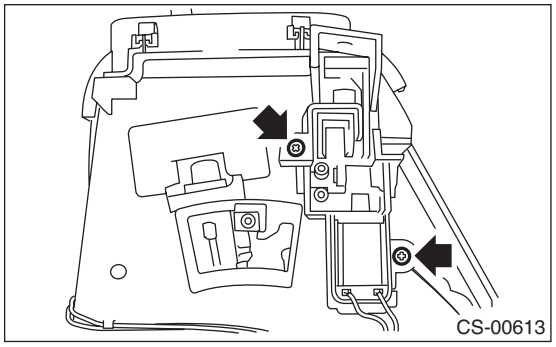
5) Remove the grip cover.



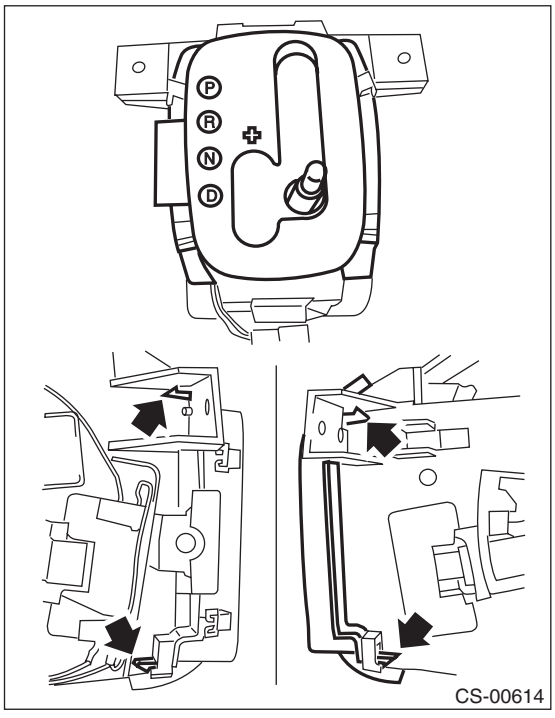
6) Remove the indicator lamp and then remove the bulb.



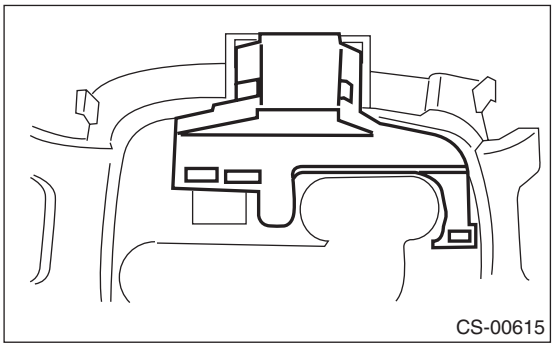
7) Remove the shift lock solenoid assembly.



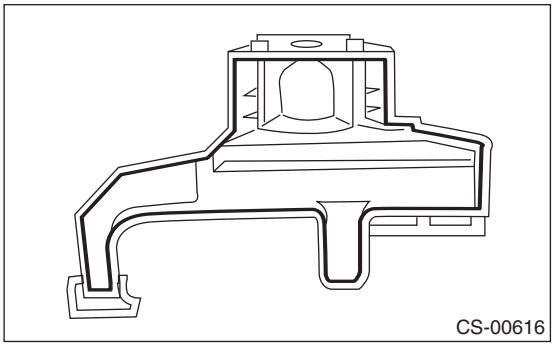
8) Remove the indicator assembly.



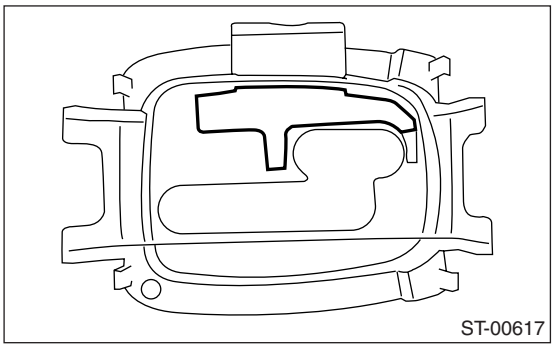
9) Remove the bulb case.



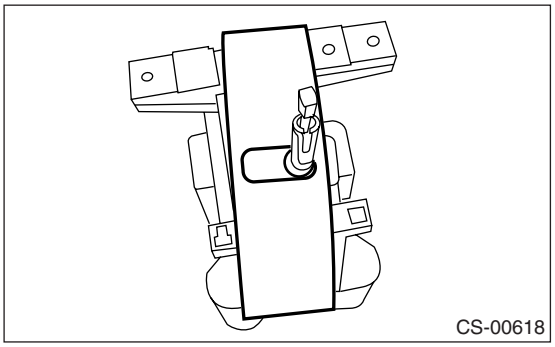
10) Remove the plate lamp guide.



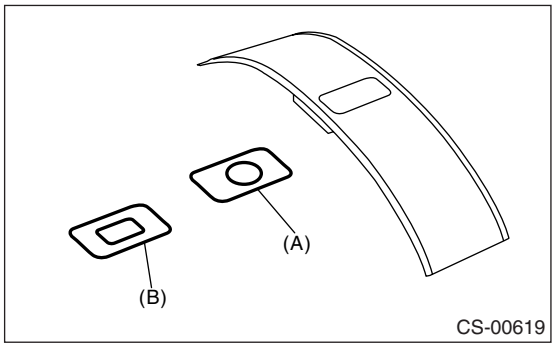
11) Remove the position plate.



12) Remove the blind assembly.

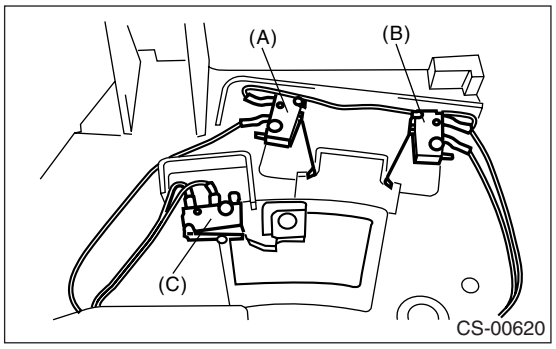


13) Remove blind A and B.



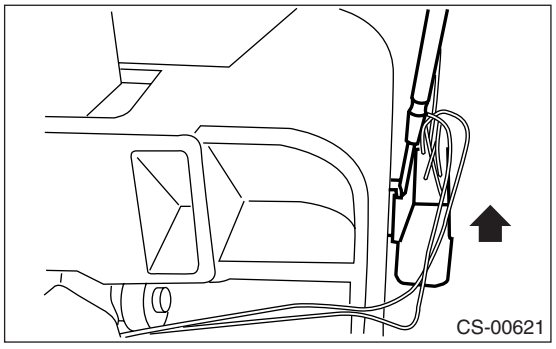
(A) Blind A
(B) Blind B

14) Remove the clip while being careful not to break the pin, and remove all switches.

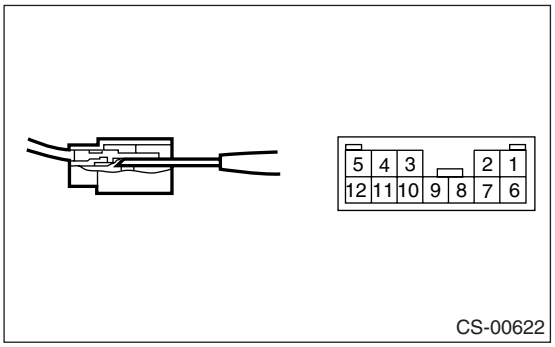


(A) Shift-up switch
(B) Shift-down switch
(C) "P" range switch

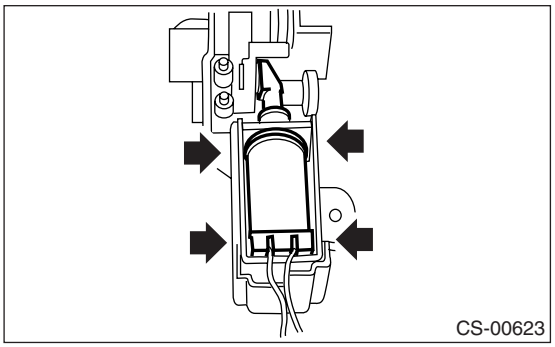
15) Remove the connector from the base assembly using a flat-tip screwdriver.



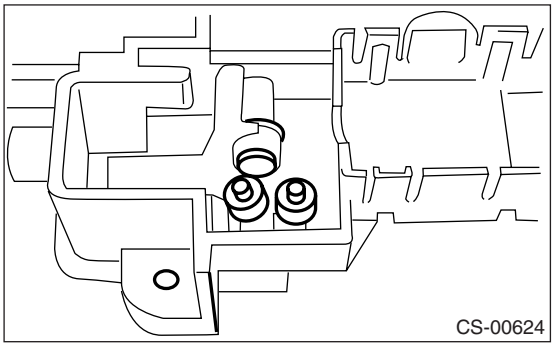
16) Remove all terminals from the connectors using a flat-tip screwdriver.



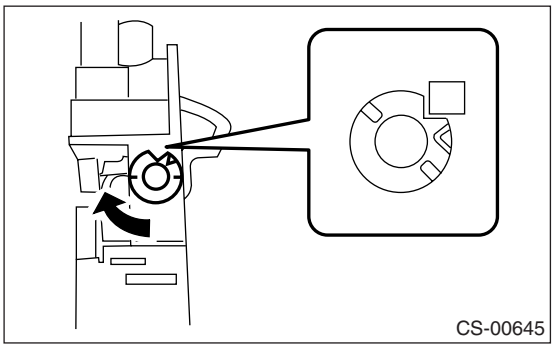
17) Remove the shift lock solenoid from the lock lever bracket.



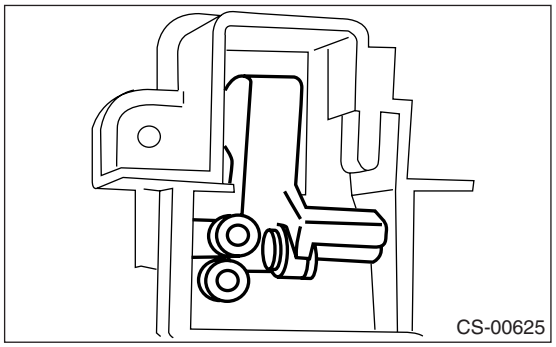
18) Remove the bushing.



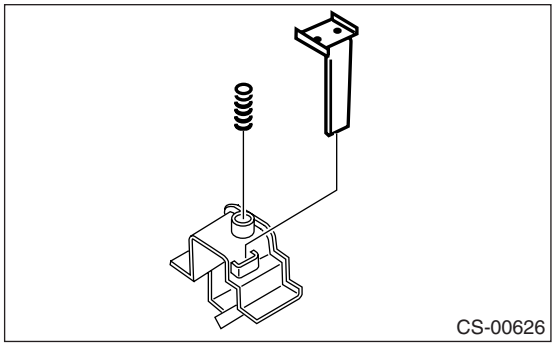
19) Remove the lock lever bushing.



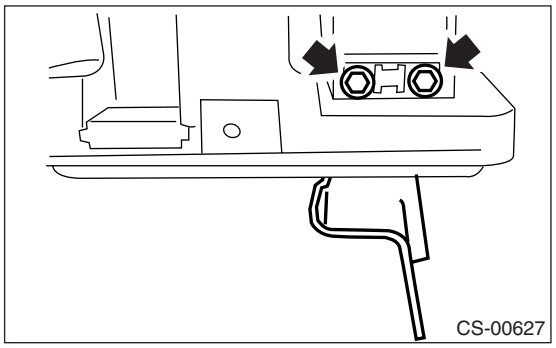
20) Remove the lock lever.



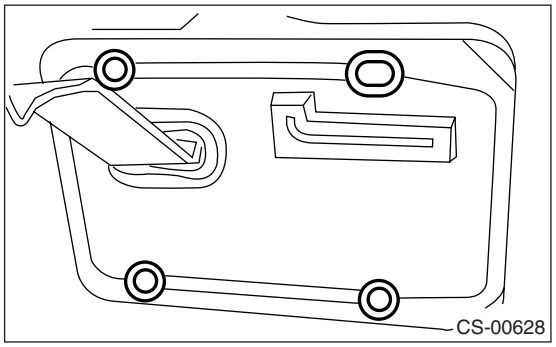
21) Remove the release rod and spring.



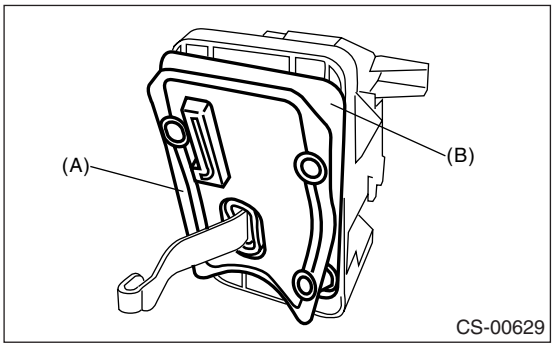
22) Remove the cable bracket.



23) Remove the spacer.

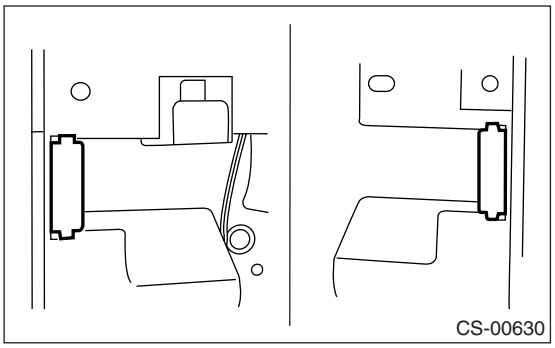


24) Remove the dust cover and dust cover bracket.

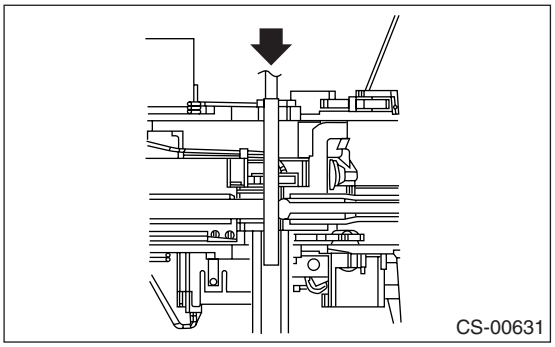


(A) Dust cover
(B) Dust cover bracket

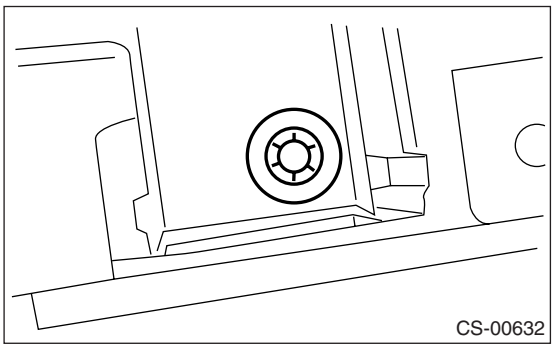
25) Remove the spacer.



26) Using a press, remove the shift position pin.

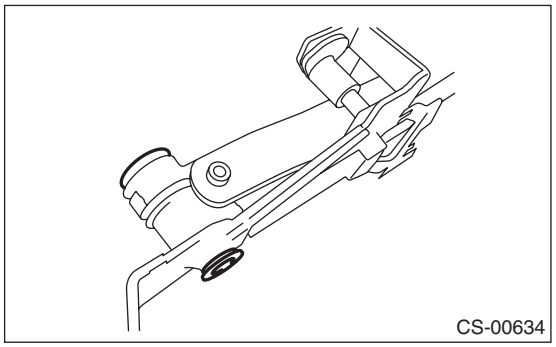


27) Remove the clips, then remove the shaft.

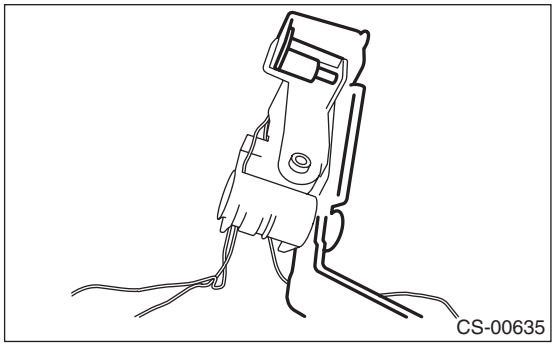


28) Remove the arm assembly.

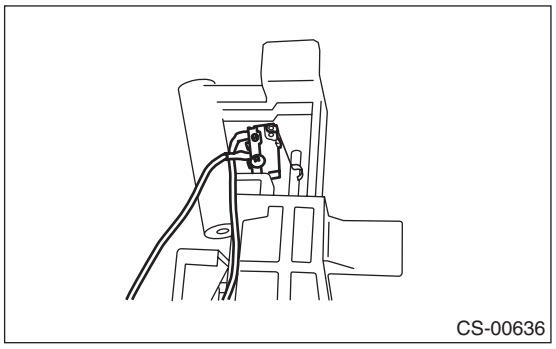
29) Remove the bushing.



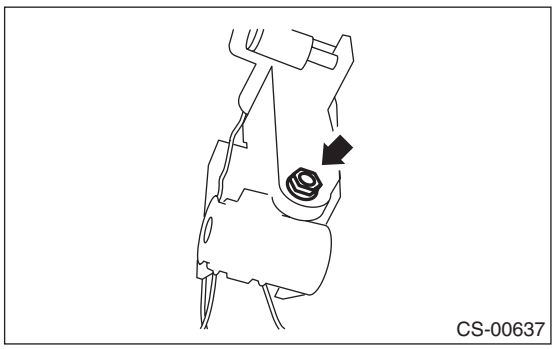
30) Remove the selector arm assembly.



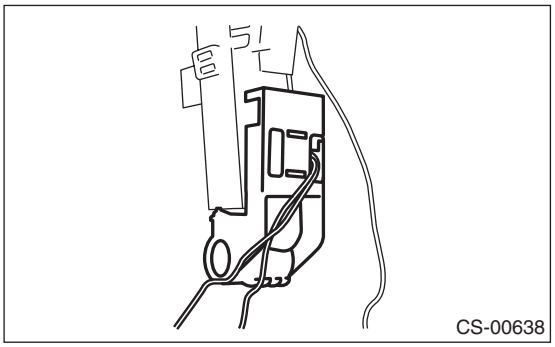
31) Remove the clip while being careful not to break the pin, then remove the shift button switch.



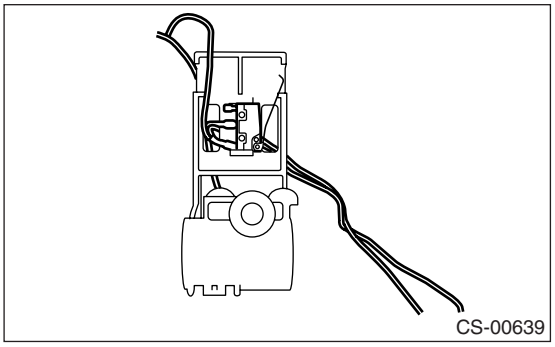
32) Remove the select shaft.



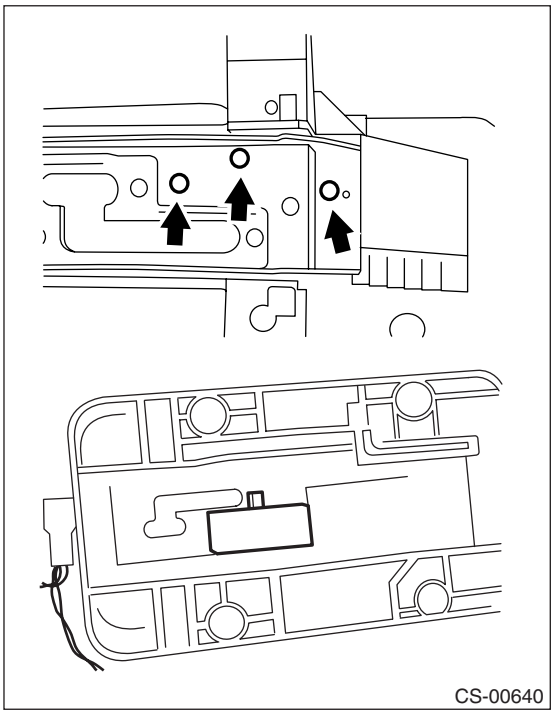
33) Remove the tube cross plate.



34) Remove the mode change switch.



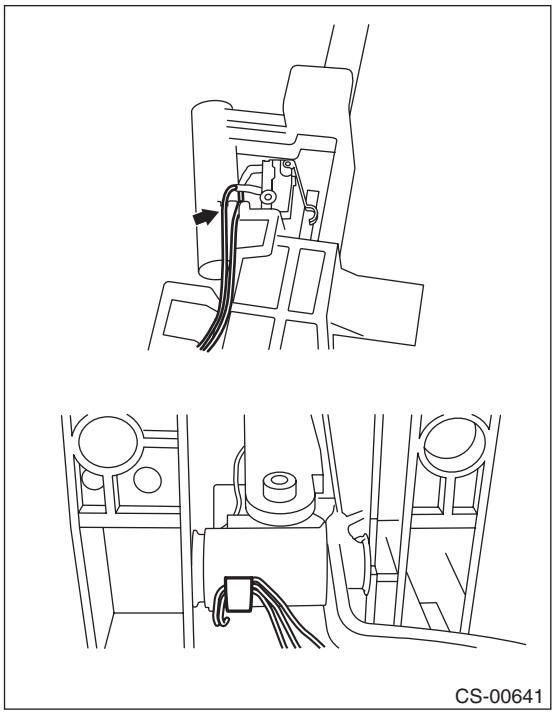
35) Remove the detent check block.



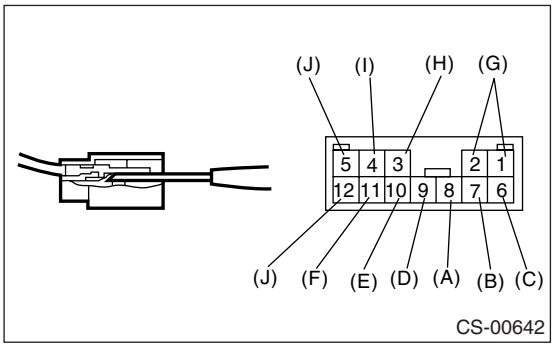
D: ASSEMBLY

1) Clean all the parts before assembly.
2) Apply grease [Multemp AC-D, and SH-W 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 (wire color: Red)
(H) Shift lock solenoid (color code: Blue)
(I) Shift lock solenoid (color code: Black)
(J) Indicator lamp (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.

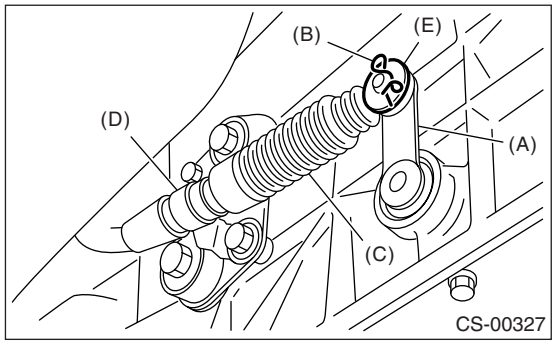
E: INSPECTION

1) Inspect the removed parts by comparing with new ones for deformation, damage and wear. Repair or replace if defective.
2) Confirm the select lever operating condition before assembly. Normal if it operates smoothly.

4. Select Cable

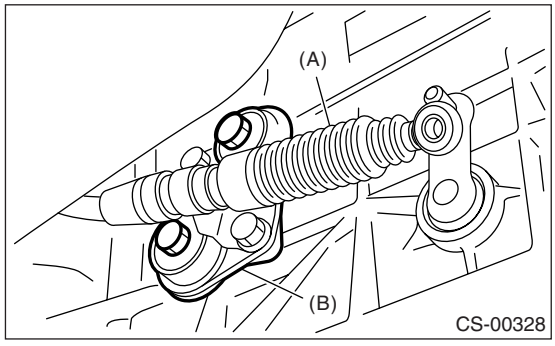
A: REMOVAL

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, center and rear exhaust pipes and muffler. <Ref. to EX(H6DO)-4, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-6, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Muffler.>
6) Remove the heat shield cover.
7) Remove the snap pin and washer from range select lever.



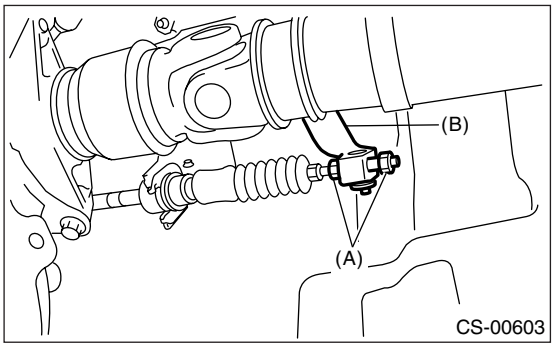
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Bracket
(E) Washer

8) Remove the plate assembly from the transmission case.



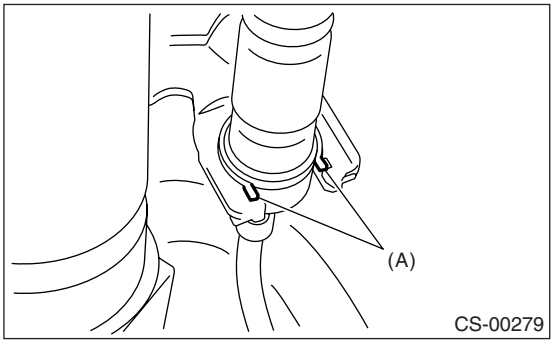
(A) Select cable
(B) Plate ASSY

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.



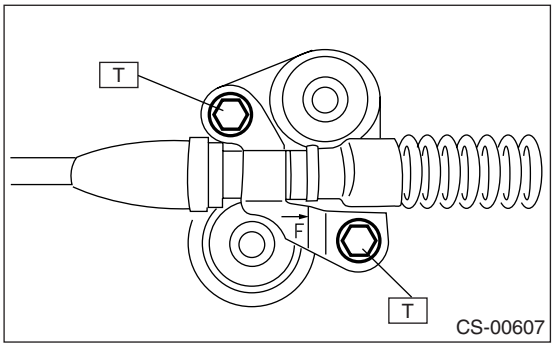
(A) Claw

11) Remove the select cable from plate assembly.

B: INSTALLATION

1) Install the select cable to plate assembly.

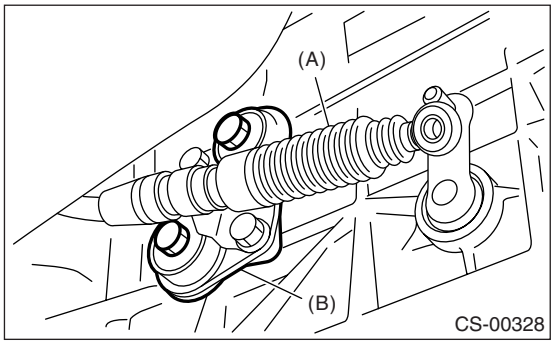
Tightening torque:
T: 18 N·m (1.8 kgf-m, 13.3 ft-lb)



2) Install the select cable to range select lever.

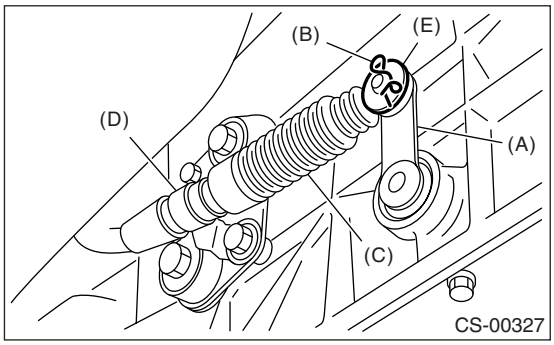
3) Install the plate assembly to transmission.

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



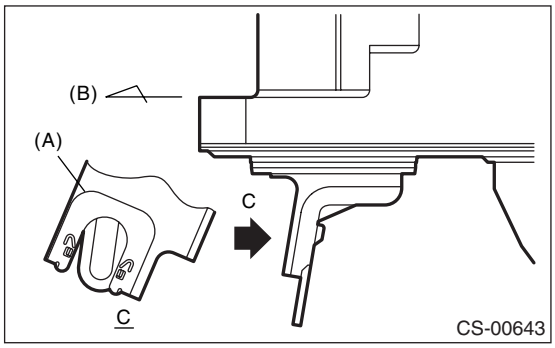
(A) Select cable
(B) Plate ASSY

4) Install the washer and snap pin to range select lever.



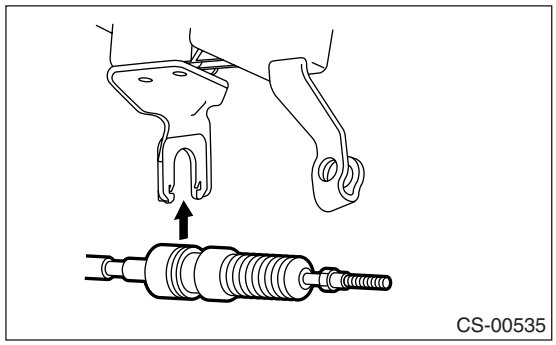
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Bracket
(E) Washer

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.



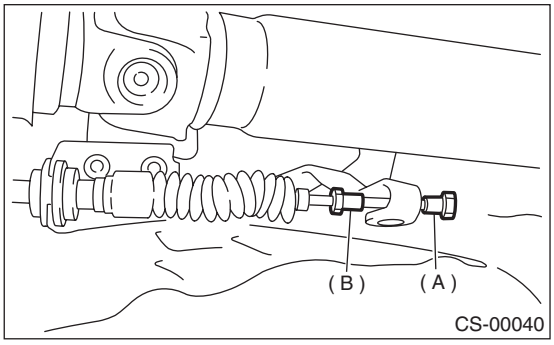
7) Shift the select lever to the “N” range, and then adjust the select cable position. <Ref. to CS-28, ADJUSTMENT, Select Cable.>
8) Install the heat shield cover.
9) Install the front, center and rear exhaust pipe, and the muffler. <Ref. to EX(H6DO)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-7, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-8, INSTALLATION, Muffler.>

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.

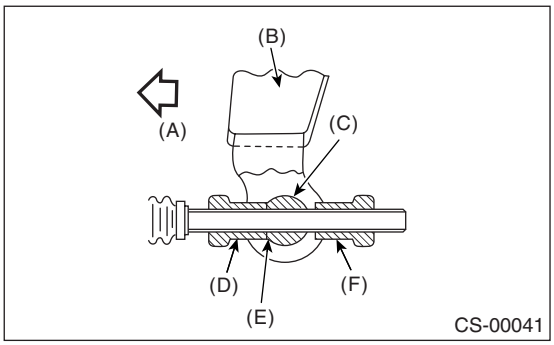
D: ADJUSTMENT

1) Shift the select lever to “N” range.
2) Remove the rear exhaust pipe and muffler. <Ref. to EX(H6DO)-6, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Muffler.>
3) Remove the heat shield cover.
4) Loosen the adjusting nuts on both sides.



(A) Adjusting nut A
(B) Adjusting nut B

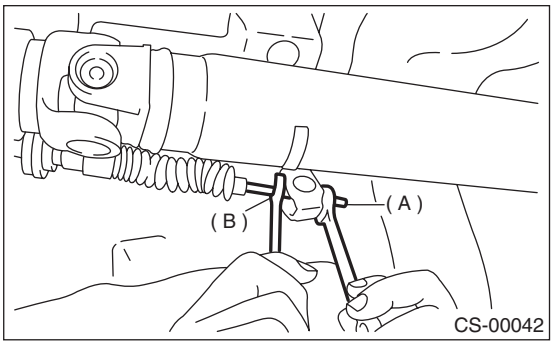
5) With the select lever pushed towards the rear of the vehicle, turn the adjustment nut B until it just contacts the connector. Then loosen the nut for a half a turn.



(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 (0.76 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.

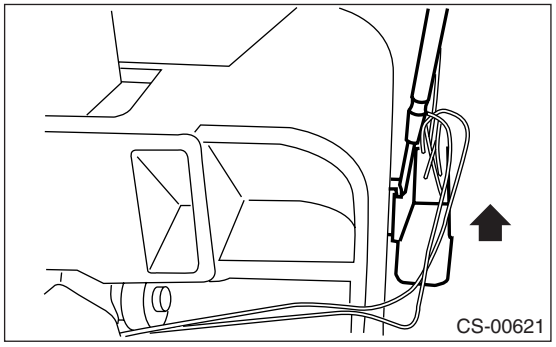
5. AT Shift Lock Solenoid and “P” Range Switch

A: REMOVAL

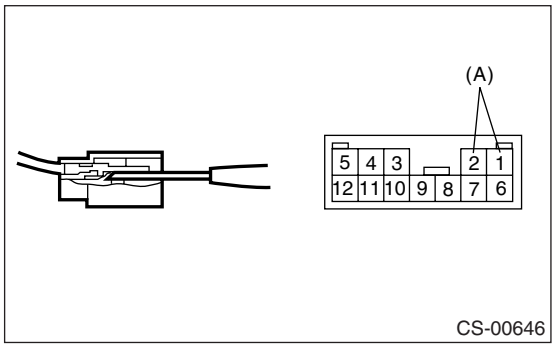
NOTE:
For removal of the mode change switch and the shift button switch, refer to the section on Select Levers. <Ref. to CS-20, DISASSEMBLY, Select Lever.>

1. “P” RANGE SWITCH

1) Remove the console box. <Ref. to EI-38, REMOVAL, Console Box.>
2) Disconnect the connector.
3) Remove the connector from the base plate using a flat-tip screwdriver.

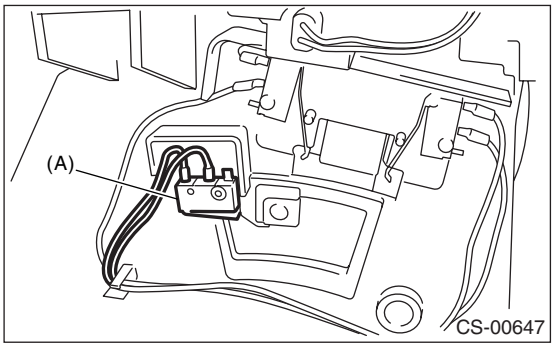


4) Disconnect the terminal of “P” range switch from connector, using a flat-tip screwdriver with thin tip.



(A) “P” range switch

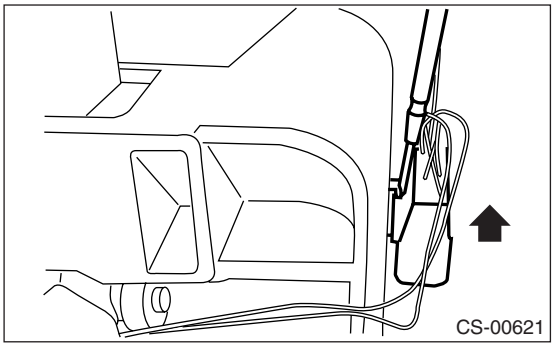
5) Remove the clip while being careful not to break the pin, then remove the “P” range switch.



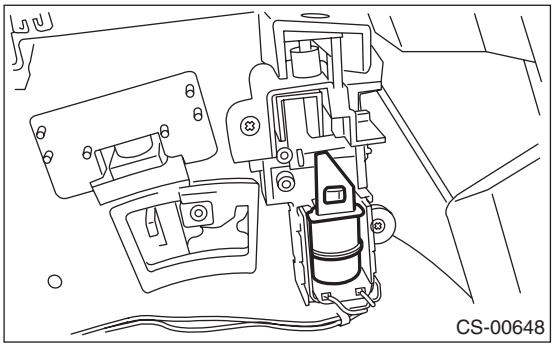
(A) “P” range switch

2. AT SHIFT LOCK SOLENOID

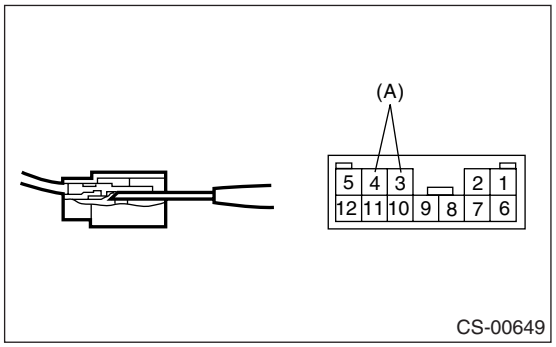
1) Remove the console box. <Ref. to EI-38, REMOVAL, Console Box.>
2) Disconnect the connector.
3) Remove the connector from the base plate using a flat-tip screwdriver.



4) Remove the AT shift lock solenoid.



5) Disconnect the terminal of AT shift lock solenoid from the connector, using a flat-tip screwdriver.



(A) AT shift lock solenoid

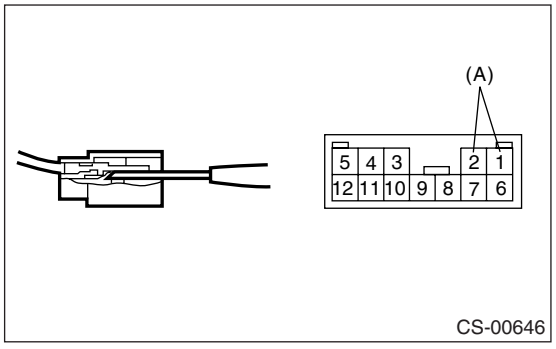
B: INSTALLATION

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.

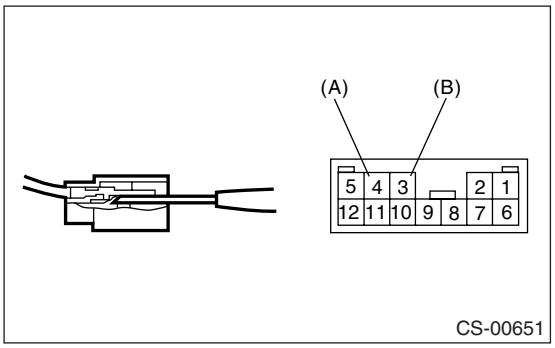


(A) “P” range switch (wire color: Red)

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 (wire color: Blue)

C: INSPECTION

	Step	Check	Yes	No
1	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid connector terminals. ***Terminals*** ***No. 4 — No. 3:***	Is the resistance between 12 and 18 Ω?	Go to step **2**.	Replace the shift lock solenoid.
2	**CHECK SHIFT LOCK SOLENOID.** Connect the battery to shift lock solenoid connector terminal, and then operate the solenoid. ***Terminals*** ***No. 3 (+) — No. 4 (–):***	Does the shift lock solenoid operate normally?	Go to step **3**.	Replace the shift lock solenoid.
3	**CHECK “P” RANGE SWITCH.** 1) Move the select lever to “P” range. 2) Measure the resistance between “P” range switch connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **4**.	Replace the “P” range switch.
4	**CHECK “P” RANGE SWITCH.** 1) Set the select lever to a range other than the “P” range. 2) Measure the resistance between “P” range switch connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Normal operation	Replace the “P” range switch.

6. Body Integrated Unit

A: NOTE

Refer to “Body Integrated Unit” for removal and installation procedure. <Ref. to SL-52, 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.

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.

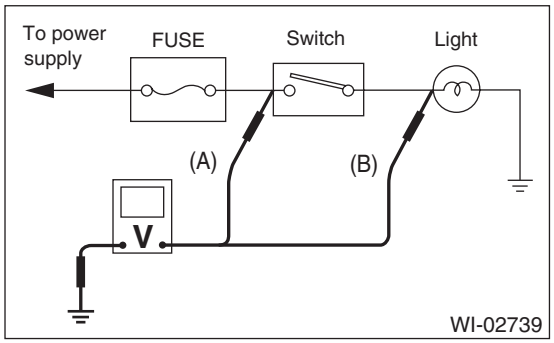
5. SYSTEM OPERATION CHECK

After repairing, ensure that the system operates properly.

B: BASIC INSPECTION

1. VOLTAGE MEASUREMENT

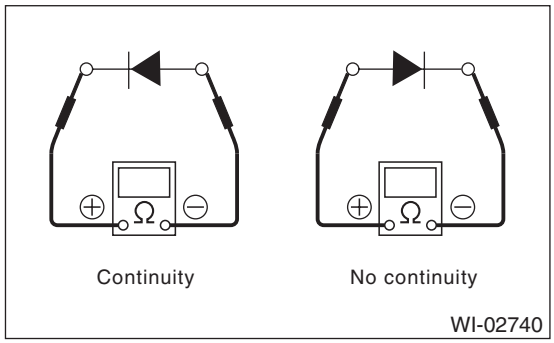
1) Using a voltmeter, connect the negative lead to a good ground point or negative battery terminal and the positive lead to the connector or component terminal.
2) Contact the positive lead of the voltmeter on connector (A). The voltmeter will indicate a voltage.
3) Shift the positive lead to connector (B). The voltmeter will indicate no voltage.



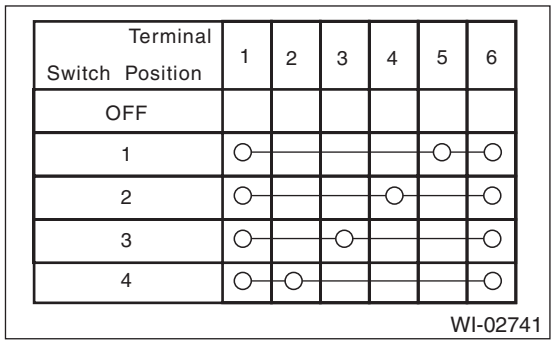
4) With the test set-up held as it is, turn the switch ON. The voltmeter will indicate a voltage and, at the same time, the light will come on.
5) The circuit is in good order. If a problem such as a light failing to illuminate occurs, use the procedures outlined above to track down the malfunction.

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.



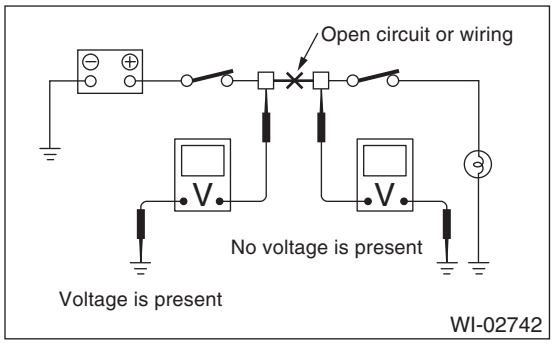
3) The symbol"○ — ○" indicates that continuity exists between two points or terminals. For example, when a switch position is at "3", continuity exists among terminals 1, 3 and 6, as shown in the table below.



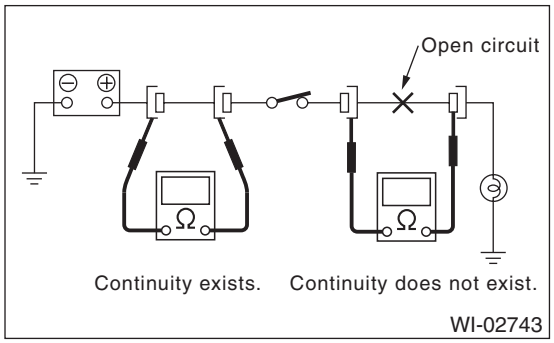
Switch Position \ Terminal	1	2	3	4	5	6
OFF						
1	○				○	○
2	○			○		○
3	○		○			○
4	○	○				○

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.

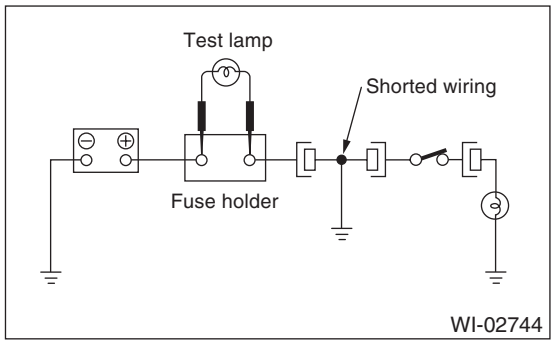


2) WITH OHMMETER:
Disconnect all connectors affected, and check continuity in the wiring between adjacent connectors. When the ohmmeter indicates “infinite”, the wiring is open.

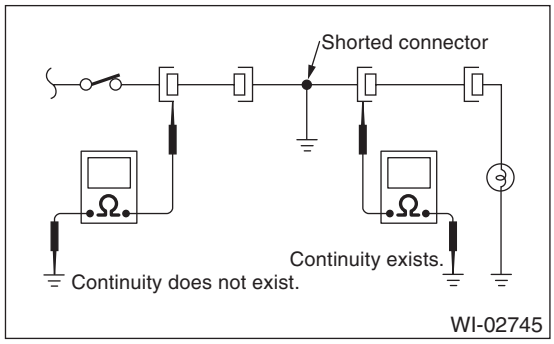


4. HOW TO DETERMINE A SHORT CIRCUIT

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.

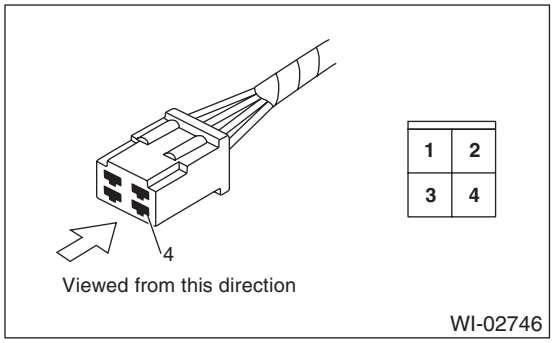


C: HOW TO READ WIRING DIAGRAMS

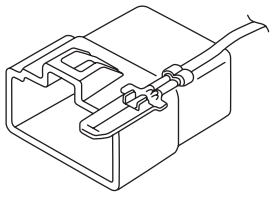
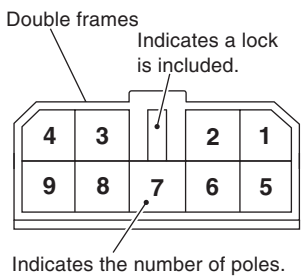
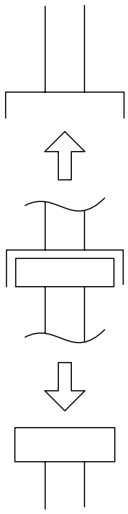
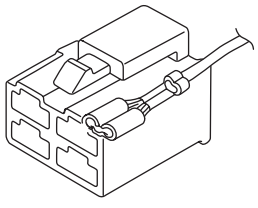
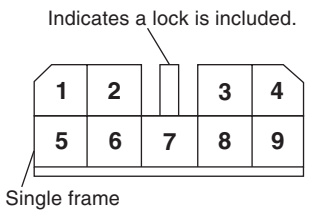
1. WIRING DIAGRAM

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.

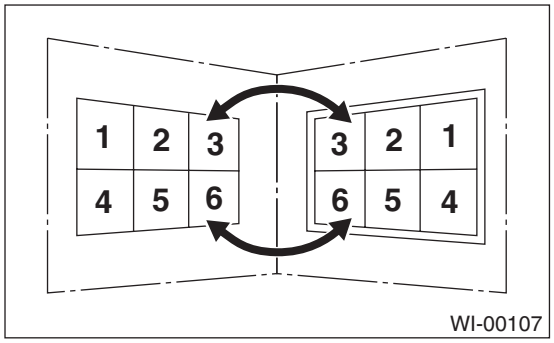


- The number of poles or pins, presence of a lock are indicated in the sketch of each connector. In the sketch, the highest pole number refers to the number of poles which the connector has. For example, the sketch of the connector shown in figure indicates the connector has 9 poles.

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

WI-02747

• 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.



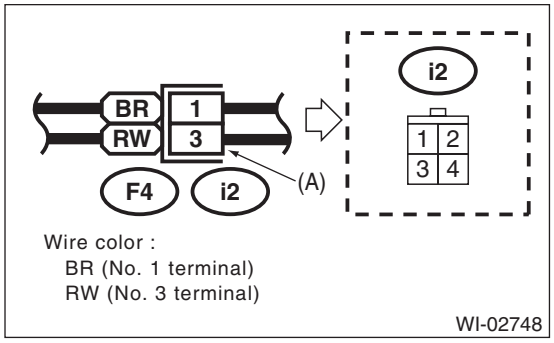
• WIRING DIAGRAM:

The connectors are numbered along with the number of poles, external colors, and mating connections in the accompanying list.

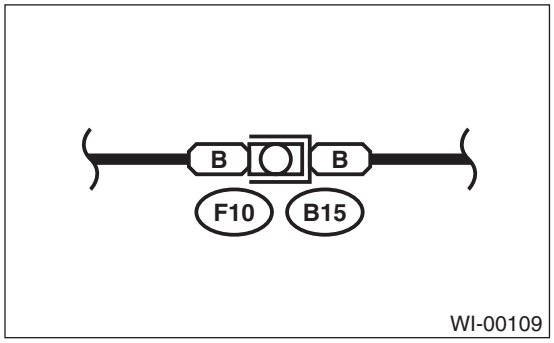
• The sketch of each connector in the wiring diagram usually shows the (A) side of the connector. The relationship between the wire color, terminal number and connector is described in the figure.

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.

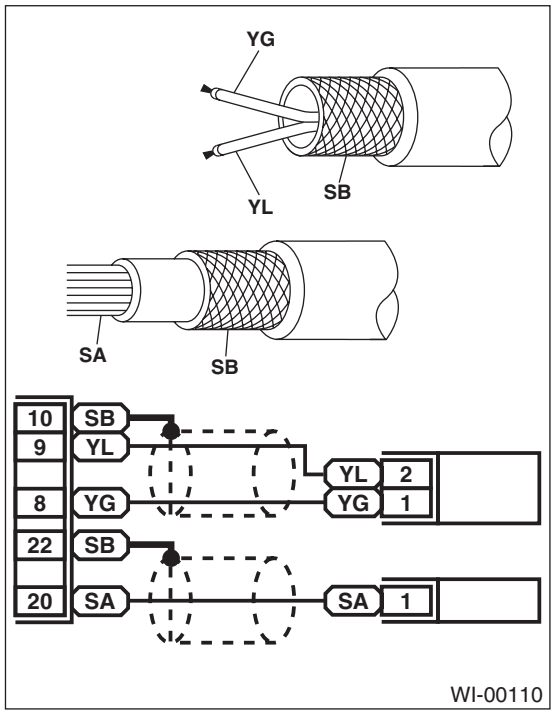


• In the wiring diagram, connectors which have no terminal number refer to one-pole types. Sketches of these connectors are omitted intentionally.

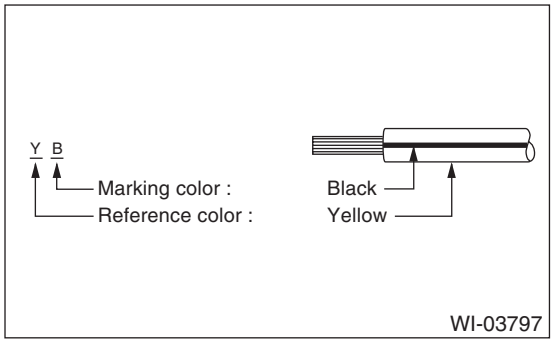


• The following color codes are used to indicate the colors of the wires.

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.



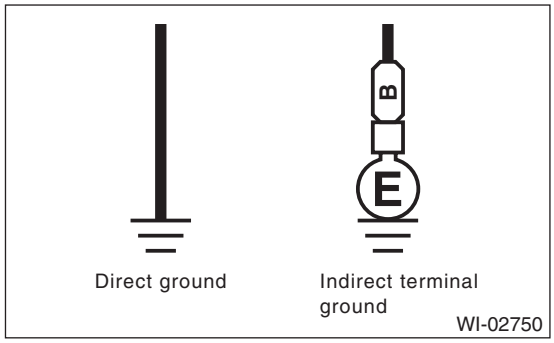
• The table lists the nominal sectional areas and allowable currents of the wires.

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.

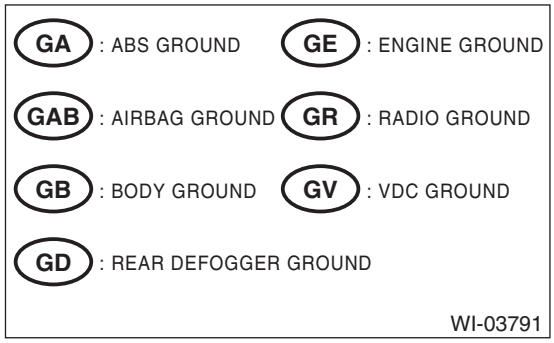
Nominal sectional area mm^2	No. of strands/ strand diameter	Outside diameter of wiring mm	Allowable current Amps/ 40°C (104°F)
0.3	7/0.26	1.8	7
0.5	7/0.32	2.2 (or 2.0)	12
0.75	30/0.18	2.6 (or 2.4)	16
0.85	11/0.32	2.4 (or 2.2)	16
1.25	16/0.32	2.7 (or 2.5)	21
2	26/0.32	3.1 (or 2.9)	28
3	41/0.32	3.8 (or 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.



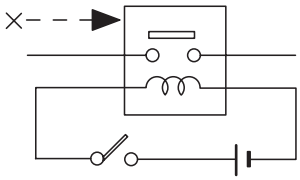
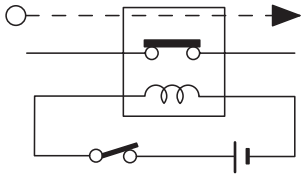
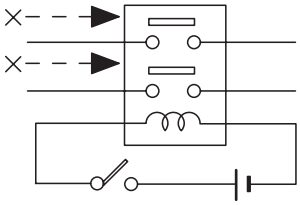
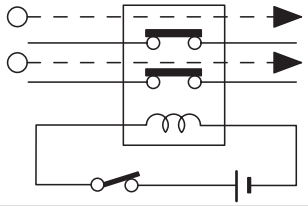
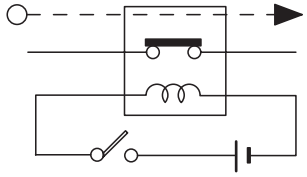
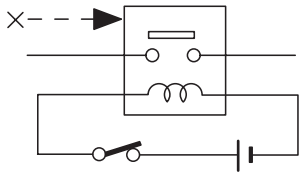
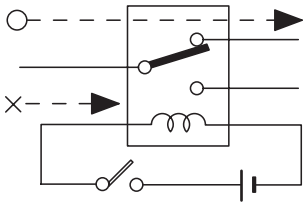
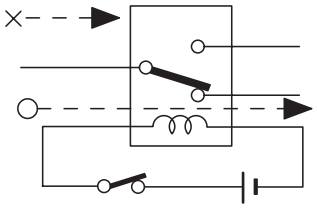
• The ground points shown in the wiring diagram refer to the following:

NOTE:
All wiring harnesses are provided with a ground point which should be securely connected.



- Relays are classified as normally-open or normally-closed.

The normally-closed relay has one or more contacts. The wiring diagram shows the relay mode when the energizing circuit is OFF.

Relay type		Energizing circuit OFF	Energizing circuit ON
Normally-open type	4-pole		
	6-pole		
Normally-closed type	4-pole		
Mixed type	6-pole		

Key to symbols:

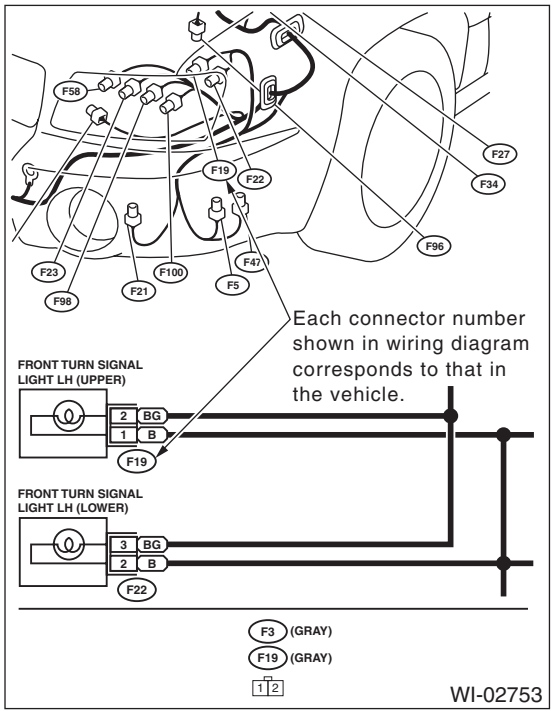
○ ⟶ : Current flows.

× ⟶ : Current does not flow.

WI-02752

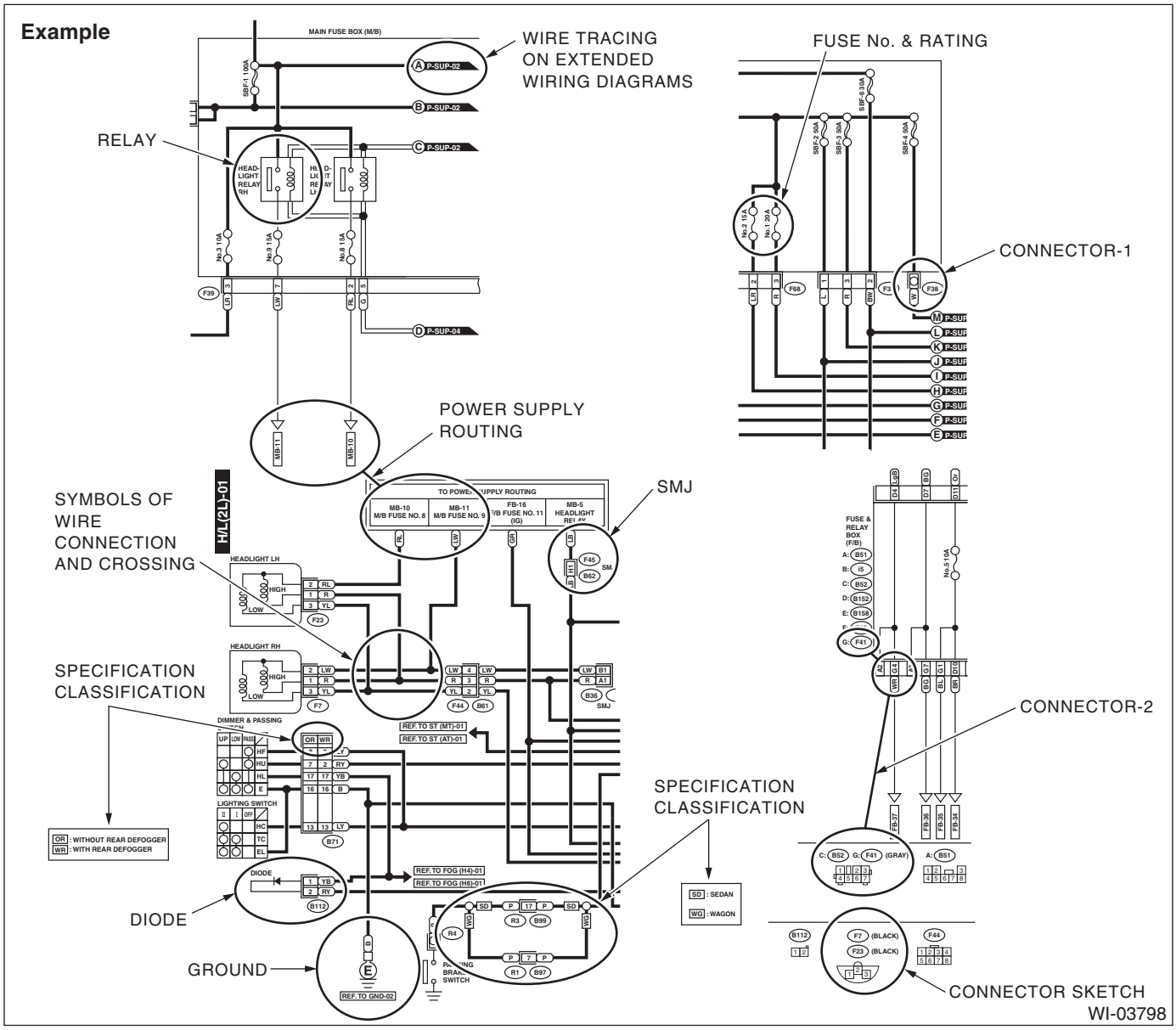
• Each connector number shown in the wiring diagram corresponds to that in the wiring harness. The location of each connector in the actual vehicle is determined by reading the first character of the connector (for example, a “F” for F8, “i” for i16, etc.) and the type of wiring harness. The first character 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



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.

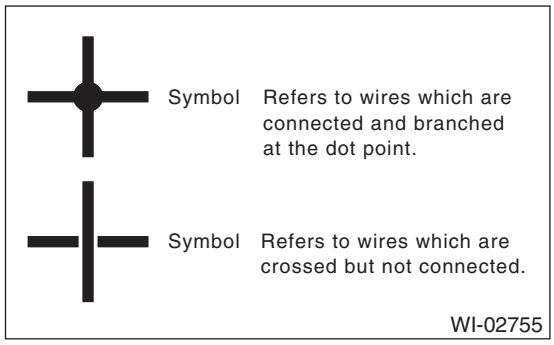
8. DIODE

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 ←→ B, B ←→ B

10.SYMBOLS OF WIRE CONNECTION AND CROSSING



11.POWER SUPPLY CIRCUIT

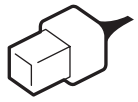
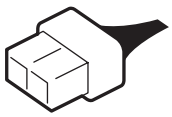
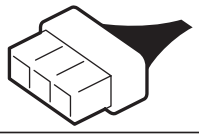
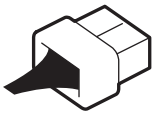
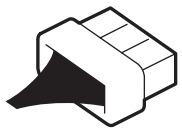
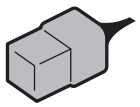
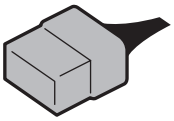
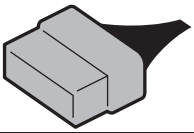
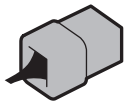
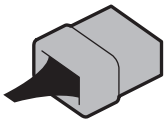
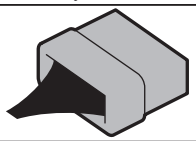
A symbol is used to indicate the power supply in each wiring diagram.
“MB-5”, “MB-6”, etc., which are used as power-supply symbols throughout the text, correspond with those shown in the “DC POWER SUPPLY CIRCUIT” in the wiring diagram.
Accordingly, using the “DC POWER SUPPLY CIRCUIT” and wiring diagrams permits service personnel to understand the entire electrical arrangement of a system.

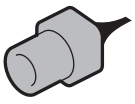
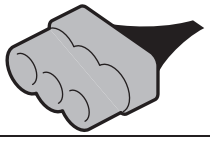
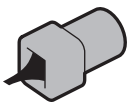
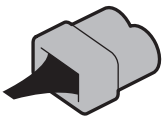
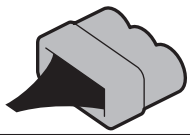
12.CLASSIFICATION BY SPECIFICATION

When the wiring diagram differ according to vehicle specifications, the specification difference is described by using abbreviations.

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		
		
		

WI-02756

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
AT	Electronically controlled fully-automatic
AUX	Auxiliary
AWD	All Wheel Drive
CAN	Controller Area Network
CPC	Canister Purge Control
CPU	Central Processing Unit
ECM	Engine Control Module (ECM)
EEPROM	Electronically Erasable and Programmable Read Only Memory
F/B	Fuse & Relay box
FWD	Front Wheel Drive
H/L	Headlight
I/F	Interface
IG	Ignition
L, LH	Left Hand
LCD	Liquid Crystal Display
M/B	Main fuse box
MFD	Multi Function Display
OP	Optional Parts or Open
PWM	Pulse Width Modulation
R, RH	Right Hand
SBF	Slow Blow Fuse
ST	Starter
TCS	Traction Control System
TCM	AT Control Module
TPM	Tire Pressure Monitor
TV	Television
U, UP	Up
VDC	Vehicle Dynamics Control
VVL	Variable Valve Lift

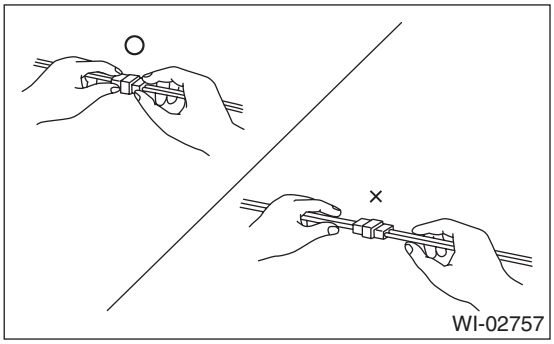
2. Working Precautions

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

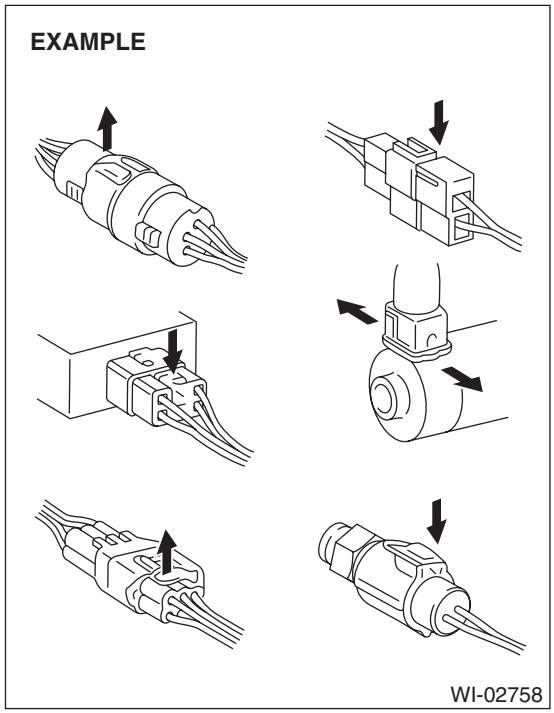
1) When working under a vehicle which is jacked-up, always be sure to use rigid rack.
2) The parking brake must always be applied during working. Also, in automatic transmission vehicles, keep the select lever set to the P (Parking) range.
3) Be sure the workshop is properly ventilated when running the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

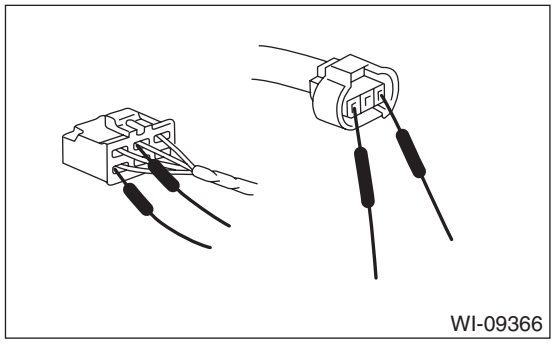
1) The battery cable must be disconnected from the battery's (–) terminal, and the ignition switch must be set to the OFF position, unless otherwise required by the diagnostics.
2) Securely fasten the wiring harness with clamps and slips so that the harness does not interfere with the body end parts or edges and bolts or screws.
3) When installing parts, be careful not to catch them on the wiring harness.
4) When disconnecting a connector, do not pull the wires, but pull while holding the connector body.



5) Some connectors are provided with a lock. One type of such a connector is disconnected by pushing the lock, and the other, by moving the lock up. In either type the lock shape must be identified before attempting to disconnect the connector.
To connect, insert the connector until it snaps and confirm that it is 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.

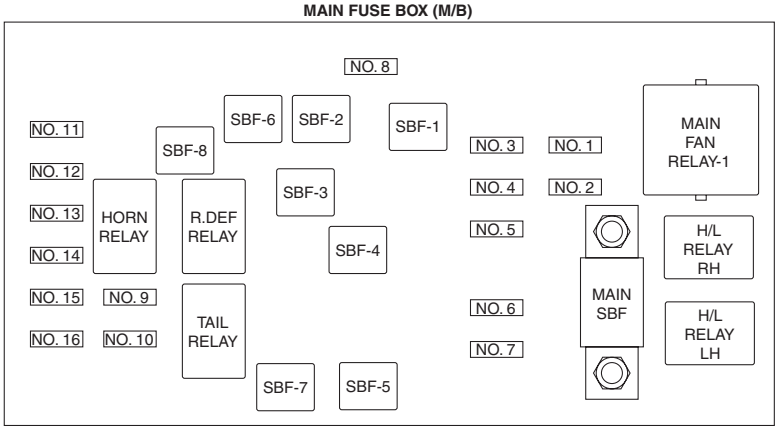
3. Power Supply Circuit

A: WIRING DIAGRAM

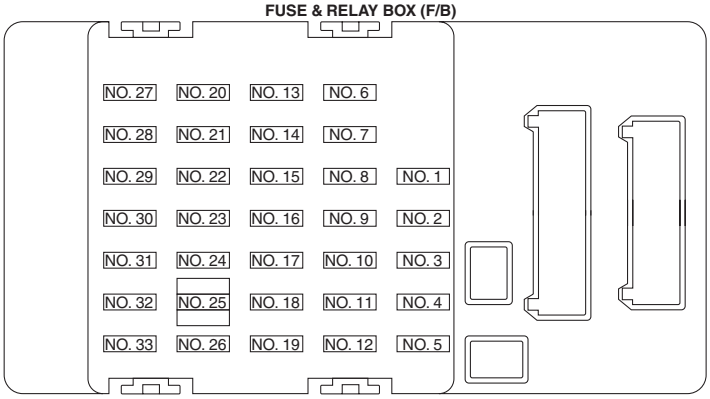
P-SUP-01

P-SUP-01

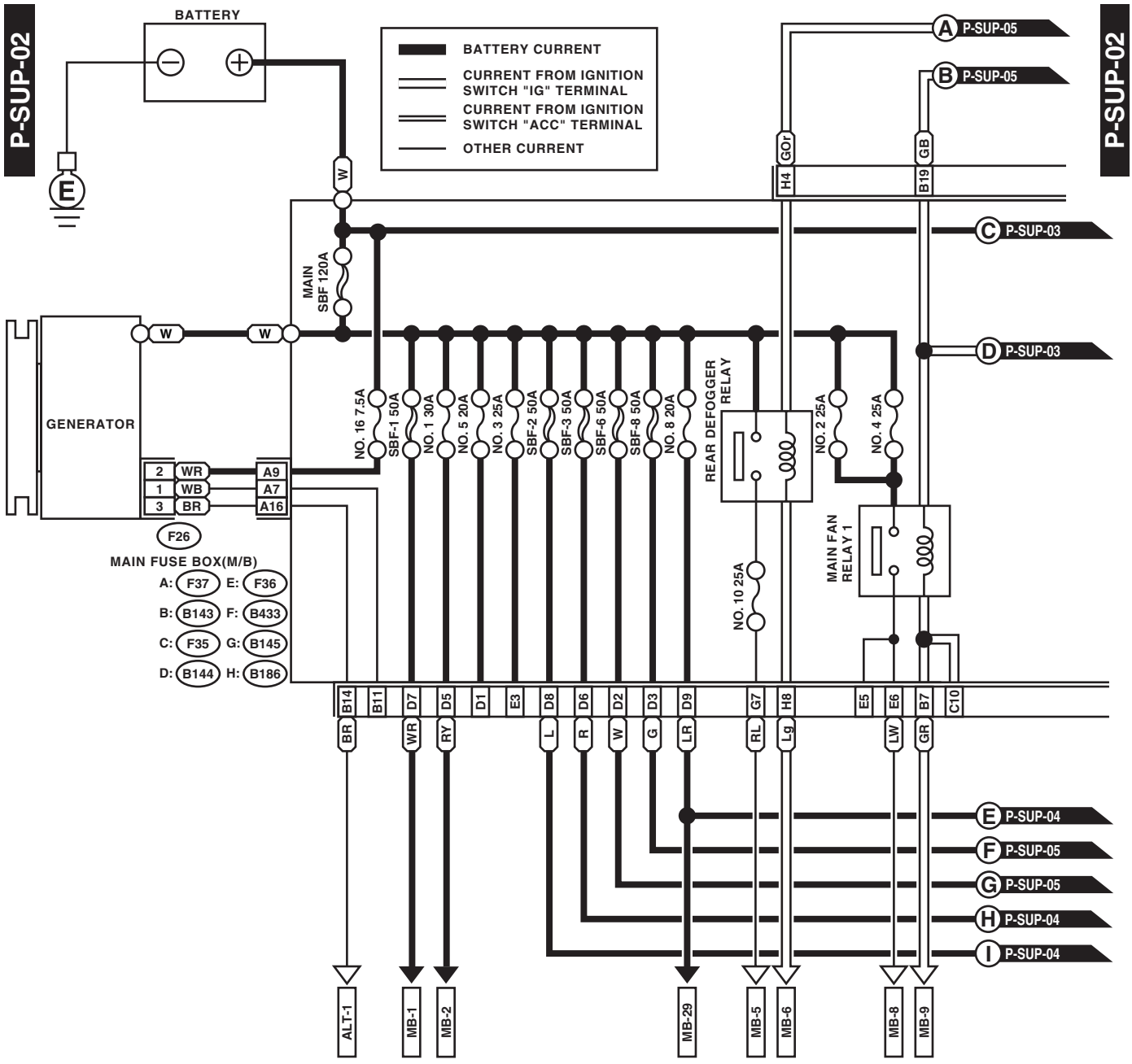
MAIN FUSE BOX (M/B)

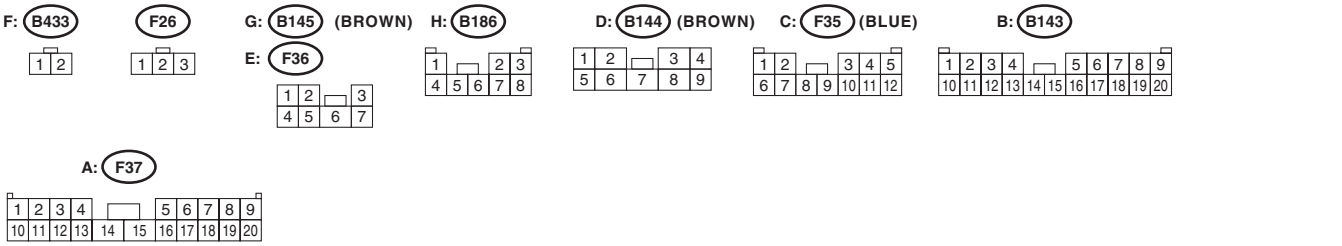


FUSE & RELAY BOX (F/B)

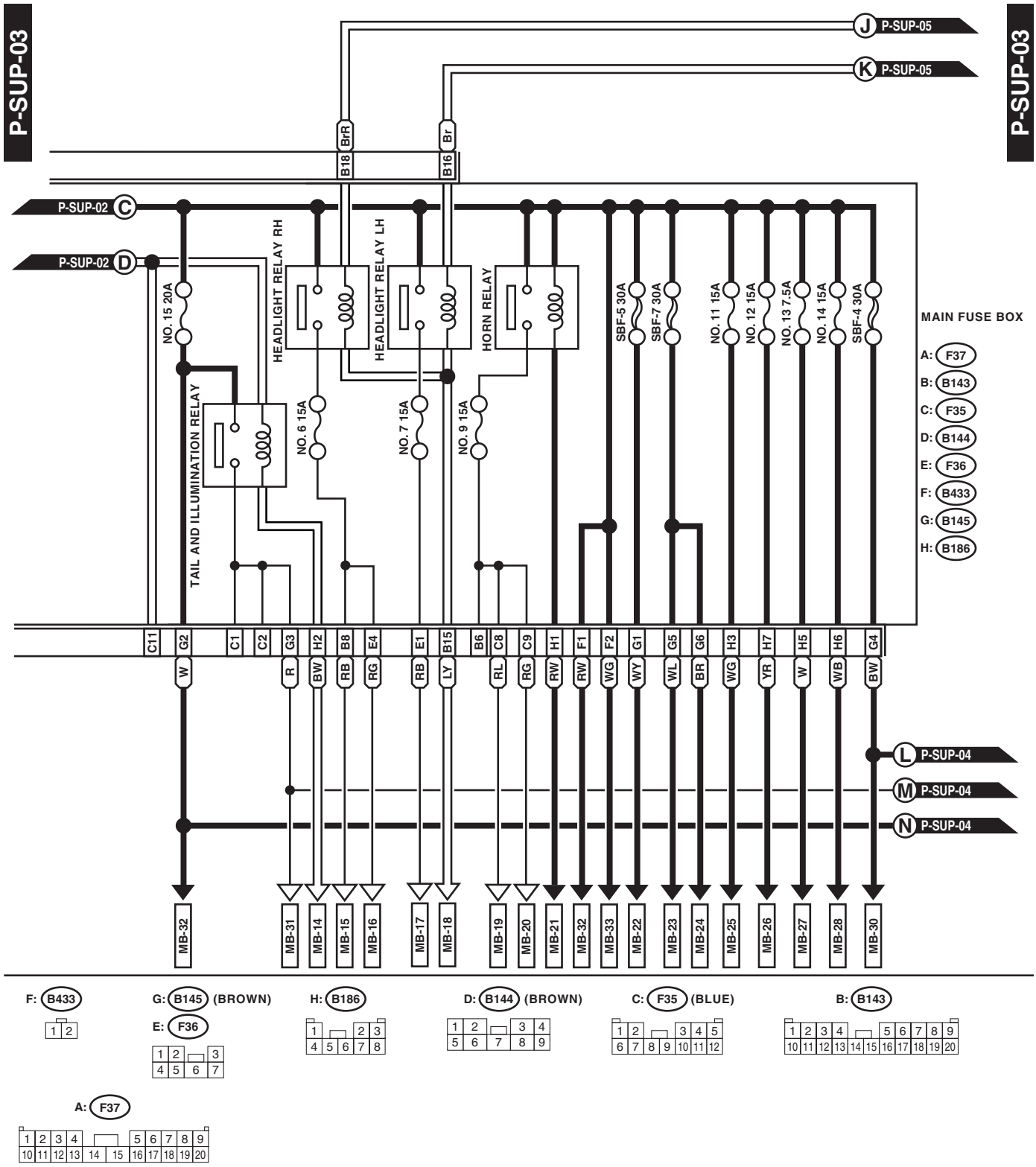


WI-08510

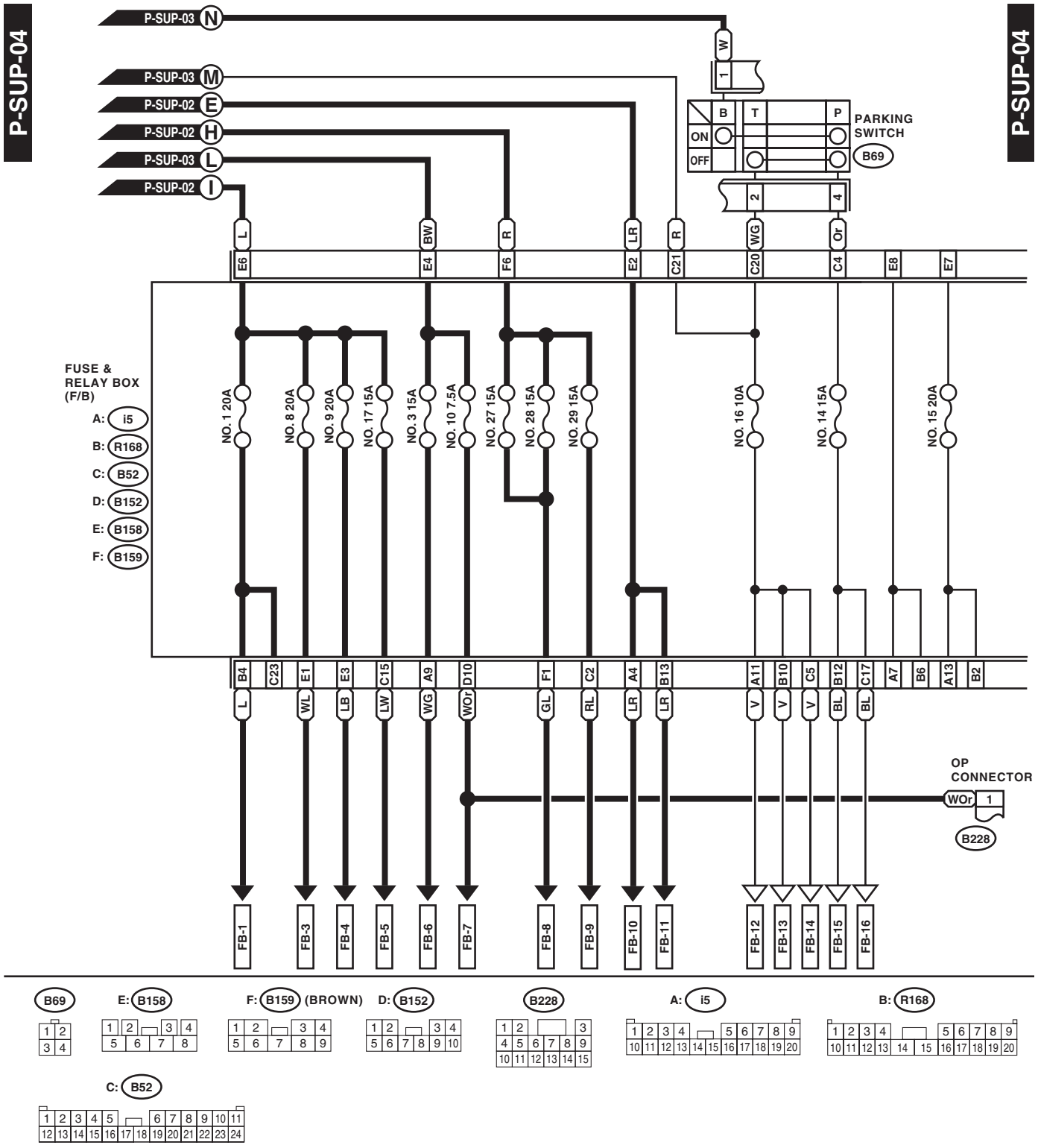

P-SUP-02
BATTERY
BATTERY CURRENT
CURRENT FROM IGNITION SWITCH "IG" TERMINAL
CURRENT FROM IGNITION SWITCH "ACC" TERMINAL
OTHER CURRENT
A P-SUP-05
B P-SUP-05
C P-SUP-03
D P-SUP-03
E P-SUP-04
F P-SUP-05
G P-SUP-05
H P-SUP-04
I P-SUP-04
GENERATOR
MAIN SBF 120A
NO. 16 7.5A
SBF-1 50A
NO. 1 30A
NO. 5 20A
NO. 3 25A
SBF-2 50A
SBF-3 50A
SBF-6 50A
SBF-8 50A
NO. 8 20A
REAR DEFOGGER RELAY
NO. 2 25A
NO. 4 25A
NO. 10 25A
MAIN FAN RELAY 1
MAIN FUSE BOX(M/B)
A: F37 E: F36
B: B143 F: B433
C: F35 G: B145
D: B144 H: B186
F26
ALT-1
MB-1
MB-2
MB-29
MB-5
MB-6
MB-8
MB-9


F: B433
F26
G: B145 (BROWN)
E: F36
H: B186
D: B144 (BROWN)
C: F35 (BLUE)
B: B143
A: F37

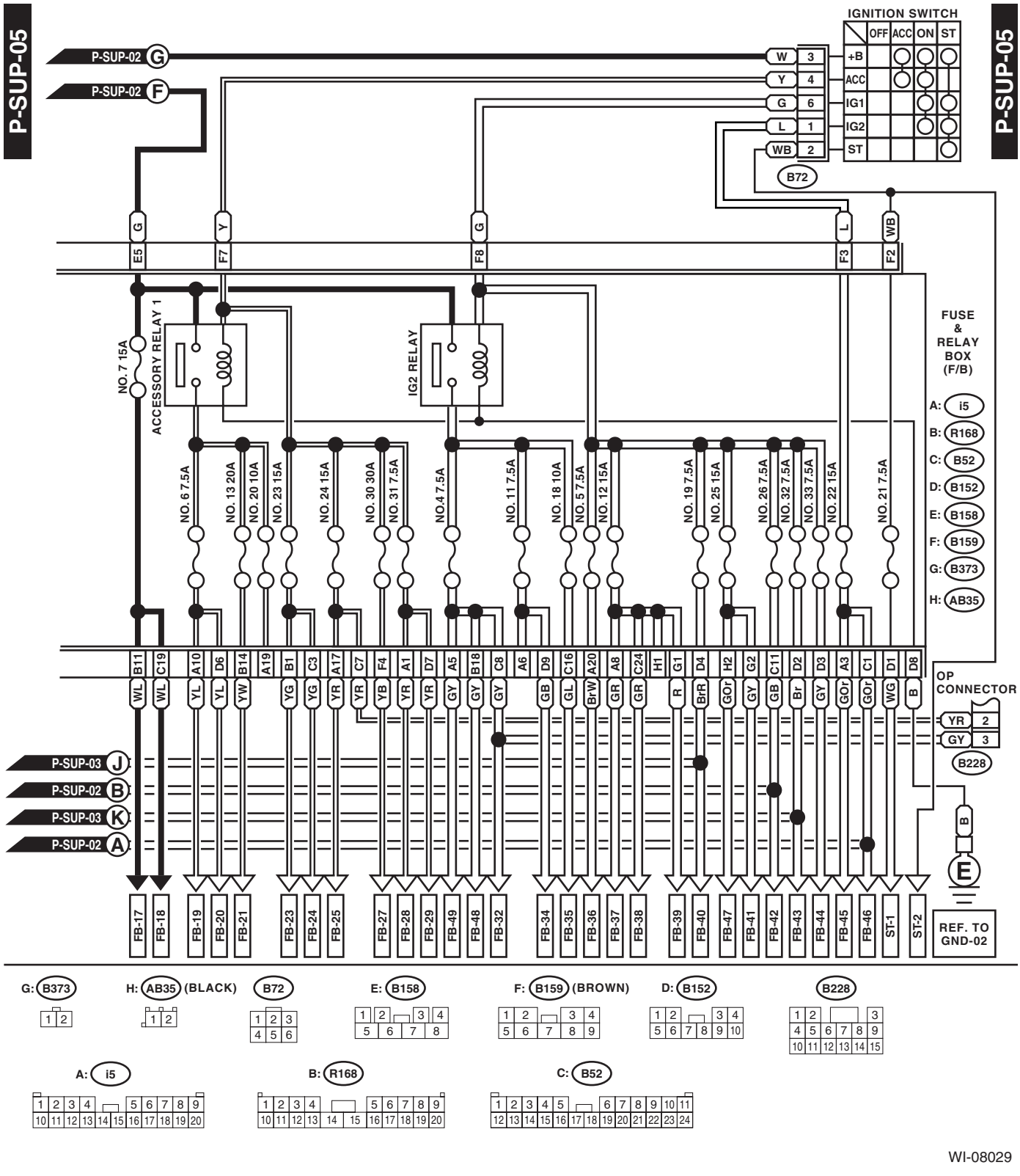
WI-08026


P-SUP-03
P-SUP-03
J P-SUP-05
K P-SUP-05
BrR
Br
B18
B16
P-SUP-02 C
P-SUP-02 D
NO. 15 20A
HEADLIGHT RELAY RH
HEADLIGHT RELAY LH
HORN RELAY
SBF-5 30A
SBF-7 30A
NO. 11 15A
NO. 12 15A
NO. 13 7.5A
NO. 14 15A
SBF-4 30A
MAIN FUSE BOX
A: F37
B: B143
C: F35
D: B144
E: F36
F: B433
G: B145
H: B186
TAIL AND ILLUMINATION RELAY
NO. 6 15A
NO. 7 15A
NO. 9 15A
C11 G2 C1 C2 G3 H2 B8 E4 E1 B15 B6 C8 C9 H1 F1 F2 G1 G5 G6 H3 H7 H5 H6 G4
W R BW RB RG RB LY RL RG RW RW WG WY WL BR WG YR W WB BW
L P-SUP-04
M P-SUP-04
N P-SUP-04
MB-32 MB-31 MB-14 MB-15 MB-16 MB-17 MB-18 MB-19 MB-20 MB-21 MB-32 MB-33 MB-22 MB-23 MB-24 MB-25 MB-26 MB-27 MB-28 MB-30
F: B433
G: B145 (BROWN)
E: F36
H: B186
D: B144 (BROWN)
C: F35 (BLUE)
B: B143
A: F37

WI-08027


P-SUP-04
P-SUP-04
P-SUP-03 N
P-SUP-03 M
P-SUP-02 E
P-SUP-02 H
P-SUP-03 L
P-SUP-02 I
PARKING SWITCH
B69
ON
OFF
FUSE & RELAY BOX (F/B)
A: i5
B: R168
C: B52
D: B152
E: B158
F: B159
NO. 1 20A
NO. 8 20A
NO. 9 20A
NO. 17 15A
NO. 3 15A
NO. 10 7.5A
NO. 27 15A
NO. 28 15A
NO. 29 15A
NO. 16 10A
NO. 14 15A
NO. 15 20A
OP CONNECTOR
B228
FB-1
FB-3
FB-4
FB-5
FB-6
FB-7
FB-8
FB-9
FB-10
FB-11
FB-12
FB-13
FB-14
FB-15
FB-16
B69
E: B158
F: B159 (BROWN)
D: B152
B228
A: i5
B: R168
C: B52

WI-08028


P-SUP-05
P-SUP-05
IGNITION SWITCH
OFF ACC ON ST
+B
ACC
IG1
IG2
ST
P-SUP-02 G
P-SUP-02 F
W 3
Y 4
G 6
L 1
WB 2
B72
G E5
Y F7
G F8
L F3
WB F2
NO. 7 15A
ACCESSORY RELAY 1
IG2 RELAY
FUSE & RELAY BOX (F/B)
A: i5
B: R168
C: B52
D: B152
E: B158
F: B159
G: B373
H: AB35
NO. 6 7.5A
NO. 13 20A
NO. 20 10A
NO. 23 15A
NO. 24 15A
NO. 30 30A
NO. 31 7.5A
NO.4 7.5A
NO. 11 7.5A
NO. 18 10A
NO. 5 7.5A
NO. 12 15A
NO. 19 7.5A
NO. 25 15A
NO. 26 7.5A
NO. 32 7.5A
NO. 33 7.5A
NO. 22 15A
NO. 21 7.5A
B11 C19 A10 D6 B14 A19 B1 C3 A17 C7 F4 A1 D7 A5 B18 C8 A6 D9 C16 A20 A8 C24 H1 G1 D4 H2 G2 C11 D2 D3 A3 C1 D1 D8
WL WL YL YL YW YG YG YR YR YB YR YR GY GY GY GB GL BrW GR GR R BrR GOr GY GB Br GY GOr GOr WG B
OP CONNECTOR
YR 2
GY 3
B228
P-SUP-03 J
P-SUP-02 B
P-SUP-03 K
P-SUP-02 A
B
E
FB-17 FB-18 FB-19 FB-20 FB-21 FB-23 FB-24 FB-25 FB-27 FB-28 FB-29 FB-49 FB-48 FB-32 FB-34 FB-35 FB-36 FB-37 FB-38 FB-39 FB-40 FB-47 FB-41 FB-42 FB-43 FB-44 FB-45 FB-46 ST-1 ST-2
REF. TO GND-02
G: B373
H: AB35 (BLACK)
B72
E: B158
F: B159 (BROWN)
D: B152
B228
A: i5
B: R168
C: B52

WI-08029

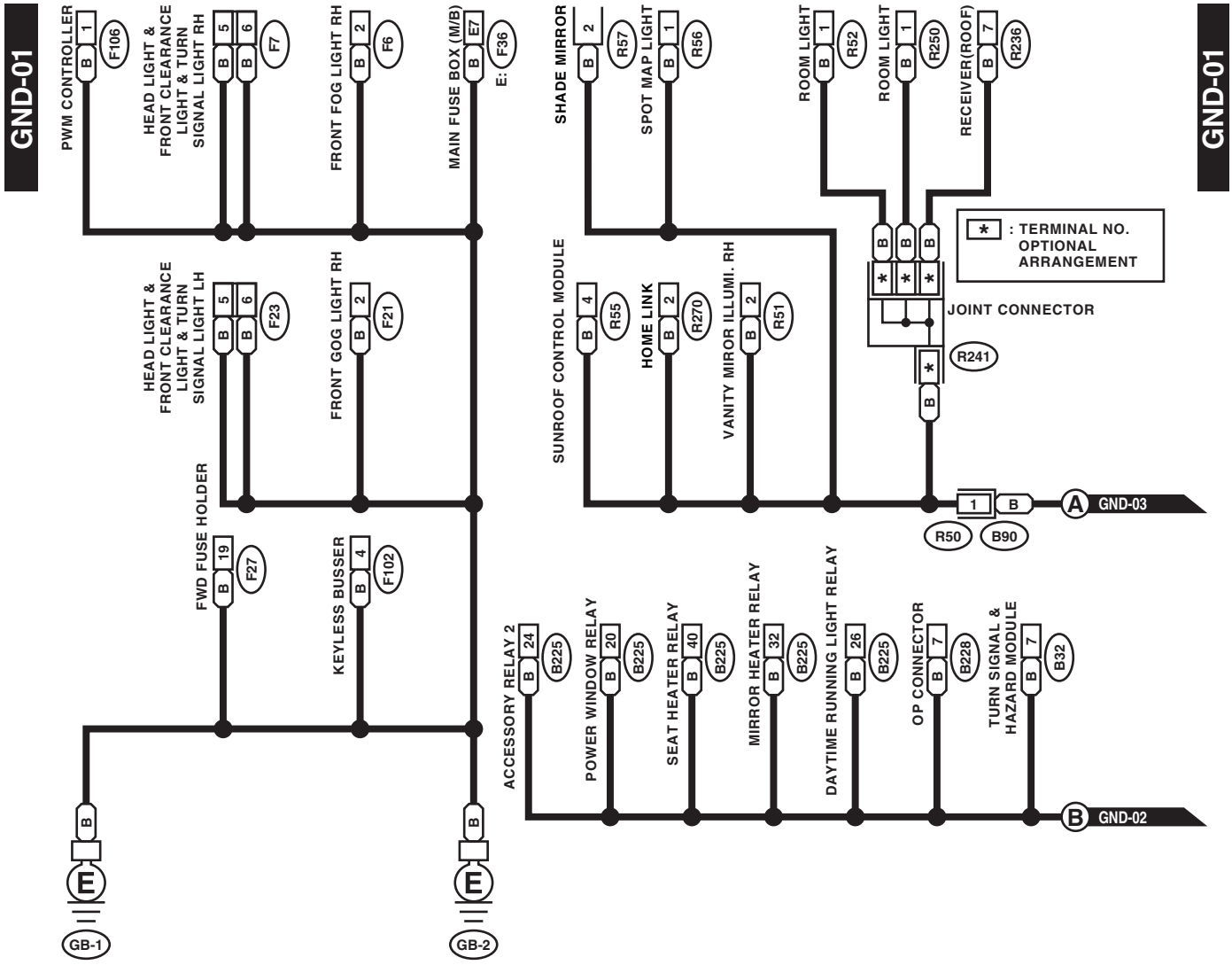
No.	Load
MB-1	Fail safe relay
MB-2	VDC control module
MB-5	Mirror heater relay Rear defogger
MB-6	Body integrated unit
MB-8	PWM controller
MB-9	ECM
MB-14	OP connector Lighting switch
MB-15	Combination meter
MB-16	Headlight RH
MB-17	Headlight LH
MB-18	OP connector Daytime running light control module
MB-19	Horn
MB-20	Horn
MB-21	Body integrated unit
MB-22	Ignition relay Main relay
MB-23	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 Turn signal & hazard unit Body integrated unit
MB-29	Auto A/C control module Spot map light Vanity mirror illumination light RH Handle light LH Handle light RH Foot light (Driver's seat) Foot light (Passenger's seat) Home link Body integrated unit
MB-30	Power window circuit breaker
MB-31	F/B fuse No. 16
MB-32	ALT-1 ECM Parking light switch
MB-33	Blower fan relay
MB-34	Accessory relay 2 Vacuum pump relay
ALT-1	ECM
FB-1	Trailer connector
FB-3	Stop light & brake switch Stop light switch
FB-4	Mirror heater relay Wiper deicer relay
FB-5	Seat heater relay
FB-6	Body integrated unit
FB-8	Rear cooler relay
FB-9	Front fog light relay

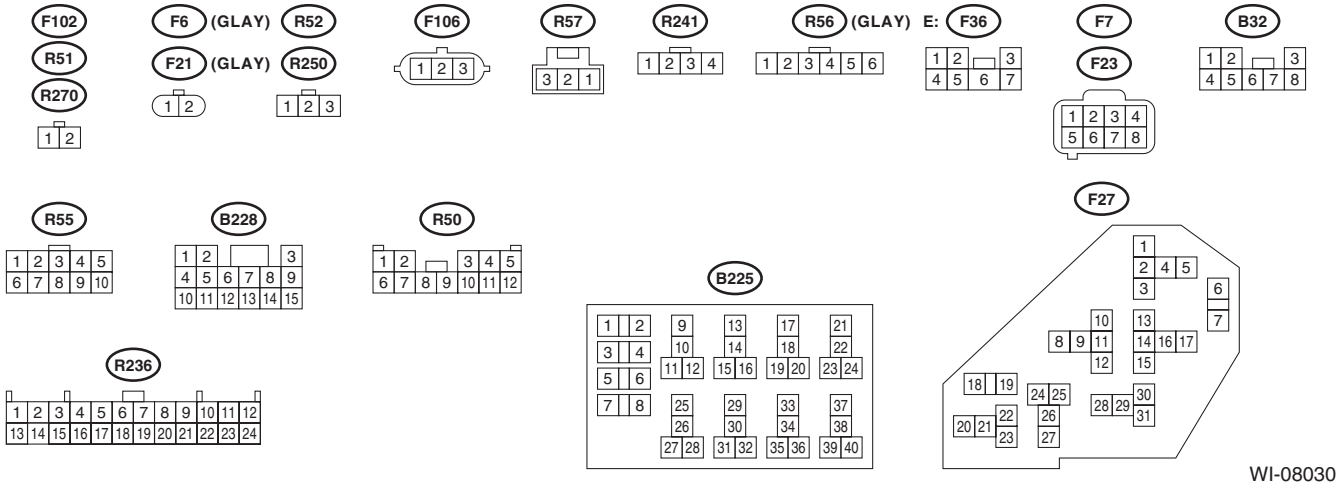
No.	Load
FB-10	MFD Impact sensor Audio Keyless entry control module Second-row seat foot light RH TV monitor Navigation module Front step light LH Front step light RH Rear seat entertainment Rear step light RH
FB-11	Second-row seat foot light LH Luggage room light Rear gate light Rear step light LH
FB-13	Navigation module
FB-17	TPM control module Warning box (Passenger's side) Combination meter
FB-18	Auto A/C control module Body integrated unit
FB-19	Remote control mirror switch
FB-20	Accessory relay 2 Seat heater relay Shade mirror
FB-21	Body integrated unit Rear accessory power supply socket
FB-23	Rear wiper motor
FB-24	Body integrated unit Rear washer motor
FB-25	MFD Audio TV monitor Navigation module Rear seat entertainment
FB-27	Front wiper switch Front wiper motor Wiper relay unit
FB-28	Key warning switch Key illumination Body integrated unit
FB-29	TCM
FB-32	Open/Close switch Sunroof control unit Stop light & brake switch Stop light switch Tilt switch Data link connector Wiper deicer relay
FB-34	Turn signal & hazard unit
FB-35	Stop light relay Daytime running light control module Daytime running light relay Back-up light relay Rearview mirror
FB-36	MFD Warning box (Passenger's side) Combination meter

No.	Load
FB-37	Body integrated unit
FB-38	ECM TCM Fuel pump relay
FB-39	Airbag control module
FB-41	Airbag control module
FB-42	Power window relay
FB-44	VDC control module Steering angle sensor Yaw rate sensor
FB-45	A/C control panel Rear cooler relay
FB-46	A/C relay FRESH/RECIRC actuator Auto A/C control module Pressure switch Blower fan relay
FB-47	Occupant detection control module
FB-48	TPM control module
FB-49	Impact sensor TV monitor
ACC-1	Front washer motor
ST-1	ECM Starter relay

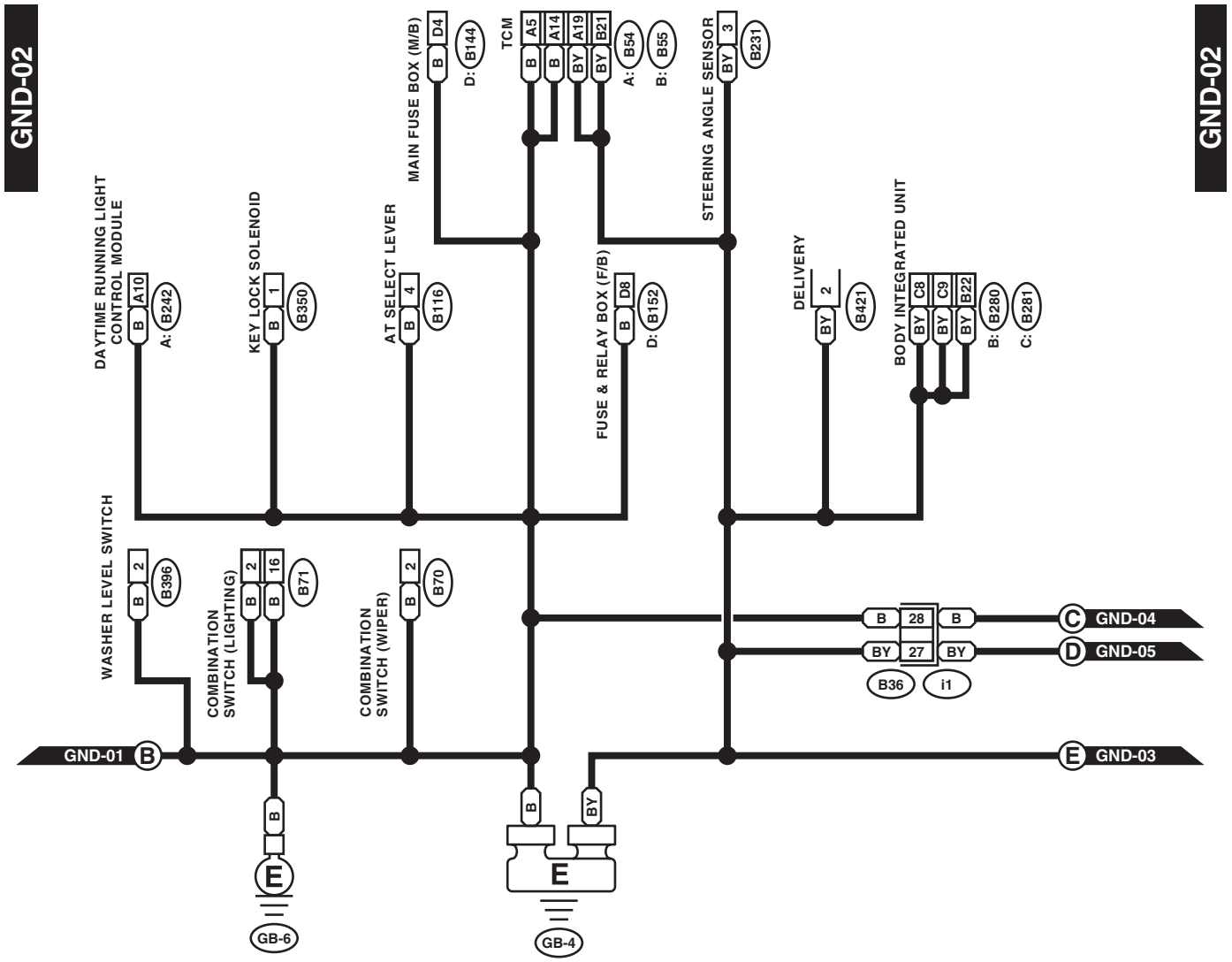
4. Ground Circuit

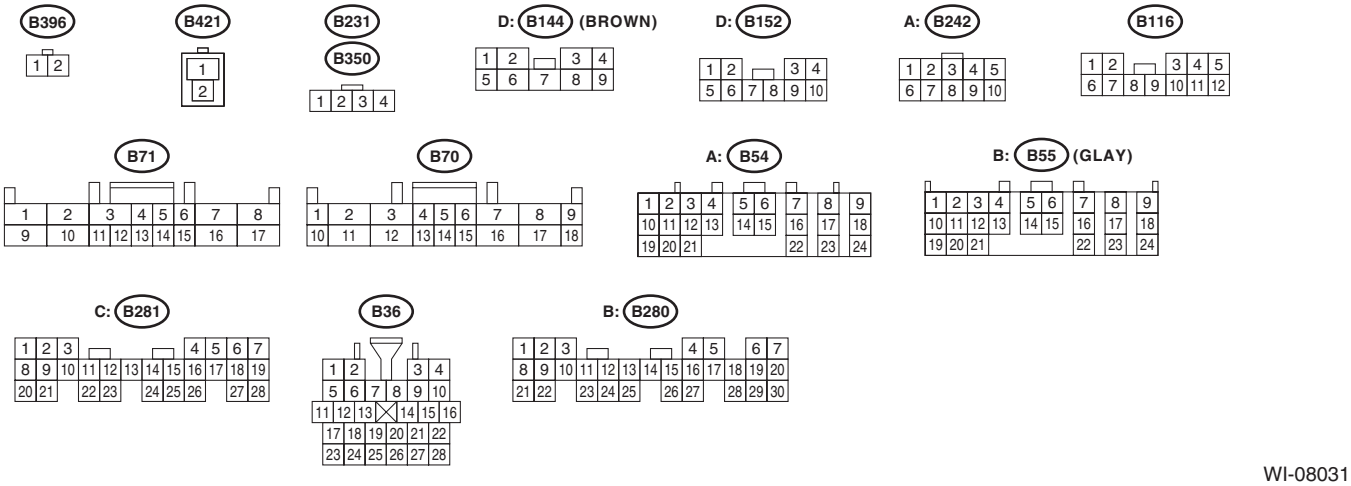
A: WIRING DIAGRAM



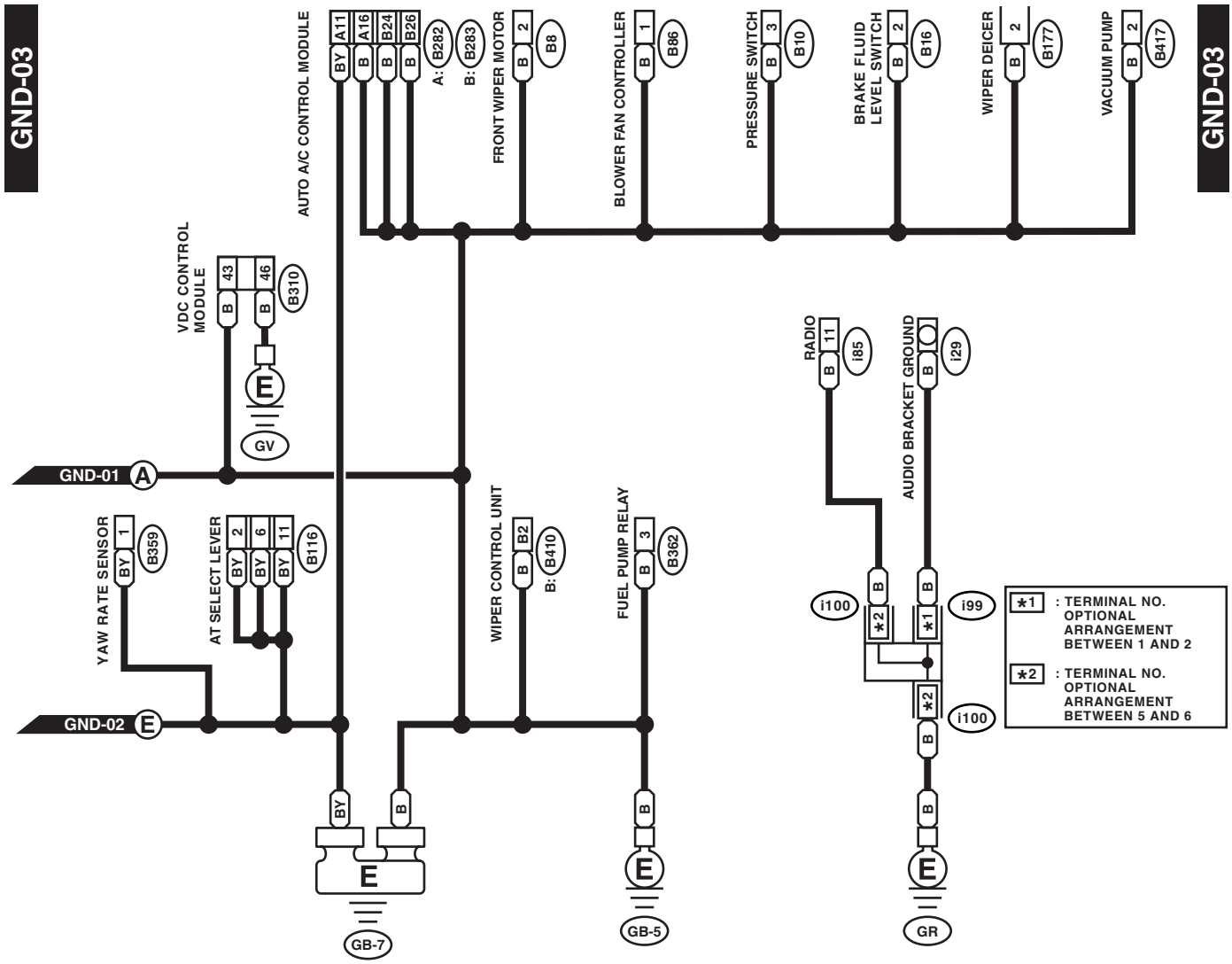


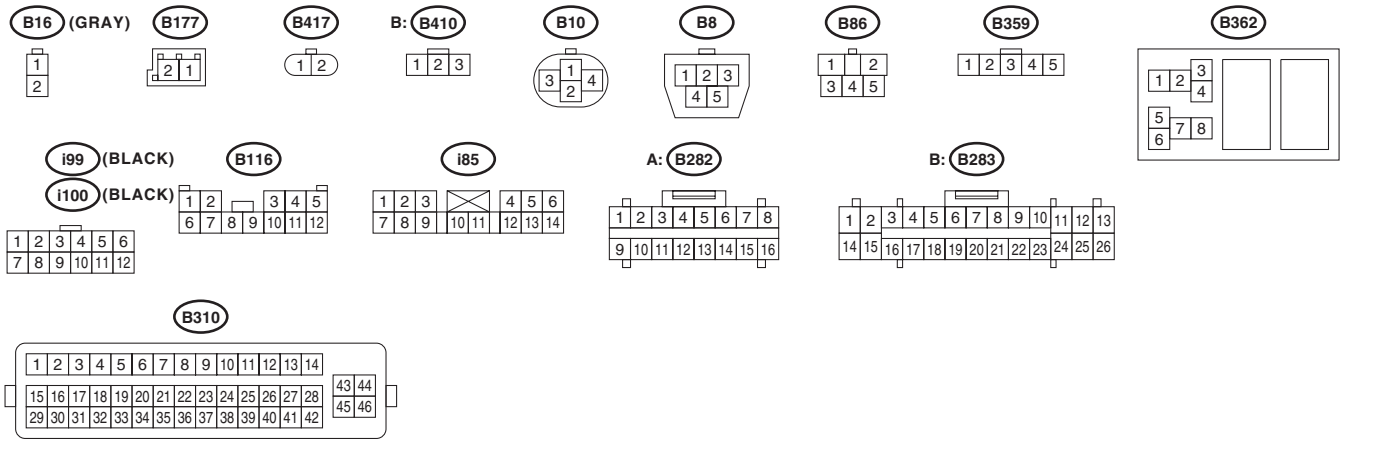
WI-08030


GND-02
GND-02
MAIN FUSE BOX (M/B)
D4
B
D: B144
TCM
A5
A14
A19
B21
B
B
BY
BY
A: B54
B: B55
STEERING ANGLE SENSOR
3
BY
B231
DAYTIME RUNNING LIGHT CONTROL MODULE
A10
B
A: B242
KEY LOCK SOLENOID
1
B
B350
AT SELECT LEVER
4
B
B116
FUSE & RELAY BOX (F/B)
D8
B
D: B152
DELIVERY
2
BY
B421
BODY INTEGRATED UNIT
C8
C9
B22
BY
BY
BY
B: B280
C: B281
WASHER LEVEL SWITCH
2
B
B396
COMBINATION SWITCH (LIGHTING)
2
16
B
B
B71
COMBINATION SWITCH (WIPER)
2
B
B70
B
28
B
C
GND-04
BY
27
BY
D
GND-05
B36
i1
GND-01
B
E
GND-03
B
BY
E
E
GB-6
GB-4


B396
B421
B231
B350
D: B144 (BROWN)
D: B152
A: B242
B116
B71
B70
A: B54
B: B55 (GLAY)
C: B281
B36
B: B280

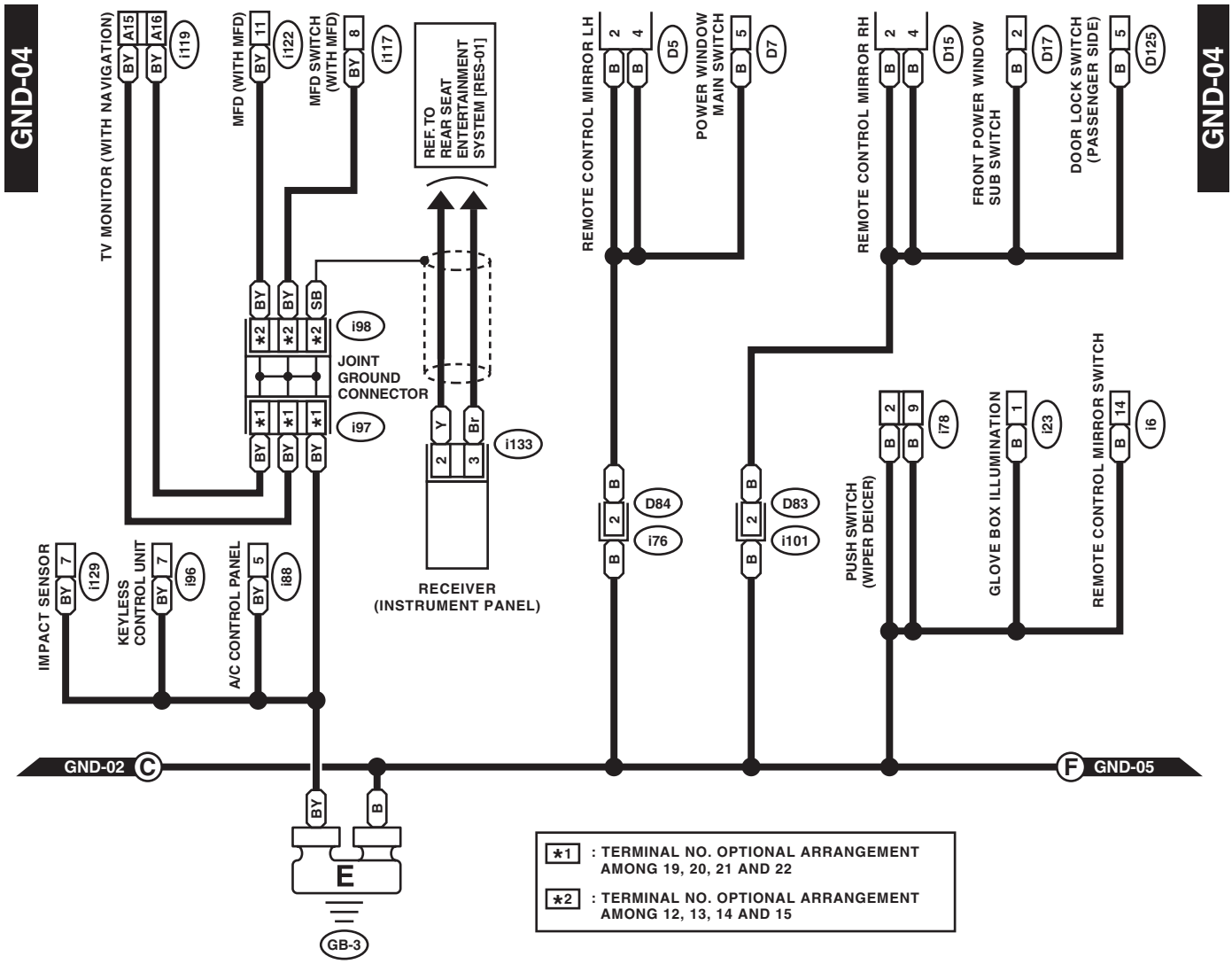
WI-08031

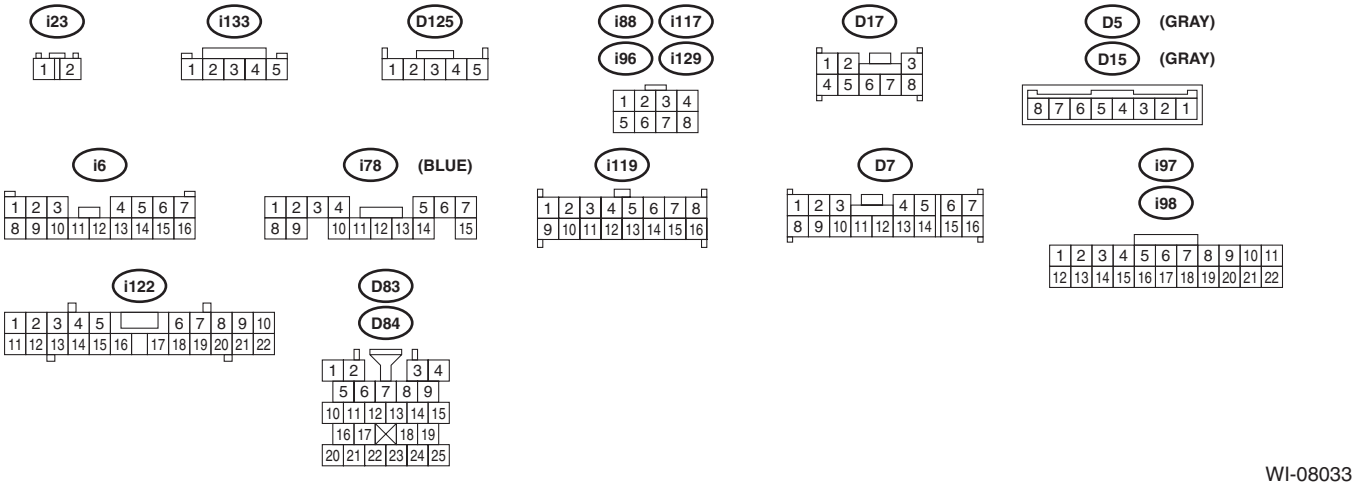

GND-03
GND-03
AUTO A/C CONTROL MODULE
A11
A16
B24
B26
BY
B
B
B
A:
B282
B:
B283
FRONT WIPER MOTOR
2
B
B8
BLOWER FAN CONTROLLER
1
B
B86
PRESSURE SWITCH
3
B
B10
BRAKE FLUID LEVEL SWITCH
2
B
B16
WIPER DEICER
2
B
B177
VACUUM PUMP
2
B
B417
VDC CONTROL MODULE
43
46
B
B
B310
E
GV
GND-01
A
YAW RATE SENSOR
1
BY
B359
AT SELECT LEVER
2
6
11
BY
BY
BY
B116
GND-02
E
WIPER CONTROL UNIT
B2
B
B
B410
FUEL PUMP RELAY
3
B
B362
RADIO
11
B
i85
AUDIO BRACKET GROUND
B
i29
i100
B
*2
i99
B
*1
*2
i100
B
B
B
E
E
E
GB-7
GB-5
GR
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 1 AND 2
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 5 AND 6


B16 (GRAY)
B177
B417
B: B410
B10
B8
B86
B359
B362
i99 (BLACK)
i100 (BLACK)
B116
i85
A: B282
B: B283
B310

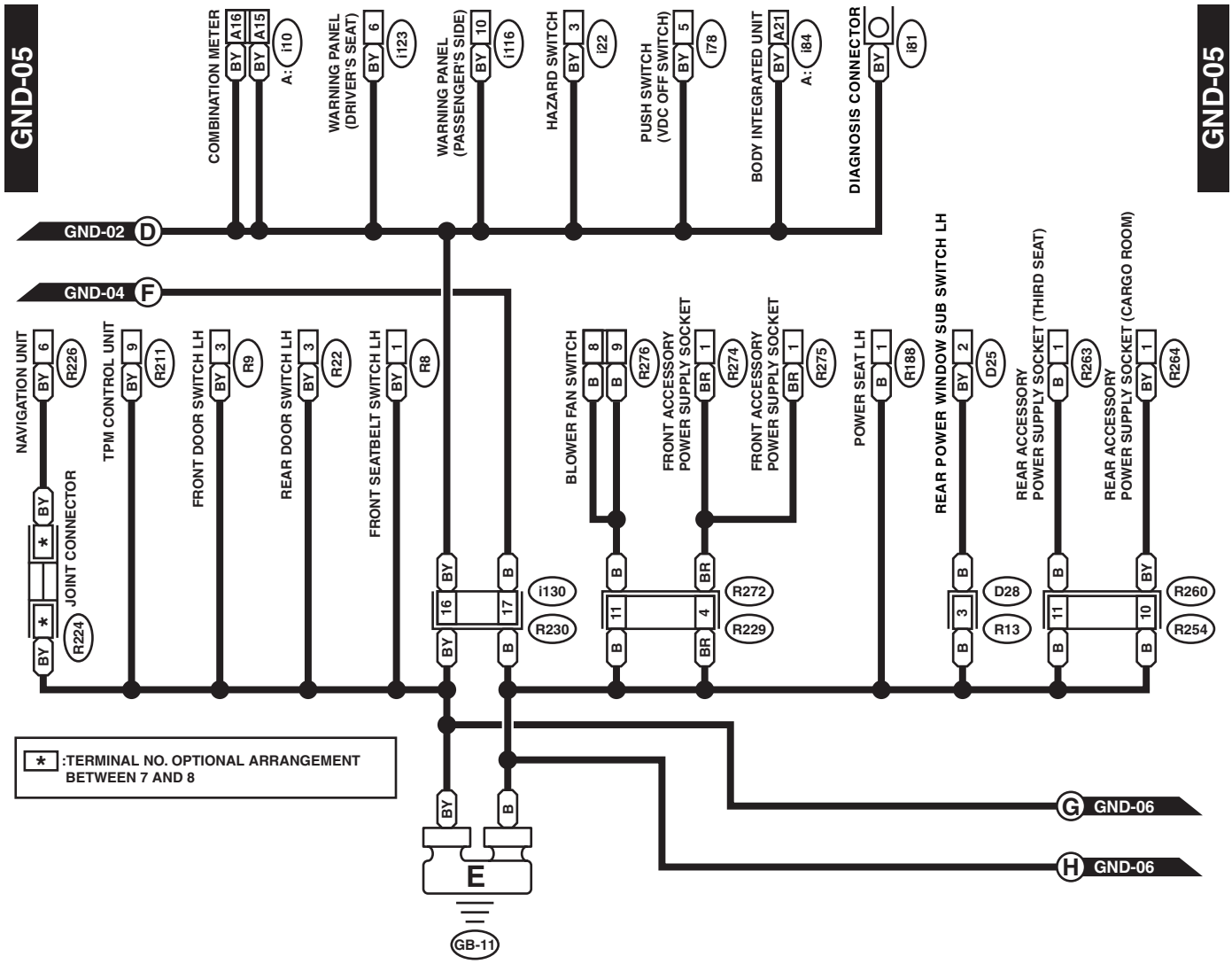
WI-08032

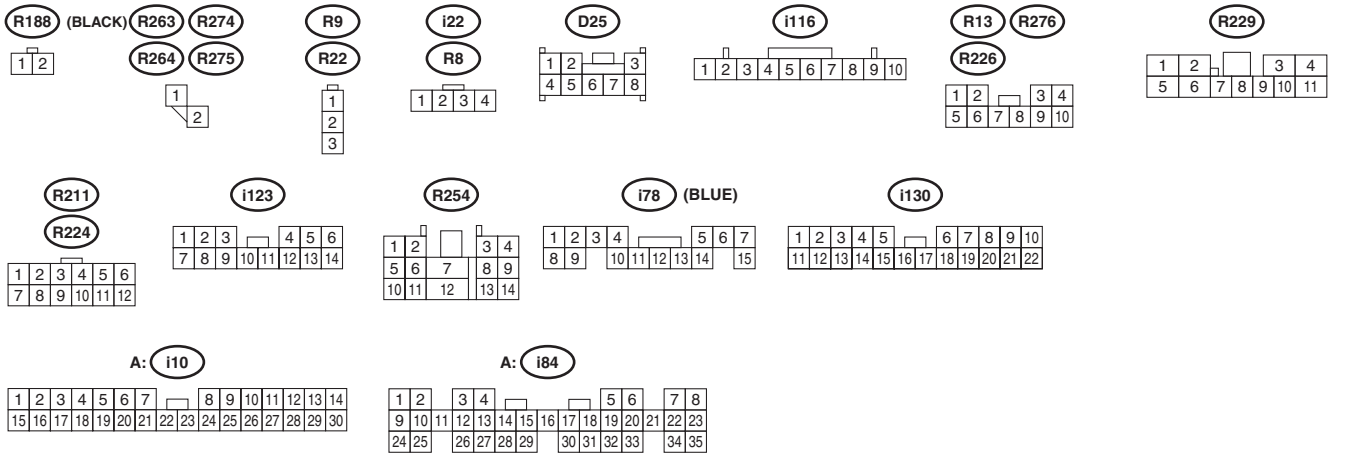
Ground Circuit



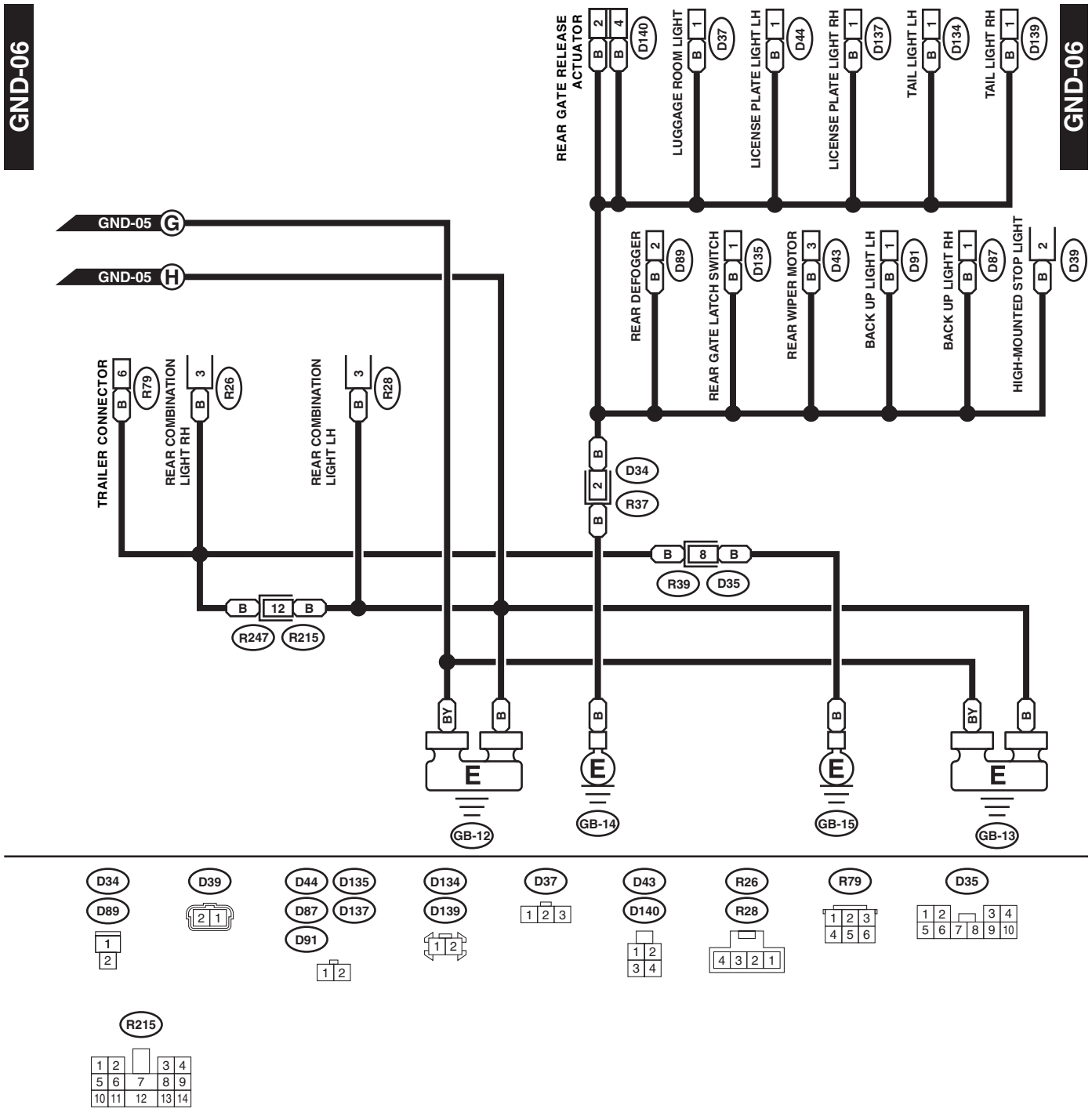


WI-08033


GND-05
GND-05
COMBINATION METER
A: i10
WARNING PANEL (DRIVER'S SEAT) i123
WARNING PANEL (PASSENGER'S SIDE) i116
HAZARD SWITCH i22
PUSH SWITCH (VDC OFF SWITCH) i78
BODY INTEGRATED UNIT
A: i84
DIAGNOSIS CONNECTOR i81
GND-02 D
GND-04 F
NAVIGATION UNIT R226
TPM CONTROL UNIT R211
FRONT DOOR SWITCH LH R9
REAR DOOR SWITCH LH R22
FRONT SEATBELT SWITCH LH R8
JOINT CONNECTOR R224
BLOWER FAN SWITCH R276
FRONT ACCESSORY POWER SUPPLY SOCKET R274
FRONT ACCESSORY POWER SUPPLY SOCKET R275
POWER SEAT LH R188
REAR POWER WINDOW SUB SWITCH LH D25
REAR ACCESSORY POWER SUPPLY SOCKET (THIRD SEAT) R263
REAR ACCESSORY POWER SUPPLY SOCKET (CARGO ROOM) R264
i130
R230
R272
R229
D28
R13
R260
R254
*:TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 7 AND 8
G GND-06
H GND-06
E
GB-11

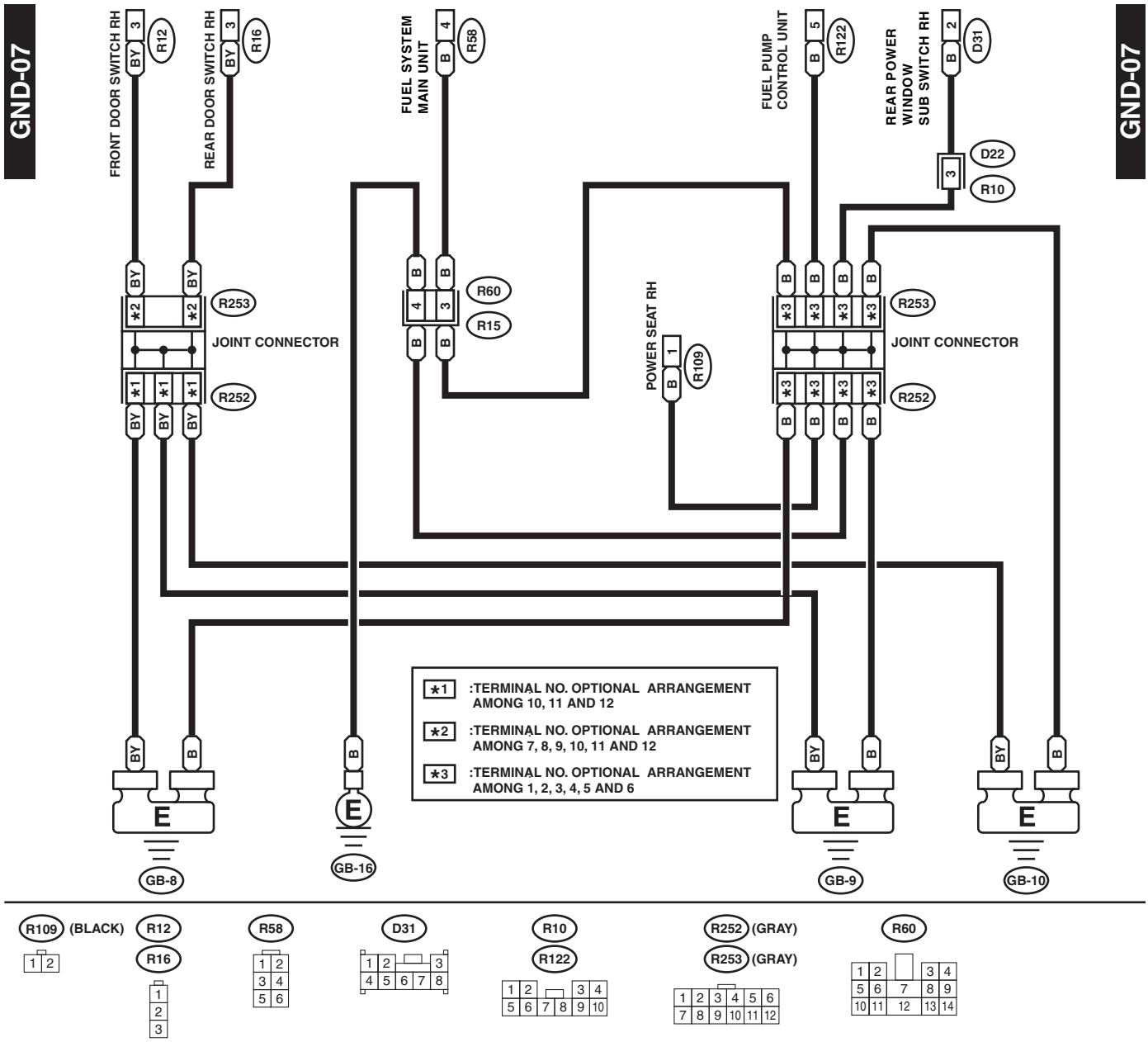

R188 (BLACK)
R263
R274
R264
R275
R9
R22
i22
R8
D25
i116
R13
R276
R226
R229
R211
R224
i123
R254
i78 (BLUE)
i130
A: i10
A: i84

WI-08034


GND-06
GND-06
REAR GATE RELEASE ACTUATOR
D140
LUGGAGE ROOM LIGHT
D37
LICENSE PLATE LIGHT LH
D44
LICENSE PLATE LIGHT RH
D137
TAIL LIGHT LH
D134
TAIL LIGHT RH
D139
GND-05 G
GND-05 H
REAR DEFOGGER
D89
REAR GATE LATCH SWITCH
D135
REAR WIPER MOTOR
D43
BACK UP LIGHT LH
D91
BACK UP LIGHT RH
D87
HIGH-MOUNTED STOP LIGHT
D39
TRAILER CONNECTOR
R79
REAR COMBINATION LIGHT RH
R26
REAR COMBINATION LIGHT LH
R28
D34
R37
R39
D35
R247
R215
GB-12
GB-14
GB-15
GB-13

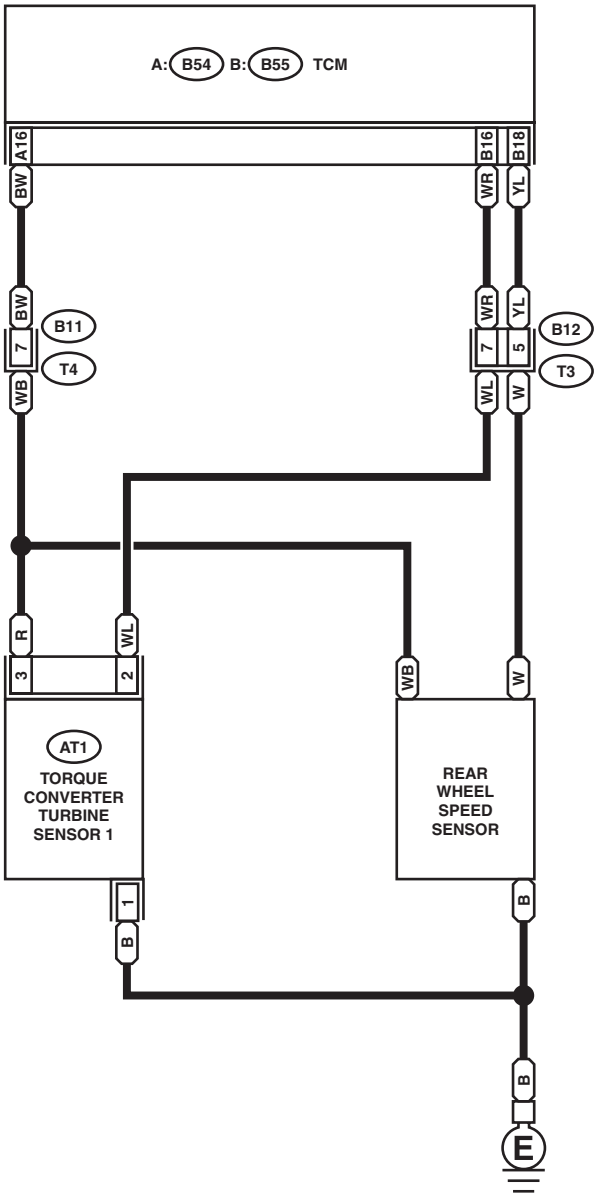
D34
D89
D39
D44
D135
D87
D137
D91
D134
D139
D37
D43
D140
R26
R28
R79
D35
R215

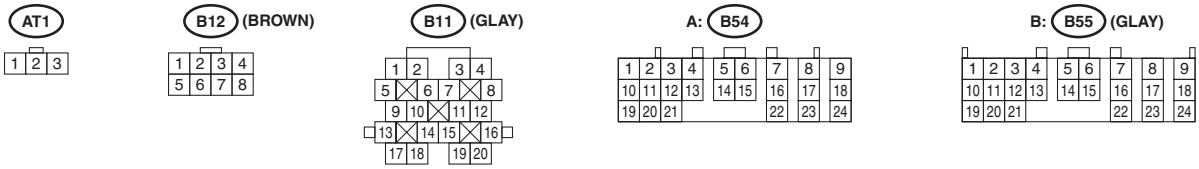
WI-08035


GND-07
GND-07
FRONT DOOR SWITCH RH
REAR DOOR SWITCH RH
FUEL SYSTEM MAIN UNIT
FUEL PUMP CONTROL UNIT
REAR POWER WINDOW SUB SWITCH RH
POWER SEAT RH
JOINT CONNECTOR
JOINT CONNECTOR
R12
R16
R58
R122
D31
D22
R10
R109
R253
R252
R60
R15
*1 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12
*2 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 7, 8, 9, 10, 11 AND 12
*3 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 1, 2, 3, 4, 5 AND 6
GB-8
GB-16
GB-9
GB-10
R109 (BLACK)
R12
R16
R58
D31
R10
R122
R252 (GRAY)
R253 (GRAY)
R60

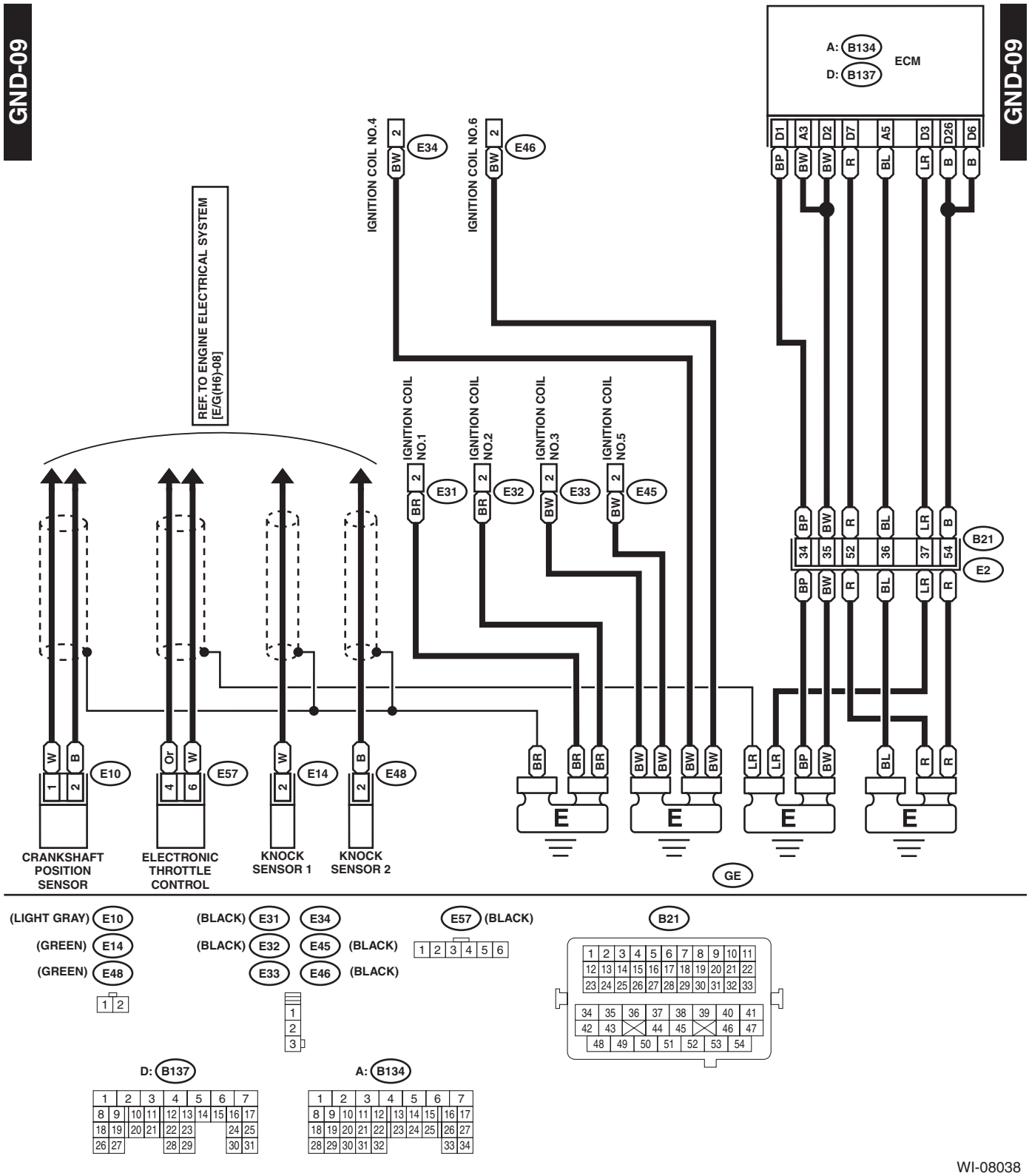
WI-08036

GND-08





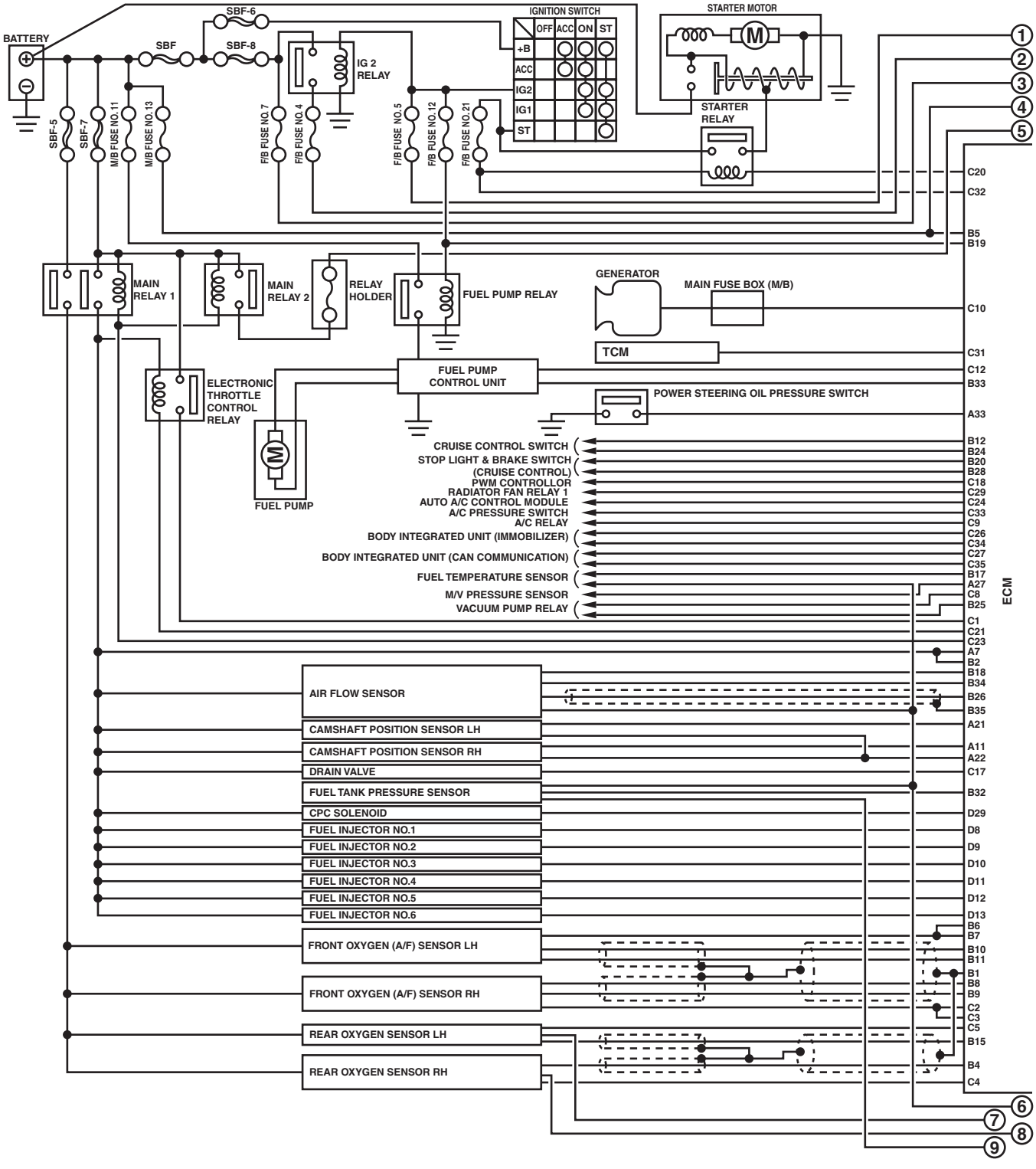
WI-08037


GND-09
GND-09
A: B134
D: B137
ECM
IGNITION COIL NO.4
IGNITION COIL NO.6
E34
E46
REF. TO ENGINE ELECTRICAL SYSTEM [E/G(H6)-08]
IGNITION COIL NO.1
IGNITION COIL NO.2
IGNITION COIL NO.3
IGNITION COIL NO.5
E31
E32
E33
E45
B21
E2
E10
E57
E14
E48
CRANKSHAFT POSITION SENSOR
ELECTRONIC THROTTLE CONTROL
KNOCK SENSOR 1
KNOCK SENSOR 2
GE
(LIGHT GRAY) E10
(GREEN) E14
(GREEN) E48
(BLACK) E31
(BLACK) E32
E33
E34
E45 (BLACK)
E46 (BLACK)
E57 (BLACK)
B21
D: B137
A: B134

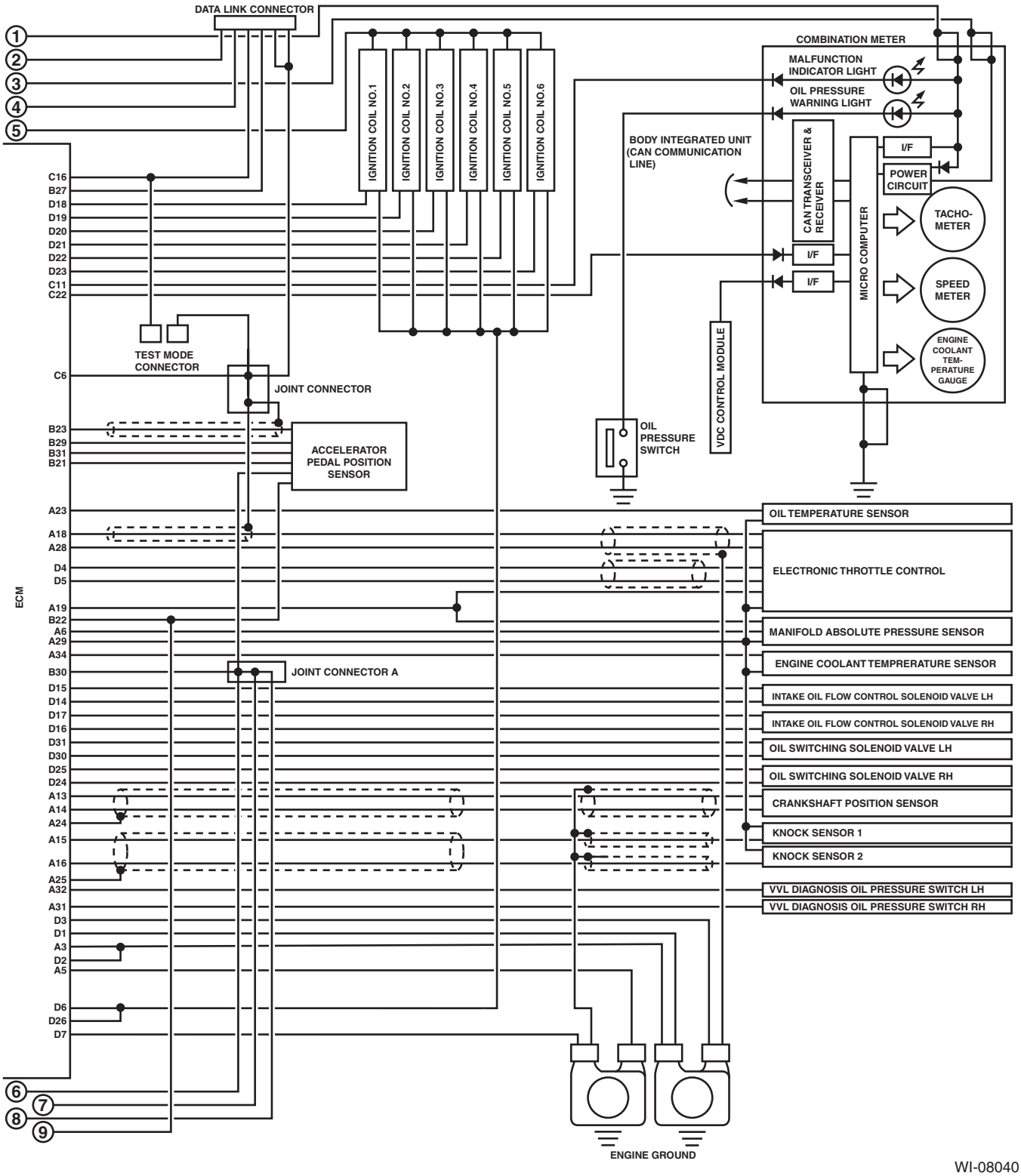
WI-08038

5. Engine Electrical System

A: WIRING DIAGRAM

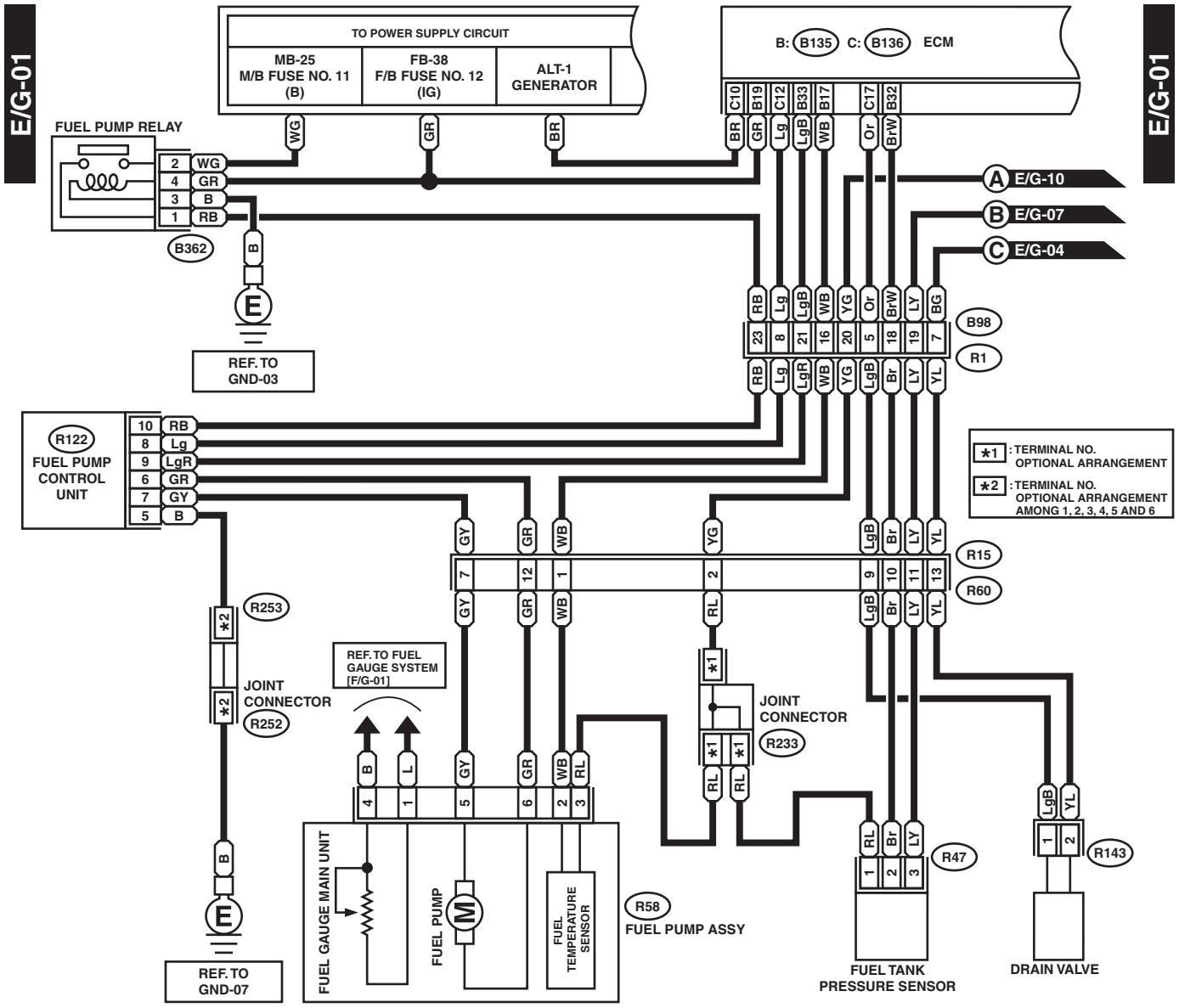


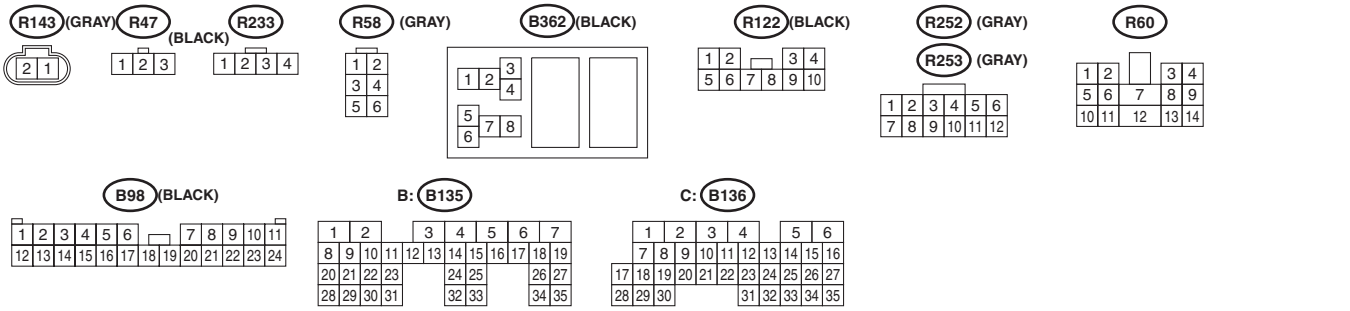
WI-08039


DATA LINK CONNECTOR
1
2
3
4
5
IGNITION COIL NO.1
IGNITION COIL NO.2
IGNITION COIL NO.3
IGNITION COIL NO.4
IGNITION COIL NO.5
IGNITION COIL NO.6
COMBINATION METER
MALFUNCTION INDICATOR LIGHT
OIL PRESSURE WARNING LIGHT
BODY INTEGRATED UNIT (CAN COMMUNICATION LINE)
CAN TRANSCEIVER & RECEIVER
MICRO COMPUTER
I/F
POWER CIRCUIT
TACHO-METER
SPEED METER
ENGINE COOLANT TEM-PERATURE GAUGE
VDC CONTROL MODULE
OIL PRESSURE SWITCH
C16
B27
D18
D19
D20
D21
D22
D23
C11
C22
TEST MODE CONNECTOR
C6
JOINT CONNECTOR
B23
B29
B31
B21
ACCELERATOR PEDAL POSITION SENSOR
ECM
A23
A18
A28
D4
D5
A19
B22
A6
A29
A34
B30
JOINT CONNECTOR A
D15
D14
D17
D16
D31
D30
D25
D24
A13
A14
A24
A15
A16
A25
A32
A31
D3
D1
A3
D2
A5
D6
D26
D7
6
7
8
9
OIL TEMPERATURE SENSOR
ELECTRONIC THROTTLE CONTROL
MANIFOLD ABSOLUTE PRESSURE SENSOR
ENGINE COOLANT TEMPRERATURE SENSOR
INTAKE OIL FLOW CONTROL SOLENOID VALVE LH
INTAKE OIL FLOW CONTROL SOLENOID VALVE RH
OIL SWITCHING SOLENOID VALVE LH
OIL SWITCHING SOLENOID VALVE RH
CRANKSHAFT POSITION SENSOR
KNOCK SENSOR 1
KNOCK SENSOR 2
VVL DIAGNOSIS OIL PRESSURE SWITCH LH
VVL DIAGNOSIS OIL PRESSURE SWITCH RH
ENGINE GROUND

WI-08040

WIRING SYSTEM

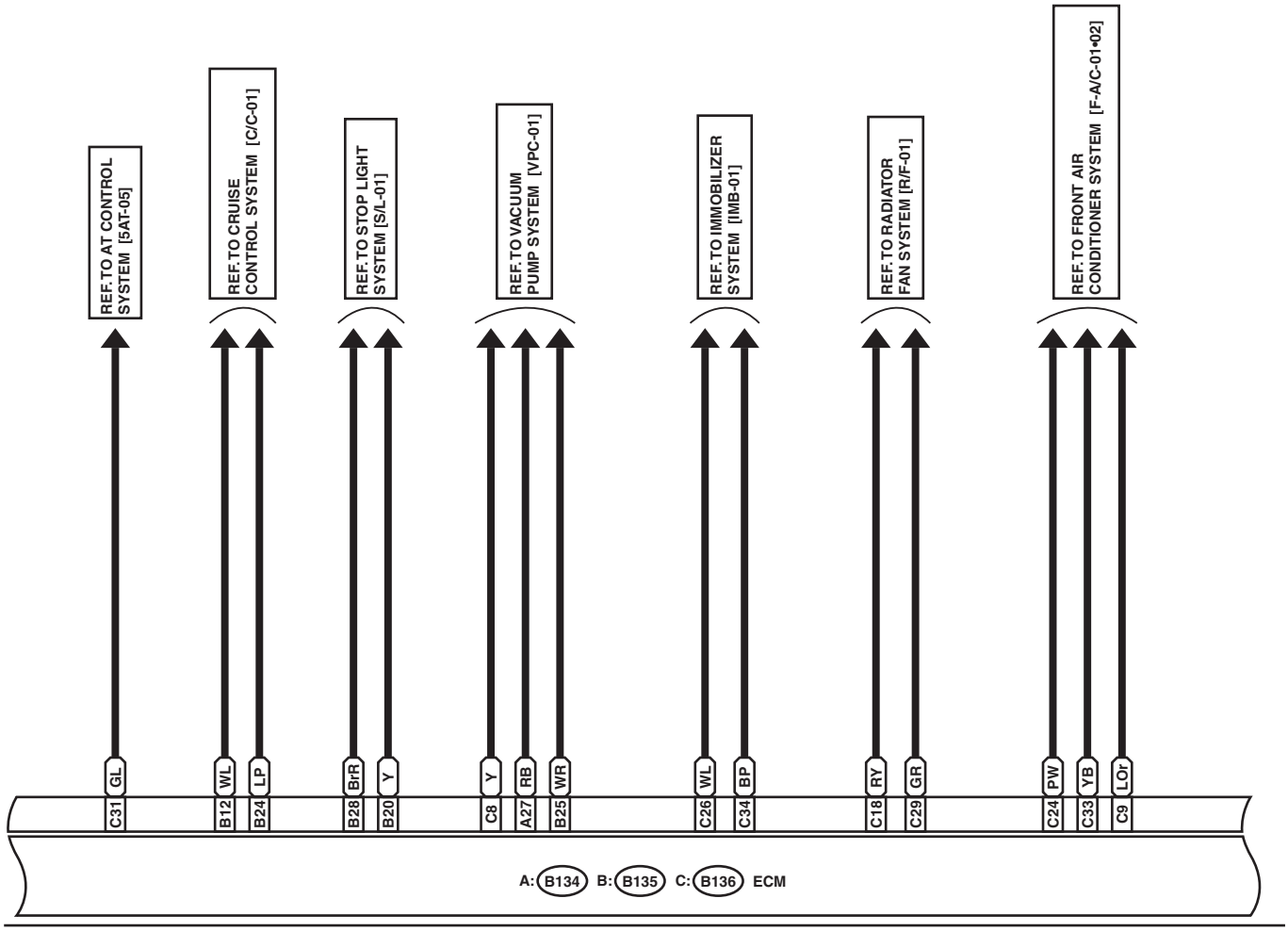




WI-08041

E/G-02

E/G-02



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

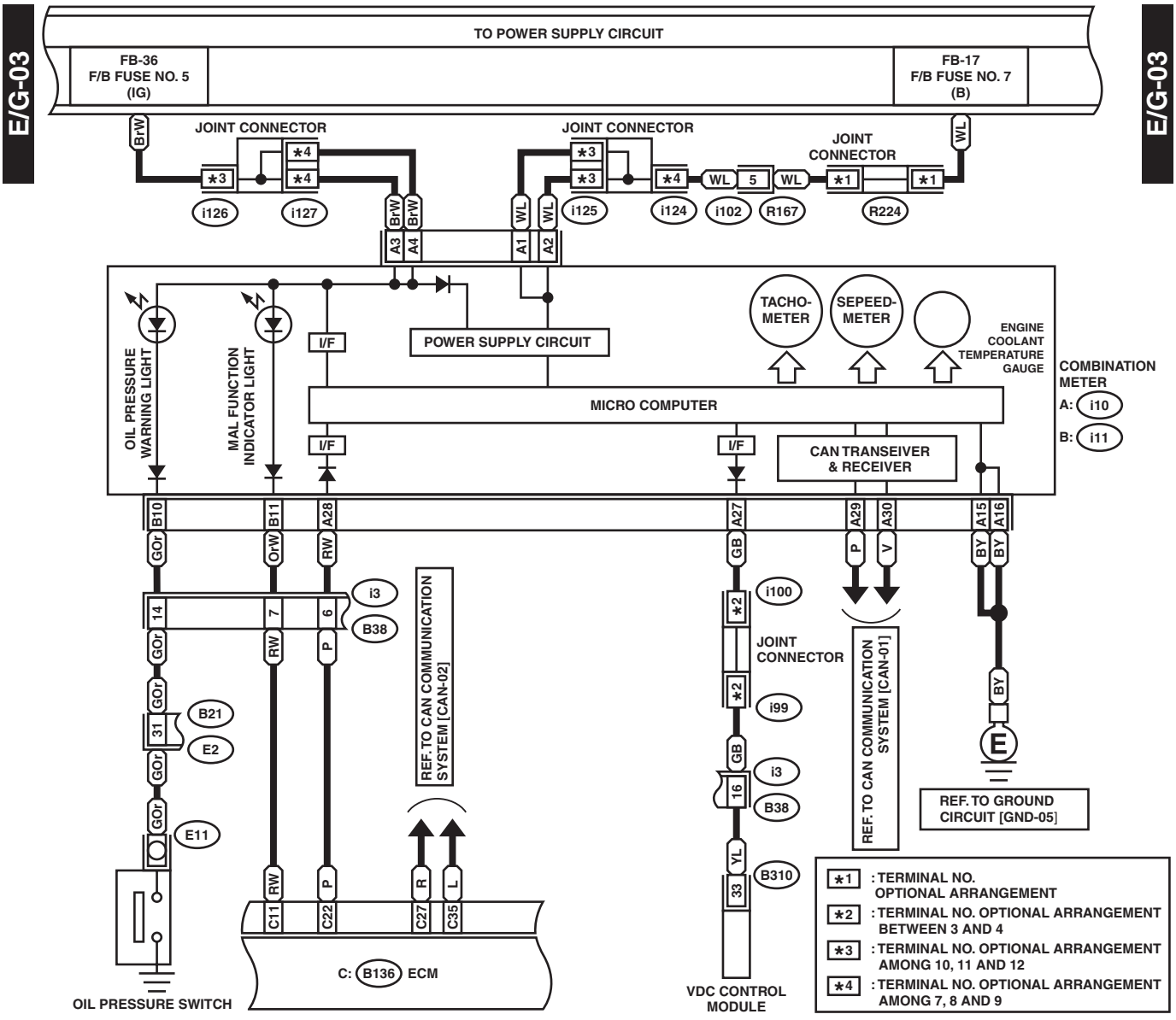
B: B135

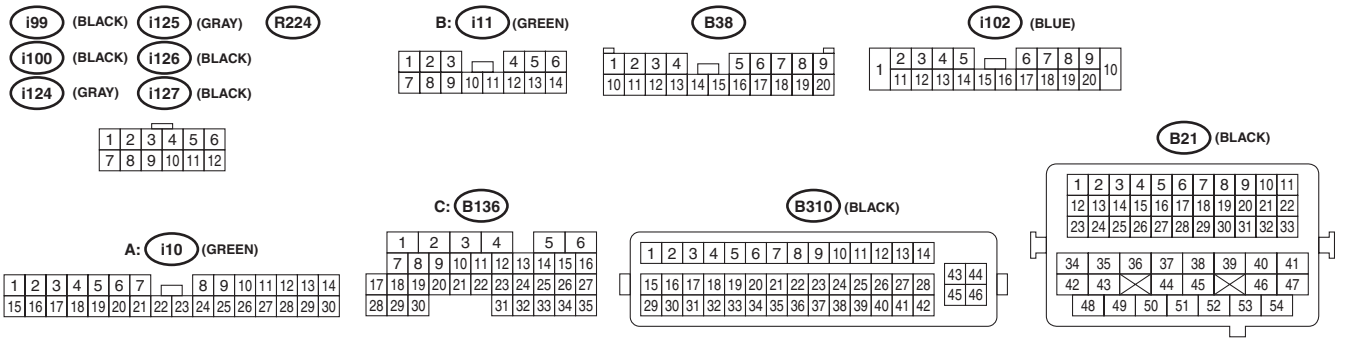
1	2		3	4	5	6	7		
8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23			24	25			26	27
28	29	30	31			32	33			34	35

C: B136

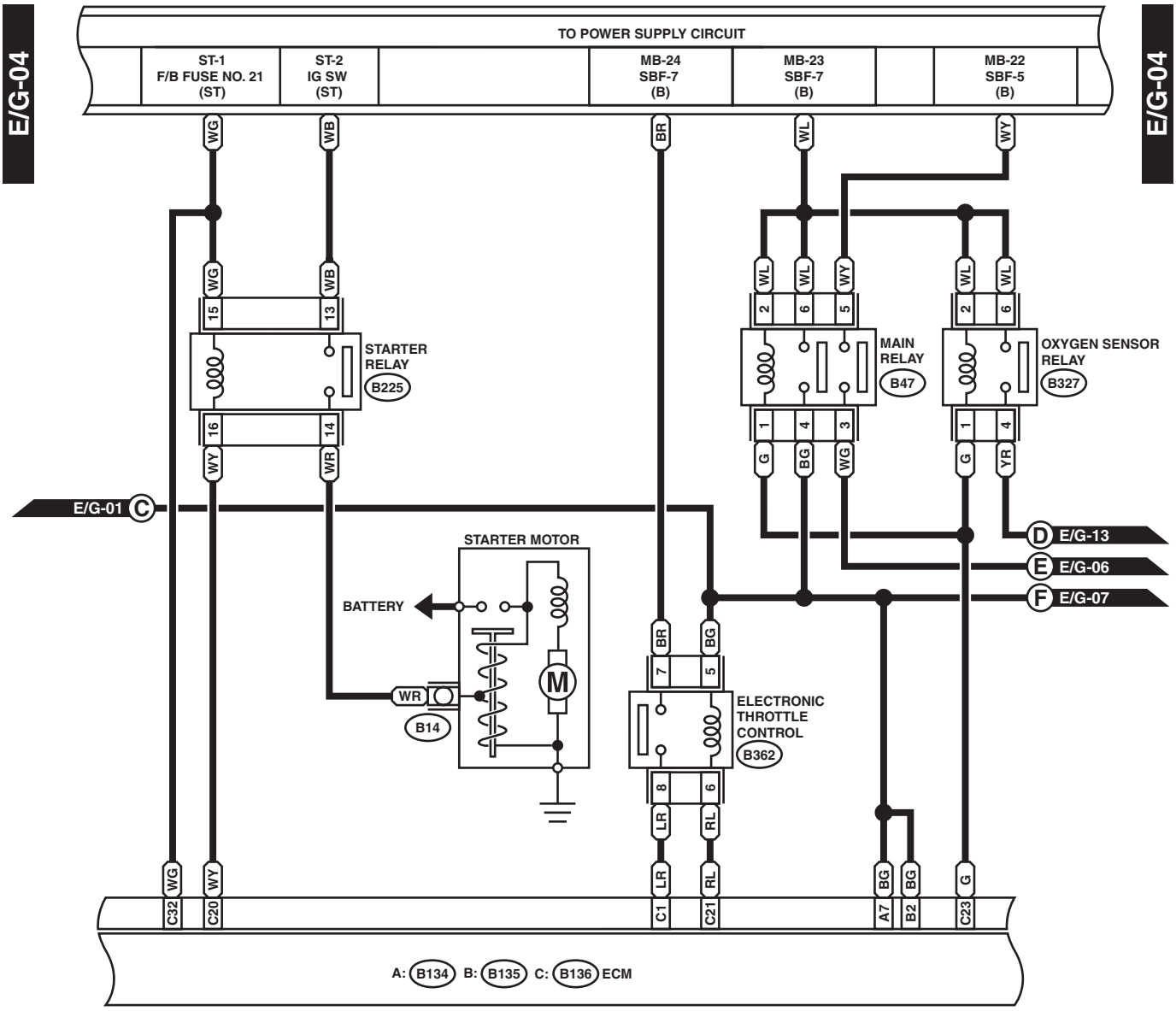
	1	2	3	4		5	6							
	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27
28	29	30			31	32	33	34	35

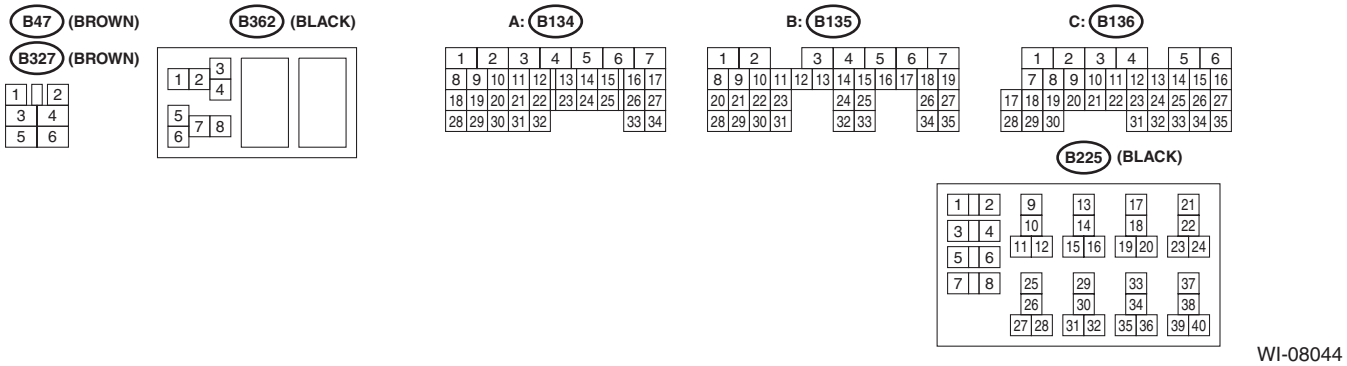
WI-08042


E/G-03
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE NO. 5
(IG)
FB-17
F/B FUSE NO. 7
(B)
JOINT CONNECTOR
JOINT CONNECTOR
JOINT CONNECTOR
i126
i127
i125
i124
i102
R167
R224
TACHO-METER
SEPEED-METER
ENGINE COOLANT TEMPERATURE GAUGE
COMBINATION METER
A: i10
B: i11
OIL PRESSURE WARNING LIGHT
MAL FUNCTION INDICATOR LIGHT
I/F
POWER SUPPLY CIRCUIT
MICRO COMPUTER
CAN TRANSEIVER & RECEIVER
REF. TO CAN COMMUNICATION SYSTEM [CAN-02]
REF. TO CAN COMMUNICATION SYSTEM [CAN-01]
REF. TO GROUND CIRCUIT [GND-05]
i3
B38
B21
E2
E11
i100
i99
B310
OIL PRESSURE SWITCH
C: B136 ECM
VDC CONTROL MODULE
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 3 AND 4
*3 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12
*4 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9

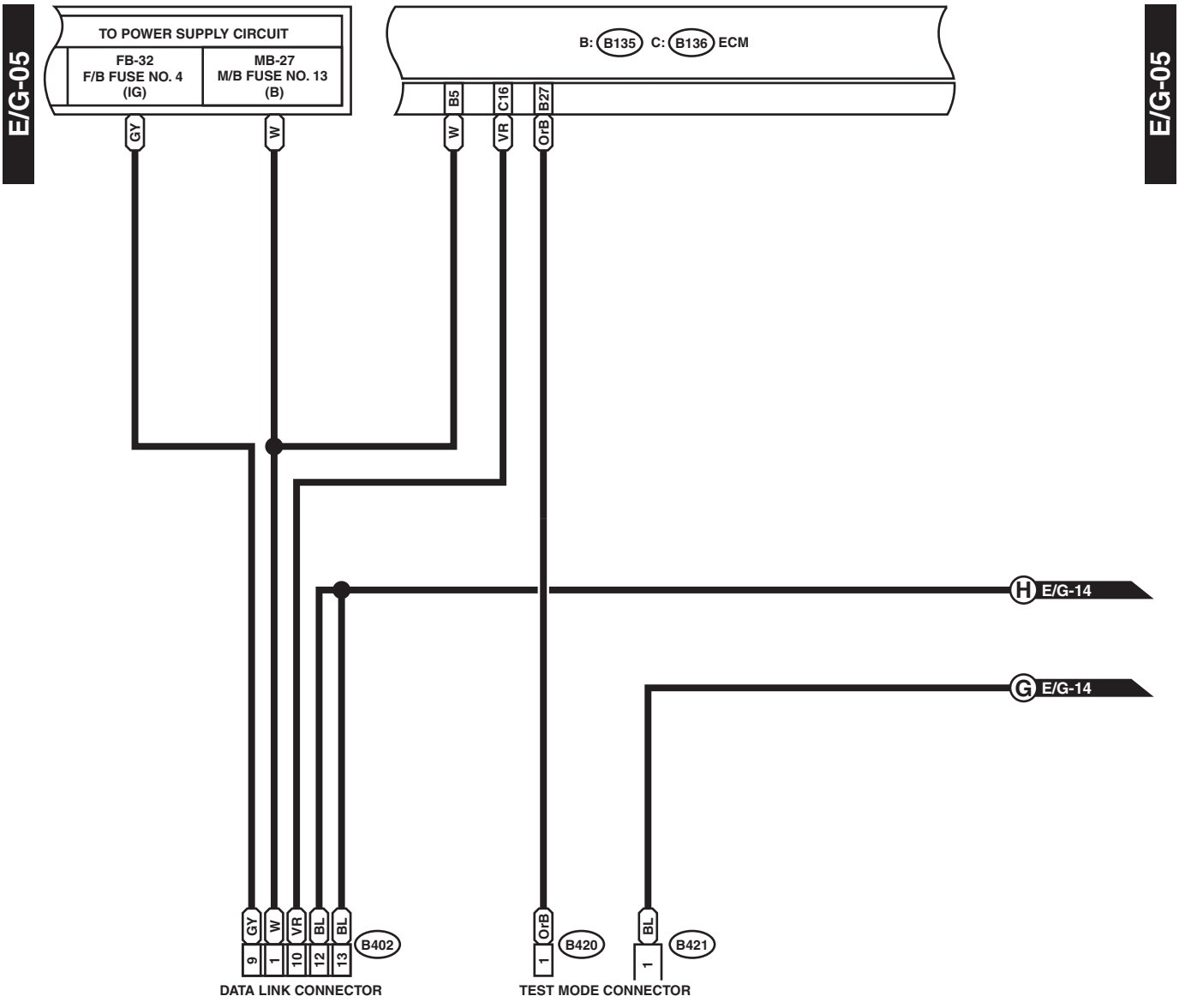

i99 (BLACK)
i125 (GRAY)
R224
i100 (BLACK)
i126 (BLACK)
i124 (GRAY)
i127 (BLACK)
B: i11 (GREEN)
B38
i102 (BLUE)
B21 (BLACK)
A: i10 (GREEN)
C: B136
B310 (BLACK)

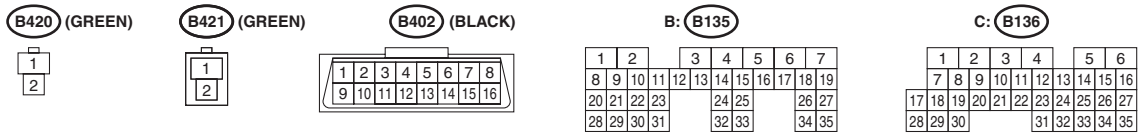
WI-08043


E/G-04
E/G-04
TO POWER SUPPLY CIRCUIT
ST-1
F/B FUSE NO. 21
(ST)
ST-2
IG SW
(ST)
MB-24
SBF-7
(B)
MB-23
SBF-7
(B)
MB-22
SBF-5
(B)
WG
WB
BR
WL
WY
STARTER
RELAY
B225
MAIN
RELAY
B47
OXYGEN SENSOR
RELAY
B327
E/G-01
C
STARTER MOTOR
BATTERY
M
WR
B14
ELECTRONIC
THROTTLE
CONTROL
B362
D
E/G-13
E
E/G-06
F
E/G-07
C32
C20
C1
C21
A7
B2
C23
A: B134 B: B135 C: B136 ECM

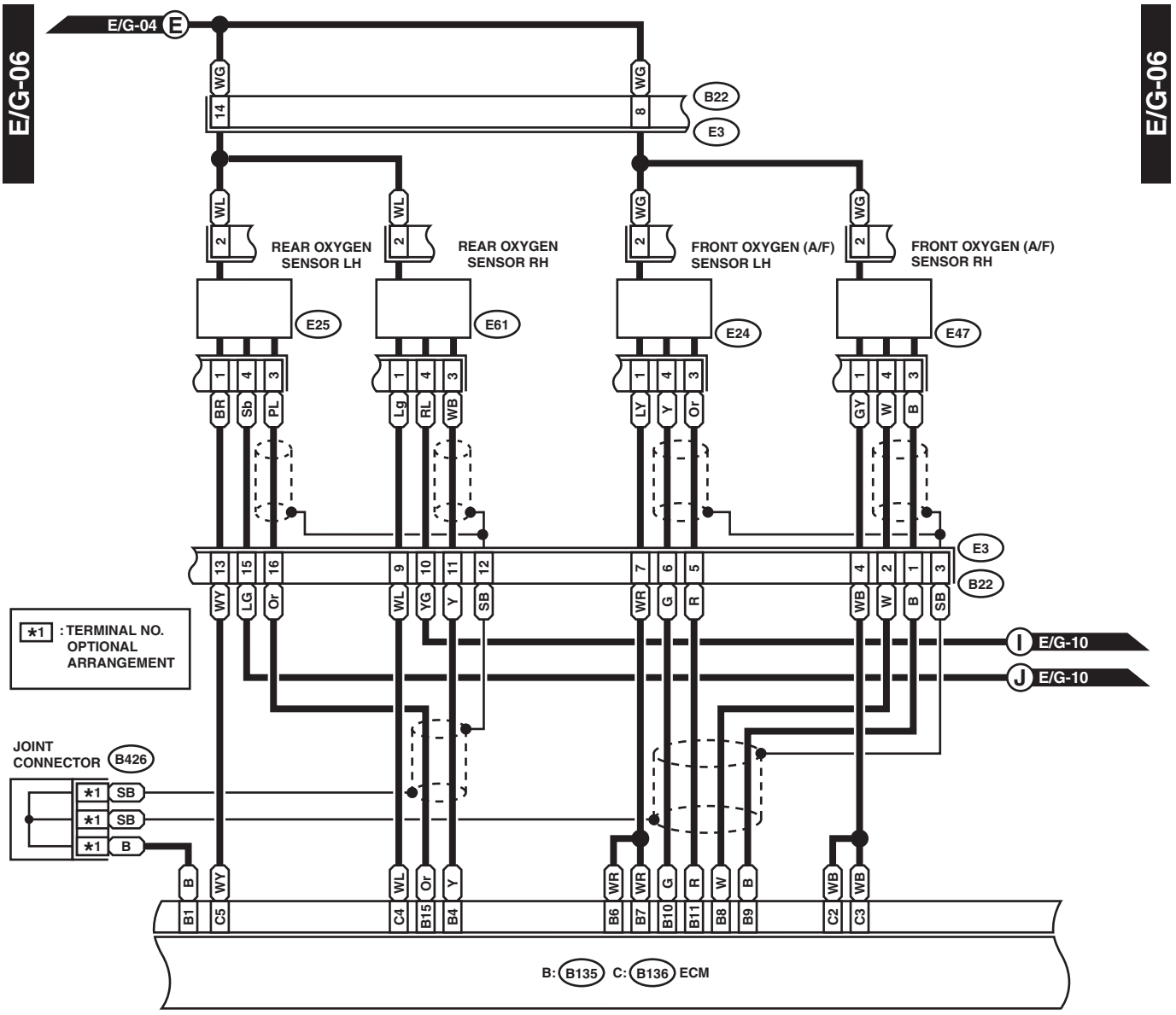

B47 (BROWN)
B327 (BROWN)
B362 (BLACK)
A: B134
B: B135
C: B136
B225 (BLACK)

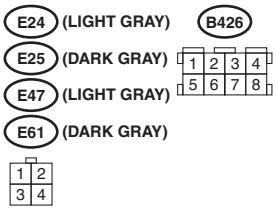
WI-08044

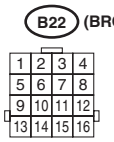

E/G-05
TO POWER SUPPLY CIRCUIT
FB-32
F/B FUSE NO. 4
(IG)
MB-27
M/B FUSE NO. 13
(B)
B: B135 C: B136 ECM
B5
C16
B27
GY
W
W
VR
OrB
E/G-05
H E/G-14
G E/G-14
GY
W
VR
BL
BL
B402
9
1
10
12
13
DATA LINK CONNECTOR
OrB
B420
1
BL
B421
1
TEST MODE CONNECTOR

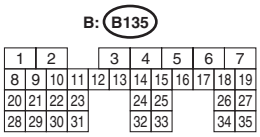

B420 (GREEN)
1
2
B421 (GREEN)
1
2
B402 (BLACK)
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35
C: B136
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35

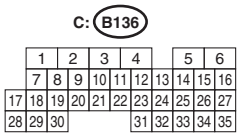
WI-08045


E/G-06
E/G-04 E
WG
14
8
B22
E3
WL
2
REAR OXYGEN SENSOR LH
REAR OXYGEN SENSOR RH
FRONT OXYGEN (A/F) SENSOR LH
FRONT OXYGEN (A/F) SENSOR RH
E25
E61
E24
E47
1
4
3
BR
Sb
PL
Lg
RL
WB
LY
Y
Or
GY
W
B
13
15
16
9
10
11
12
7
6
5
4
2
1
WY
LG
Or
WL
YG
Y
SB
WR
G
R
WB
W
B
SB
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT
I E/G-10
J E/G-10
JOINT CONNECTOR B426
*1 SB
*1 SB
*1 B
B1
C5
C4
B15
B4
B6
B7
B10
B11
B8
B9
C2
C3
B: B135 C: B136 ECM

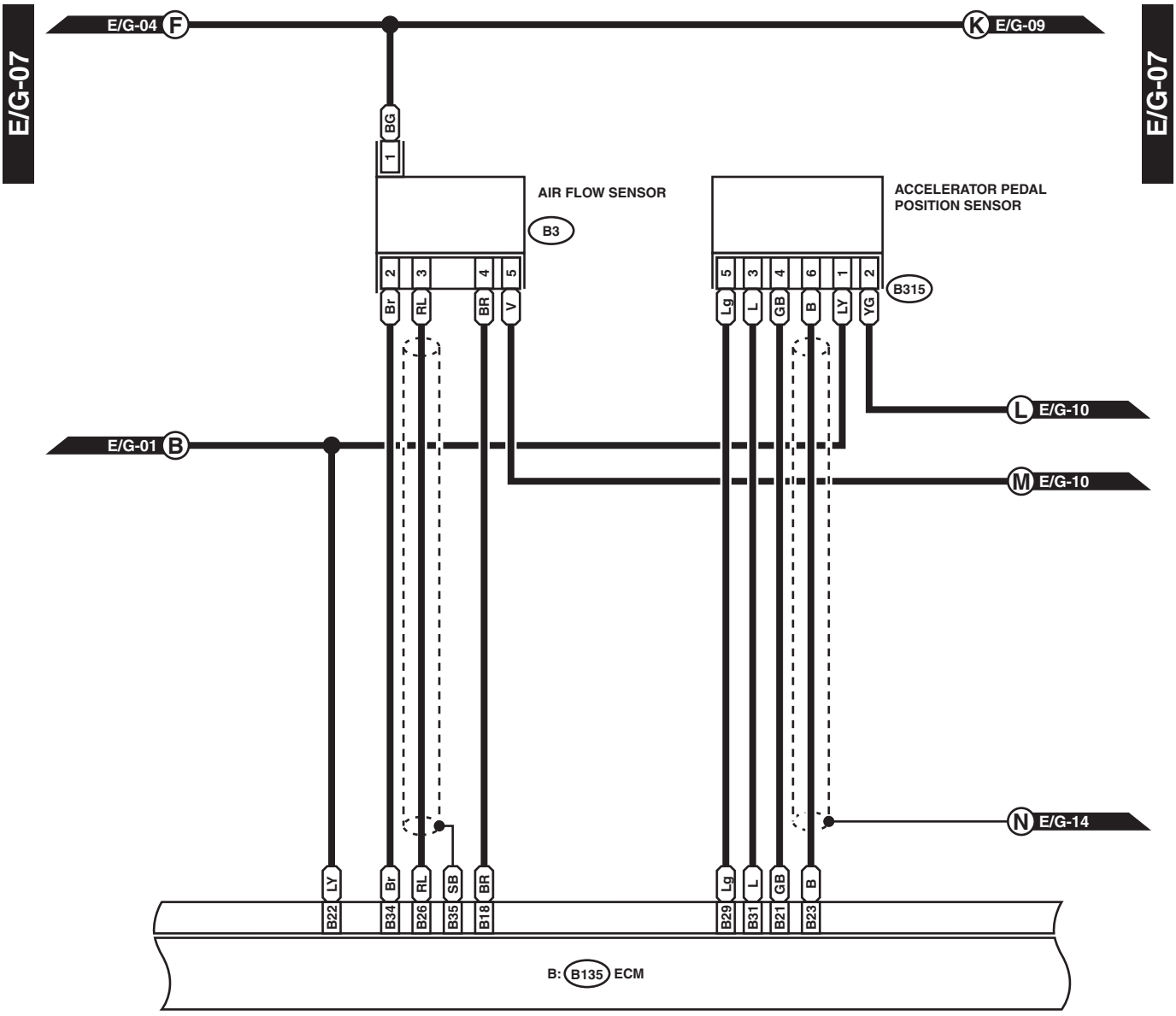

E24 (LIGHT GRAY)
E25 (DARK GRAY)
E47 (LIGHT GRAY)
E61 (DARK GRAY)
B426
1 2 3 4
5 6 7 8
1 2
3 4


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


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-08046



B3 (BLACK)

1	2	3	4	5

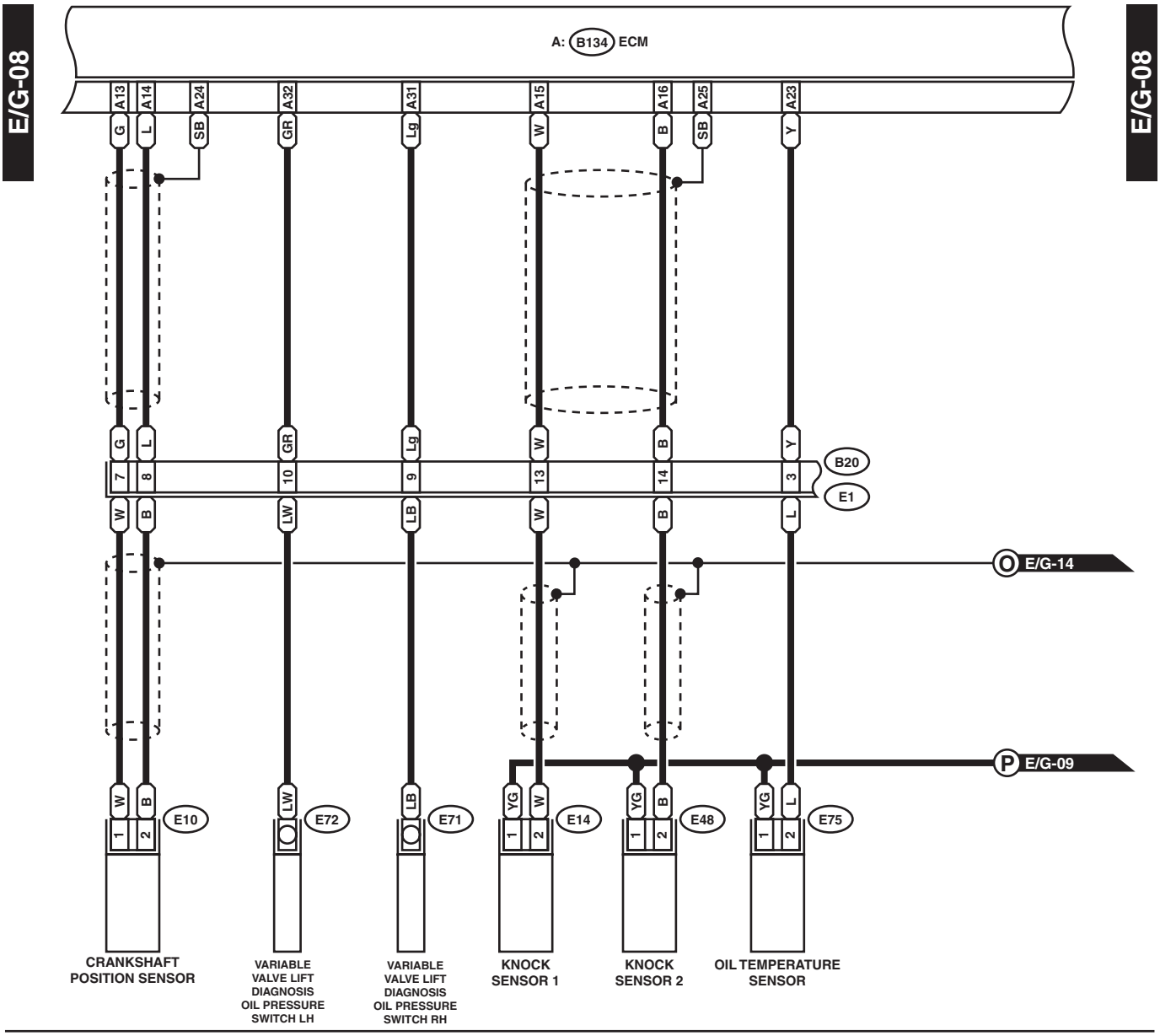
B315 (BLACK)

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

WI-08047



E10 (LIGHT GRAY)

E14 (GREEN)

E48 (GREEN)

E75 (BLACK)

1	2

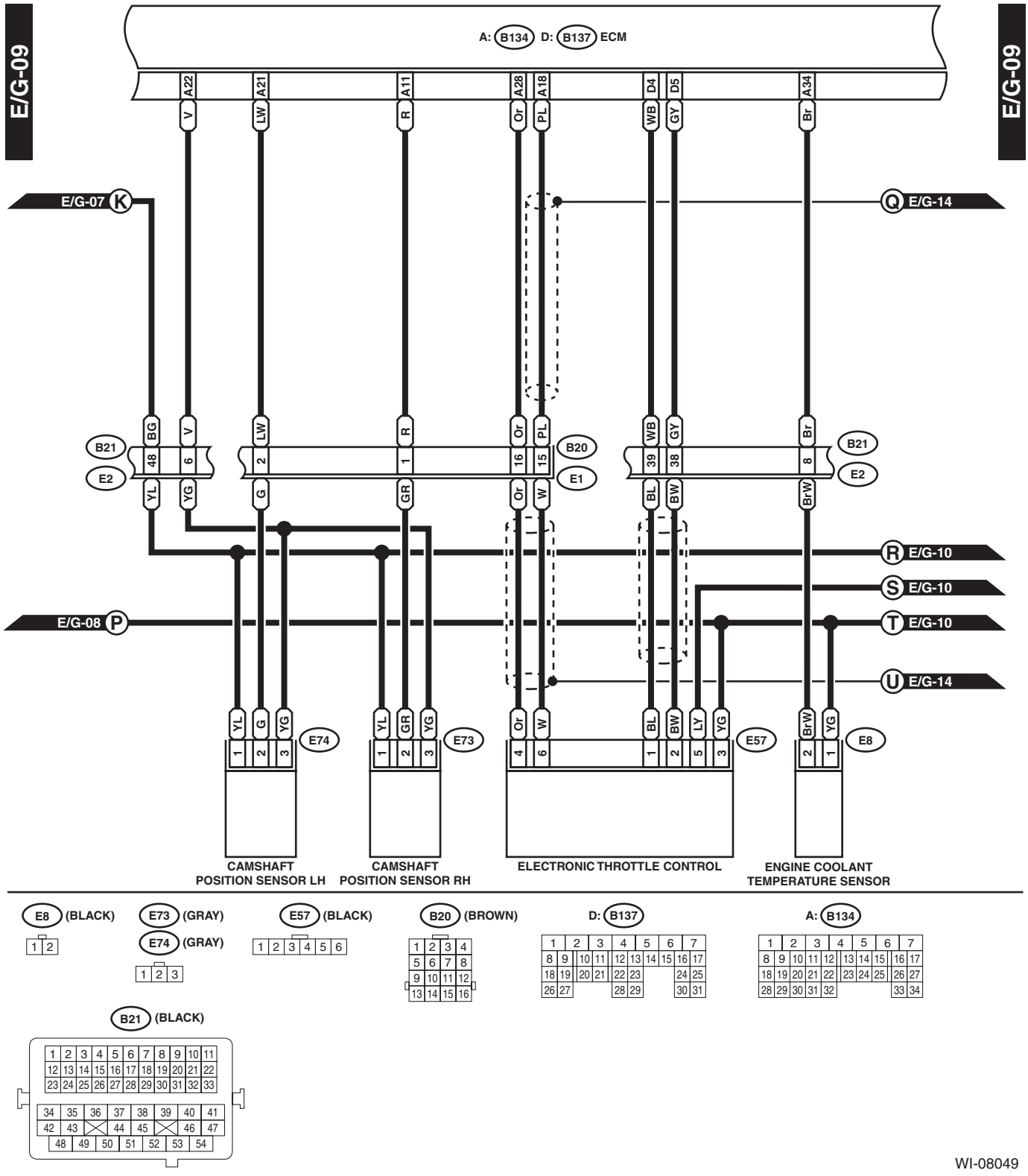
B20 (BROWN)

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

A: B134

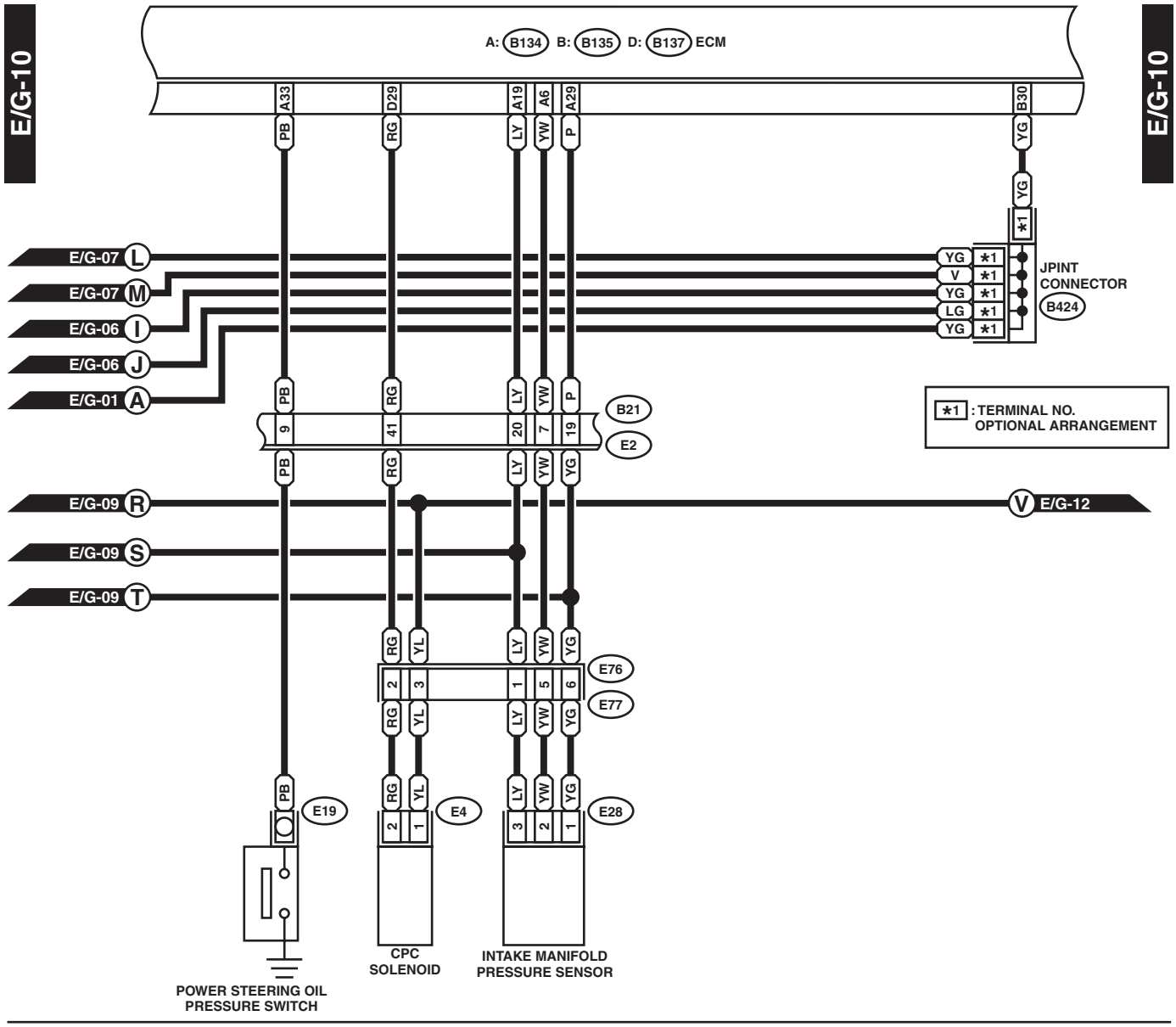
1	2	3	4	5	6	7			
8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25	26	27
28	29	30	31	32				33	34

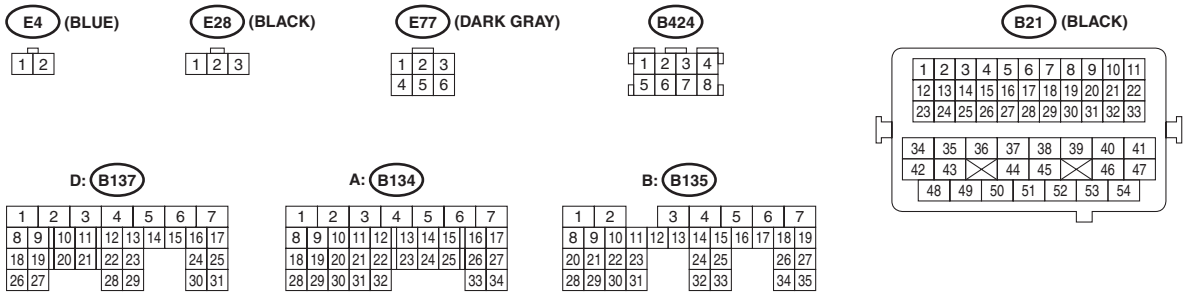
WI-08048


E/G-09
E/G-09
A: B134 D: B137 ECM
A22
A21
A11
A28
A18
D4
D5
A34
V
LW
R
Or
PL
WB
GY
Br
E/G-07 K
Q E/G-14
B21
E2
48
6
2
1
16
15
B20
E1
39
38
8
B21
E2
BG
V
LW
R
Or
PL
WB
GY
Br
YL
YG
G
GR
Or
W
BL
BW
BrW
R E/G-10
S E/G-10
E/G-08 P
T E/G-10
U E/G-14
YL
G
YG
E74
YL
GR
YG
E73
Or
W
BL
BW
LY
YG
E57
BrW
YG
E8
CAMSHAFT POSITION SENSOR LH
CAMSHAFT POSITION SENSOR RH
ELECTRONIC THROTTLE CONTROL
ENGINE COOLANT TEMPERATURE SENSOR

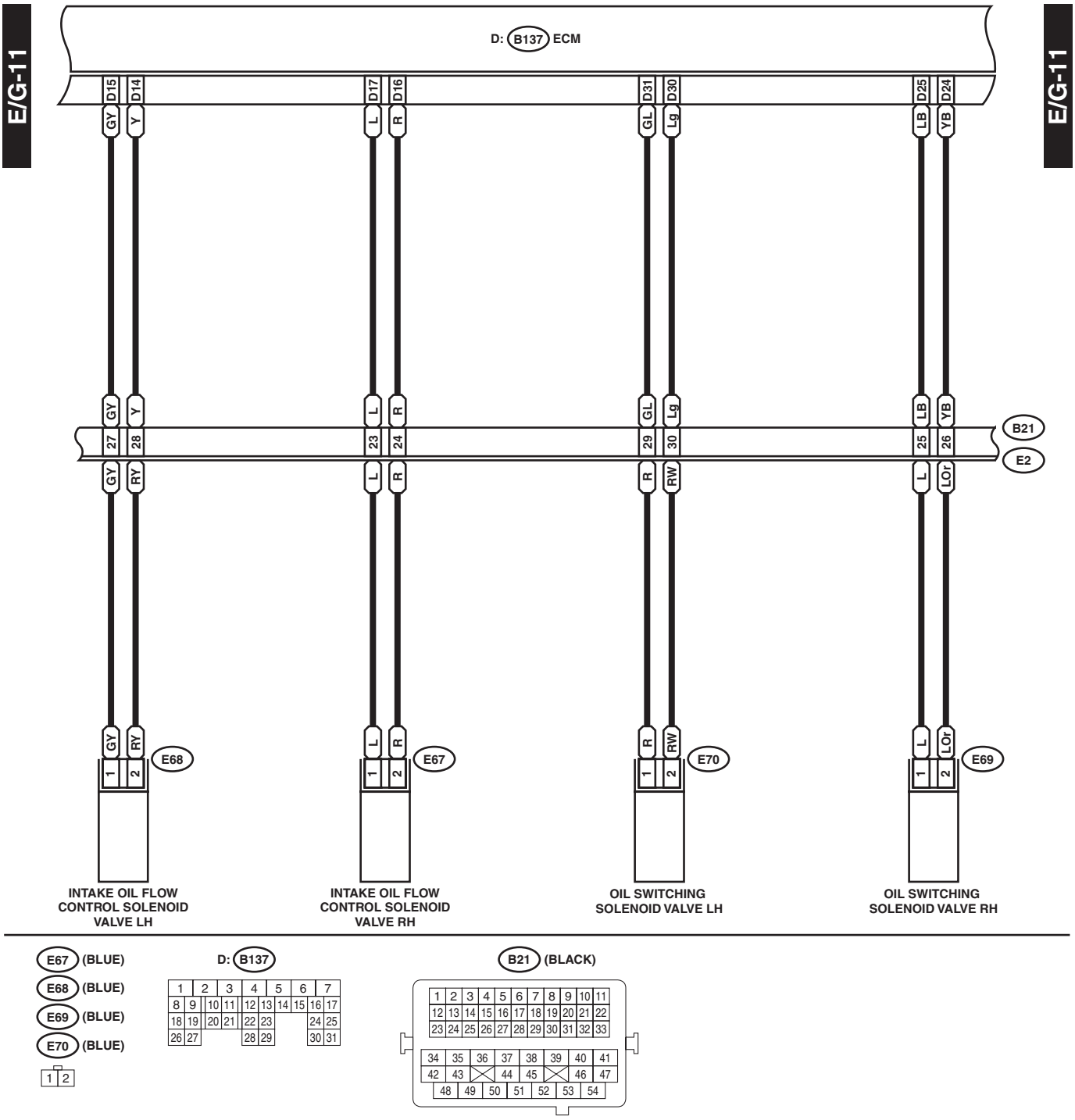
E8 (BLACK)
E73 (GRAY)
E74 (GRAY)
E57 (BLACK)
B20 (BROWN)
D: B137
A: B134
B21 (BLACK)

WI-08049


E/G-10
E/G-10
A: B134 B: B135 D: B137 ECM
A33 D29 A19 A6 A29 B30
PB RG LY YW P YG
YG *1
E/G-07 L
E/G-07 M
E/G-06 I
E/G-06 J
E/G-01 A
YG *1
V *1
YG *1
LG *1
YG *1
JPINT CONNECTOR
B424
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT
B21
9 41 20 7 19
E2
E/G-09 R
E/G-09 S
E/G-09 T
V E/G-12
RG YL LY YW YG
E76
2 3 1 5 6
E77
E19
E4
E28
CPC SOLENOID
INTAKE MANIFOLD PRESSURE SENSOR
POWER STEERING OIL PRESSURE SWITCH


E4 (BLUE)
E28 (BLACK)
E77 (DARK GRAY)
B424
B21 (BLACK)
D: B137
A: B134
B: B135

WI-08050

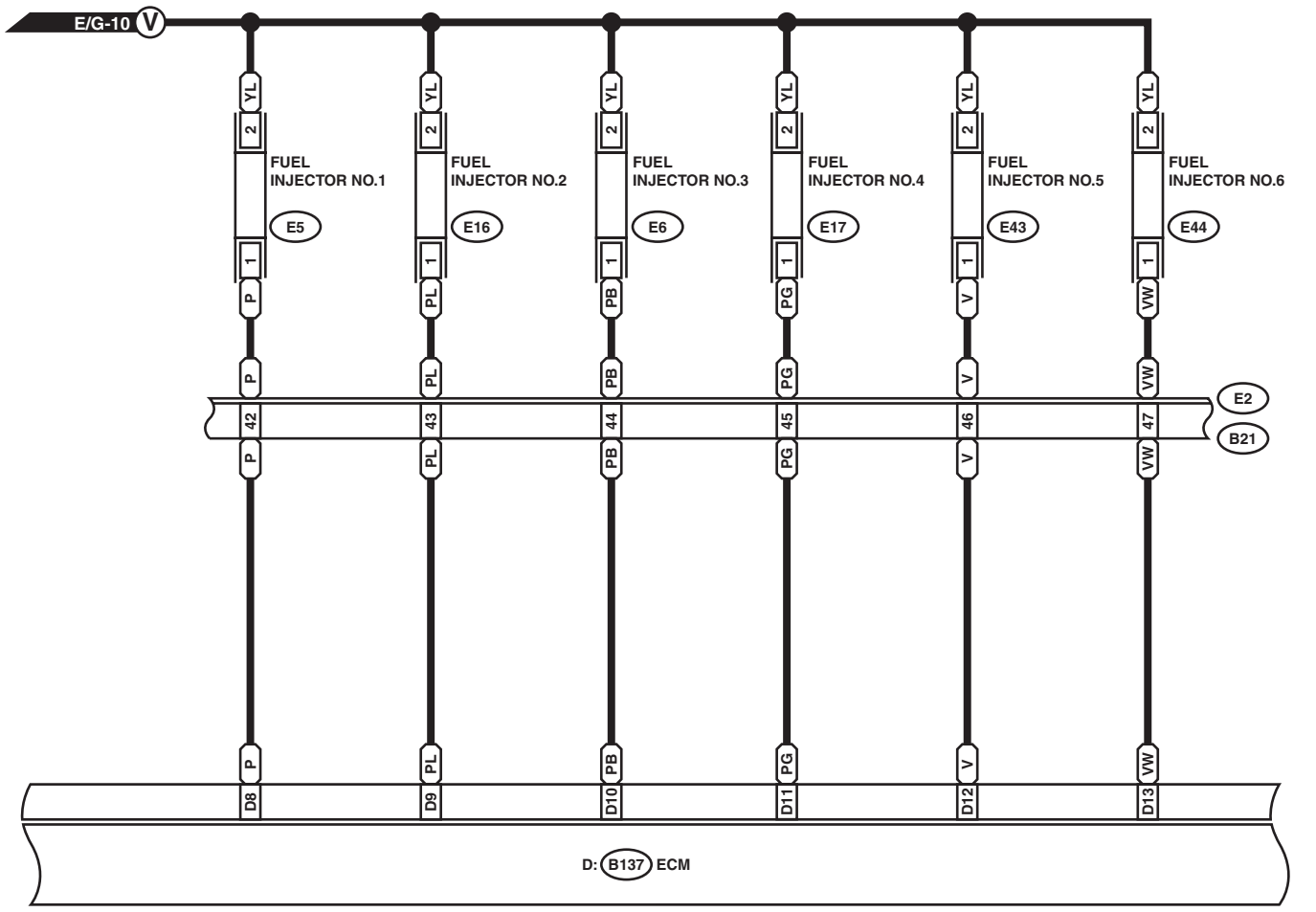

E/G-11
E/G-11
D: B137 ECM
D15
D14
D17
D16
D31
D30
D25
D24
GY
Y
L
R
GL
Lg
LB
YB
27
28
23
24
29
30
25
26
B21
E2
RY
RW
LOr
1
2
E68
E67
E70
E69
INTAKE OIL FLOW CONTROL SOLENOID VALVE LH
INTAKE OIL FLOW CONTROL SOLENOID VALVE RH
OIL SWITCHING SOLENOID VALVE LH
OIL SWITCHING SOLENOID VALVE RH

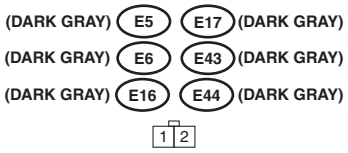
E67 (BLUE)
E68 (BLUE)
E69 (BLUE)
E70 (BLUE)
D: B137
B21 (BLACK)

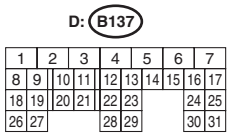
WI-08051

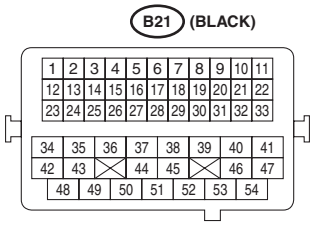
E/G-12

E/G-12

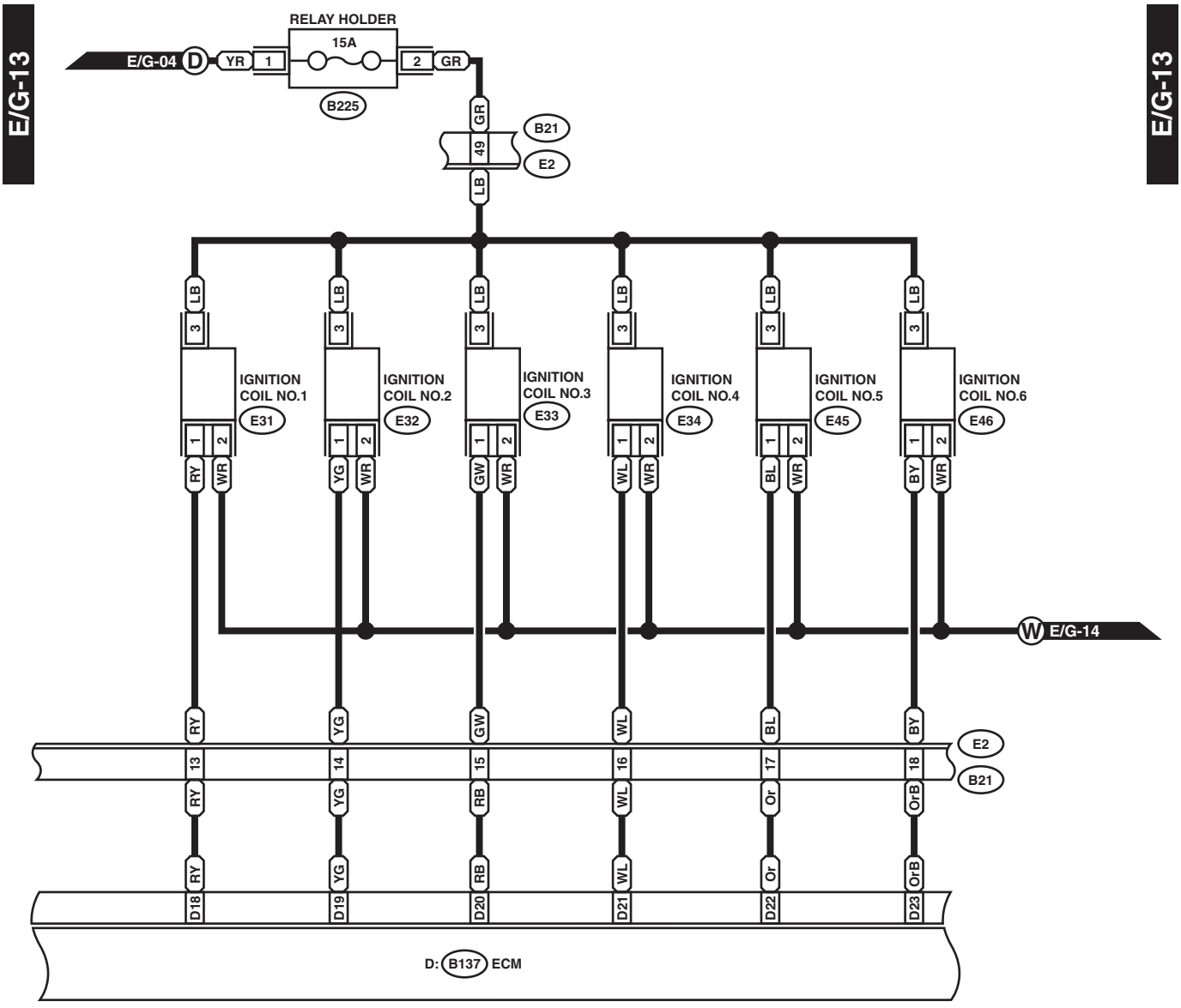


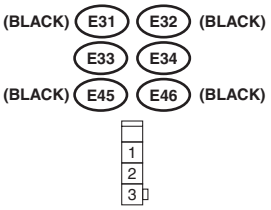


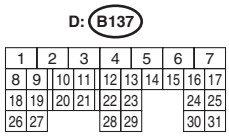


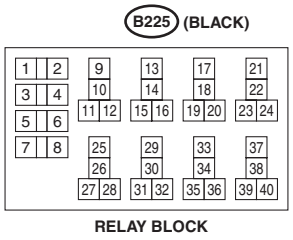


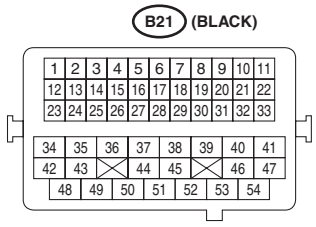
WI-08052


E/G-13
E/G-13
RELAY HOLDER
15A
E/G-04
D
YR
1
2
GR
B225
GR
49
B21
E2
LB
LB
3
IGNITION COIL NO.1
E31
IGNITION COIL NO.2
E32
IGNITION COIL NO.3
E33
IGNITION COIL NO.4
E34
IGNITION COIL NO.5
E45
IGNITION COIL NO.6
E46
1
2
RY
WR
YG
GW
WL
BL
BY
W
E/G-14
13
14
15
16
17
18
RB
Or
OrB
D18
D19
D20
D21
D22
D23
D: B137 ECM

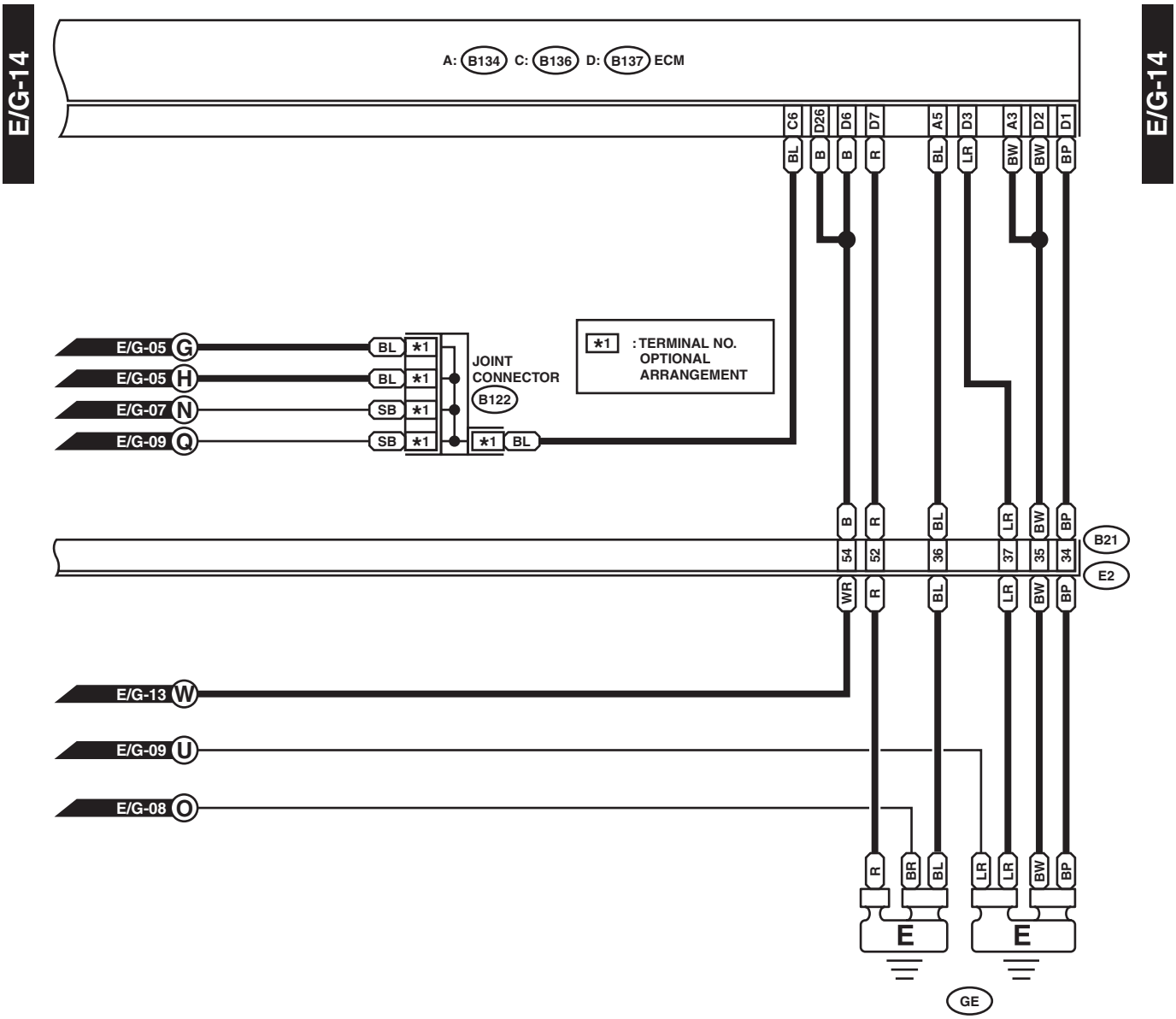

(BLACK) E31 E32 (BLACK)
E33 E34
(BLACK) E45 E46 (BLACK)
1
2
3

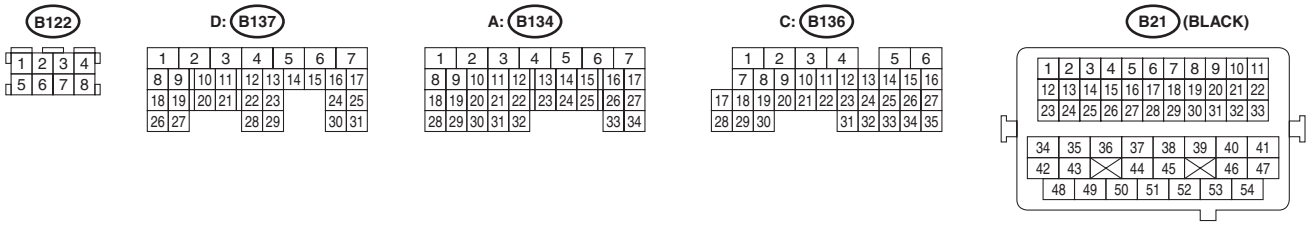

D: B137


B225 (BLACK)
RELAY BLOCK


B21 (BLACK)

WI-08053


E/G-14
E/G-14
A: B134 C: B136 D: B137 ECM
C6 D26 D6 D7 A5 D3 A3 D2 D1
BL B B R BL LR BW BW BP
E/G-05 G
E/G-05 H
E/G-07 N
E/G-09 Q
BL *1
BL *1
SB *1
SB *1
JOINT CONNECTOR B122
*1 BL
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT
B R BL LR BW BP
54 52 36 37 35 34
B21
E2
WR R BL LR BW BP
E/G-13 W
E/G-09 U
E/G-08 O
R BR BL LR LR BW BP
E
E
GE

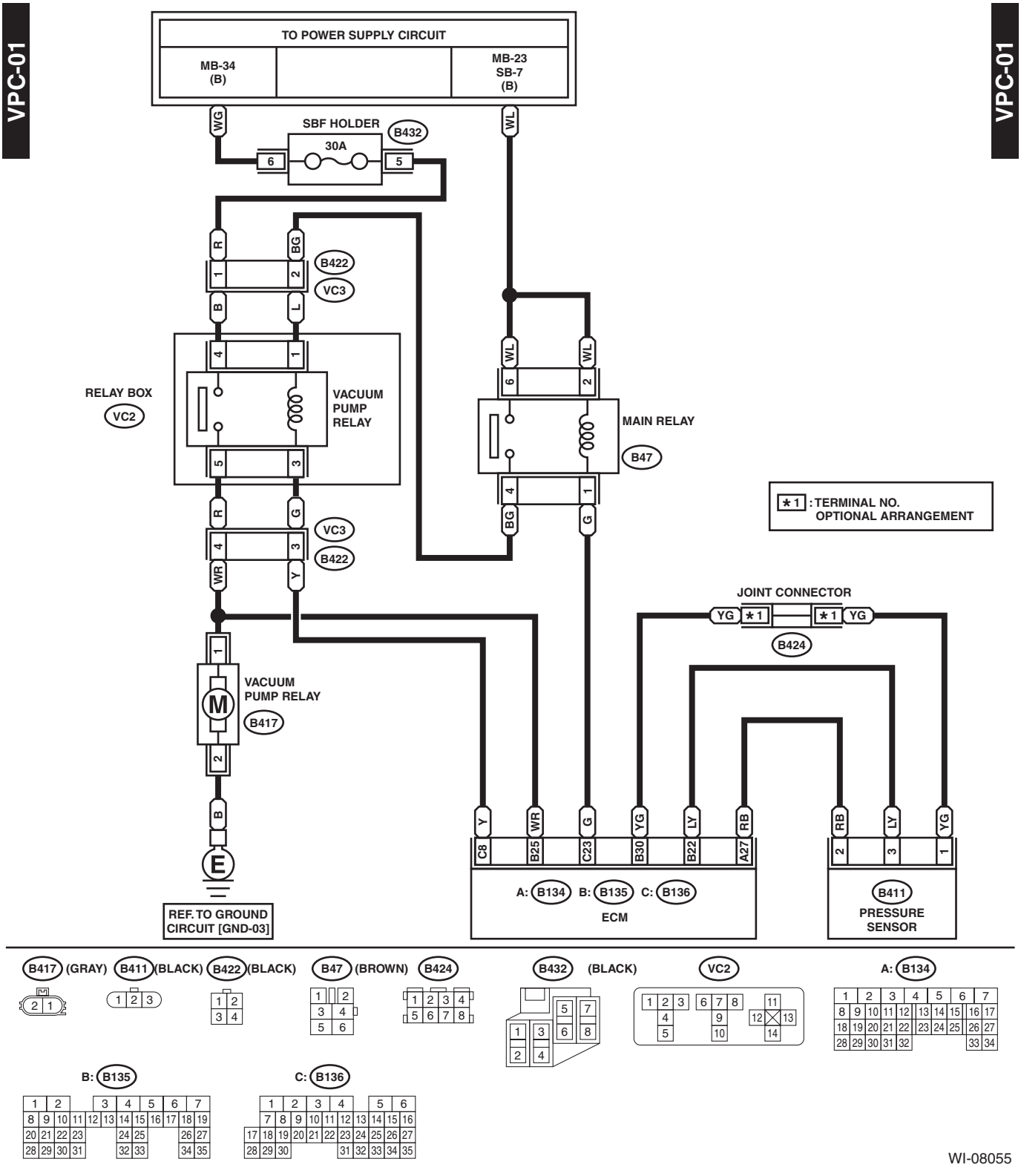

B122
1 2 3 4
5 6 7 8
D: B137
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31
A: B134
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34
C: B136
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27
28 29 30 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-08054

6. Vacuum Pump Control System

A: WIRING DIAGRAM

VPC-01

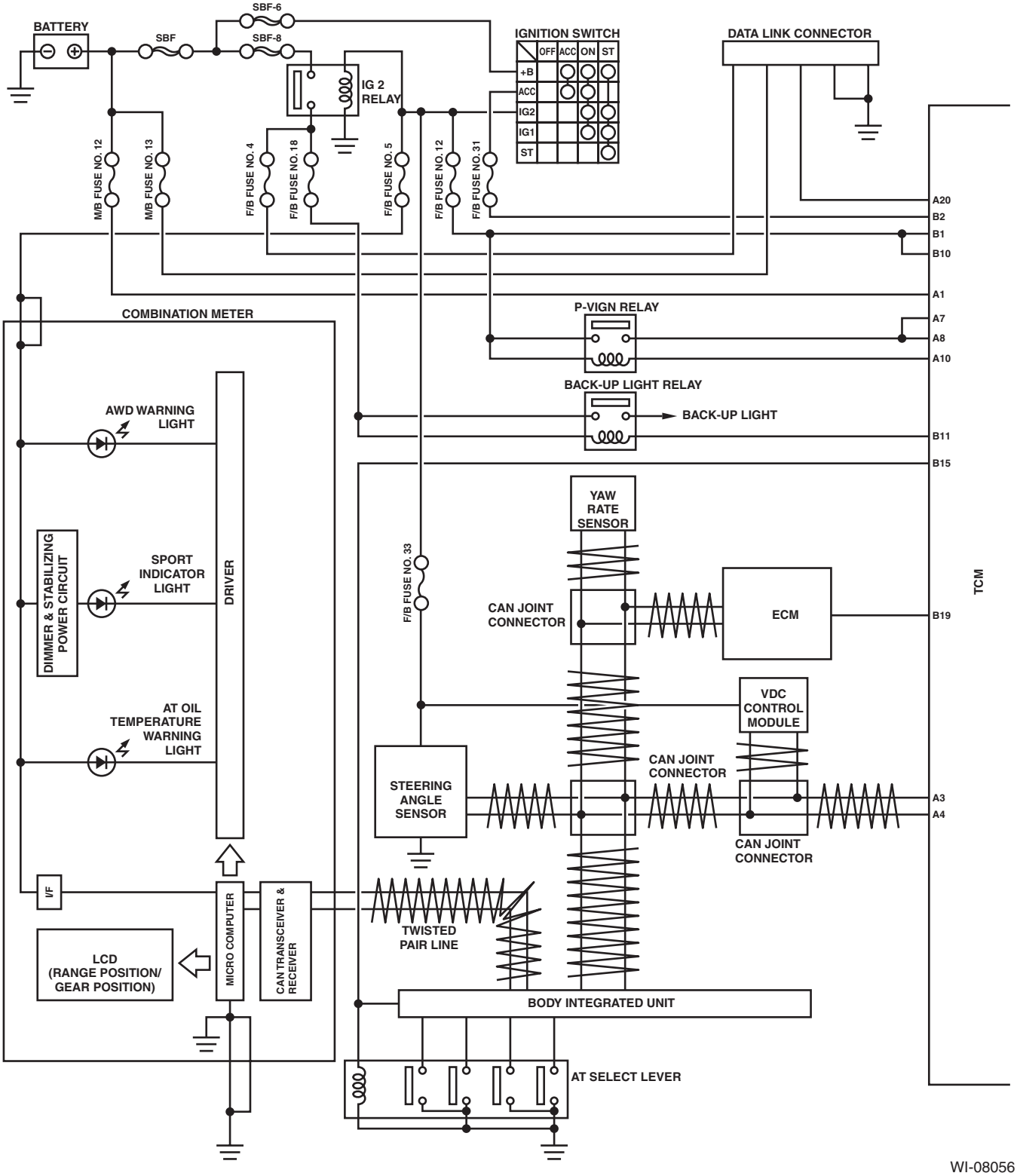


WI-08055

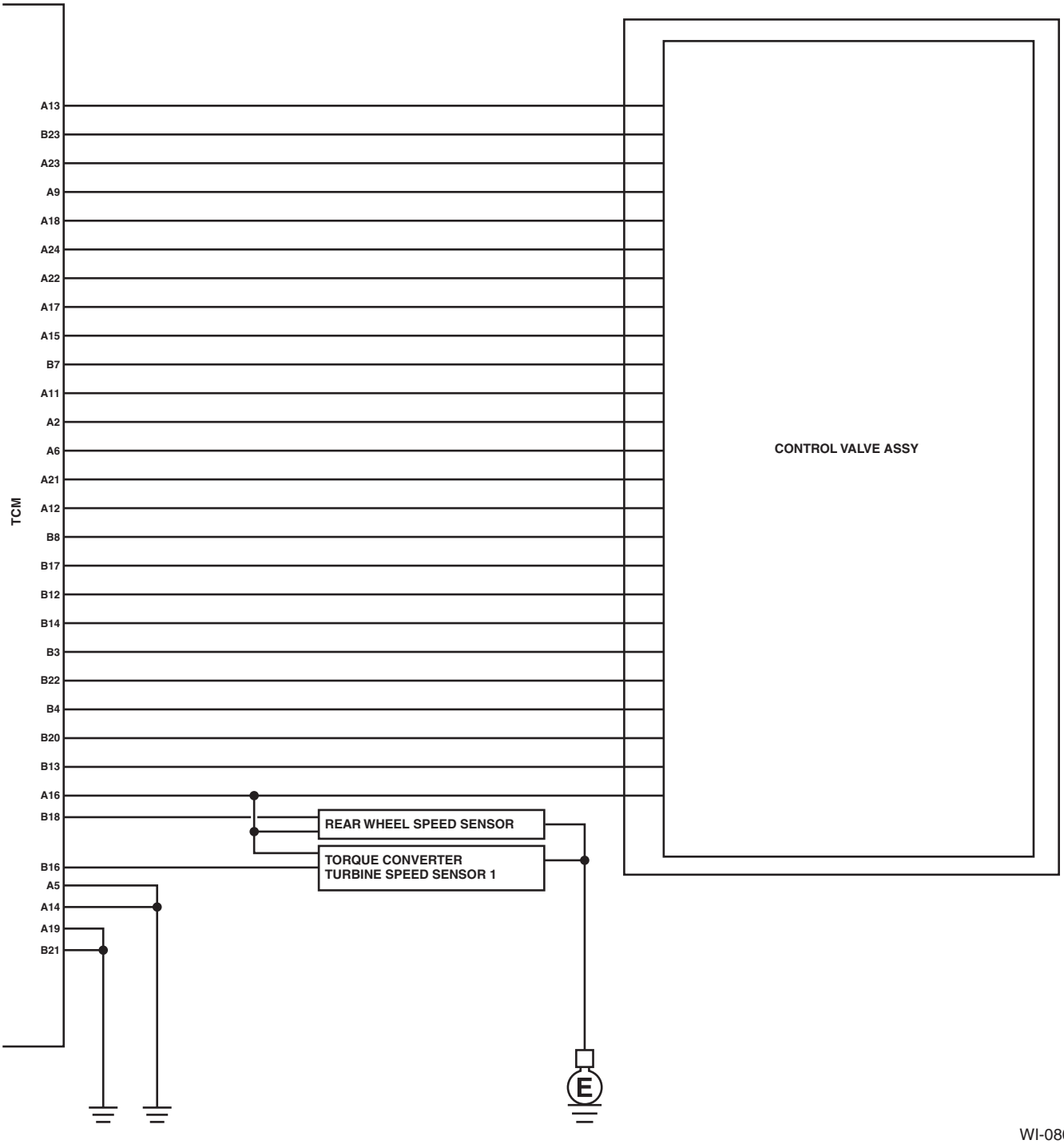
VPC-01

7. AT Control System

A: WIRING DIAGRAM



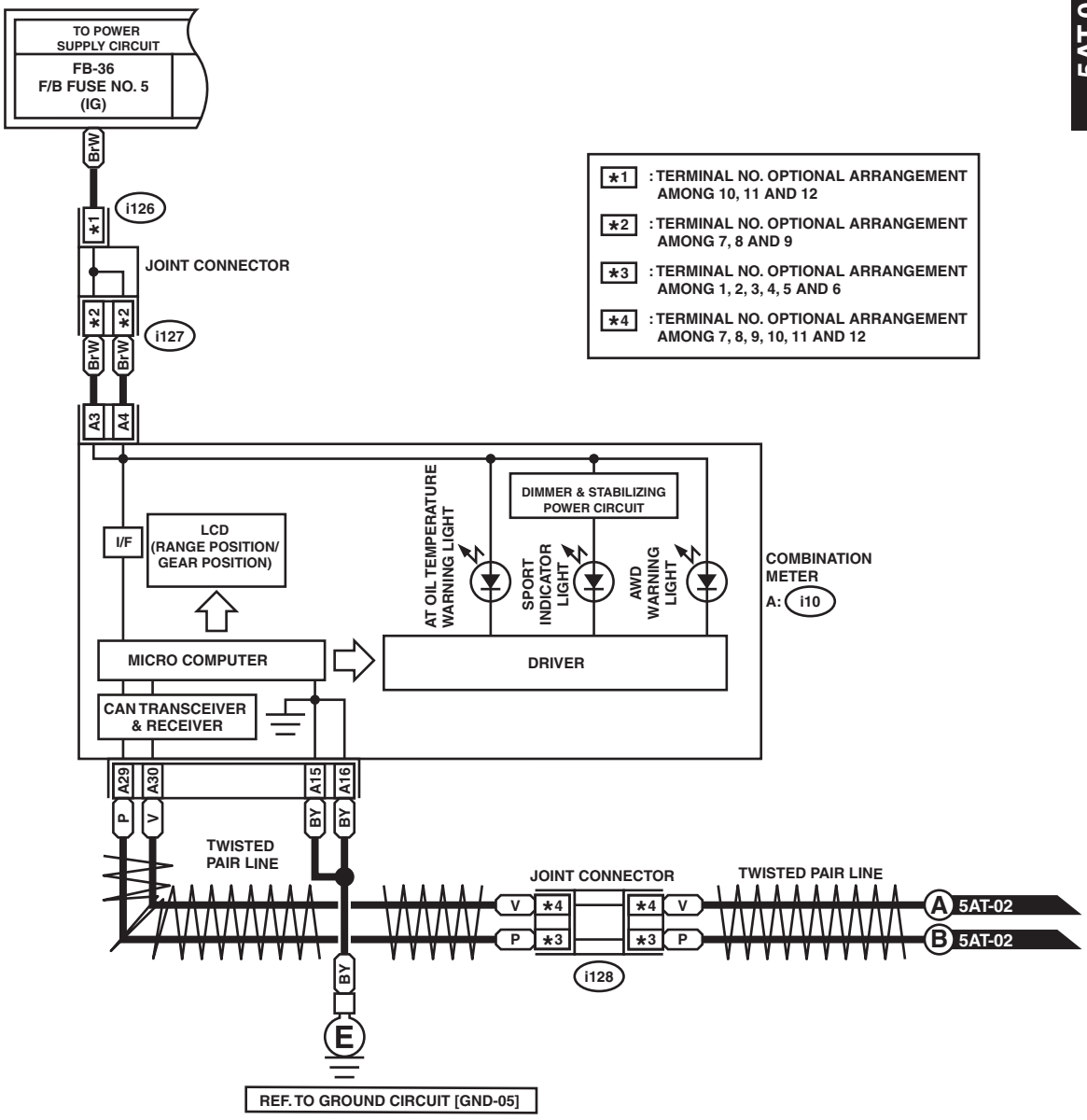
WI-08056


TCM
A13
B23
A23
A9
A18
A24
A22
A17
A15
B7
A11
A2
A6
A21
A12
B8
B17
B12
B14
B3
B22
B4
B20
B13
A16
B18
B16
A5
A14
A19
B21
CONTROL VALVE ASSY
REAR WHEEL SPEED SENSOR
TORQUE CONVERTER
TURBINE SPEED SENSOR 1
E

WI-08057

5AT-01

5AT-01



i126 (BLACK)

i127 (BLACK)

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

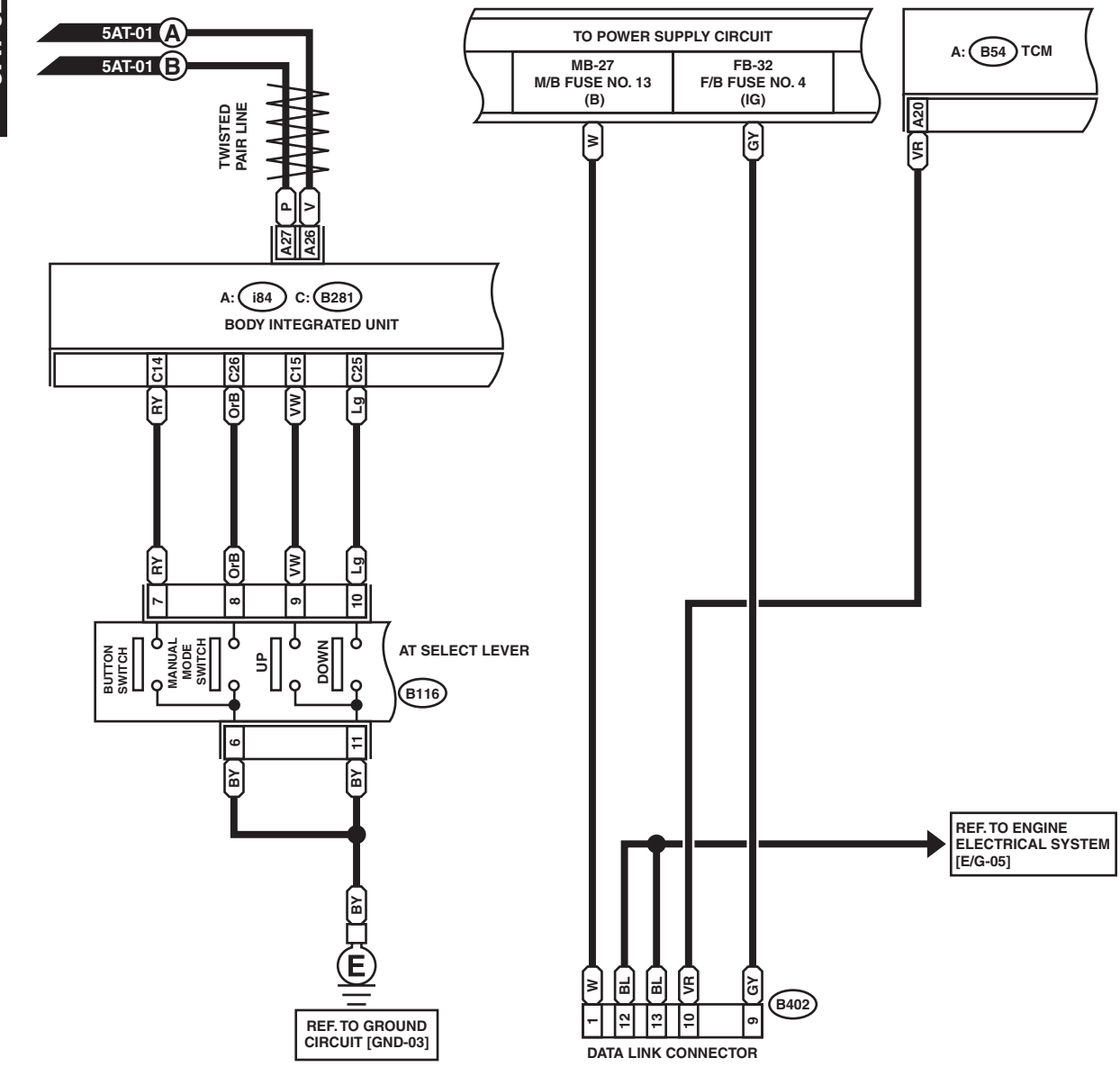
i128 (BLUE)

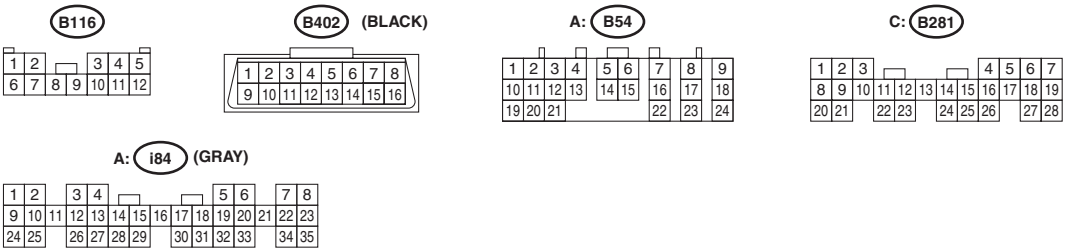
1	2	3	4	5	6	7	8	9	10	11	12

A: i10 (GREEN)

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

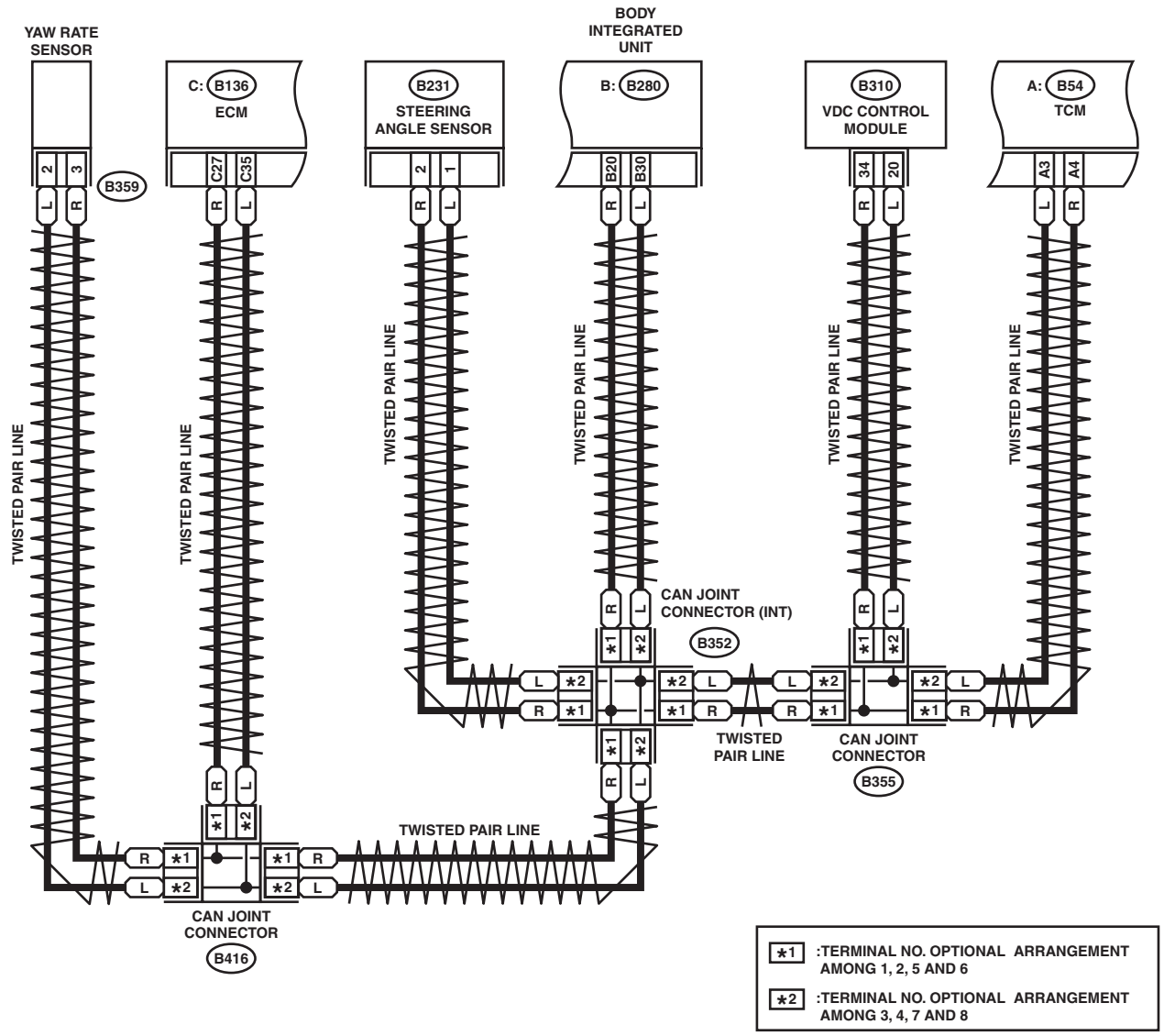
WI-08058

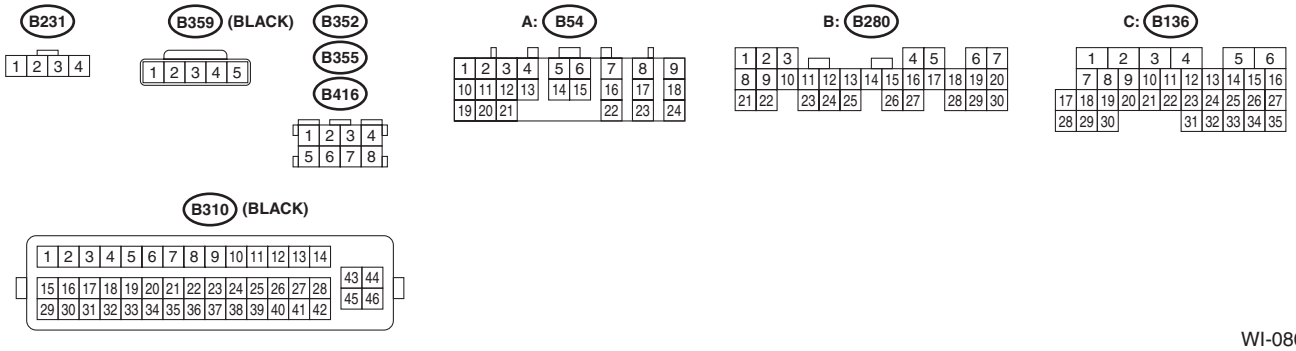

5AT-01 A
5AT-01 B
TWISTED PAIR LINE
P
V
A27
A26
A: i84 C: B281
BODY INTEGRATED UNIT
C14
C26
C15
C25
RY
OrB
VW
Lg
7
8
9
10
BUTTON SWITCH
MANUAL MODE SWITCH
UP
DOWN
AT SELECT LEVER
B116
6
11
BY
E
REF. TO GROUND CIRCUIT [GND-03]
TO POWER SUPPLY CIRCUIT
MB-27
M/B FUSE NO. 13
(B)
FB-32
F/B FUSE NO. 4
(IG)
W
GY
A: B54 TCM
A20
VR
REF. TO ENGINE ELECTRICAL SYSTEM [E/G-05]
W
BL
BL
VR
GY
B402
1
12
13
10
9
DATA LINK CONNECTOR


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
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
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
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-08059

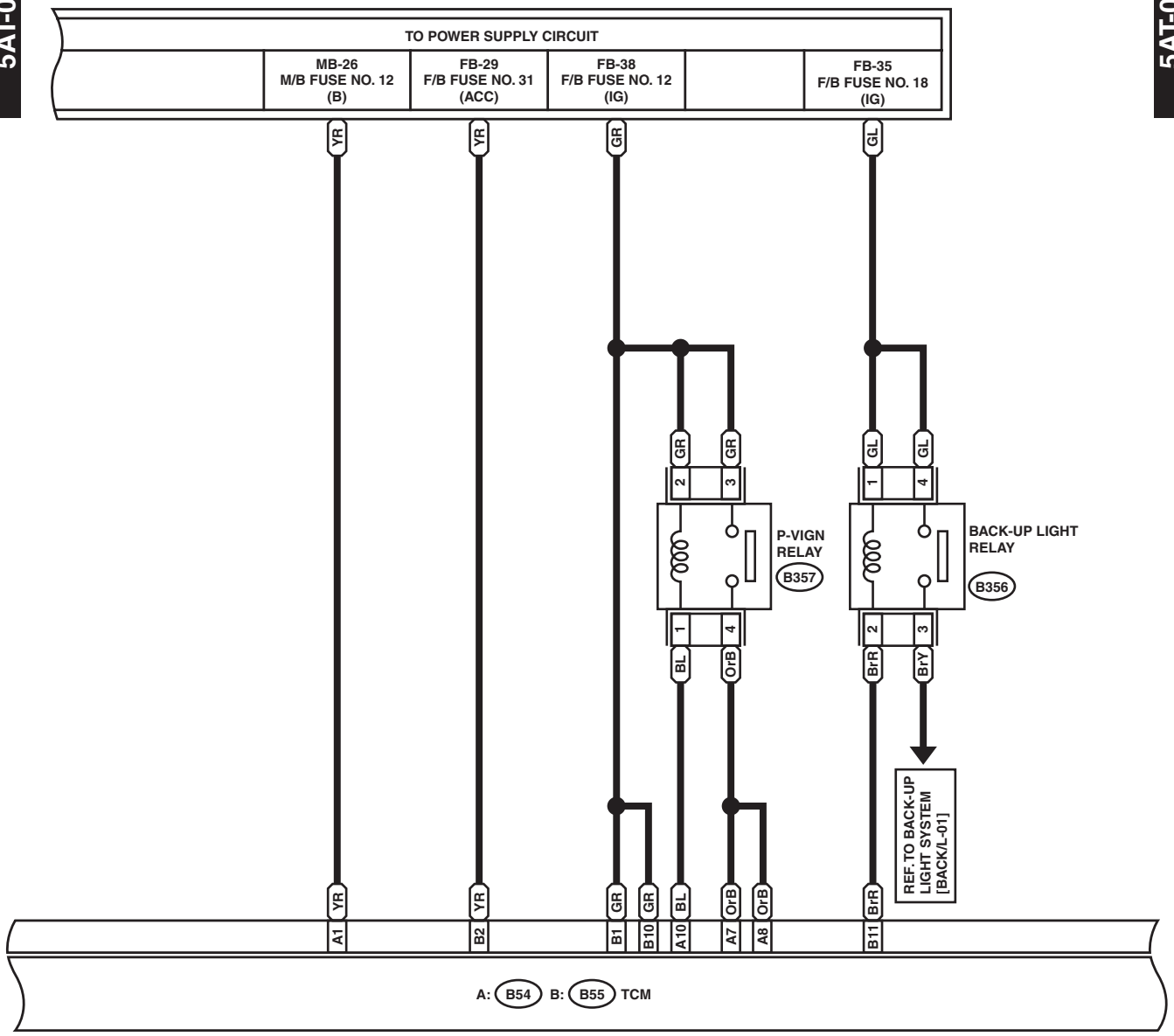
5AT-03

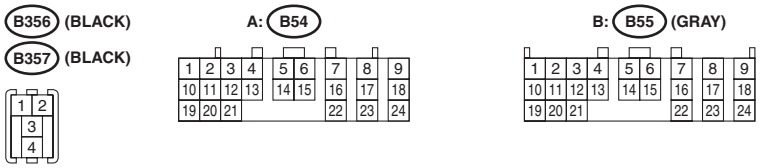




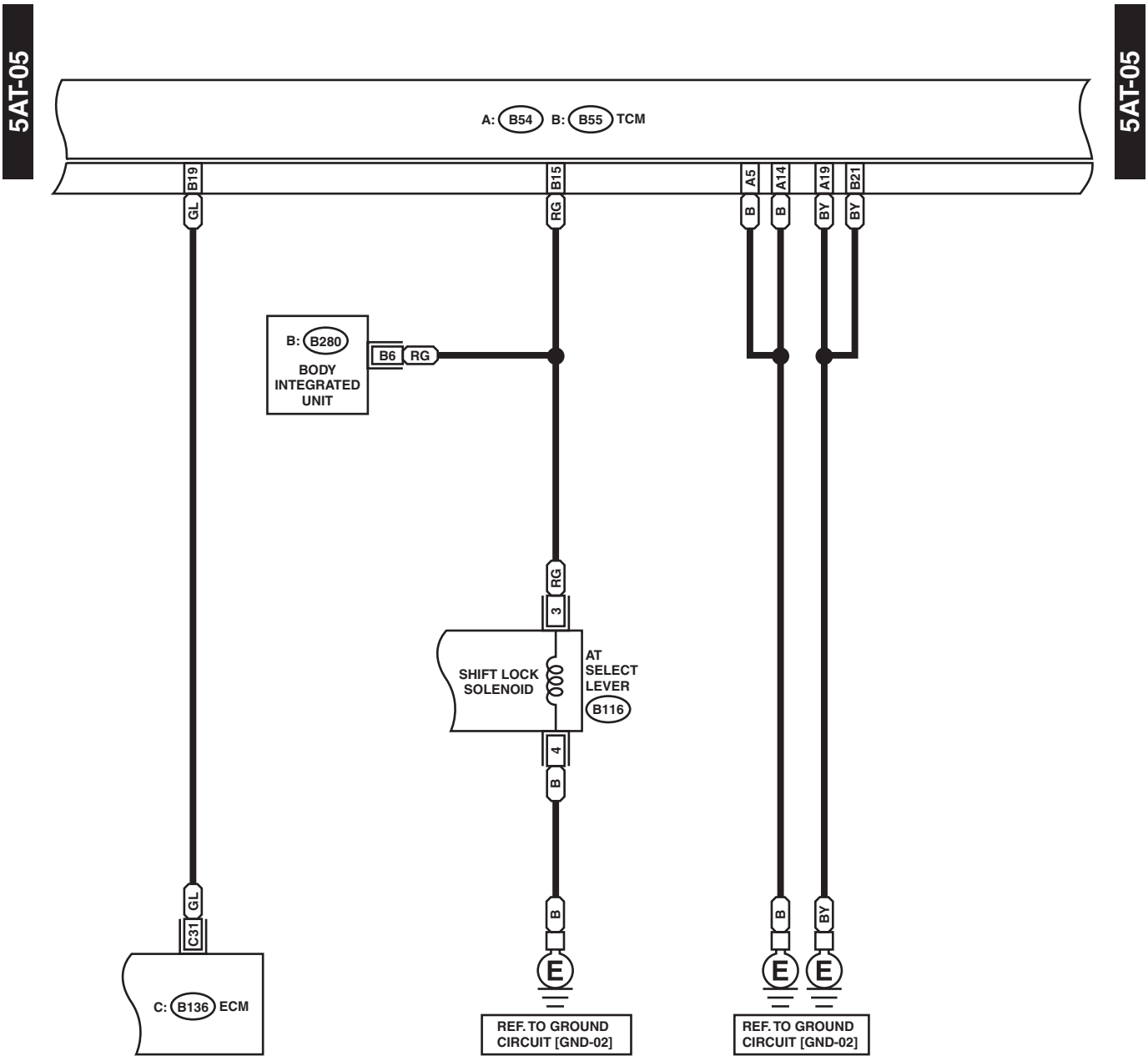
WI-08060

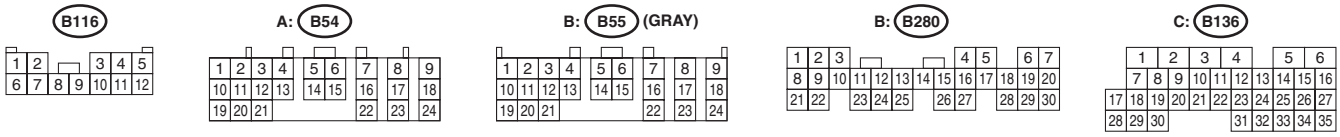
5AT-04



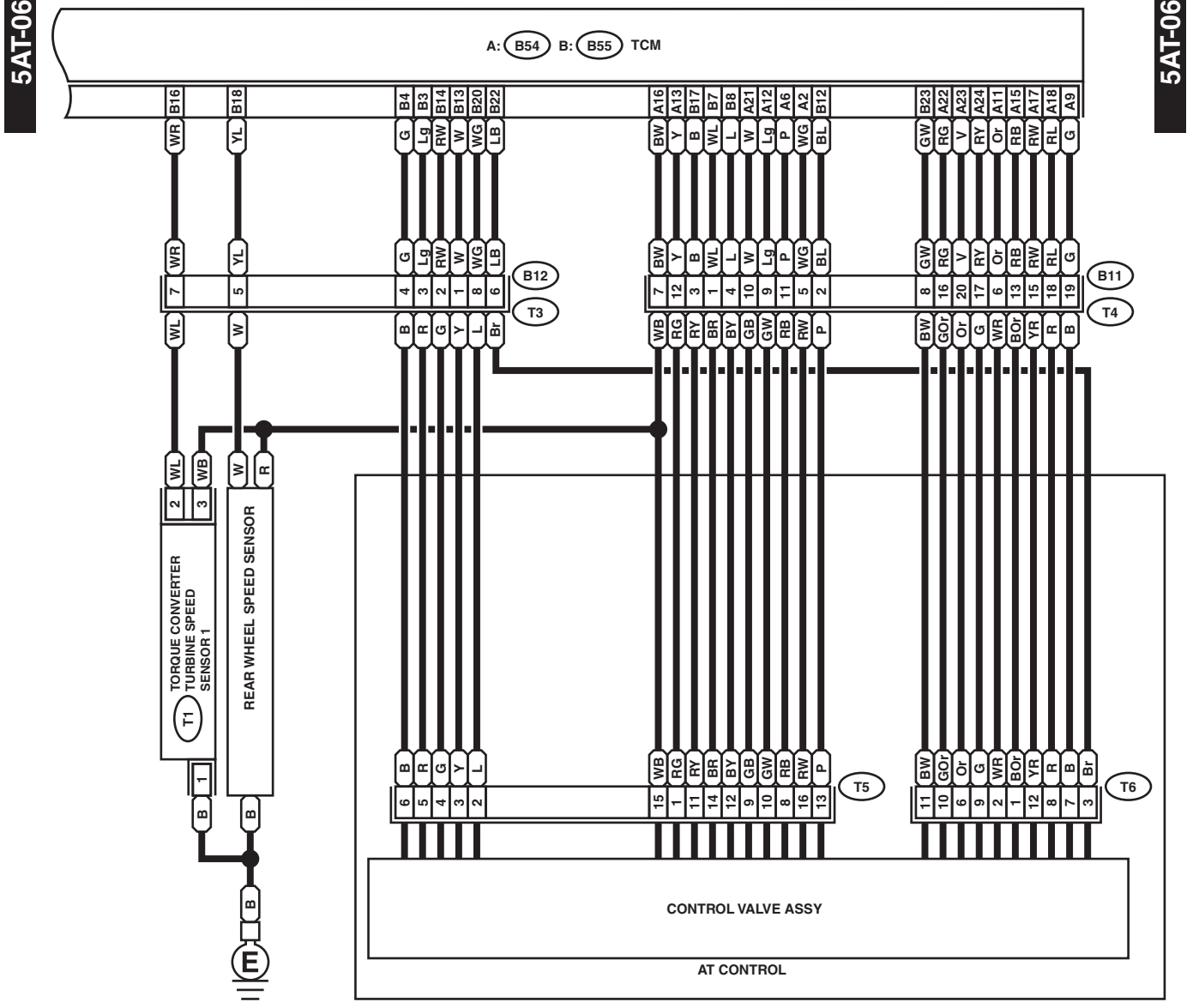


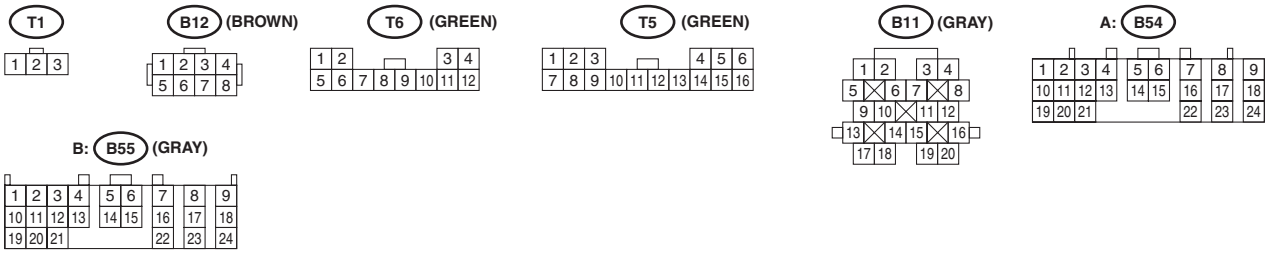
WI-08061


5AT-05
5AT-05
A: B54 B: B55 TCM
B19
B15
A5
A14
A19
B21
GL
RG
B
B
BY
BY
B: B280
BODY INTEGRATED UNIT
B6
RG
RG
3
SHIFT LOCK SOLENOID
AT SELECT LEVER
B116
4
B
C31
GL
C: B136 ECM
B
B
BY
E
E
E
REF. TO GROUND CIRCUIT [GND-02]
REF. TO GROUND CIRCUIT [GND-02]


B116
A: B54
B: B55 (GRAY)
B: B280
C: B136

WI-08062

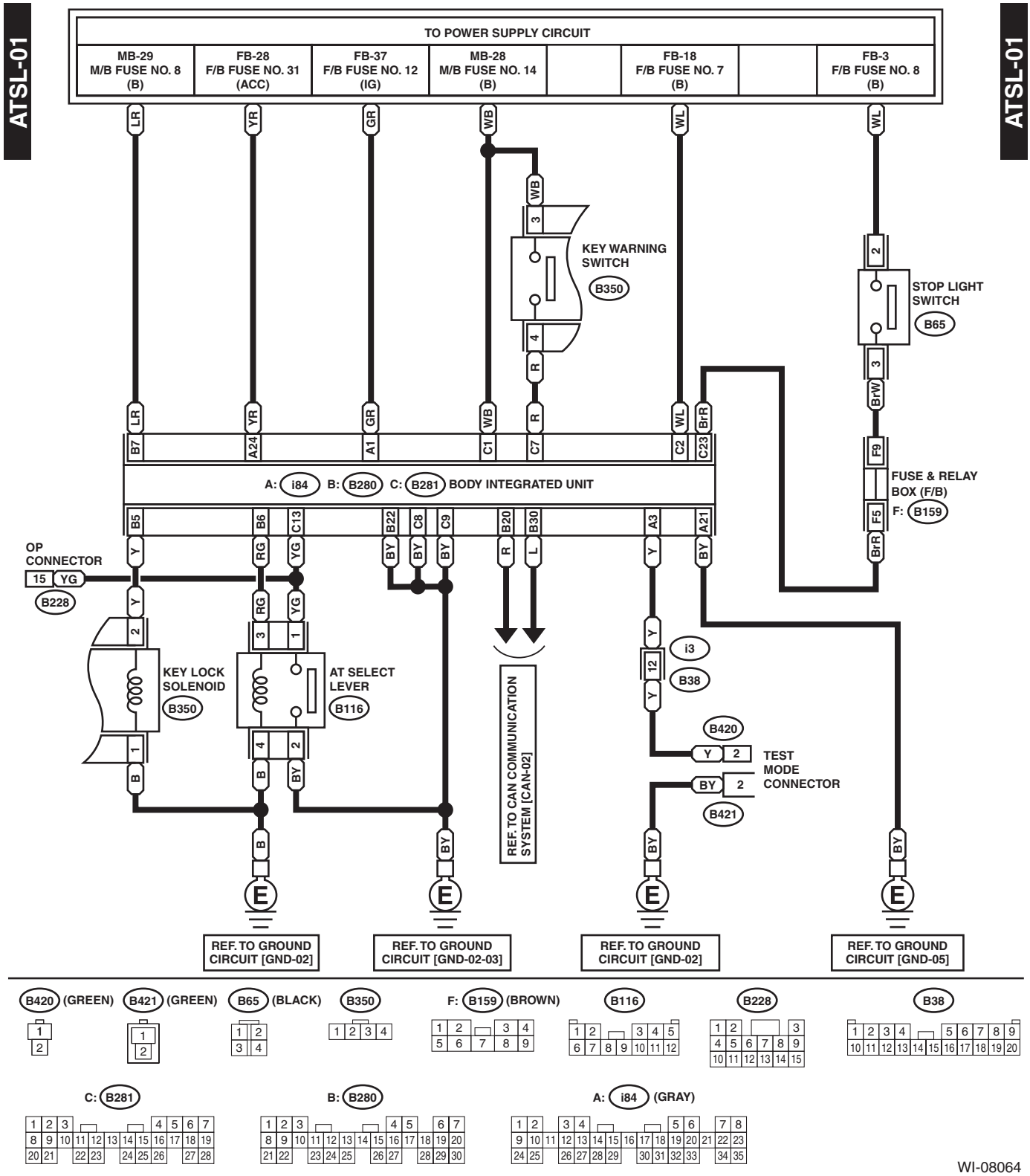

A: B54 B: B55 TCM
B16 B18 B4 B3 B14 B13 B20 B22 A16 A13 B17 B7 B8 A21 A12 A6 A2 B12 B23 A22 A23 A24 A11 A15 A17 A18 A9
WR YL G Lg RW W WG LB BW Y B WL L W Lg P WG BL GW RG V RY Or RB RW RL G
B12
T3
B11
T4
WL W B R G Y L Br WB RG RY BR BY GB GW RB RW P BW GOr Or G WR BOr YR R B
TORQUE CONVERTER TURBINE SPEED SENSOR 1
T1
REAR WHEEL SPEED SENSOR
T5
T6
CONTROL VALVE ASSY
AT CONTROL


T1
B12 (BROWN)
T6 (GREEN)
T5 (GREEN)
B11 (GRAY)
A: B54
B: B55 (GRAY)

WI-08063

8. AT Shift Lock Control System

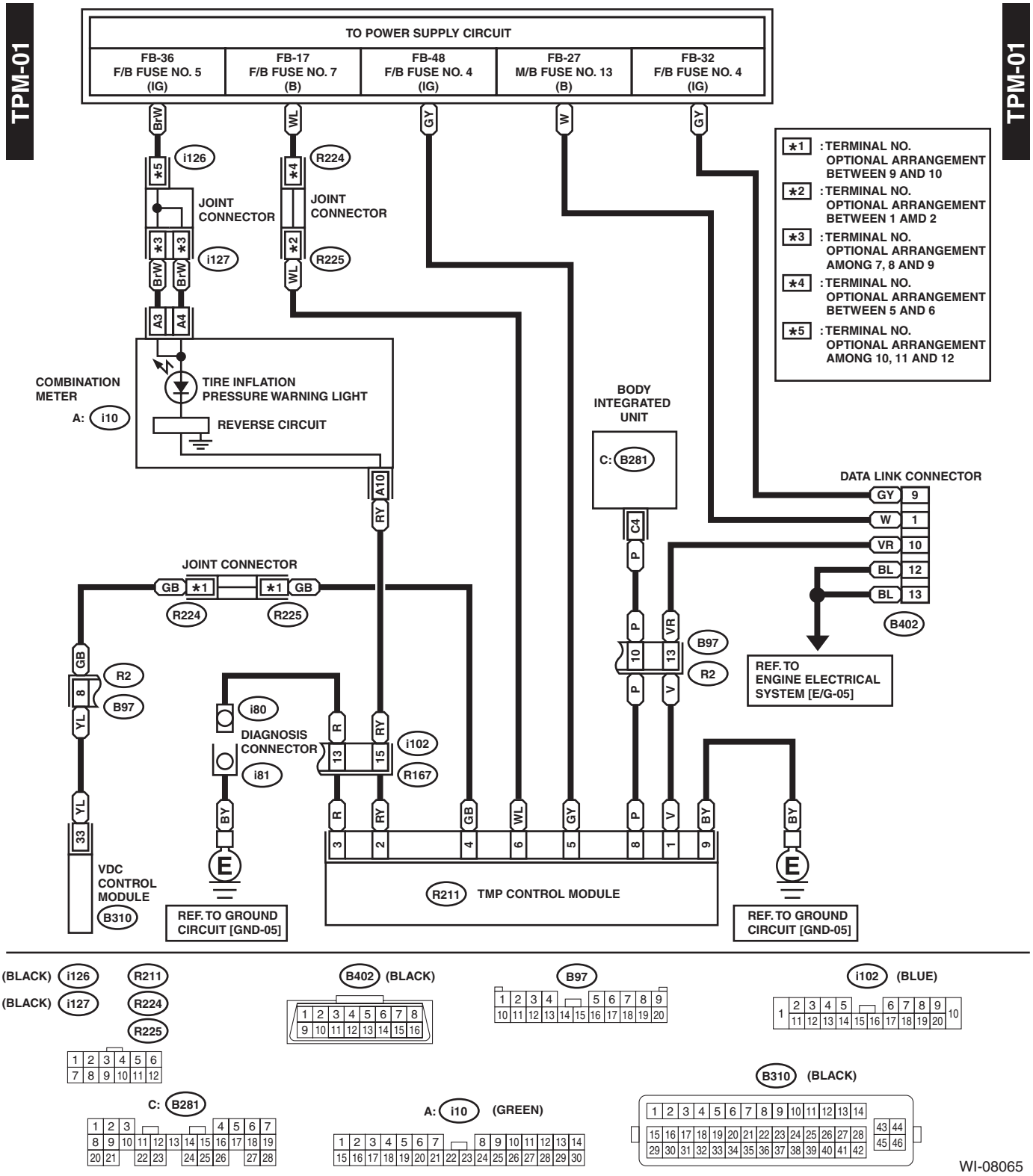
A: WIRING DIAGRAM



WI-08064

9. TPM Control System

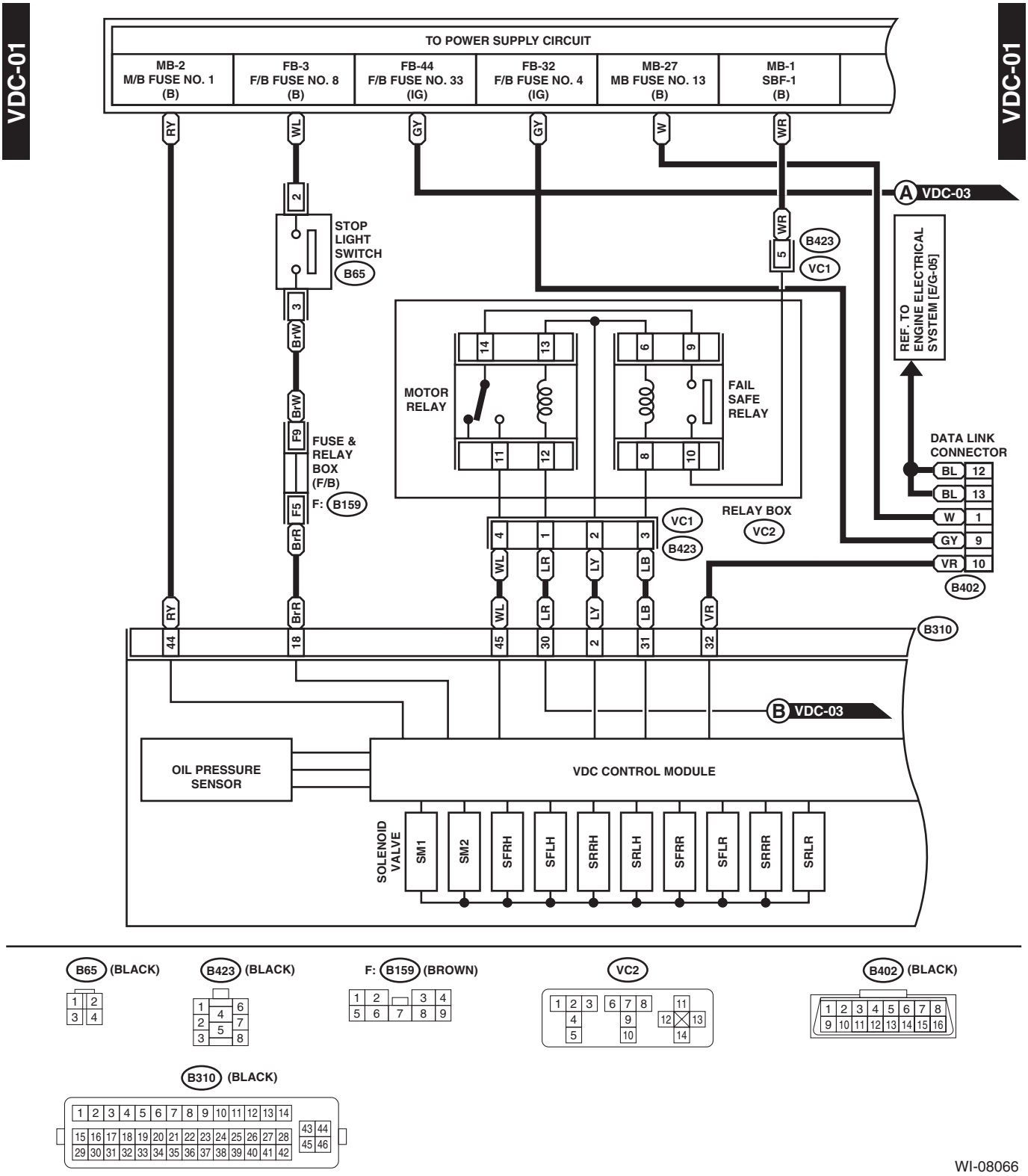
A: WIRING DIAGRAM



WI-08065

10.Vehicle Dynamics Control System

A: WIRING DIAGRAM



B65 (BLACK)

B423 (BLACK)

F: B159 (BROWN)

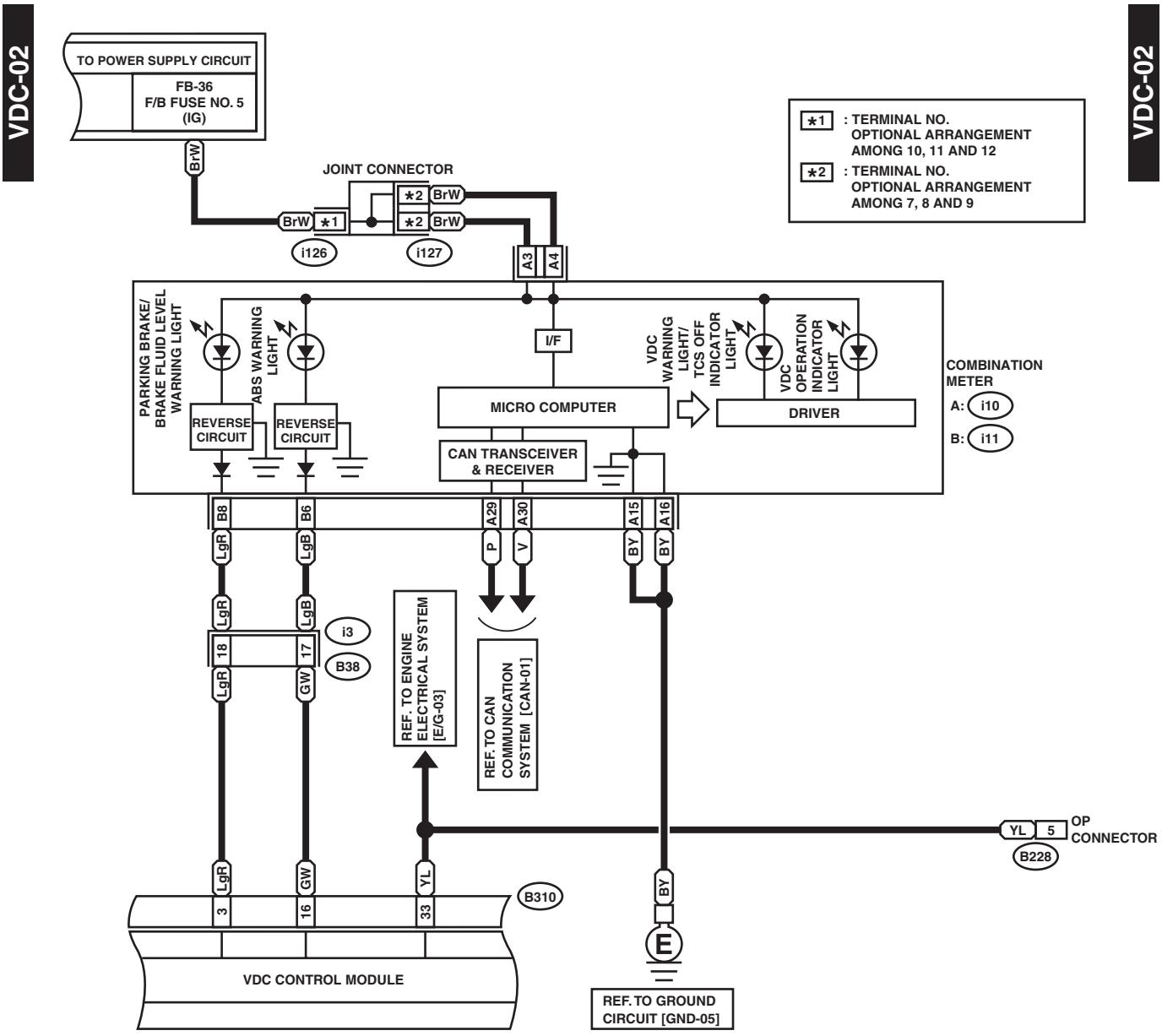
VC2

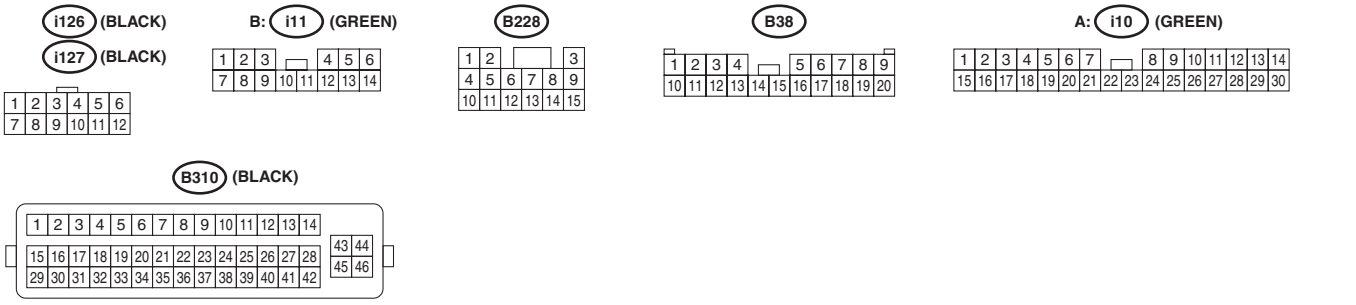
B402 (BLACK)

B310 (BLACK)

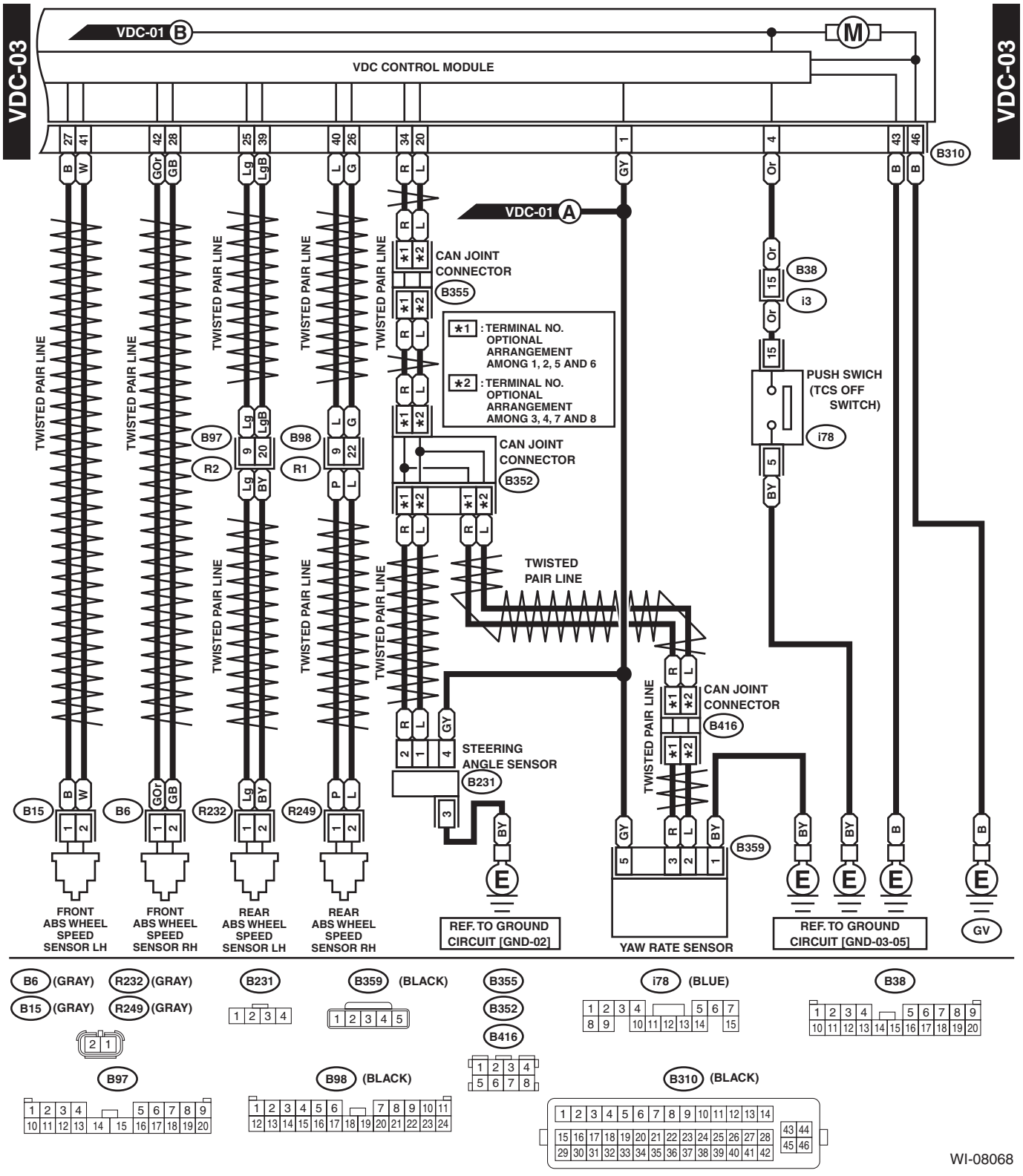
WI-08066

VDC-02





WI-08067

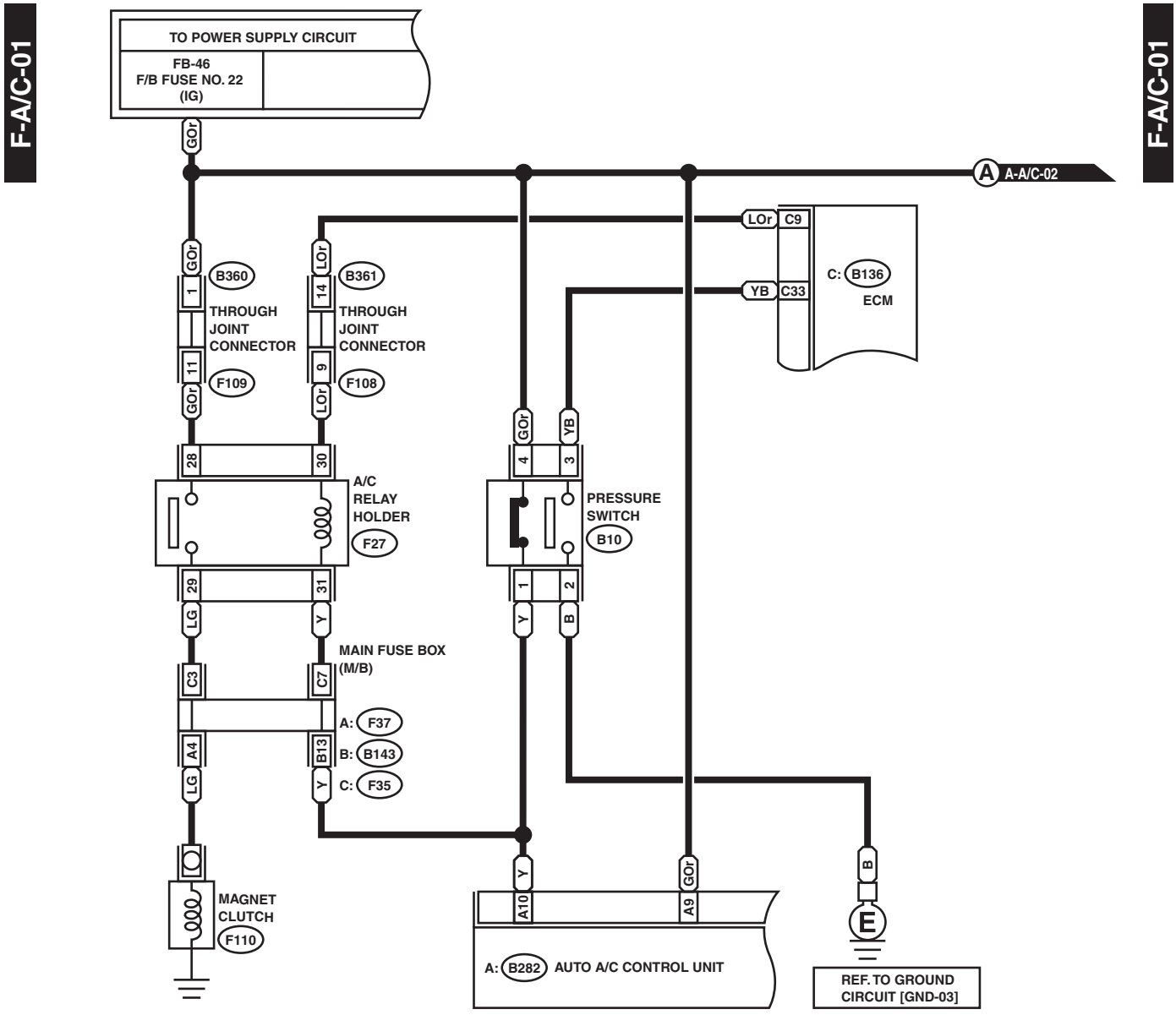

VDC-03
VDC-01 B
M
VDC CONTROL MODULE
VDC-03
B310
VDC-01 A
CAN JOINT CONNECTOR
B355
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 1, 2, 5 AND 6
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 3, 4, 7 AND 8
B38
i3
PUSH SWICH (TCS OFF SWITCH)
i78
CAN JOINT CONNECTOR
B352
TWISTED PAIR LINE
B97
B98
R2
R1
CAN JOINT CONNECTOR
B416
STEERING ANGLE SENSOR
B231
B359
B15
B6
R232
R249
FRONT ABS WHEEL SPEED SENSOR LH
FRONT ABS WHEEL SPEED SENSOR RH
REAR ABS WHEEL SPEED SENSOR LH
REAR ABS WHEEL SPEED SENSOR RH
REF. TO GROUND CIRCUIT [GND-02]
YAW RATE SENSOR
REF. TO GROUND CIRCUIT [GND-03-05]
GV
B6 (GRAY)
B15 (GRAY)
R232 (GRAY)
R249 (GRAY)
B231
B359 (BLACK)
B355
B352
B416
i78 (BLUE)
B38
B97
B98 (BLACK)
B310 (BLACK)

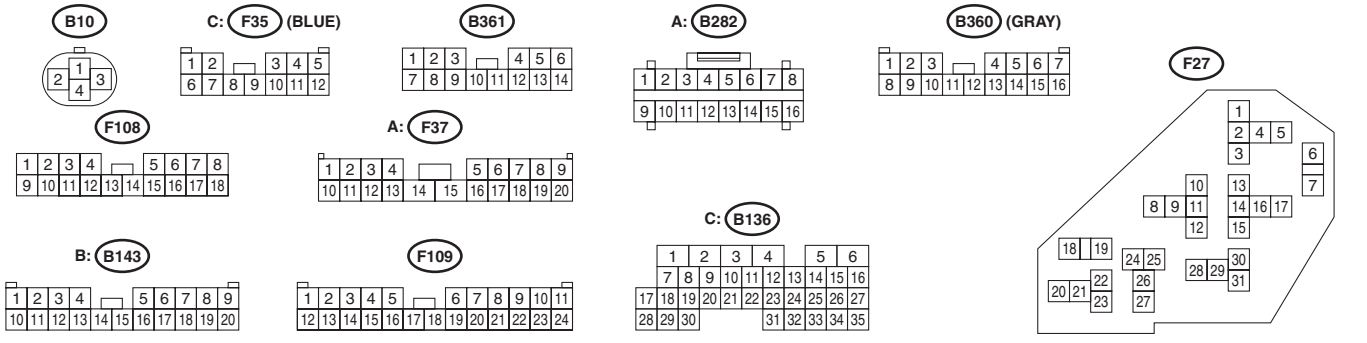
WI-08068

11.Air Conditioning System

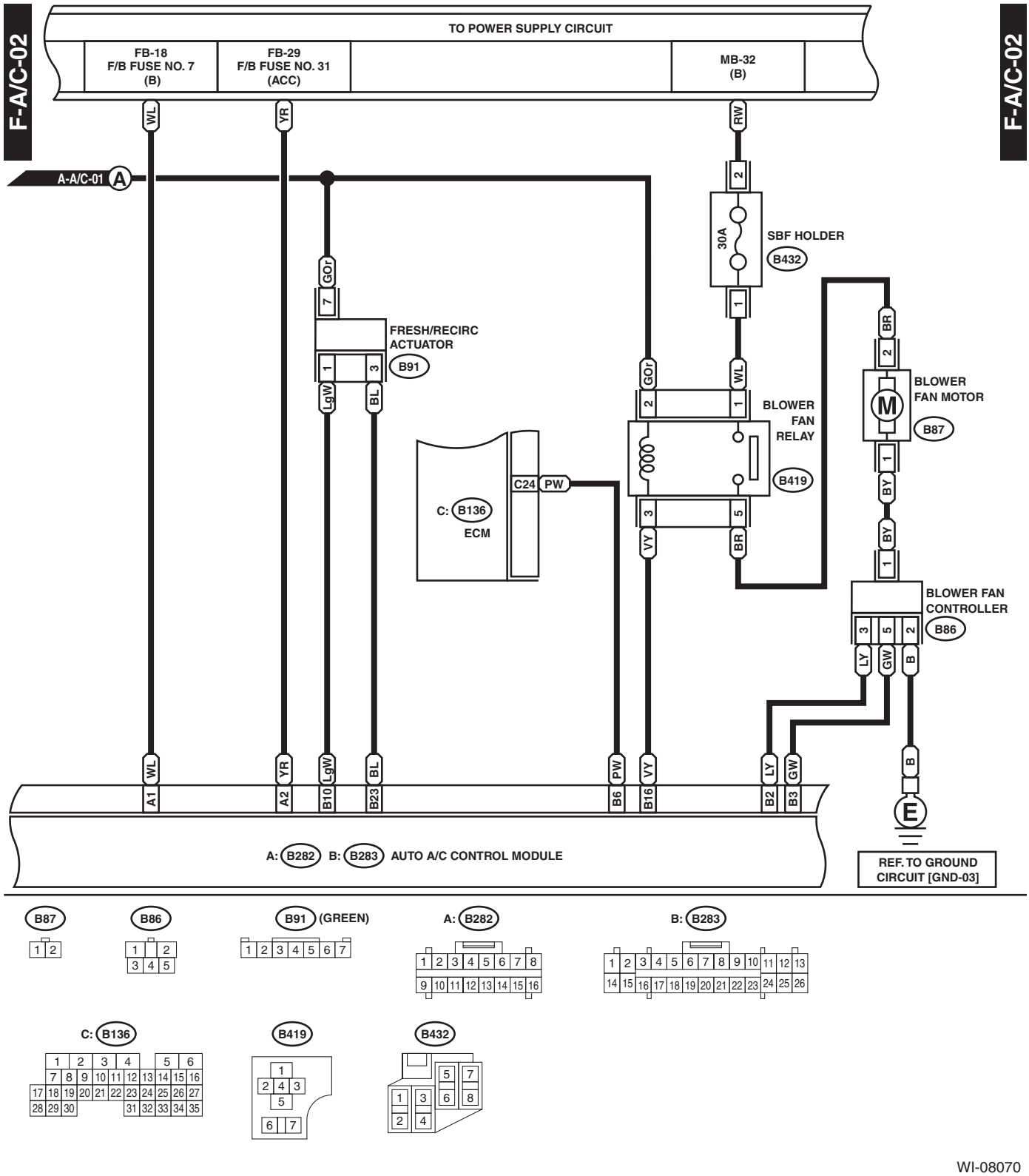
A: WIRING DIAGRAM

1. FRONT A/C

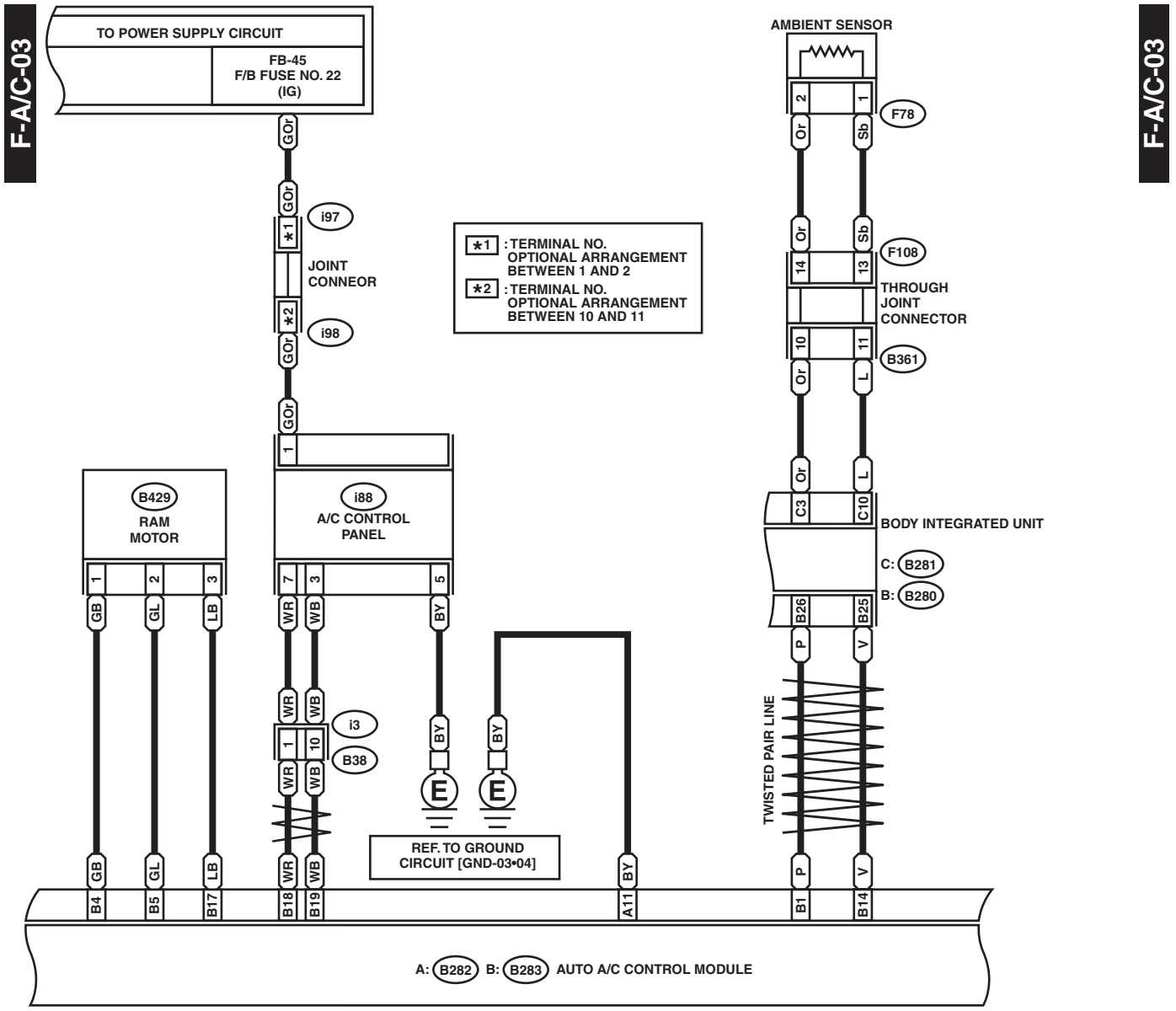


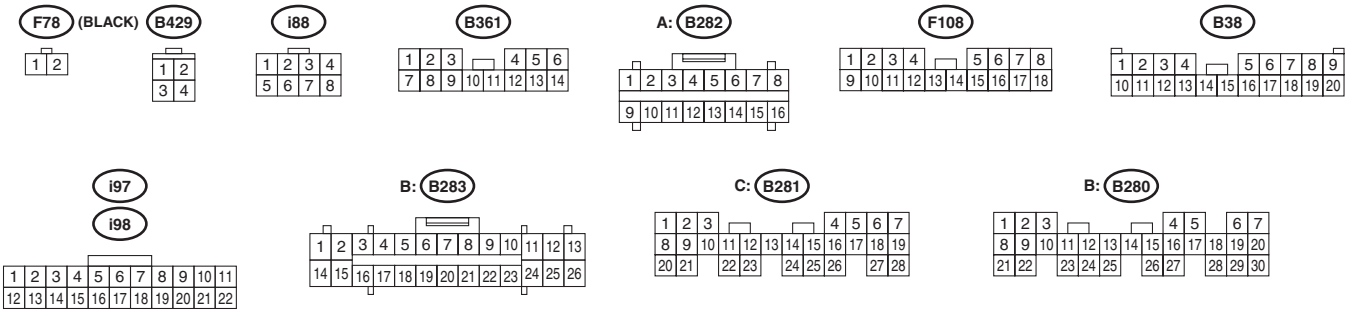


WI-08069

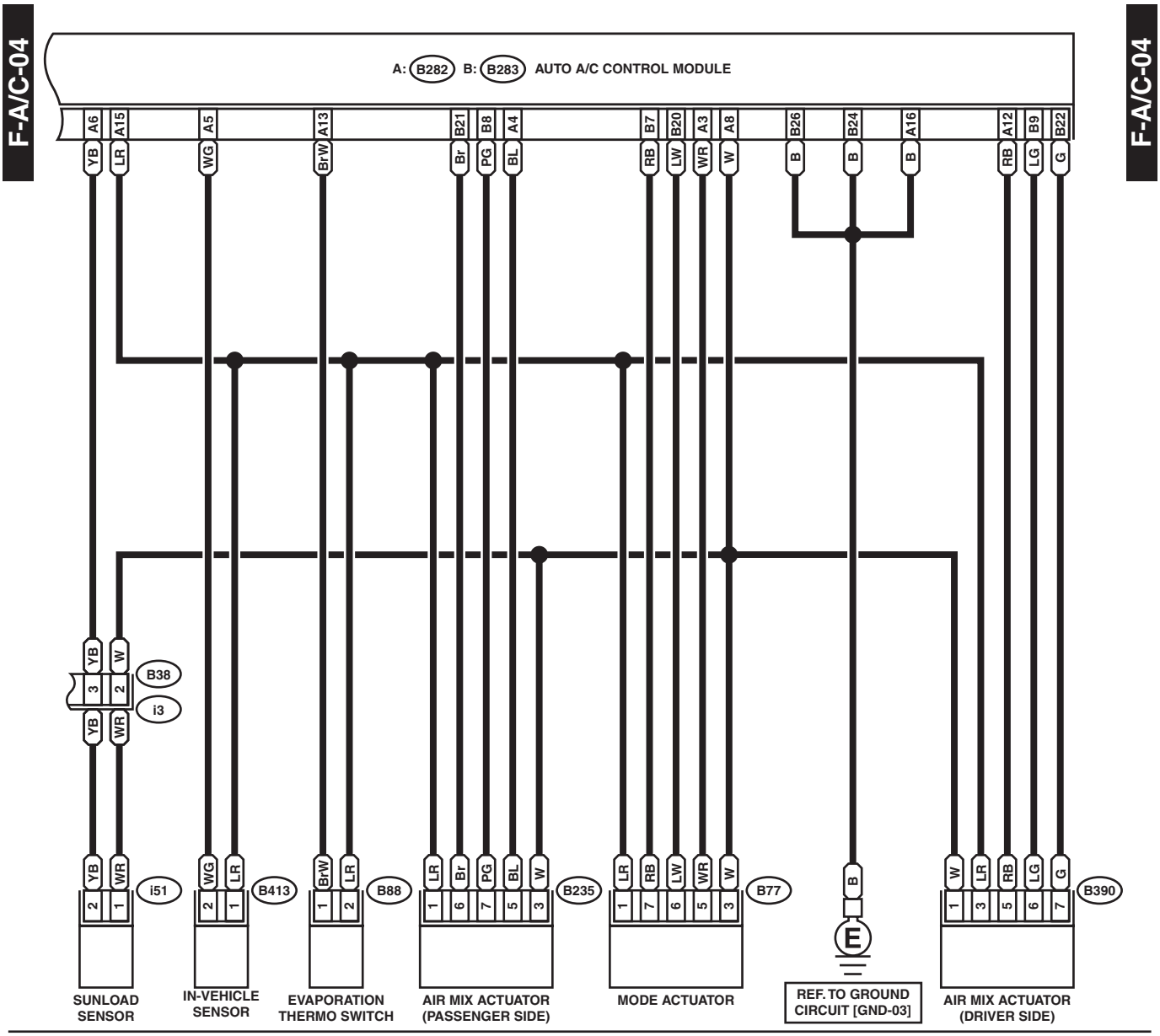

F-A/C-02
TO POWER SUPPLY CIRCUIT
FB-18
F/B FUSE NO. 7
(B)
FB-29
F/B FUSE NO. 31
(ACC)
MB-32
(B)
A-A/C-01
A
WL
YR
RW
30A
SBF HOLDER
B432
GOr
FRESH/RECIRC
ACTUATOR
B91
LgW
BL
C: B136
ECM
C24
PW
BLOWER
FAN
RELAY
B419
VY
BR
BLOWER
FAN MOTOR
B87
BY
BLOWER FAN
CONTROLLER
B86
LY
GW
B
A1
A2
B10
B23
B6
B16
B2
B3
A: B282 B: B283 AUTO A/C CONTROL MODULE
REF. TO GROUND
CIRCUIT [GND-03]
B87
B86
B91 (GREEN)
A: B282
B: B283
C: B136
B419
B432

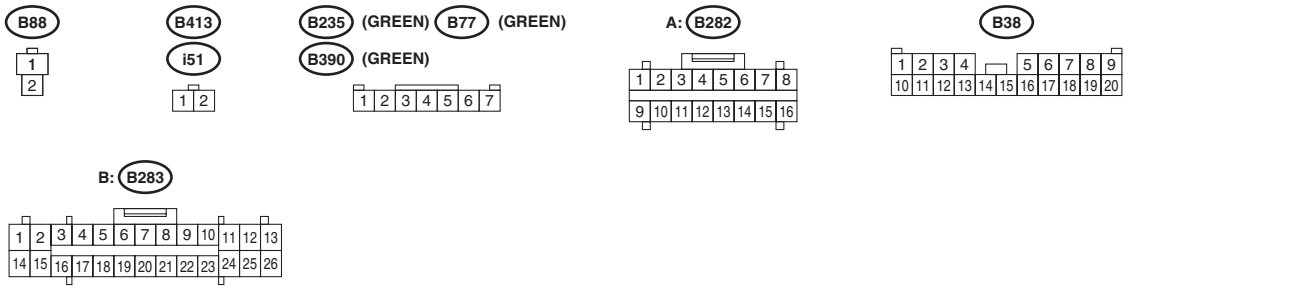
WI-08070


F-A/C-03
F-A/C-03
TO POWER SUPPLY CIRCUIT
FB-45
F/B FUSE NO. 22
(IG)
GOr
i97
*1
JOINT
CONNEOR
*2
i98
GOr
GOr
1
B429
RAM
MOTOR
i88
A/C CONTROL
PANEL
1 2 3
7 3 5
GB GL LB WR WB BY
WR WB
i3
1 10
B38
WR WB
BY BY
E E
REF. TO GROUND
CIRCUIT [GND-03•04]
B4 B5 B17 B18 B19 A11
GB GL LB WR WB BY
A: B282 B: B283 AUTO A/C CONTROL MODULE
*1 : TERMINAL NO.
OPTIONAL ARRANGEMENT
BETWEEN 1 AND 2
*2 : TERMINAL NO.
OPTIONAL ARRANGEMENT
BETWEEN 10 AND 11
AMBIENT SENSOR
2 1
Or Sb
F78
Or Sb
14 13
F108
THROUGH
JOINT
CONNECTOR
10 11
B361
Or L
Or L
C3 C10
BODY INTEGRATED UNIT
C: B281
B: B280
B26 B25
P V
TWISTED PAIR LINE
P V
B1 B14


F78 (BLACK)
B429
i88
B361
A: B282
F108
B38
i97
i98
B: B283
C: B281
B: B280

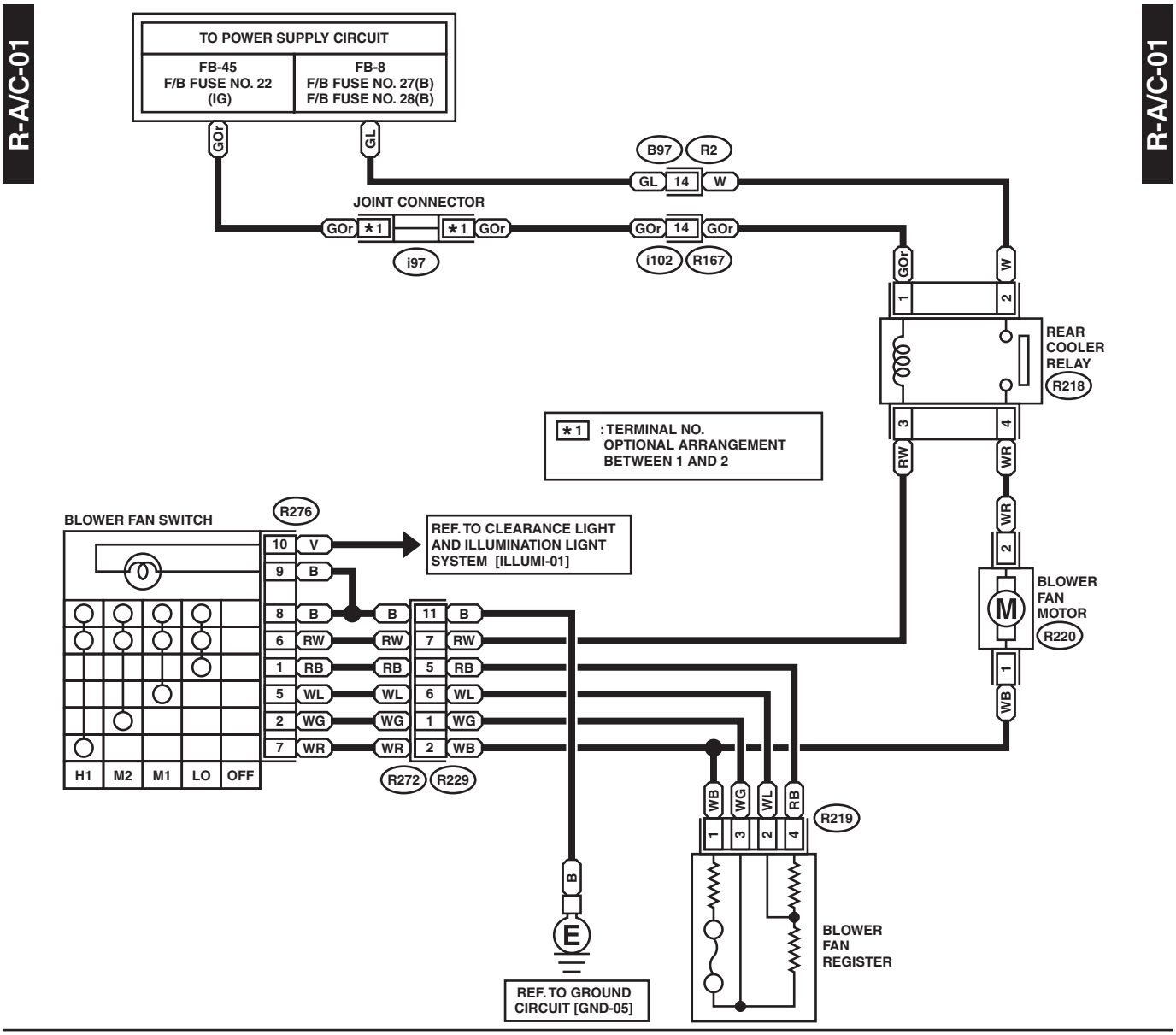
WI-08071

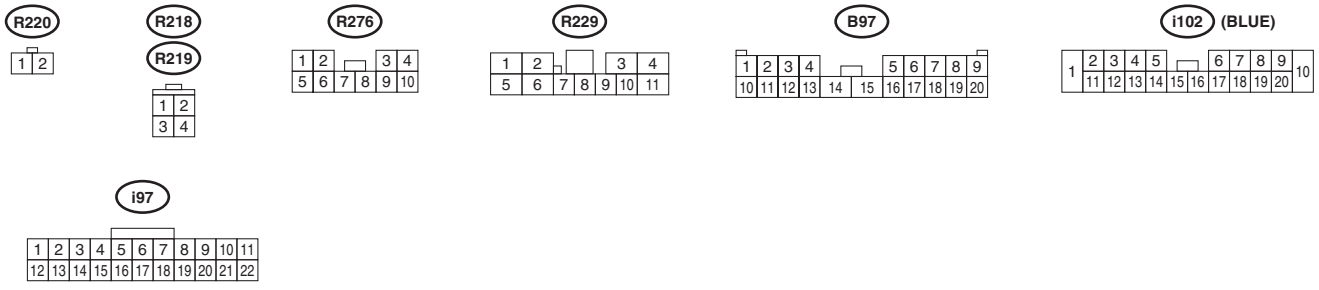

F-A/C-04
F-A/C-04
A: B282 B: B283 AUTO A/C CONTROL MODULE
A6 A15 A5 A13 B21 B8 A4 B7 B20 A3 A8 B26 B24 A16 A12 B9 B22
YB LR WG BrW Br PG BL RB LW WR W B B B RB LG G
B38
i3
i51
B413
B88
B235
B77
B390
SUNLOAD SENSOR
IN-VEHICLE SENSOR
EVAPORATION THERMO SWITCH
AIR MIX ACTUATOR (PASSENGER SIDE)
MODE ACTUATOR
REF. TO GROUND CIRCUIT [GND-03]
AIR MIX ACTUATOR (DRIVER SIDE)


B88
B413
i51
B235 (GREEN) B77 (GREEN)
B390 (GREEN)
A: B282
B38
B: B283

WI-08072

2. REAR A/C

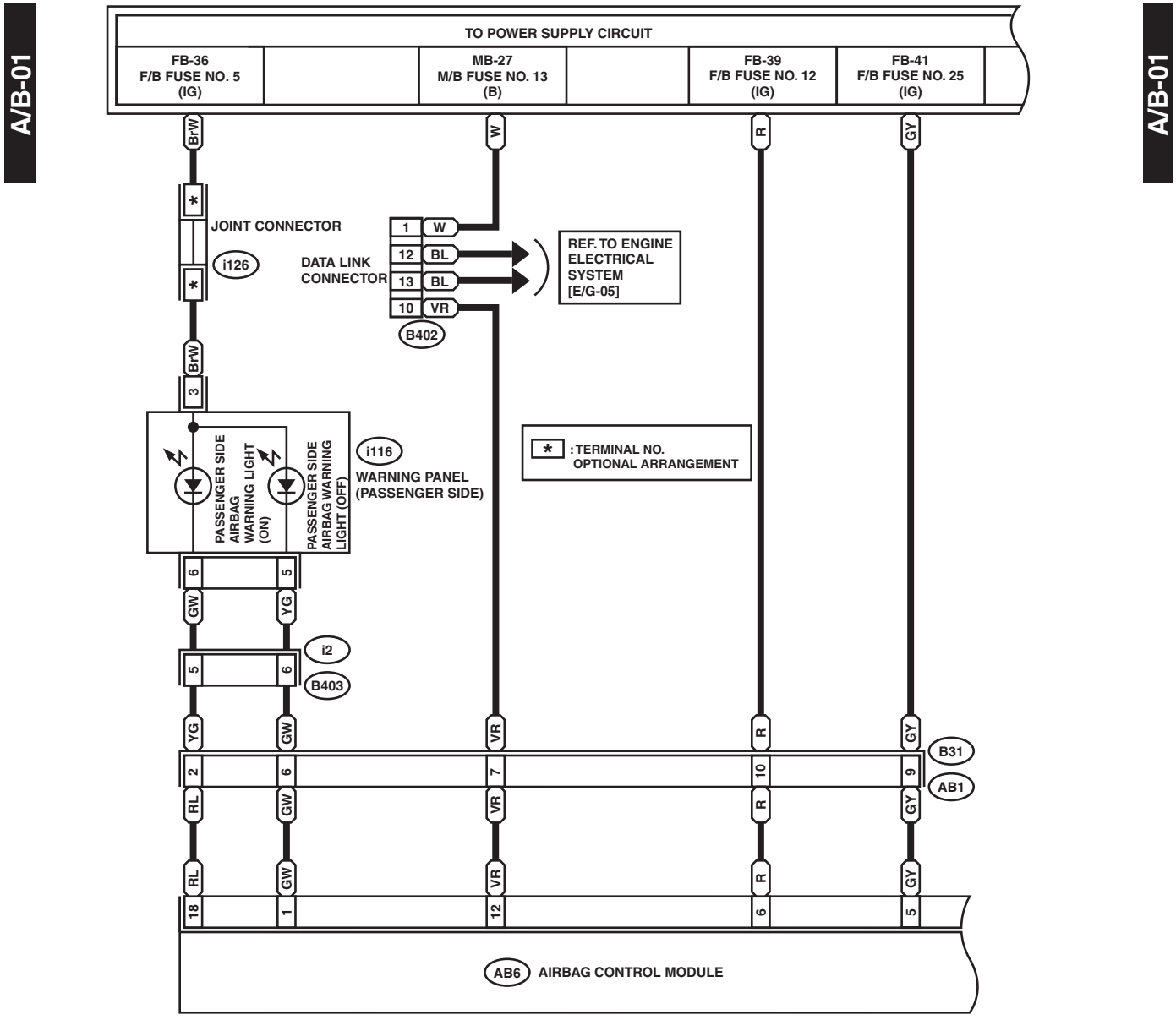


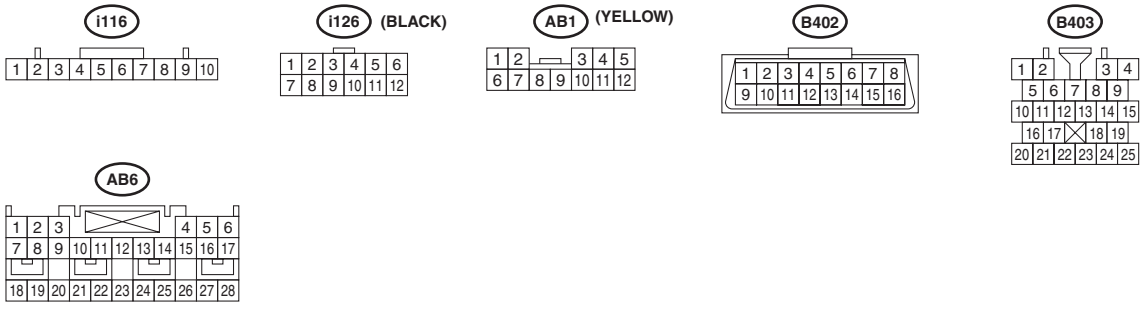


WI-08073

12.Airbag System

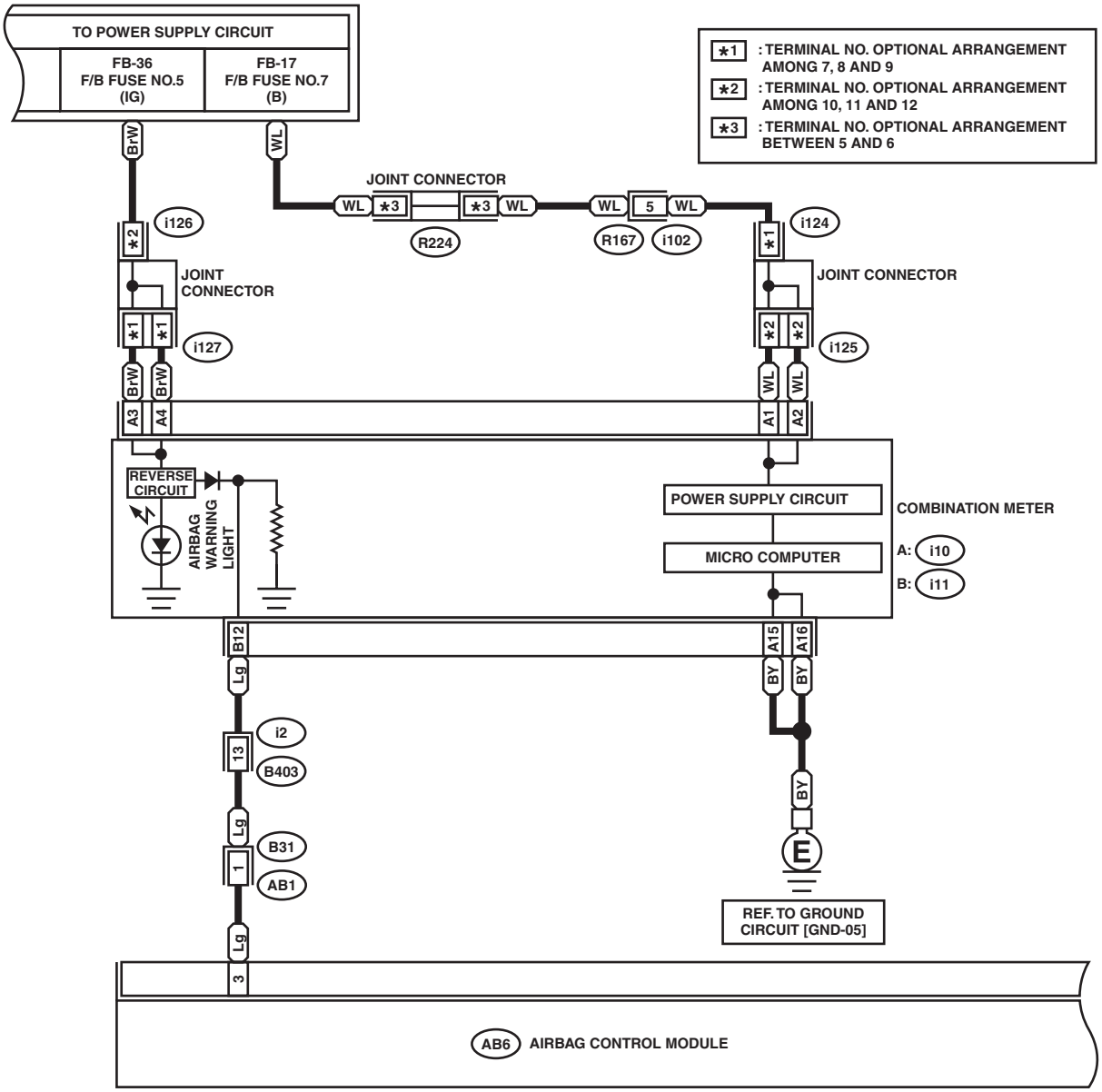
A: WIRING DIAGRAM

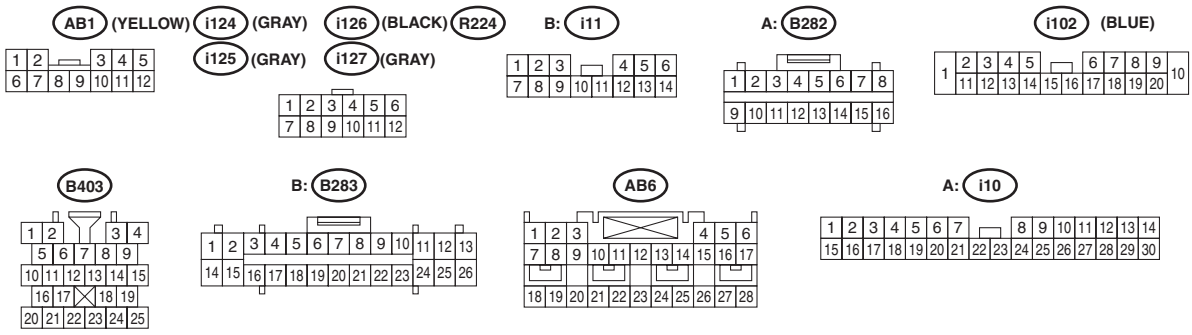




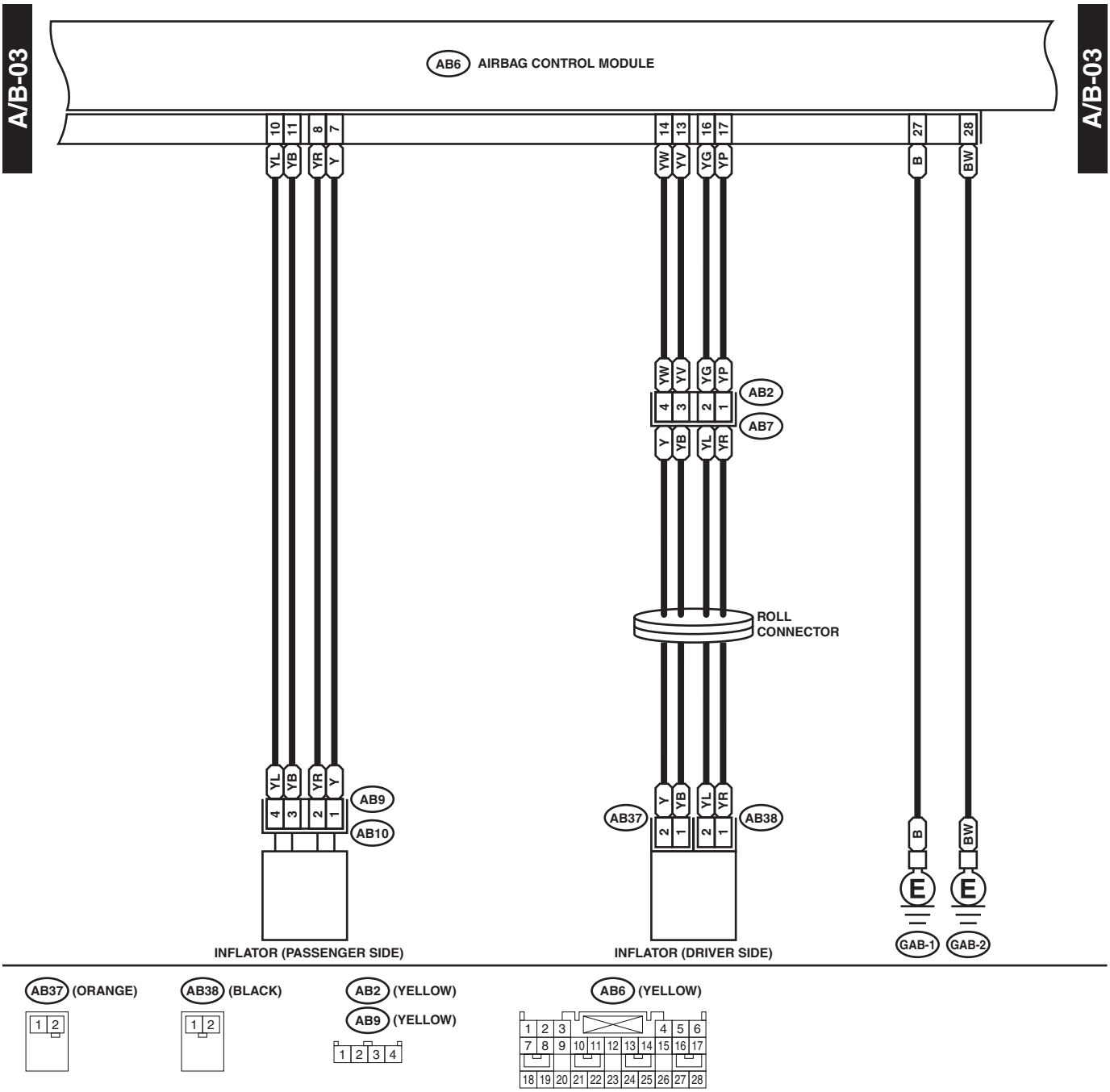
WI-08074

AB-02



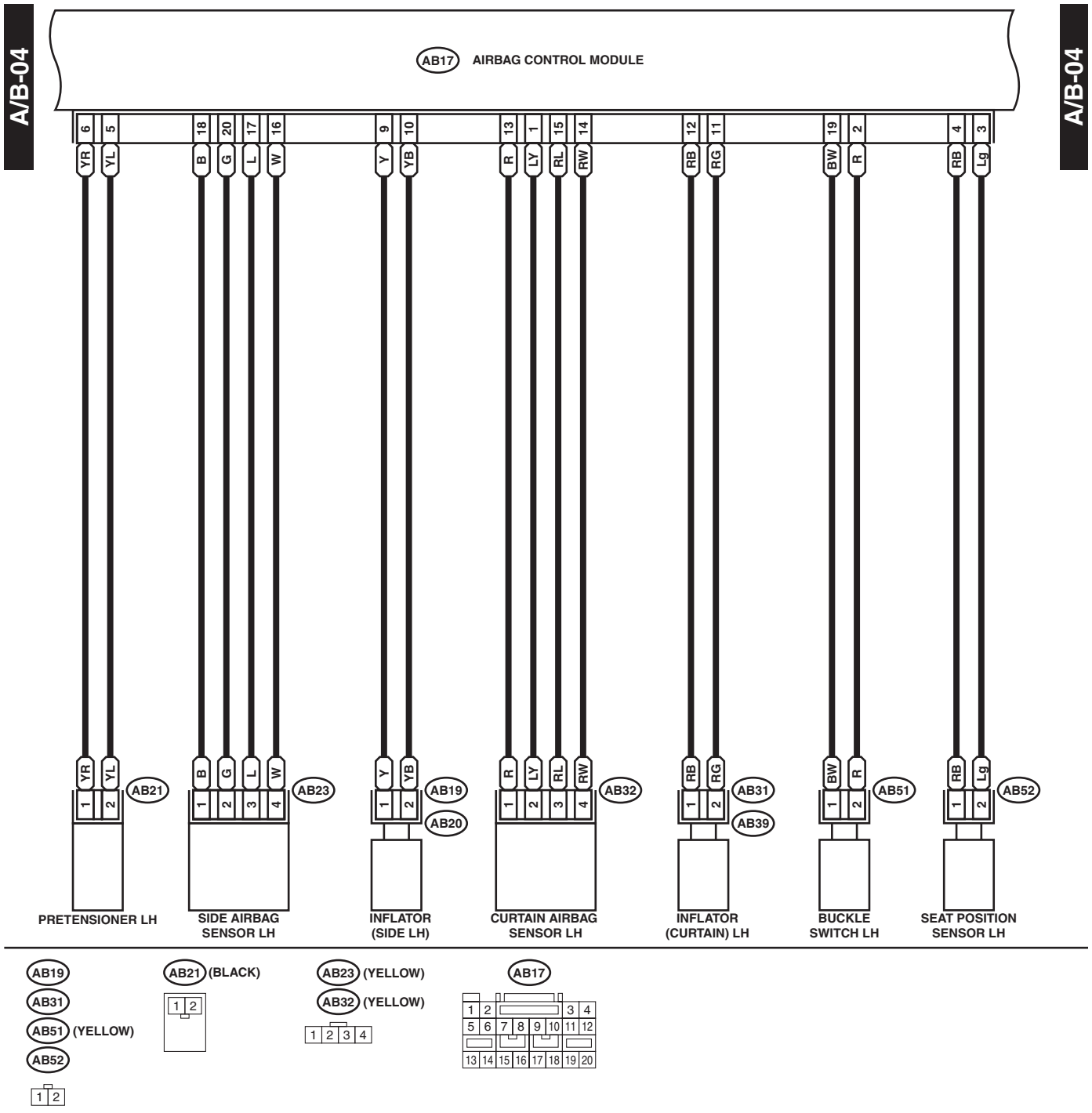


WI-08075


A/B-03
A/B-03
AB6 AIRBAG CONTROL MODULE
10
11
8
7
14
13
16
17
27
28
YL
YB
YR
Y
YW
YV
YG
YP
B
BW
AB2
AB7
AB9
AB10
AB37
AB38
ROLL
CONNECTOR
INFLATOR (PASSENGER SIDE)
INFLATOR (DRIVER SIDE)
GAB-1
GAB-2

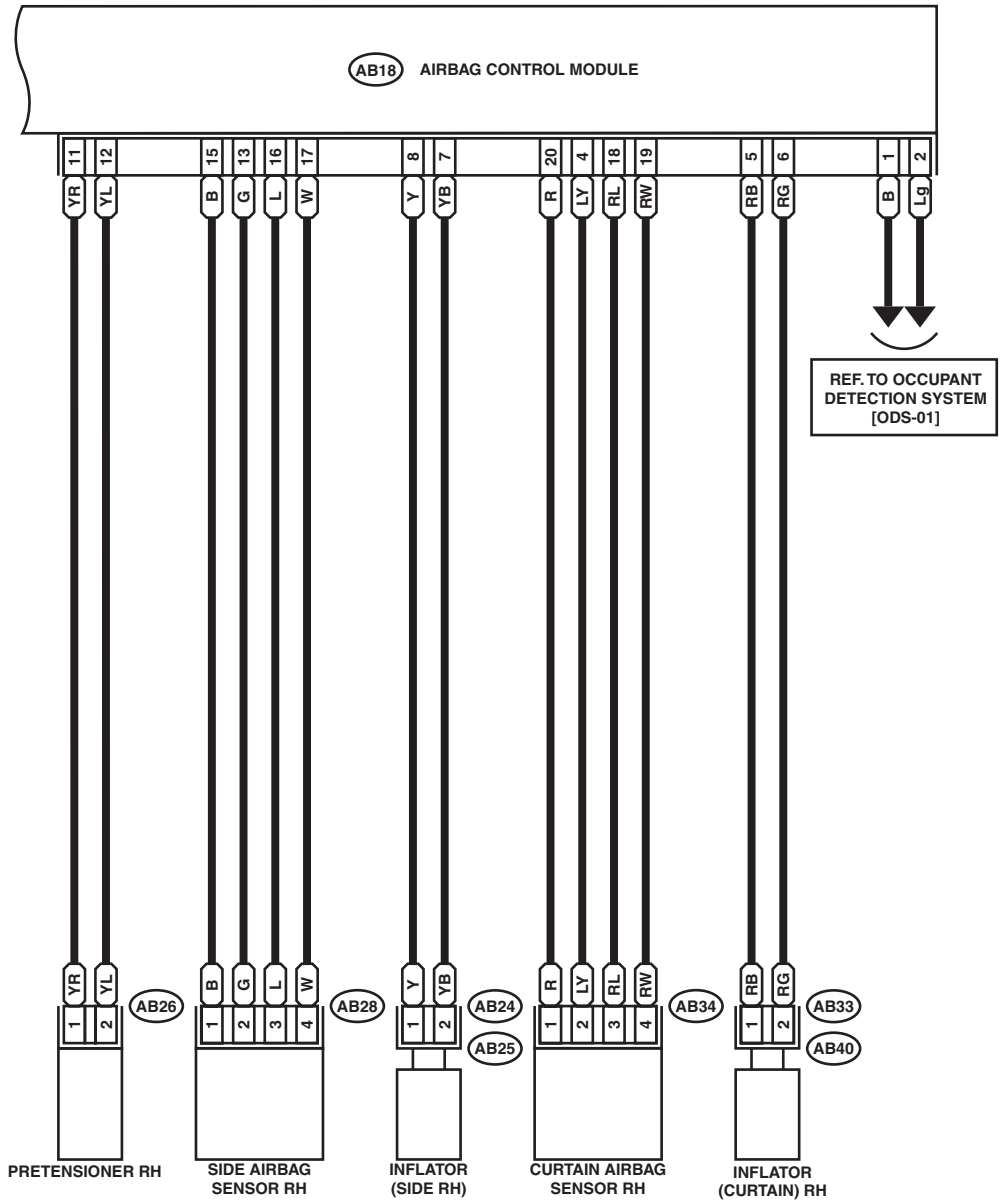
AB37 (ORANGE)
AB38 (BLACK)
AB2 (YELLOW)
AB9 (YELLOW)
AB6 (YELLOW)

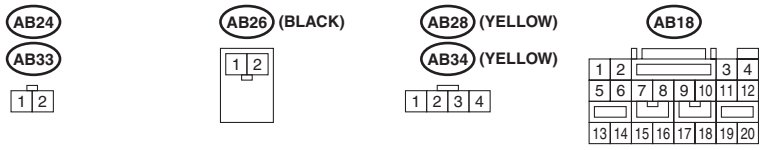
WI-08076


A/B-04
A/B-04
AB17 AIRBAG CONTROL MODULE
6 5 18 20 17 16 9 10 13 1 15 14 12 11 19 2 4 3
YR YL B G L W Y YB R LY RL RW RB RG BW R RB Lg
AB21
AB23
AB19
AB20
AB32
AB31
AB39
AB51
AB52
PRETENSIONER LH
SIDE AIRBAG SENSOR LH
INFLATOR (SIDE LH)
CURTAIN AIRBAG SENSOR LH
INFLATOR (CURTAIN) LH
BUCKLE SWITCH LH
SEAT POSITION SENSOR LH
AB19
AB31
AB51 (YELLOW)
AB52
AB21 (BLACK)
AB23 (YELLOW)
AB32 (YELLOW)
AB17

WI-08077

A/B-05

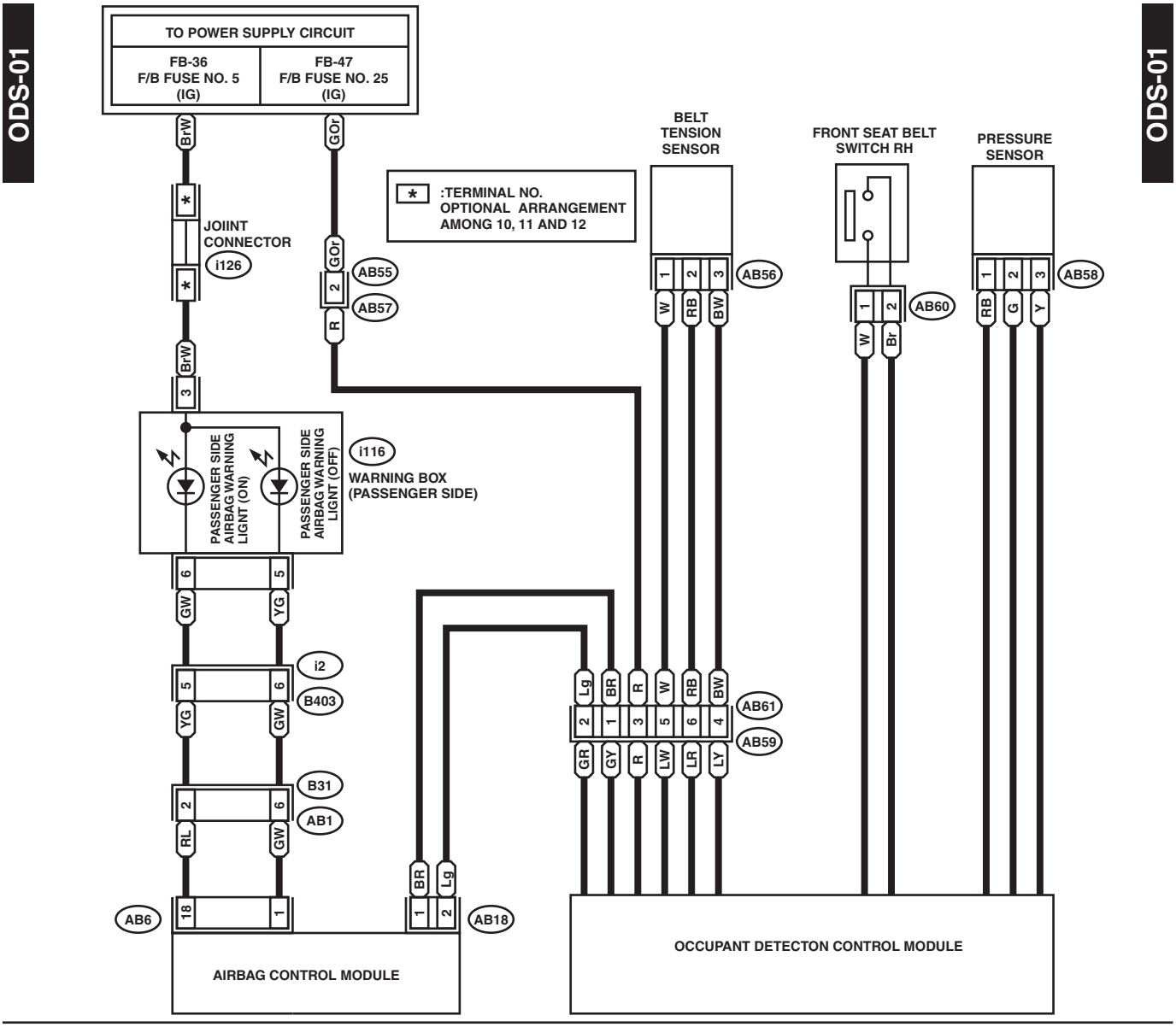


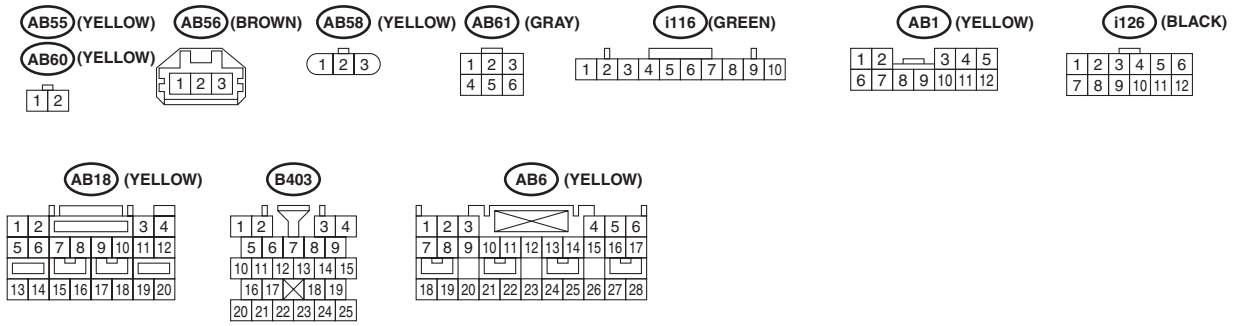


WI-08078

13.Occupant Detection System

A: WIRING DIAGRAM

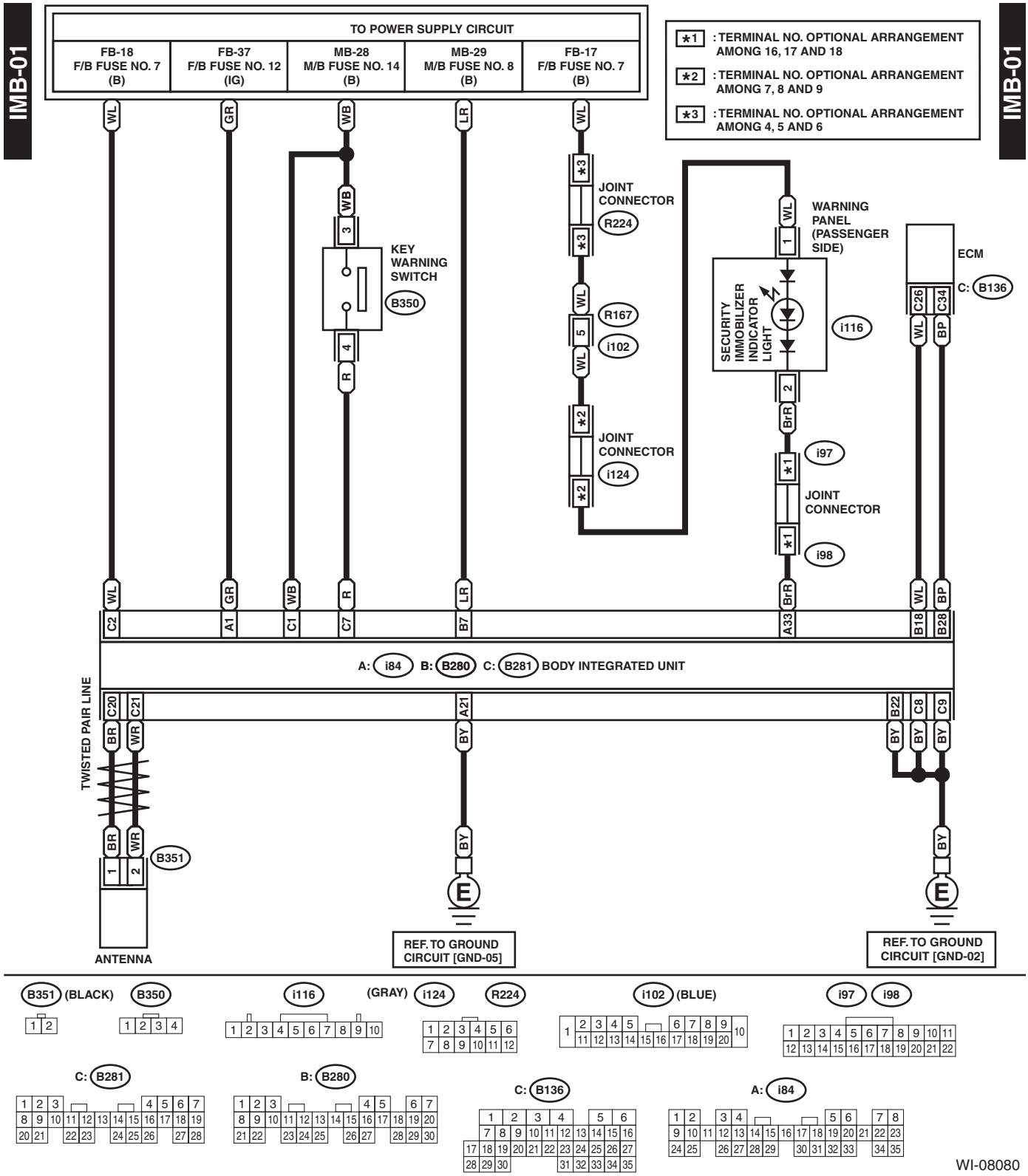




WI-08079

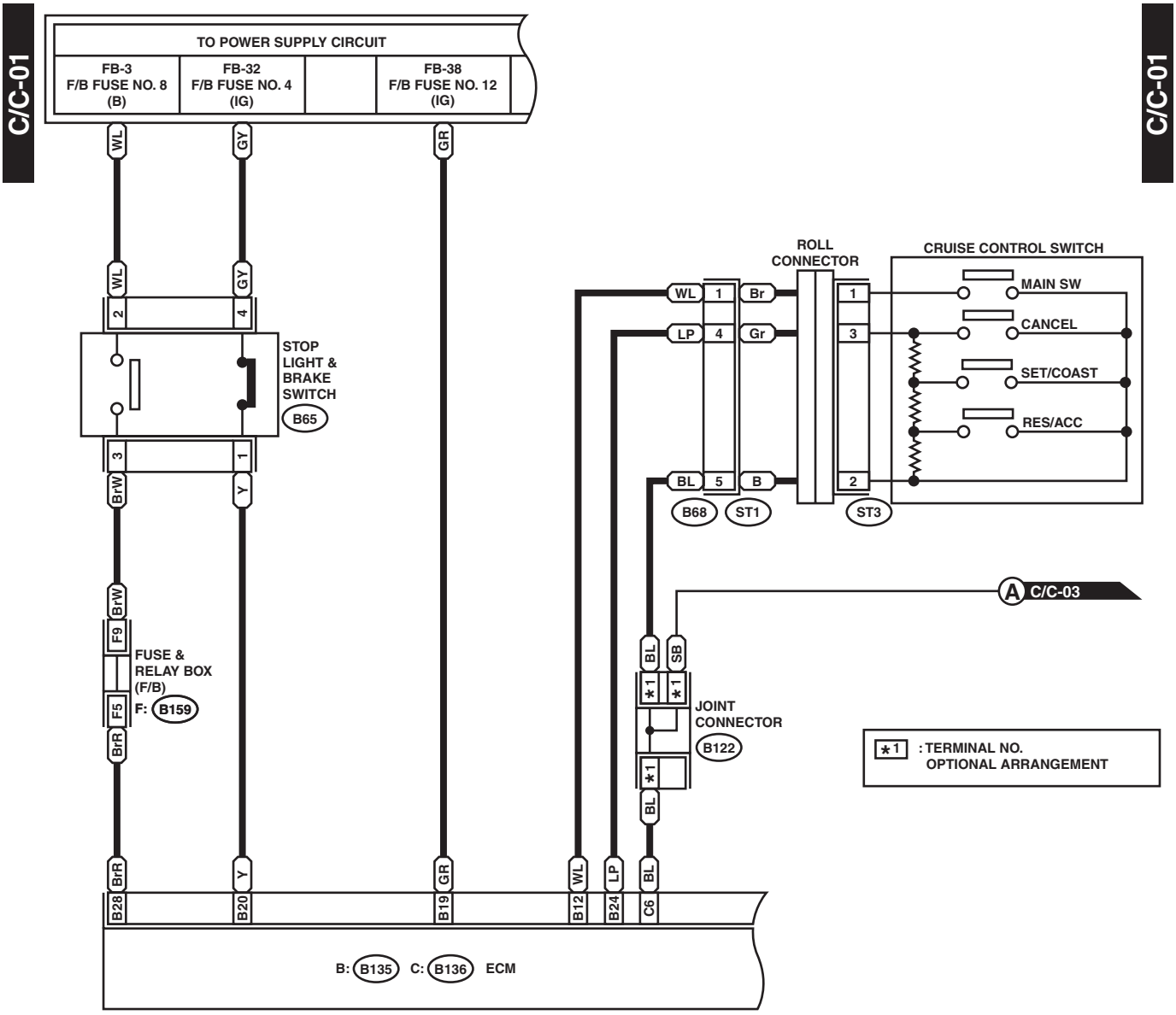
14.Immobilizer System

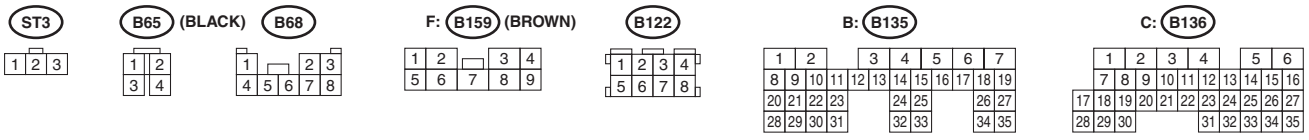
A: WIRING DIAGRAM



15.Cruise Control System

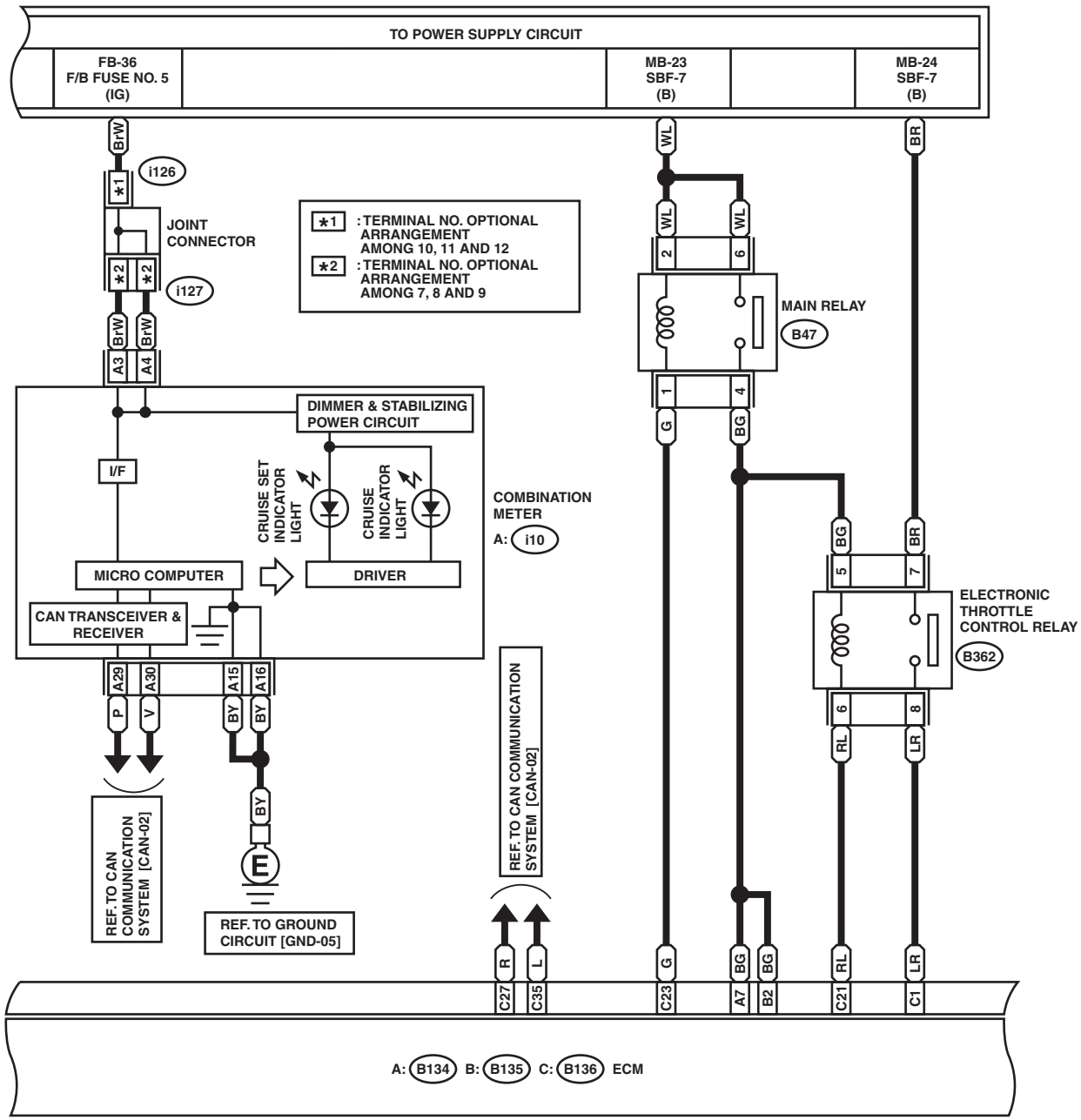
A: WIRING DIAGRAM

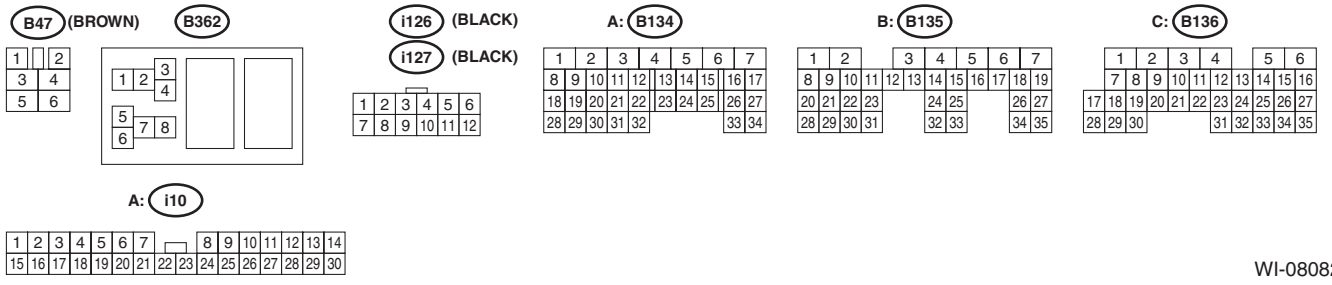




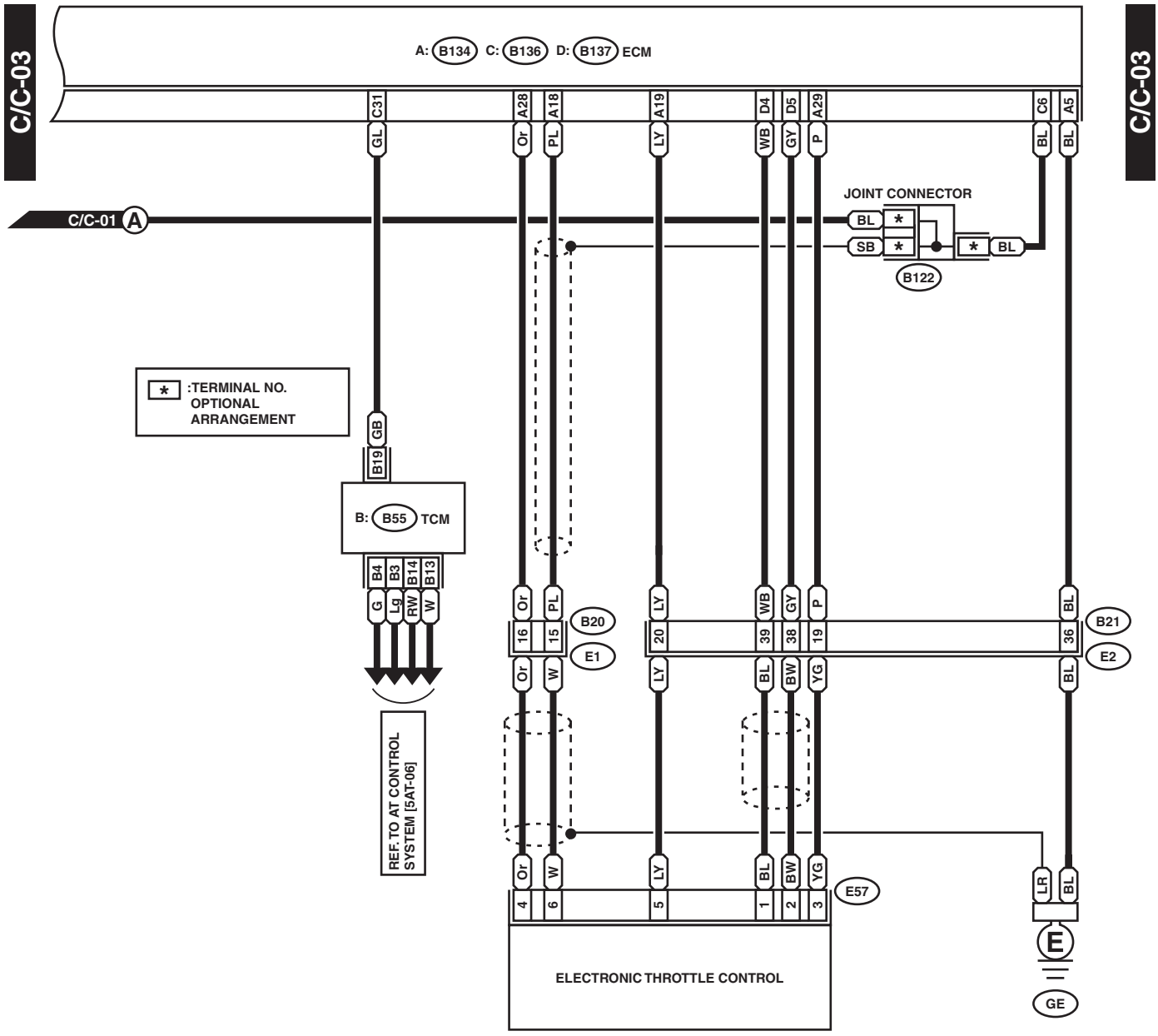
WI-08081

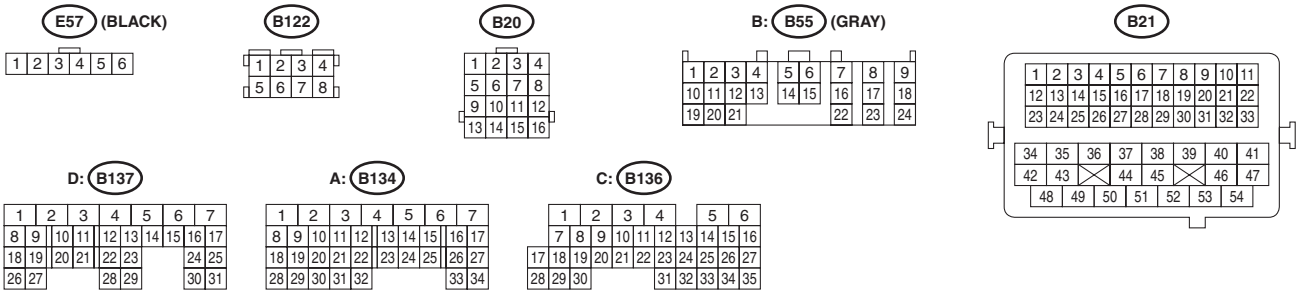
C/C-02





WI-08082

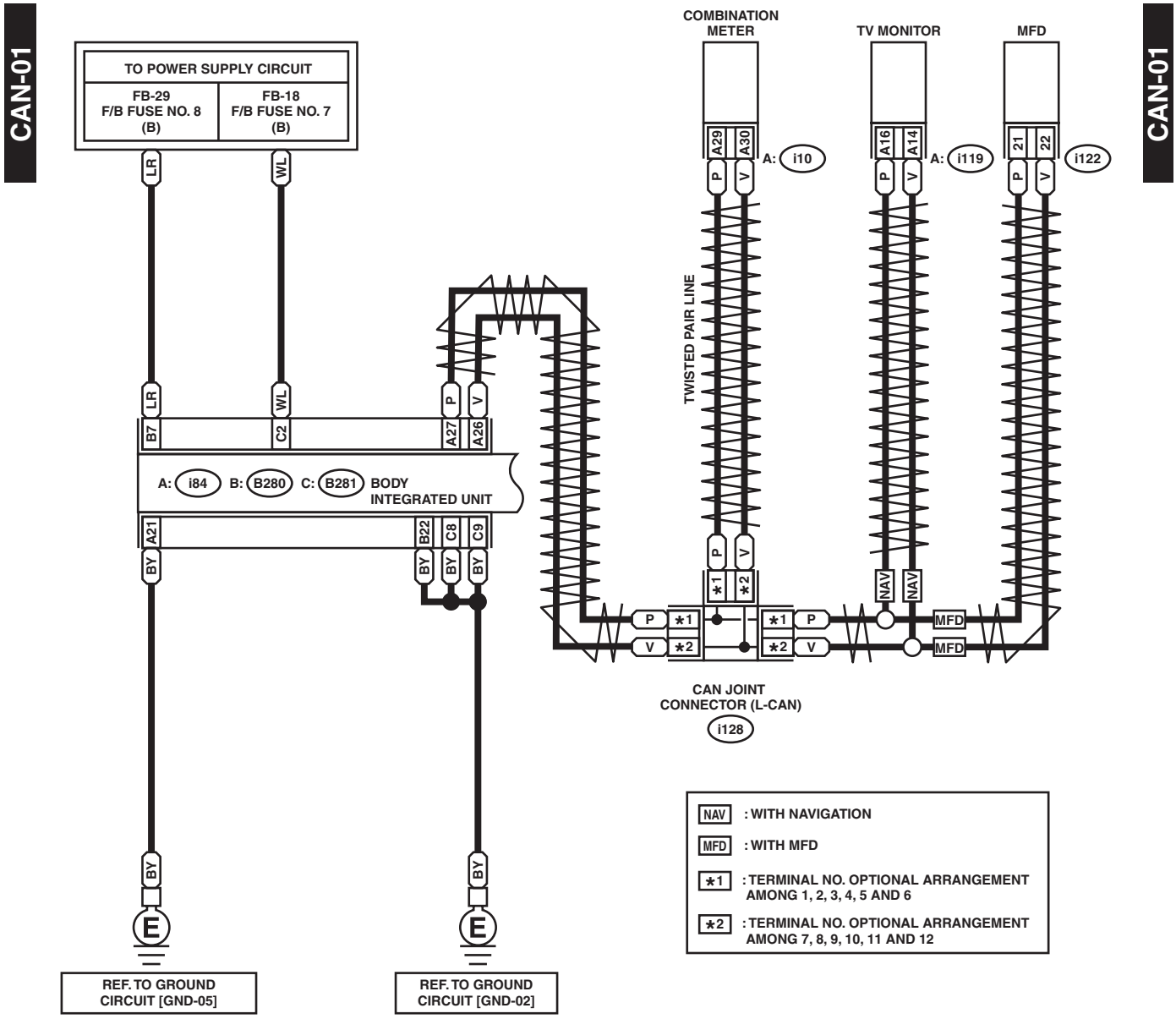

C/C-03
A: B134 C: B136 D: B137 ECM
C31
A28
A18
A19
D4
D5
A29
C6
A5
GL
Or
PL
LY
WB
GY
P
BL
BL
JOINT CONNECTOR
C/C-01 A
BL
SB
BL
B122
* :TERMINAL NO. OPTIONAL ARRANGEMENT
GB
B19
B: B55 TCM
B4
B3
B14
B13
G
Lg
RW
W
Or
PL
B20
16
15
E1
LY
WB
GY
P
BL
B21
20
39
38
19
36
E2
Or
W
LY
BL
BW
YG
BL
REF. TO AT CONTROL SYSTEM [5AT-06]
Or
W
LY
BL
BW
YG
E57
4
6
5
1
2
3
LR
BL
E
GE
ELECTRONIC THROTTLE CONTROL

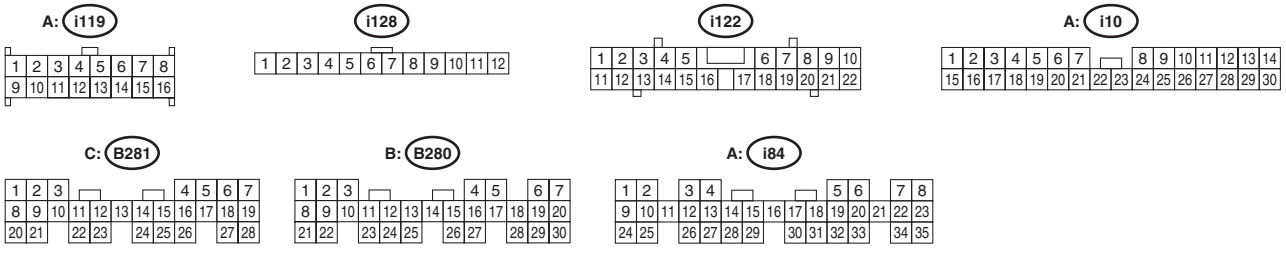

E57 (BLACK)
B122
B20
B: B55 (GRAY)
B21
D: B137
A: B134
C: B136

WI-08083

16.CAN Communication System

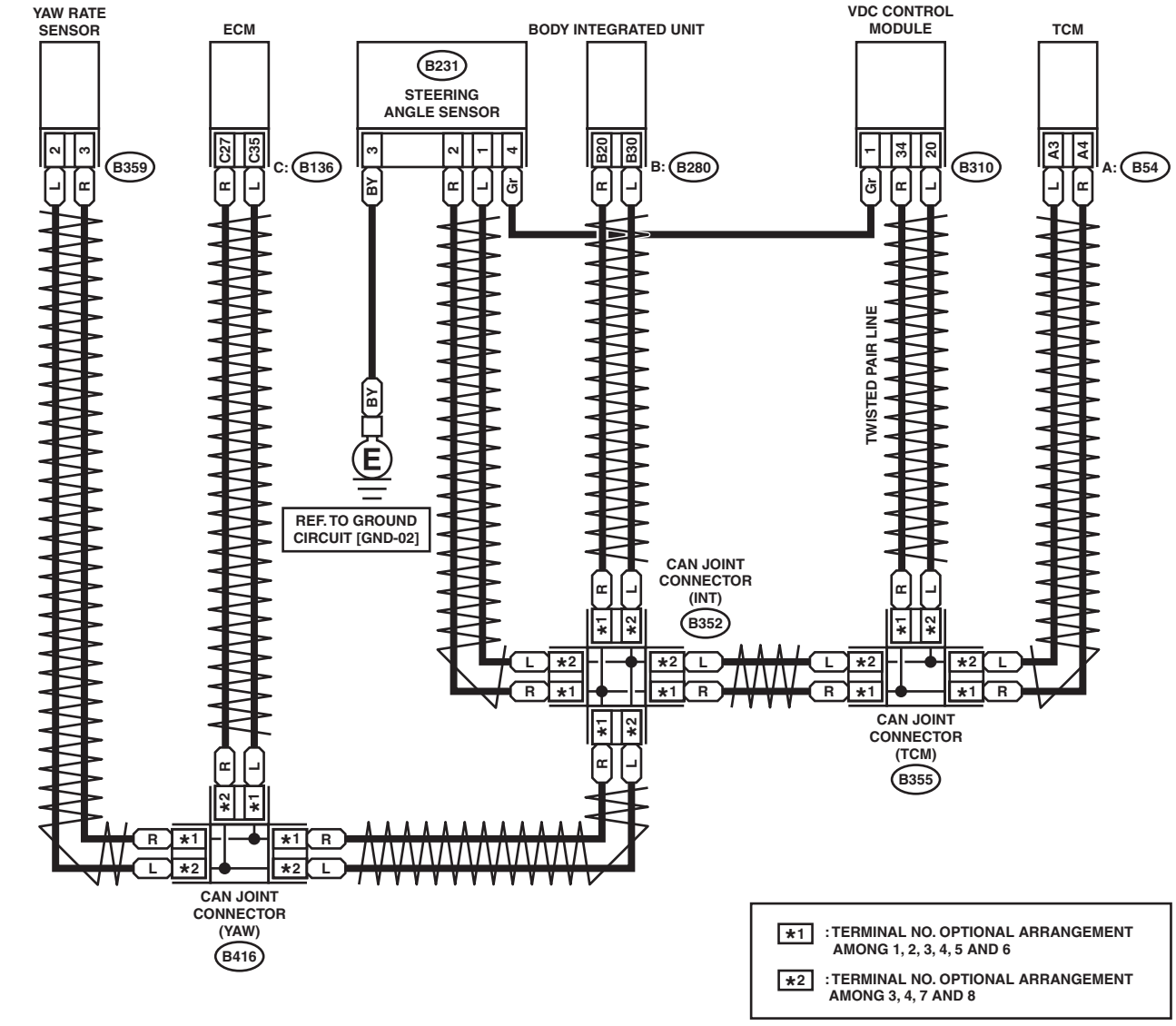
A: WIRING DIAGRAM

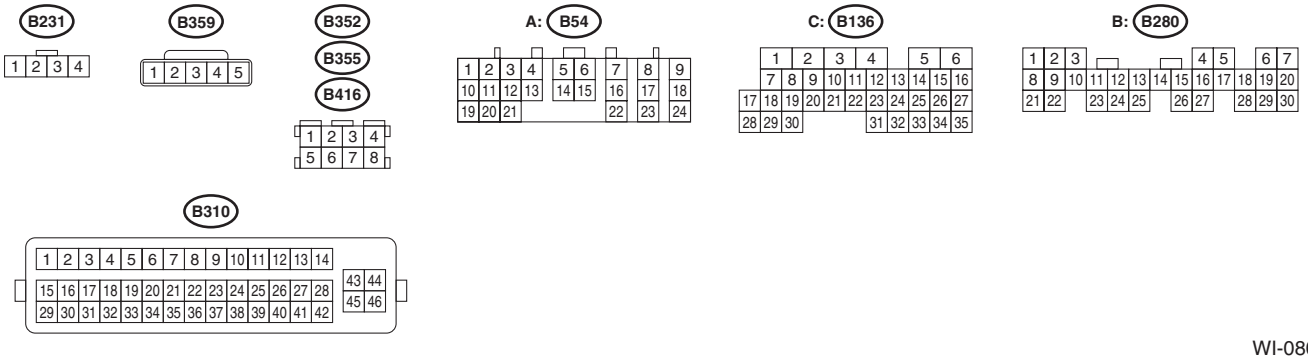




WI-08084

CAN-02



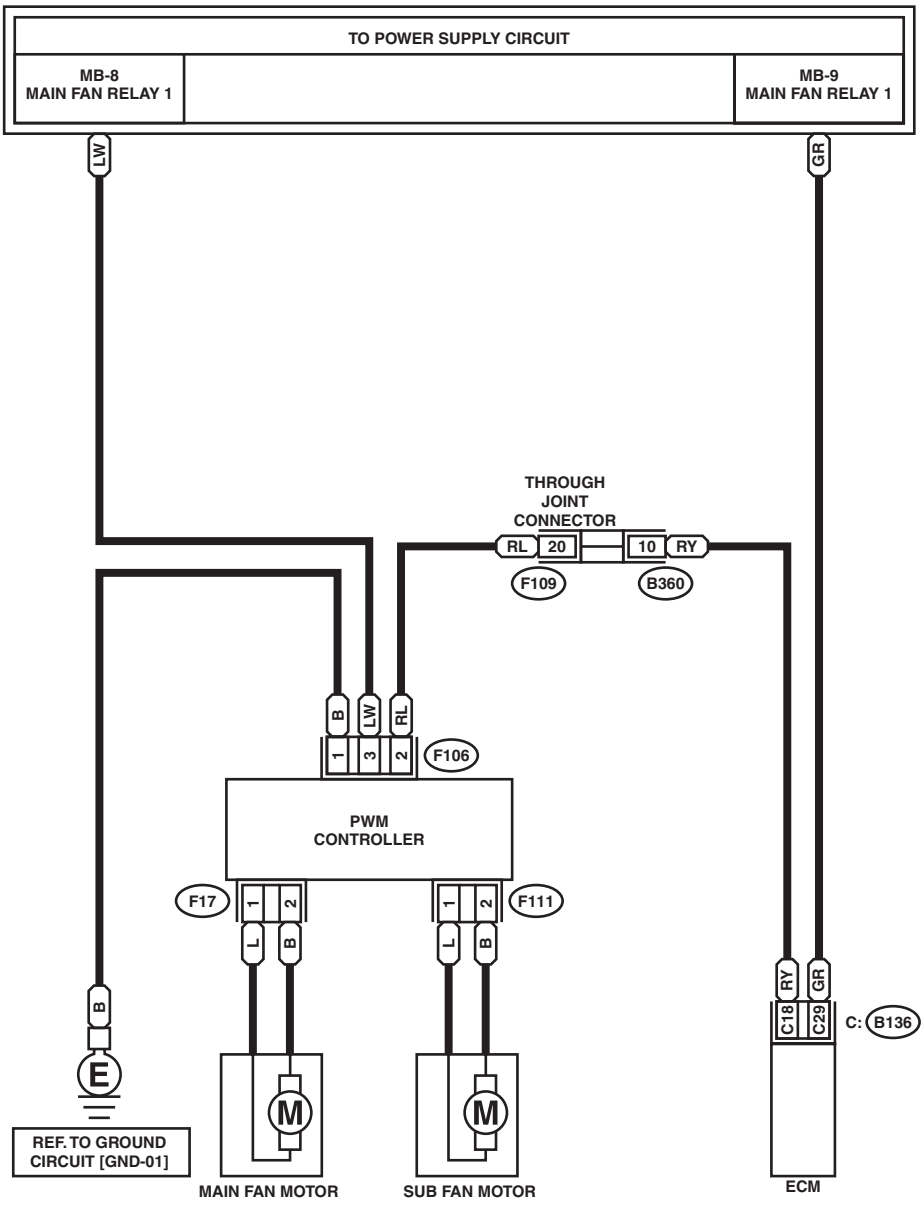


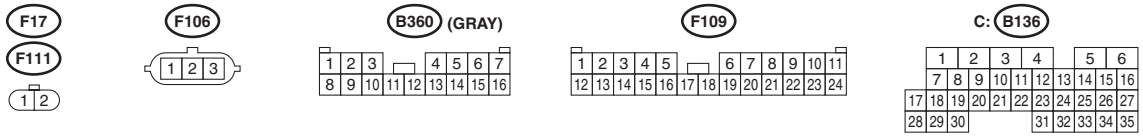
WI-08085

17.Radiator Fan System

A: WIRING DIAGRAM

RF-01



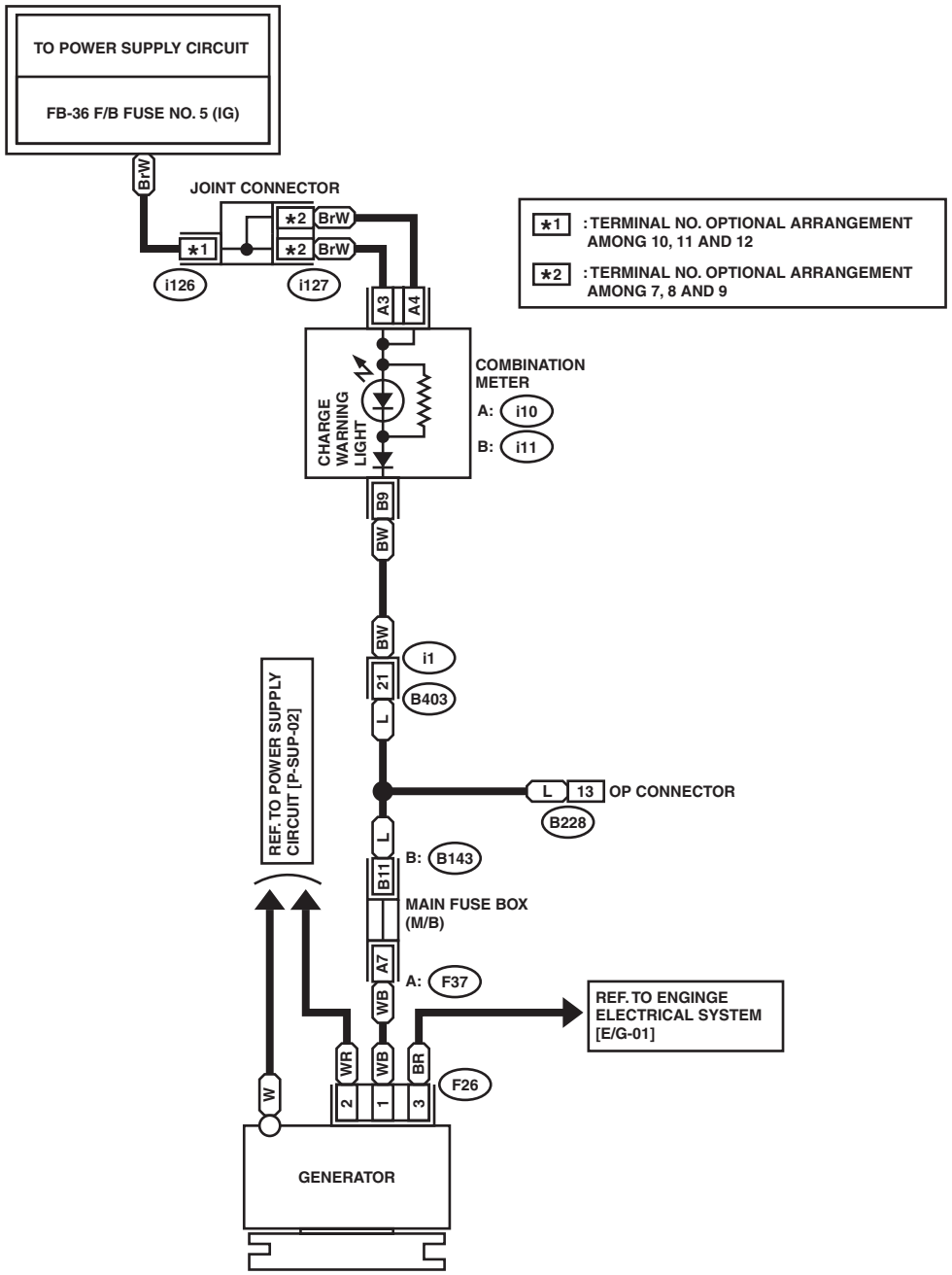


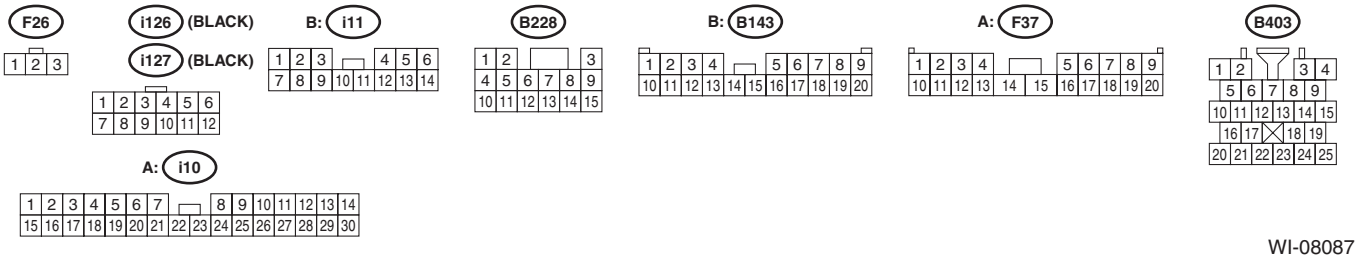
WI-08086

18.Charging System

A: WIRING DIAGRAM

CHG-01





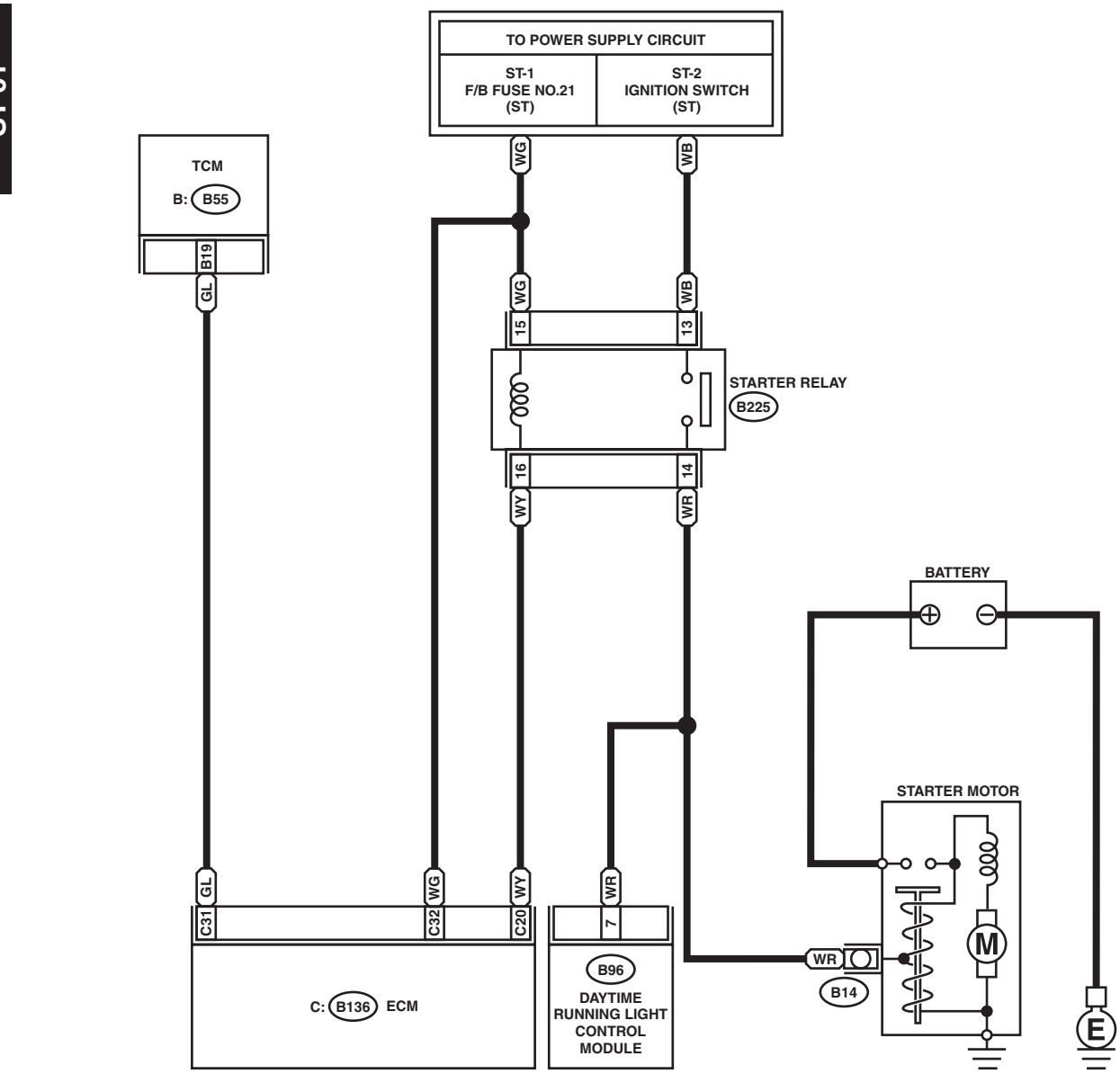
WI-08087

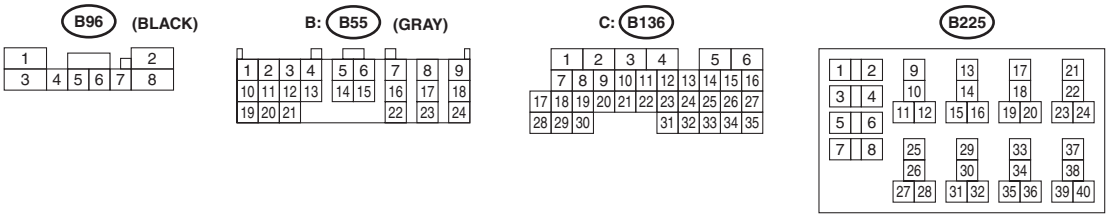
19.Starter System

A: WIRING DIAGRAM

ST-01

ST-01



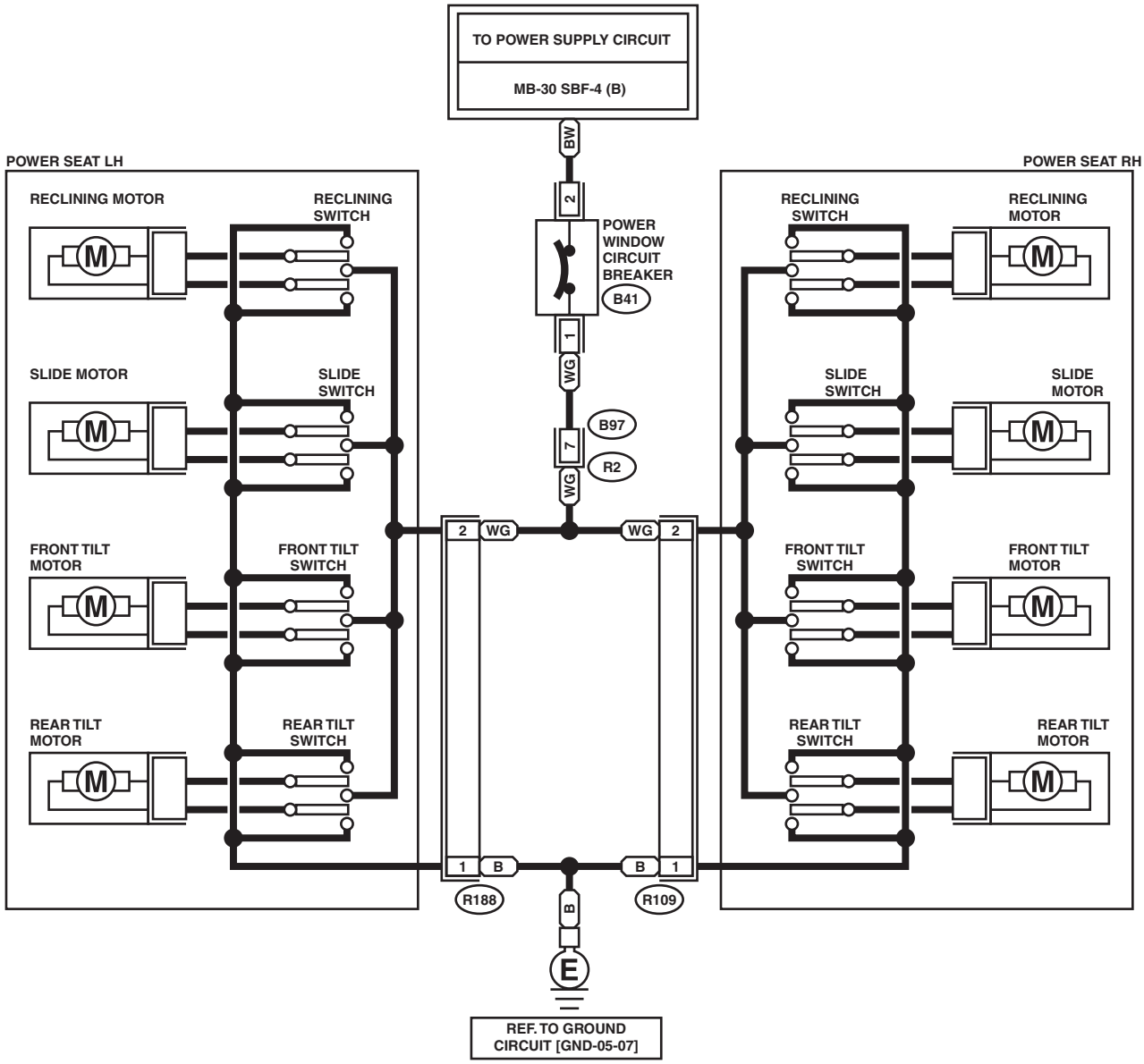


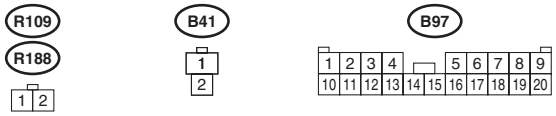
WI-08088

20.Power Seat System

A: WIRING DIAGRAM

P/SEAT-01

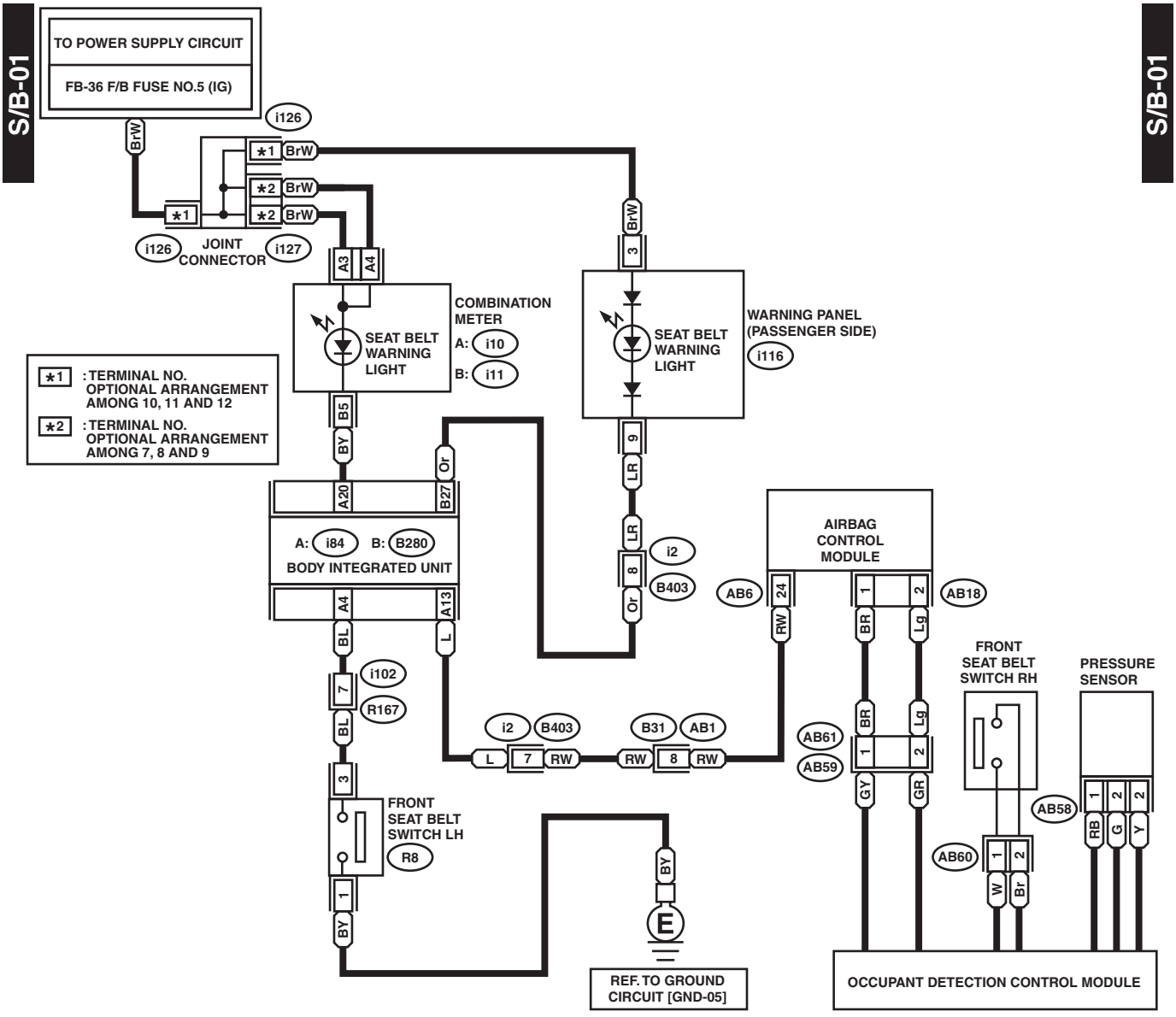


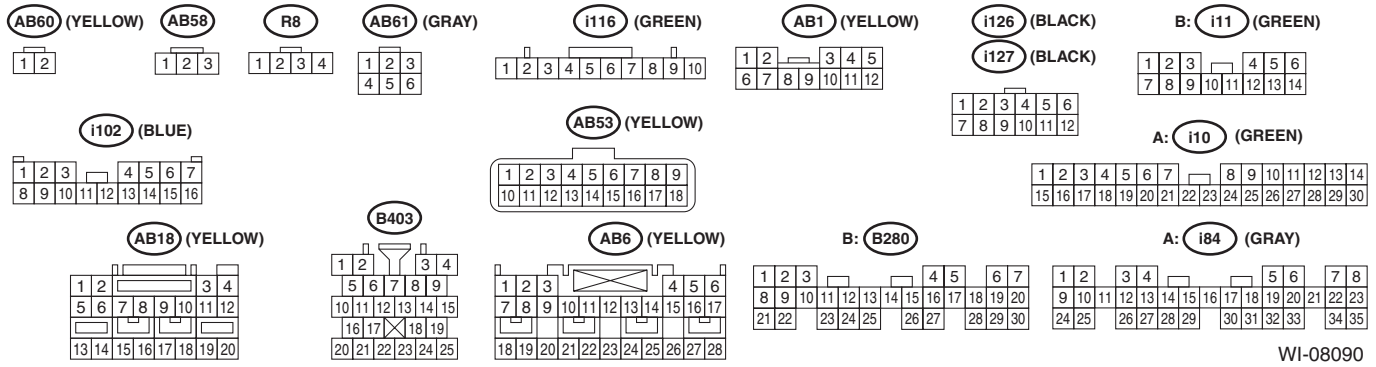


WI-08089

21.Seat Belt Warning System

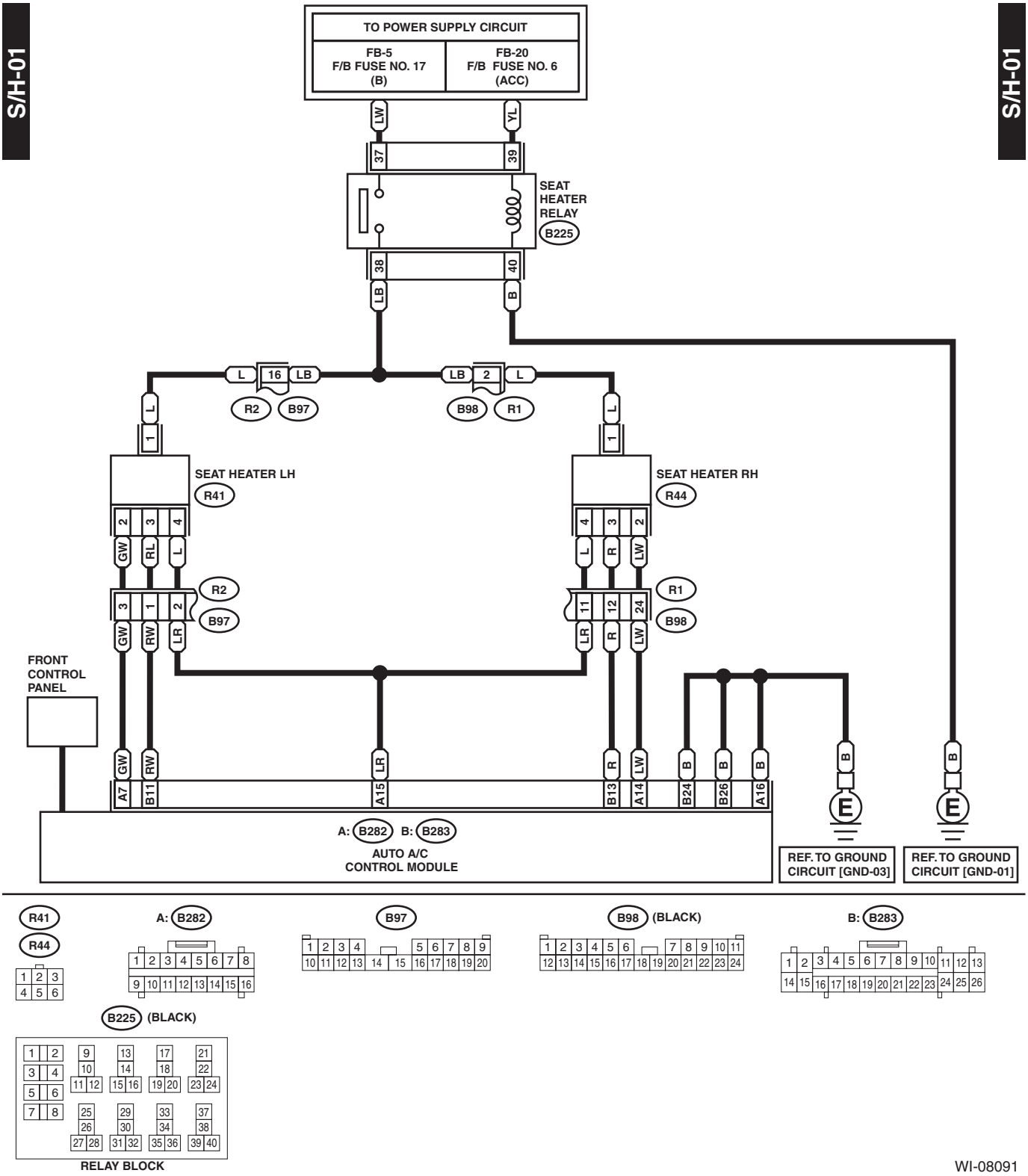
A: WIRING DIAGRAM





22.Seat Heater System

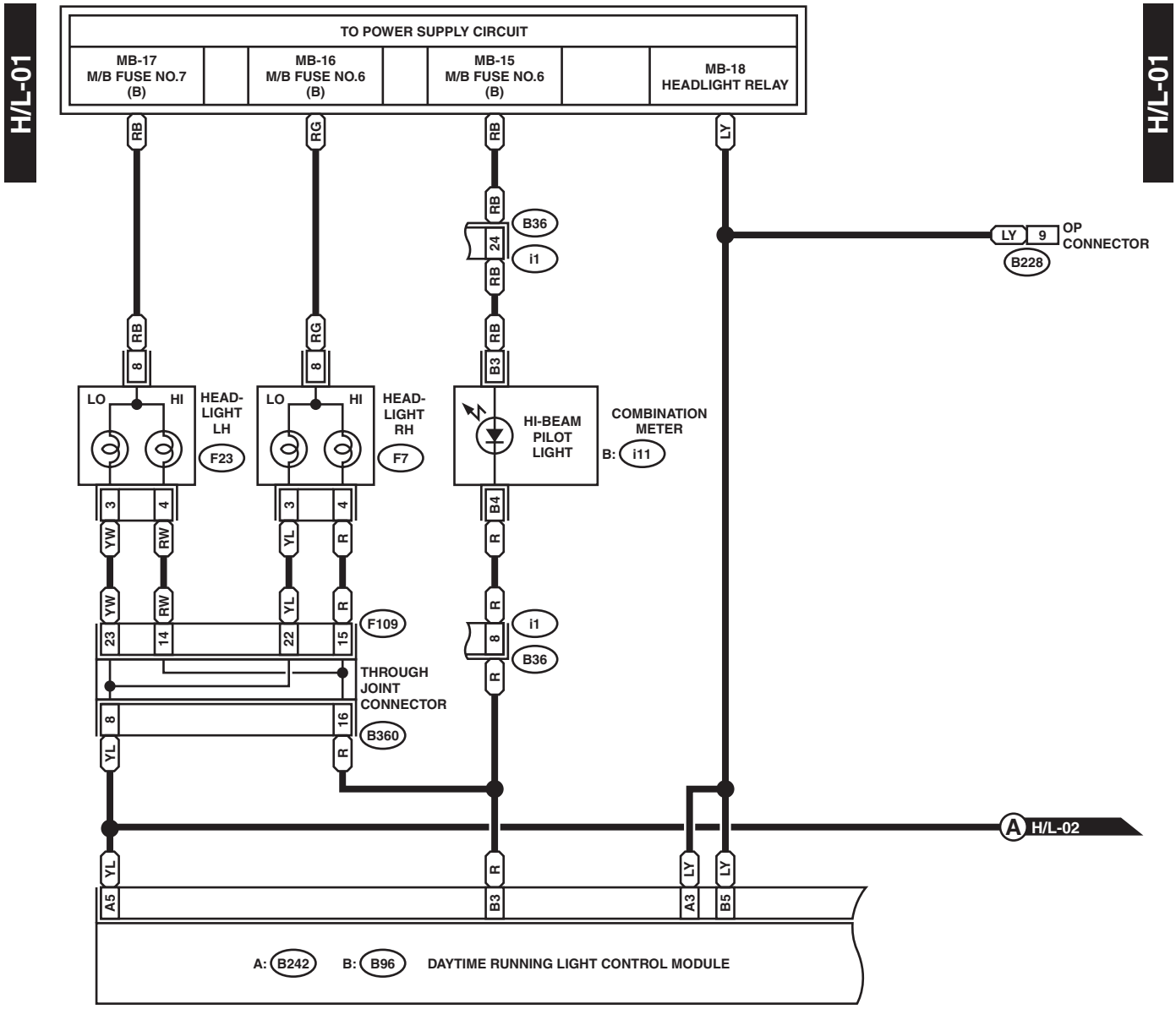
A: WIRING DIAGRAM

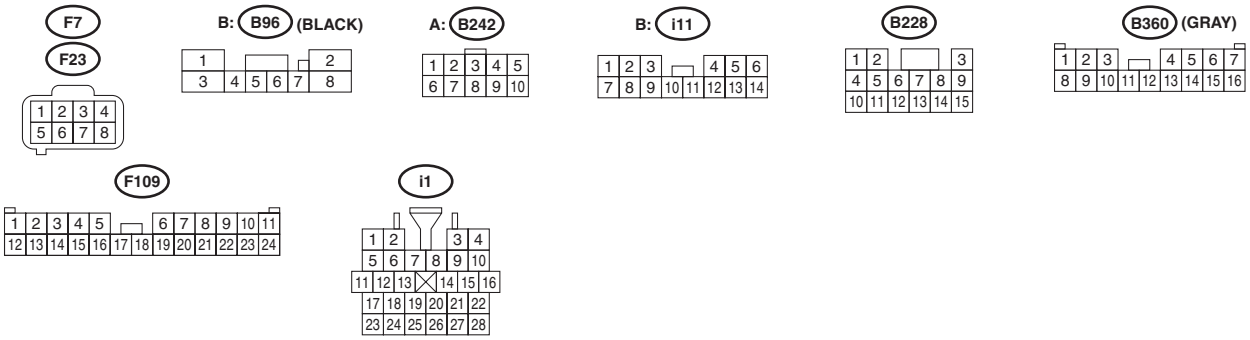


WI-08091

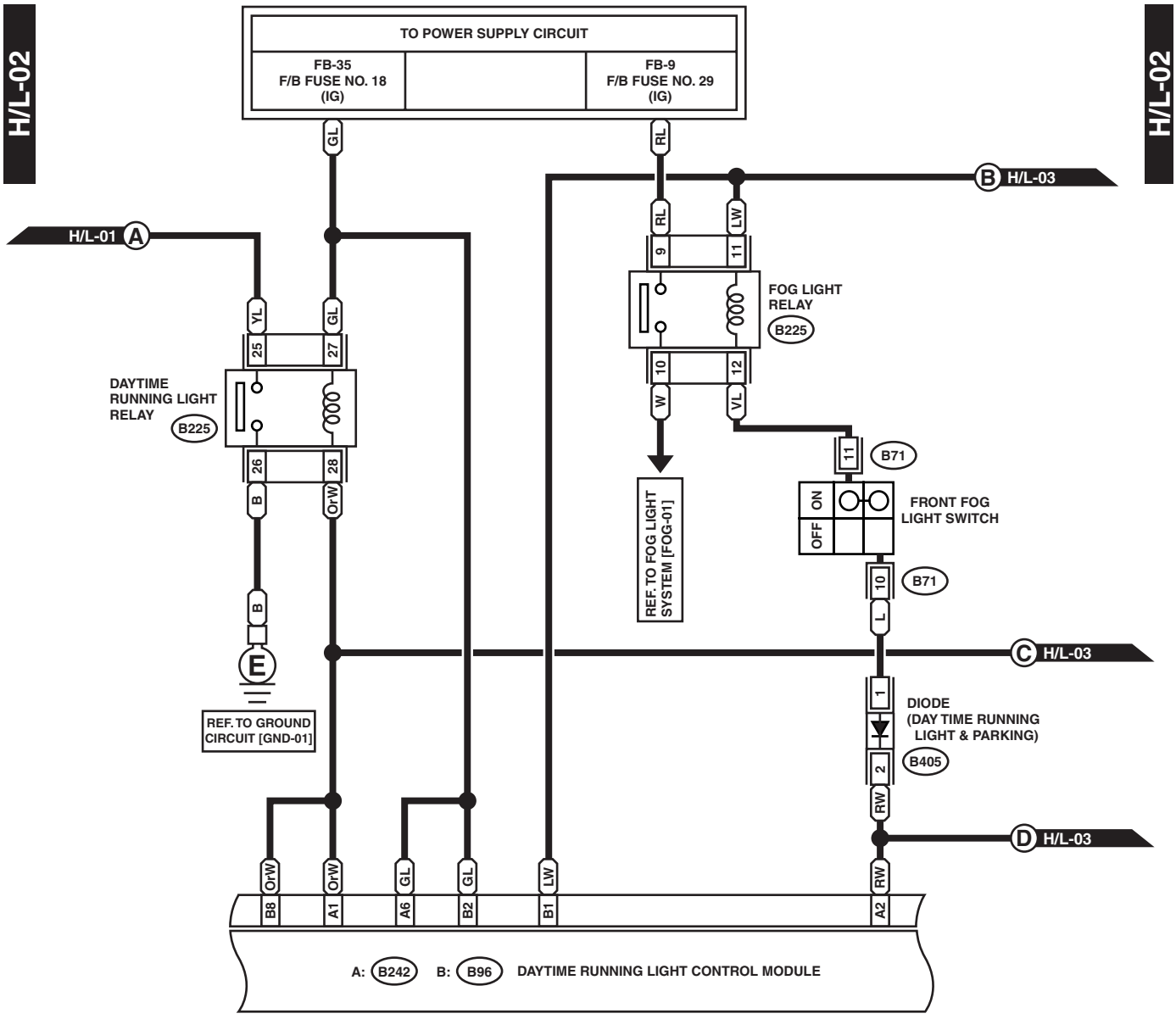
23.Headlight System

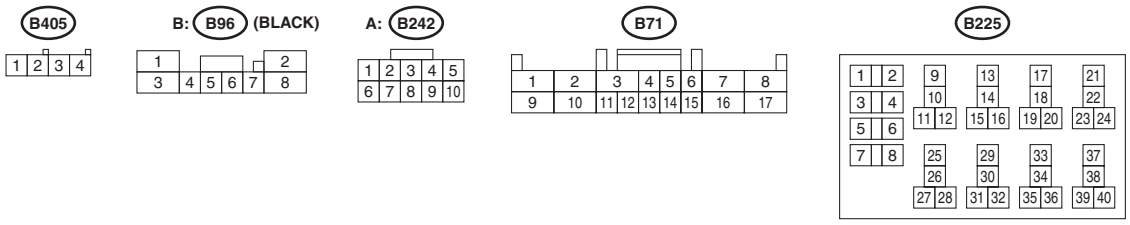
A: WIRING DIAGRAM



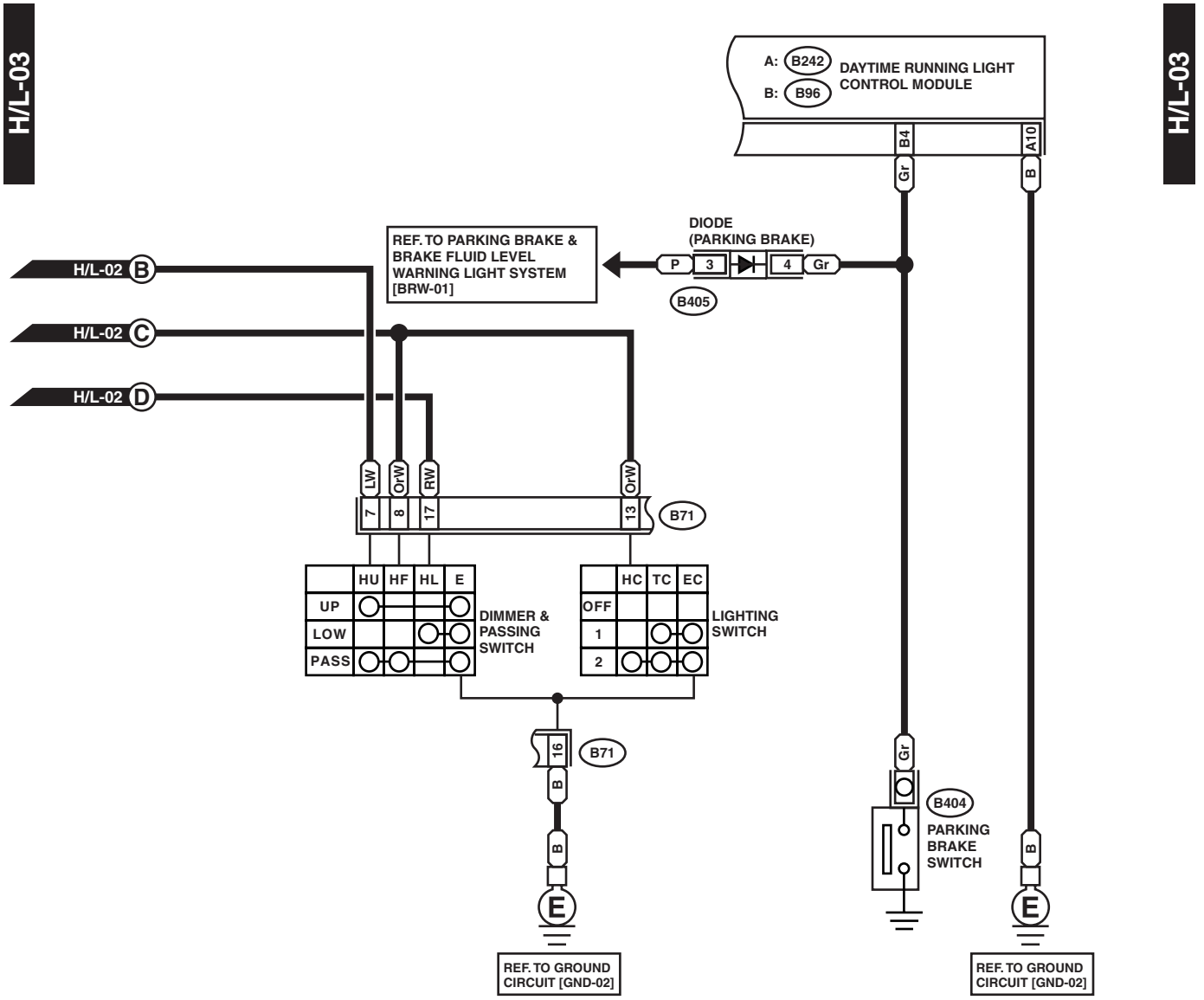


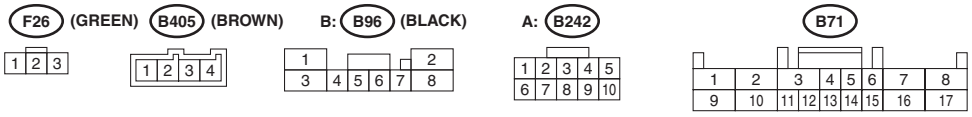
WI-08092


H/L-02
H/L-02
TO POWER SUPPLY CIRCUIT
FB-35
F/B FUSE NO. 18
(IG)
FB-9
F/B FUSE NO. 29
(IG)
GL
RL
B H/L-03
H/L-01 A
RL
LW
9
11
FOG LIGHT
RELAY
B225
YL
GL
25
27
DAYTIME
RUNNING LIGHT
RELAY
B225
10
12
W
VL
11
B71
ON
OFF
FRONT FOG
LIGHT SWITCH
26
28
B
OrW
REF. TO FOG LIGHT
SYSTEM [FOG-01]
10
B71
L
B
C H/L-03
E
REF. TO GROUND
CIRCUIT [GND-01]
1
DIODE
(DAY TIME RUNNING
LIGHT & PARKING)
2
B405
RW
D H/L-03
OrW
OrW
GL
GL
LW
RW
B8
A1
A6
B2
B1
A2
A: B242 B: B96 DAYTIME RUNNING LIGHT CONTROL MODULE


B405
1 2 3 4
B: B96 (BLACK)
1 2
3 4 5 6 7 8
A: B242
1 2 3 4 5
6 7 8 9 10
B71
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16 17
B225
1 2 9 13 17 21
3 4 10 14 18 22
5 6 11 12 15 16 19 20 23 24
7 8 25 29 33 37
26 30 34 38
27 28 31 32 35 36 39 40

WI-08093


H/L-03
H/L-03
A: B242
B: B96
DAYTIME RUNNING LIGHT CONTROL MODULE
B4
A10
Gr
B
DIODE (PARKING BRAKE)
P
3
4
Gr
B405
REF. TO PARKING BRAKE & BRAKE FLUID LEVEL WARNING LIGHT SYSTEM [BRW-01]
H/L-02 B
H/L-02 C
H/L-02 D
LW
OrW
RW
OrW
7
8
17
13
B71
HU
HF
HL
E
UP
LOW
PASS
DIMMER & PASSING SWITCH
HC
TC
EC
OFF
1
2
LIGHTING SWITCH
16
B71
B
B
E
REF. TO GROUND CIRCUIT [GND-02]
Gr
B404
PARKING BRAKE SWITCH
B
E
REF. TO GROUND CIRCUIT [GND-02]

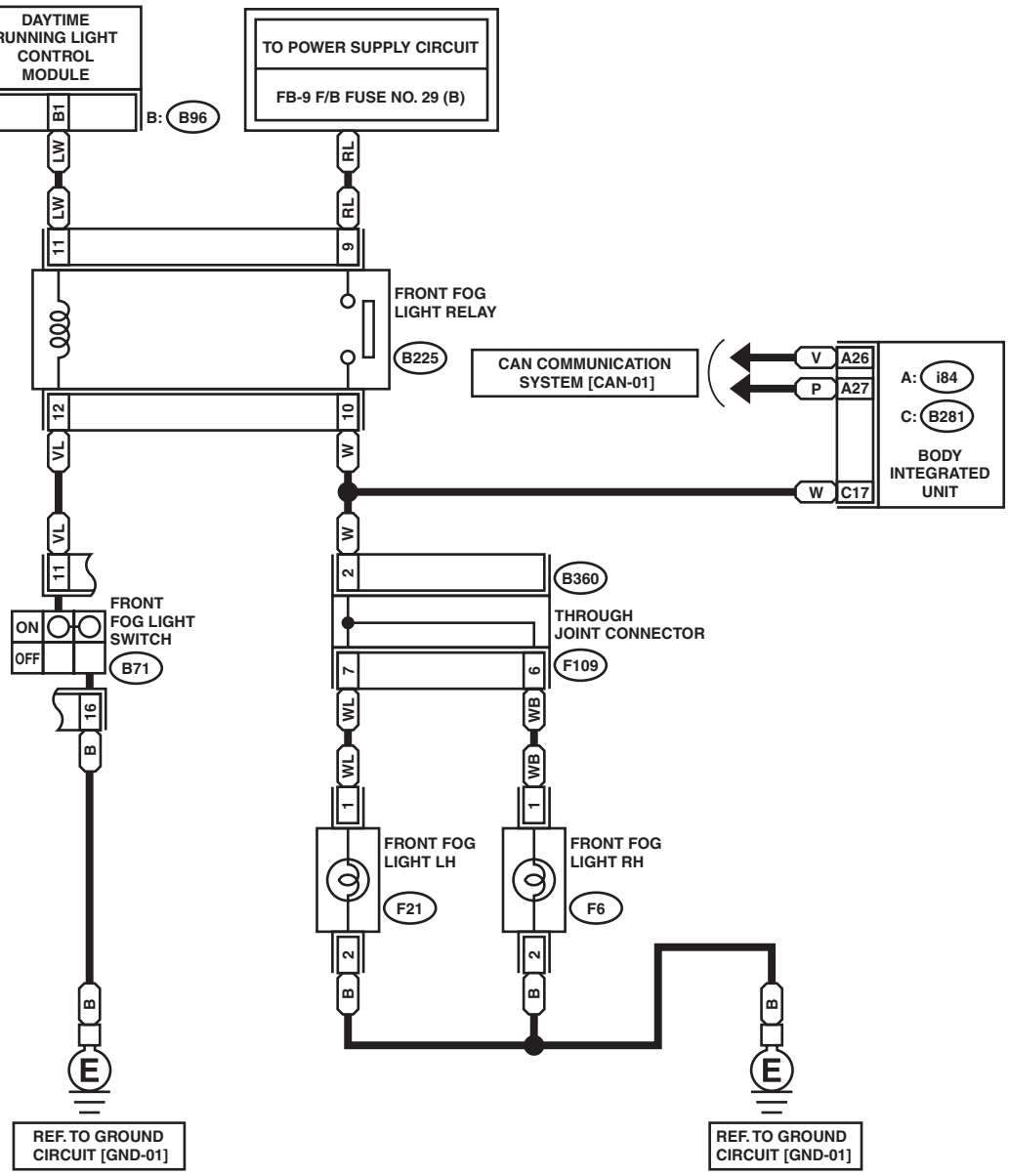

F26 (GREEN)
B405 (BROWN)
B: B96 (BLACK)
A: B242
B71

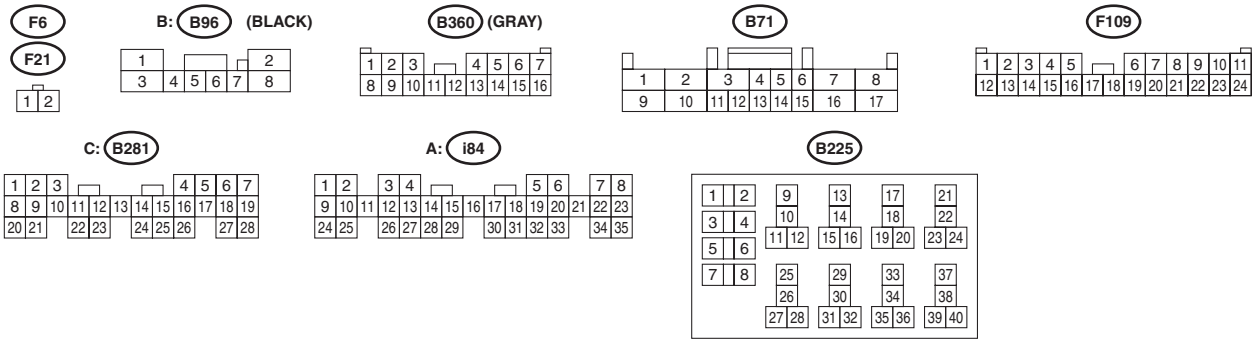
WI-08094

24.Front Fog Light System

A: WIRING DIAGRAM

FOG-01

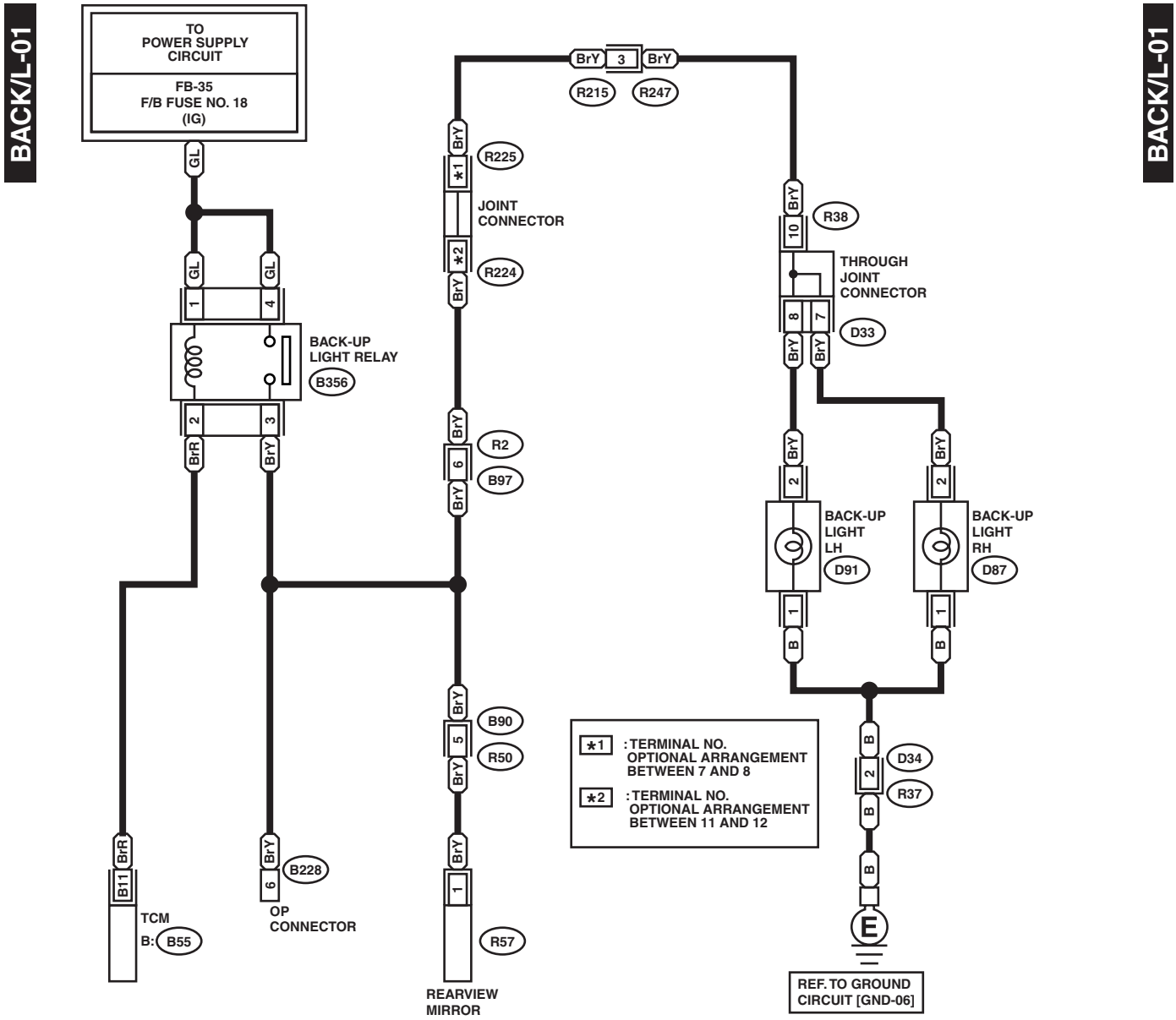




WI-08095

25.Back–up Light System

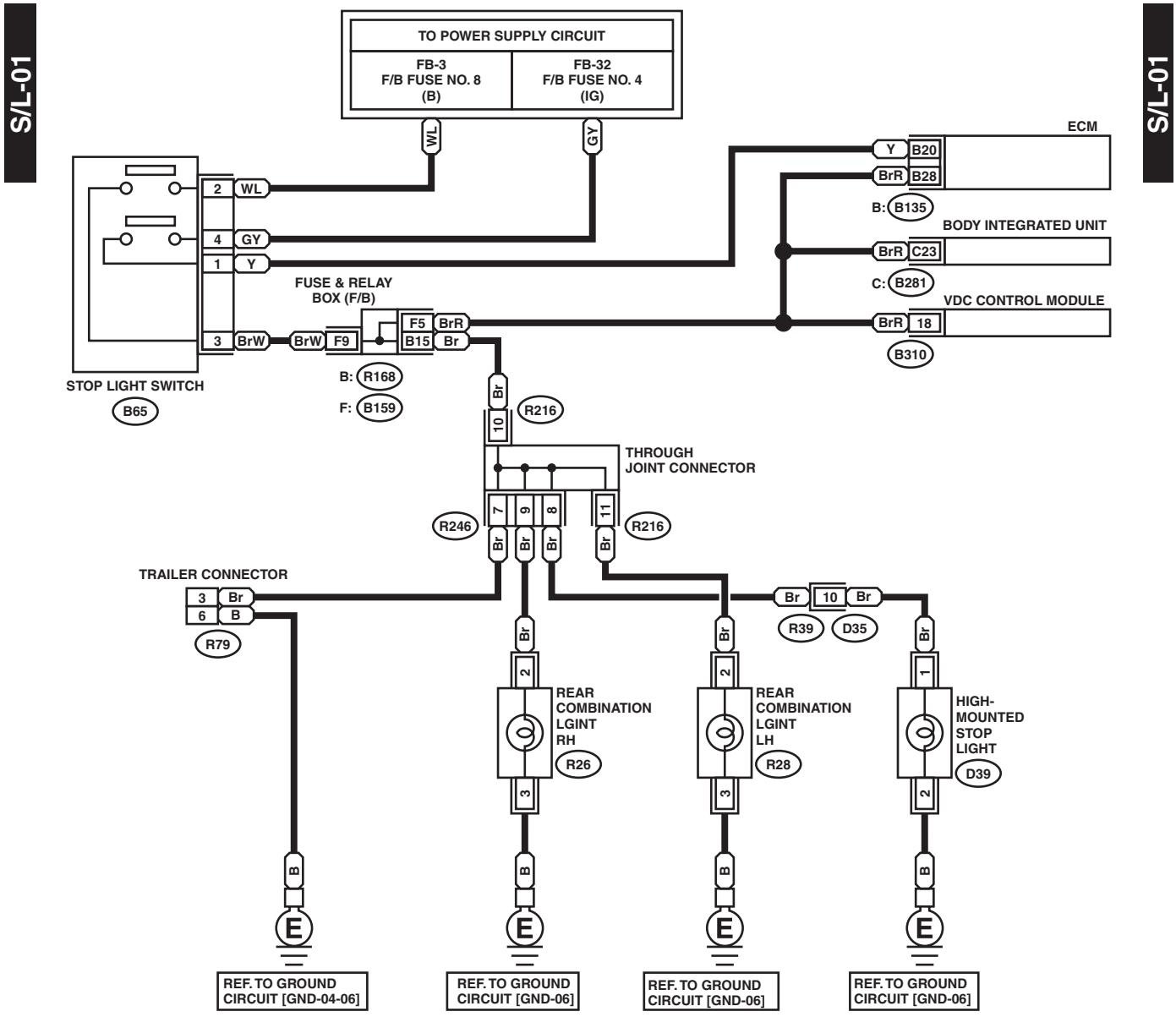
A: WIRING DIAGRAM



WI-08096

26.Stop Light System

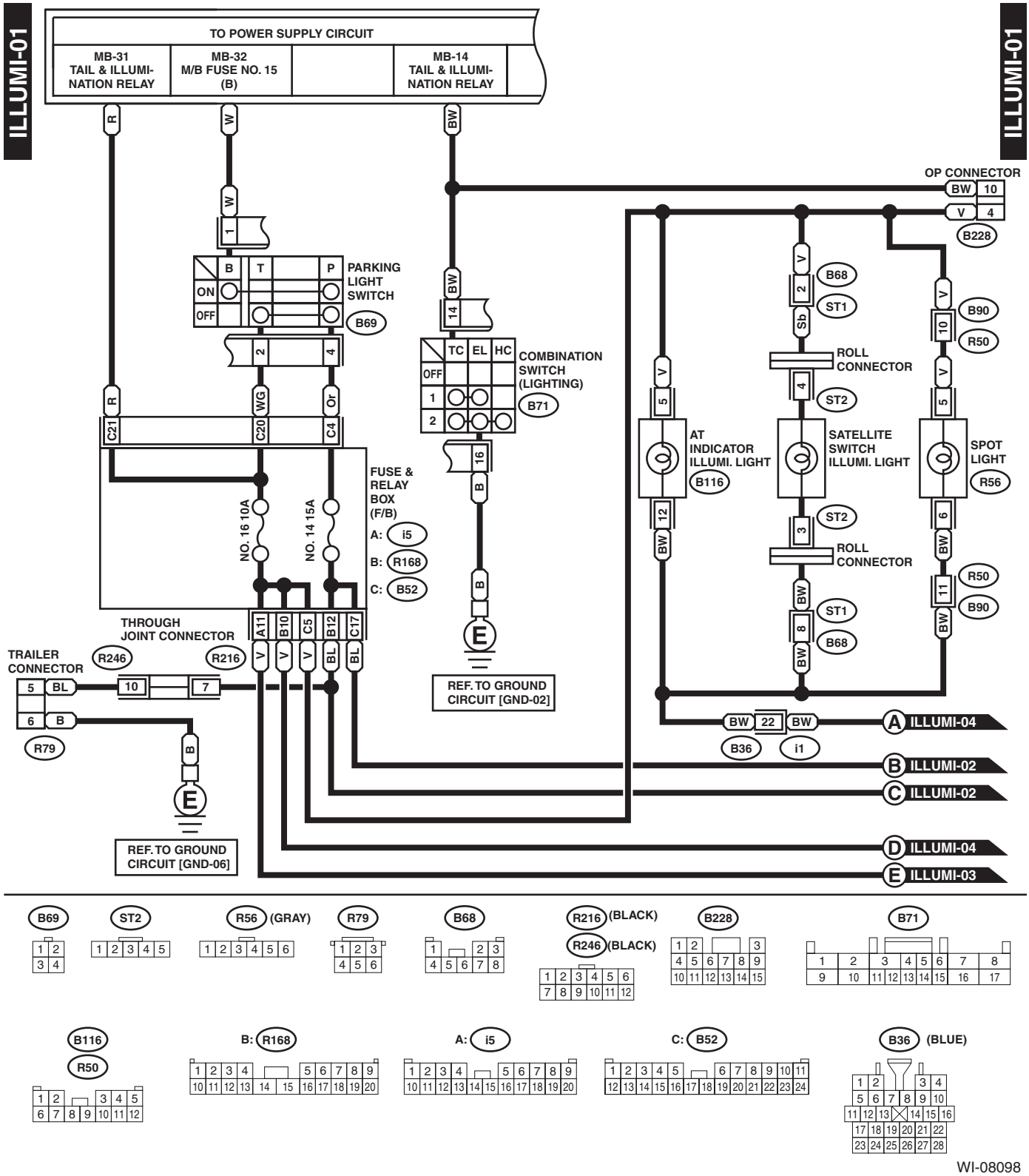
A: WIRING DIAGRAM



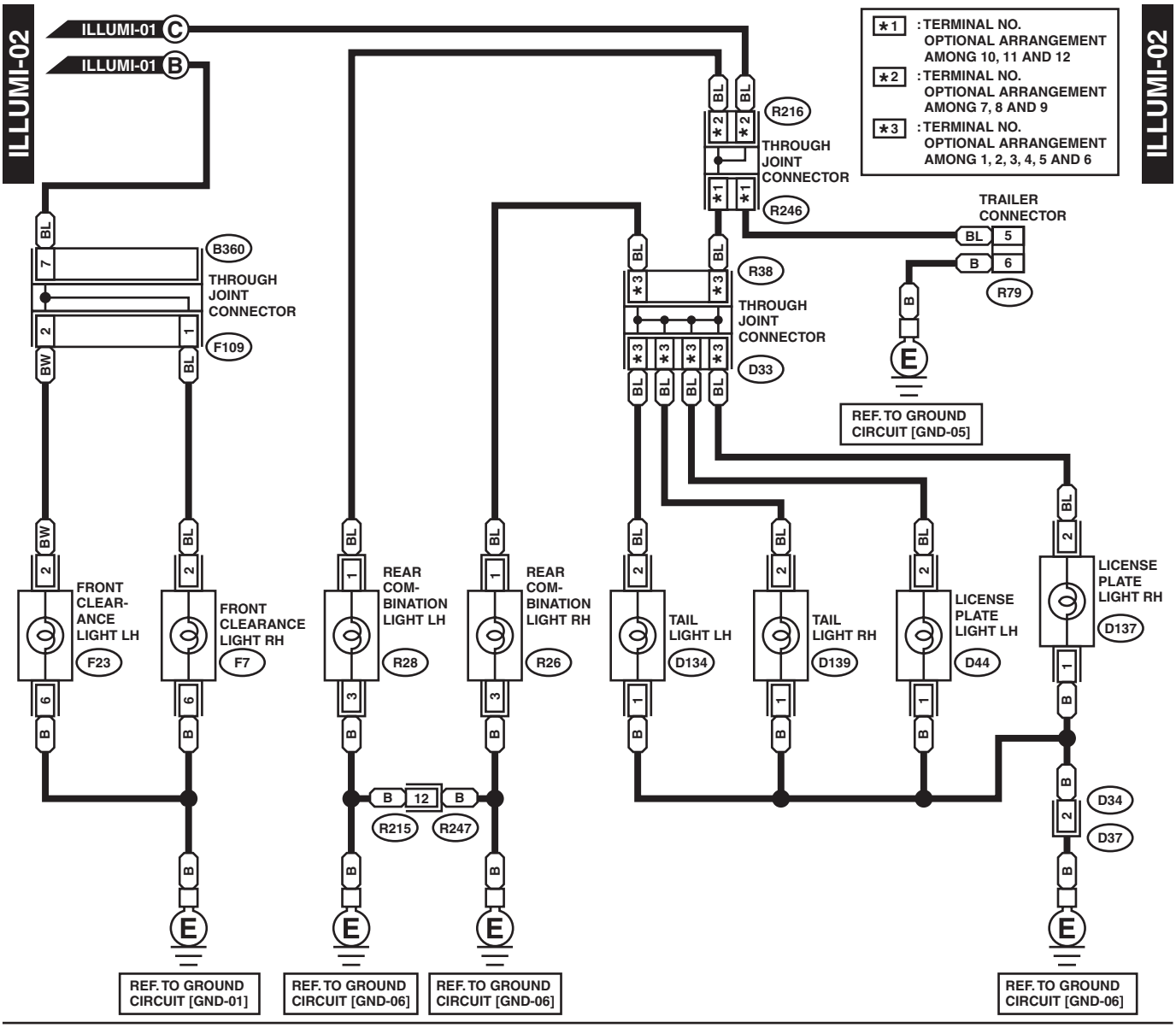
WI-08097

27.Clearance Light and Illumination Light System

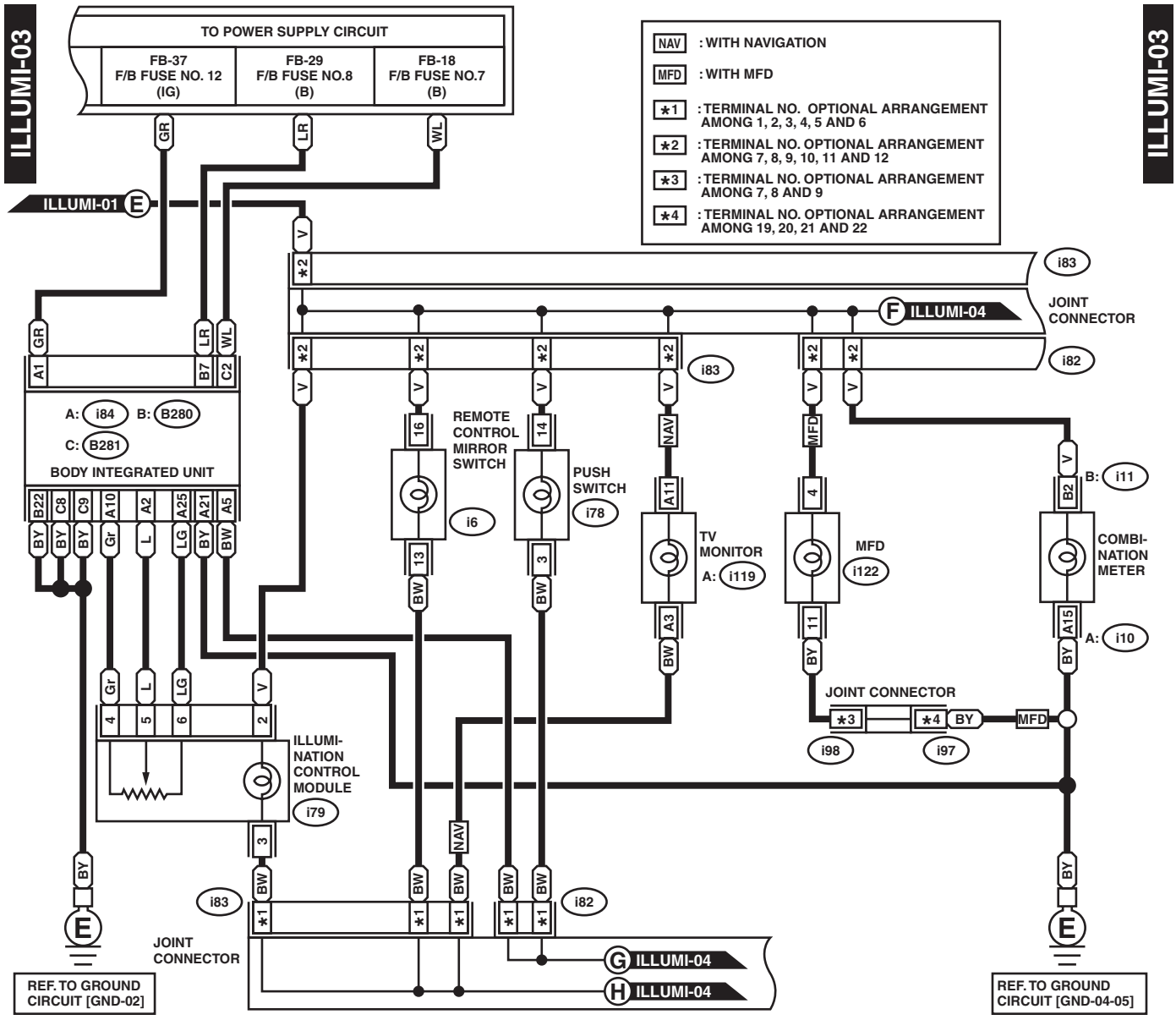
A: WIRING DIAGRAM

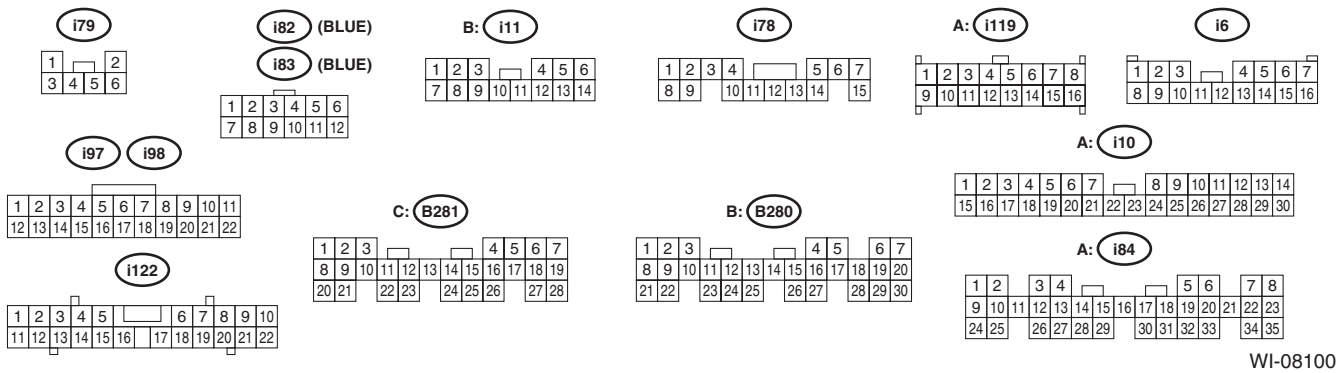


WI-08098

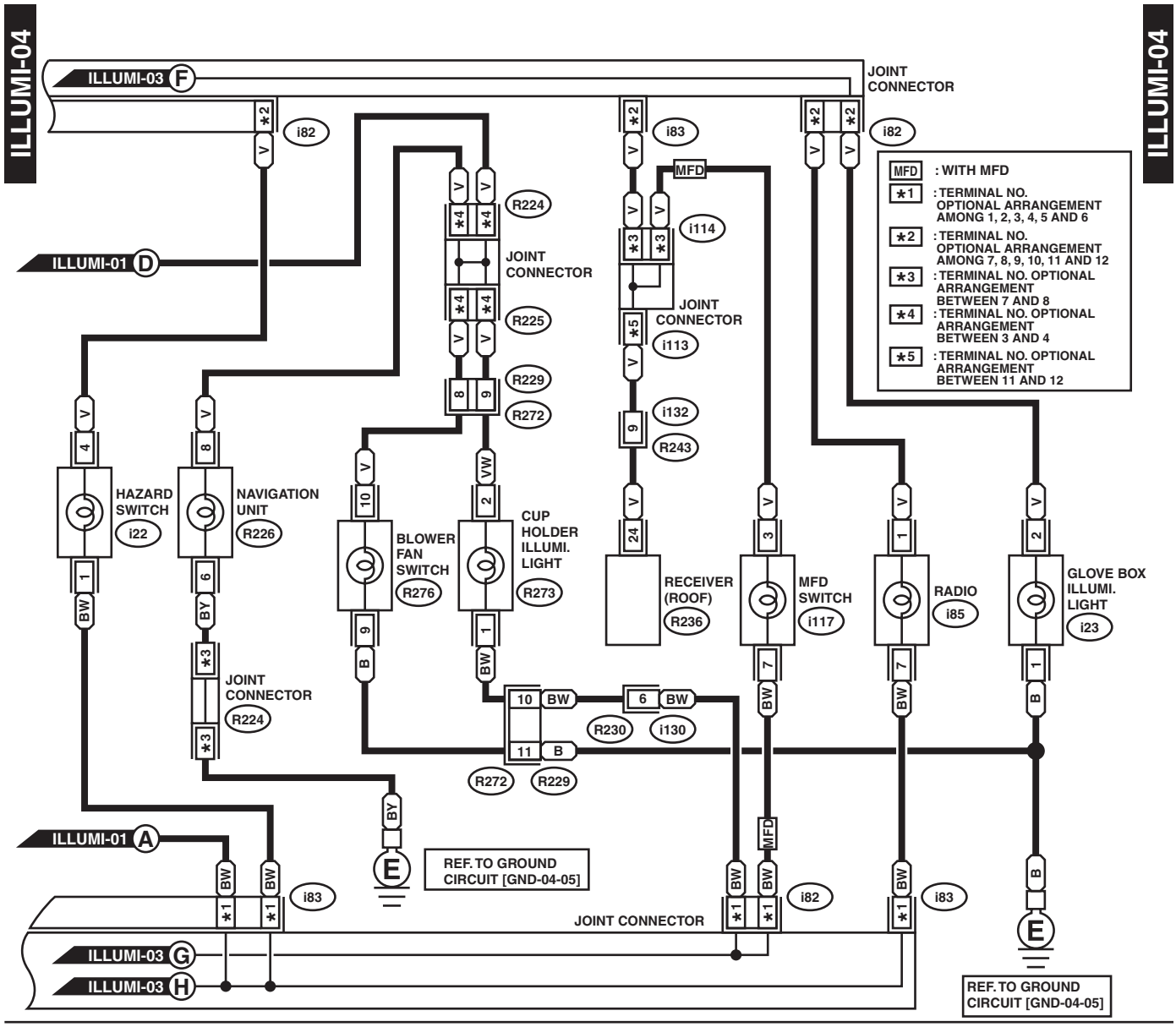

ILLUMI-02
ILLUMI-01 C
ILLUMI-01 B
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9
*3 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 1, 2, 3, 4, 5 AND 6
R216
THROUGH JOINT CONNECTOR
R246
TRAILER CONNECTOR
R79
B360
THROUGH JOINT CONNECTOR
F109
R38
THROUGH JOINT CONNECTOR
D33
REF. TO GROUND CIRCUIT [GND-05]
FRONT CLEARANCE LIGHT LH
F23
FRONT CLEARANCE LIGHT RH
F7
REAR COMBINATION LIGHT LH
R28
REAR COMBINATION LIGHT RH
R26
TAIL LIGHT LH
D134
TAIL LIGHT RH
D139
LICENSE PLATE LIGHT LH
D44
LICENSE PLATE LIGHT RH
D137
D34
D37
R215
R247
REF. TO GROUND CIRCUIT [GND-01]
REF. TO GROUND CIRCUIT [GND-06]
REF. TO GROUND CIRCUIT [GND-06]
REF. TO GROUND CIRCUIT [GND-06]
D34
D44
D137
D134 (GRAY)
D139 (GRAY)
R26
R28
R79
F7 (GRAY)
F23 (GRAY)
R38 (GRAY)
R216 (BLACK)
R246 (BLACK)
D33 (GRAY)
R215
B360 (GRAY)
F109

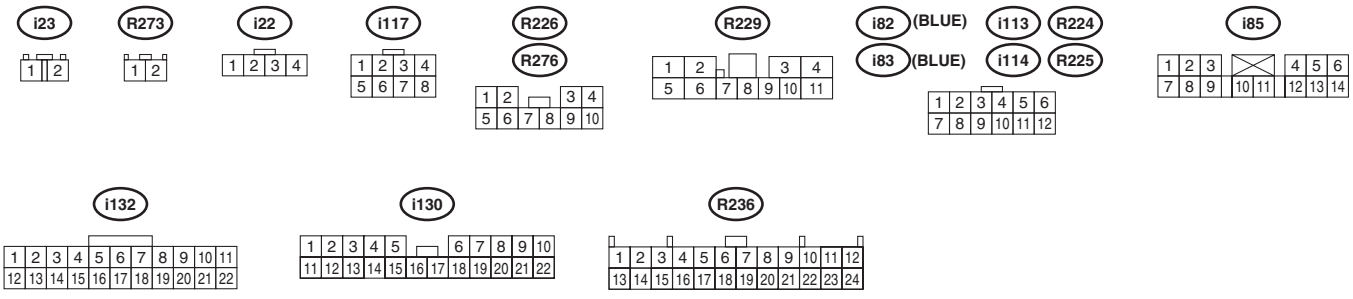
WI-08099


ILLUMI-03
TO POWER SUPPLY CIRCUIT
FB-37 F/B FUSE NO. 12 (IG)
FB-29 F/B FUSE NO.8 (B)
FB-18 F/B FUSE NO.7 (B)
NAV : WITH NAVIGATION
MFD : WITH MFD
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 1, 2, 3, 4, 5 AND 6
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 7, 8, 9, 10, 11 AND 12
*3 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9
*4 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 19, 20, 21 AND 22
ILLUMI-01
JOINT CONNECTOR
ILLUMI-04
BODY INTEGRATED UNIT
A: i84 B: B280
C: B281
REMOTE CONTROL MIRROR SWITCH
i6
PUSH SWITCH
i78
TV MONITOR
A: i119
MFD
i122
COMBI-NATION METER
B: i11
A: i10
JOINT CONNECTOR
i98
i97
ILLUMI-NATION CONTROL MODULE
i79
REF. TO GROUND CIRCUIT [GND-02]
REF. TO GROUND CIRCUIT [GND-04-05]


i79
i82 (BLUE)
i83 (BLUE)
B: i11
i78
A: i119
i6
i97
i98
A: i10
C: B281
B: B280
i122
A: i84

WI-08100

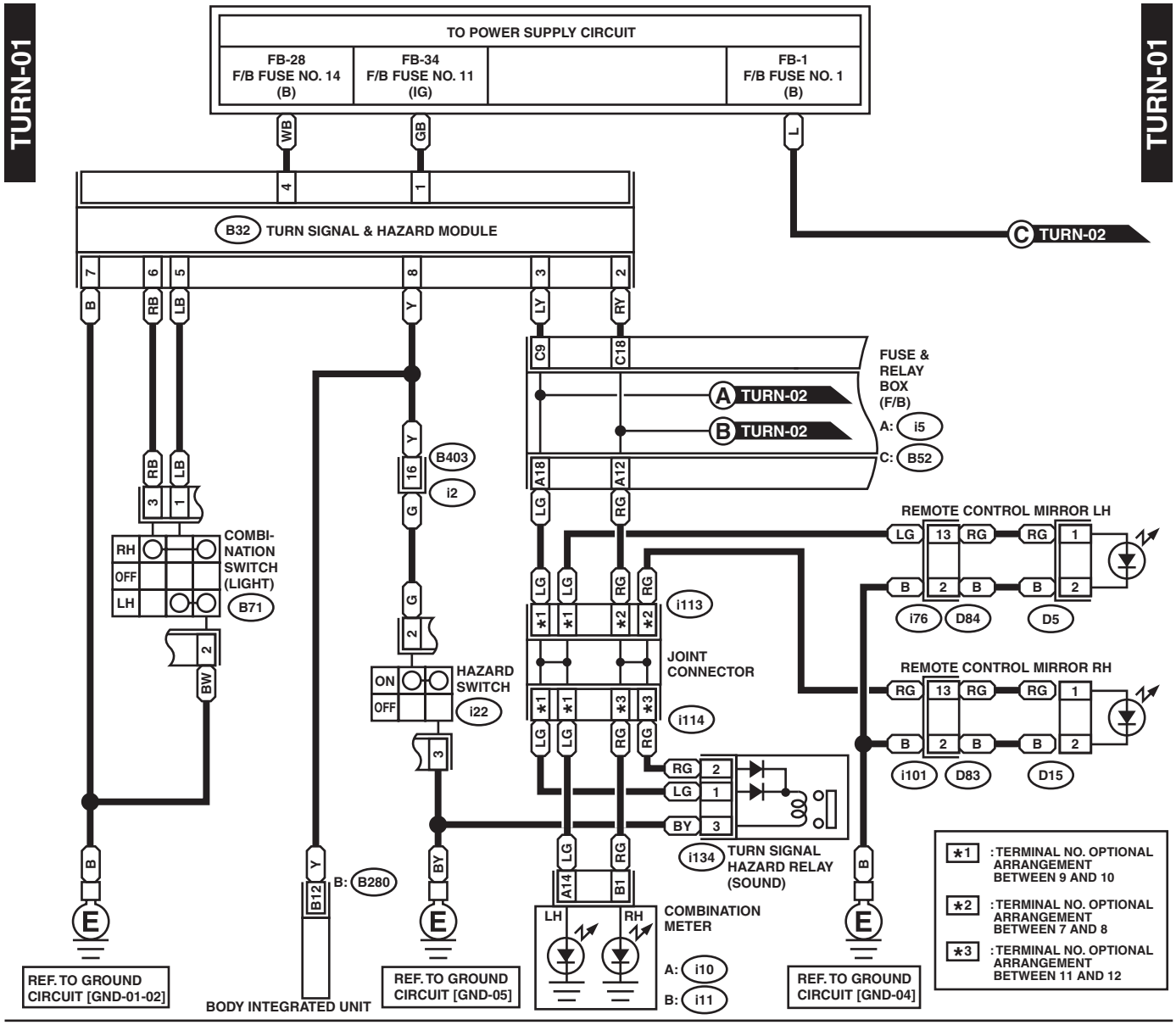

ILLUMI-04
ILLUMI-04
ILLUMI-03 F
ILLUMI-01 D
ILLUMI-01 A
ILLUMI-03 G
ILLUMI-03 H
JOINT CONNECTOR
i82
i83
R224
JOINT CONNECTOR
R225
R229
R272
MFD
i114
JOINT CONNECTOR
i113
i132
R243
HAZARD SWITCH
i22
NAVIGATION UNIT
R226
BLOWER FAN SWITCH
R276
CUP HOLDER ILLUMI. LIGHT
R273
RECEIVER (ROOF)
R236
MFD SWITCH
i117
RADIO
i85
GLOVE BOX ILLUMI. LIGHT
i23
JOINT CONNECTOR
R224
R230
i130
R272
R229
REF. TO GROUND CIRCUIT [GND-04-05]
JOINT CONNECTOR
REF. TO GROUND CIRCUIT [GND-04-05]
MFD : WITH MFD
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 1, 2, 3, 4, 5 AND 6
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 7, 8, 9, 10, 11 AND 12
*3 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 7 AND 8
*4 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 3 AND 4
*5 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 11 AND 12

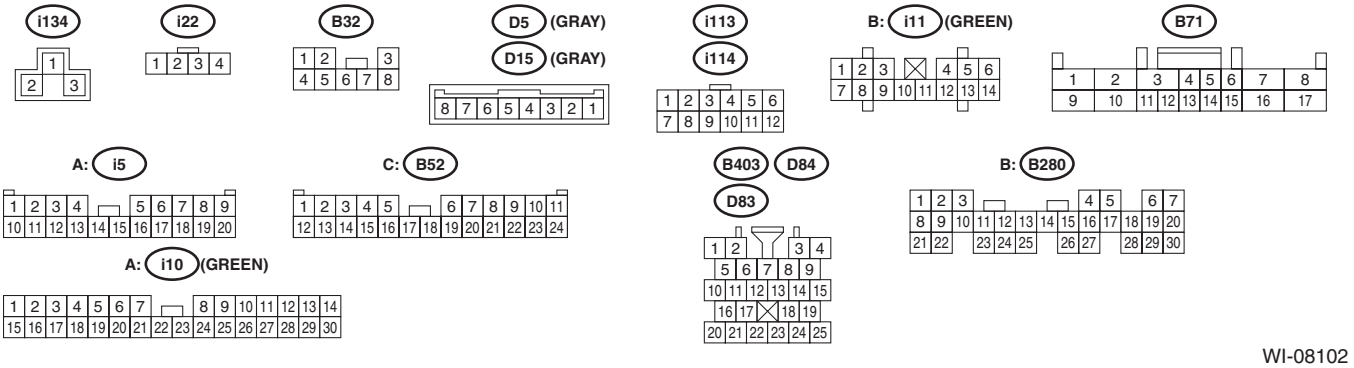

i23
R273
i22
i117
R226
R276
R229
i82 (BLUE)
i83 (BLUE)
i113
R224
i114
R225
i85
i132
i130
R236

WI-08101

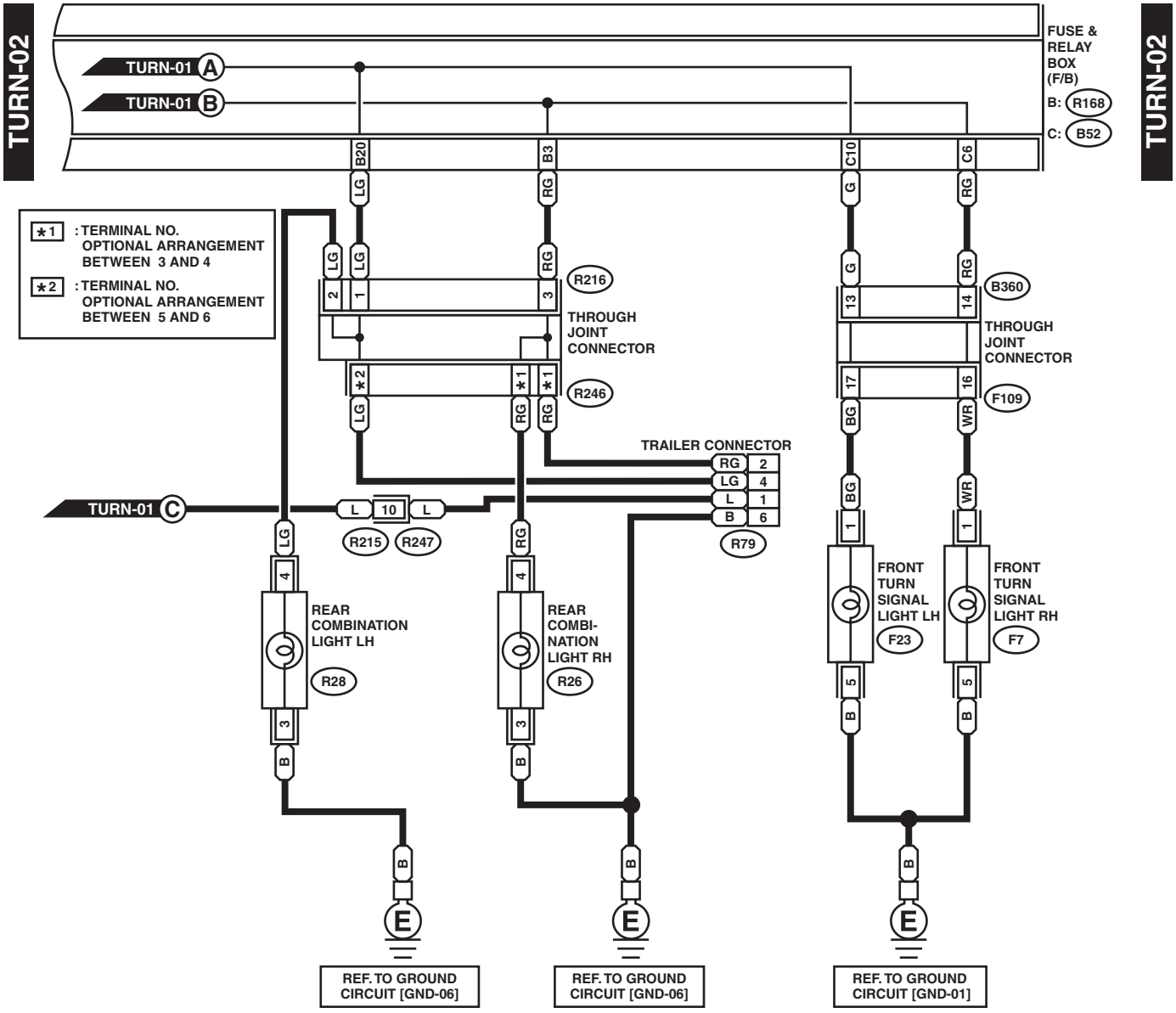
28.Turn Signal and Hazard Light System

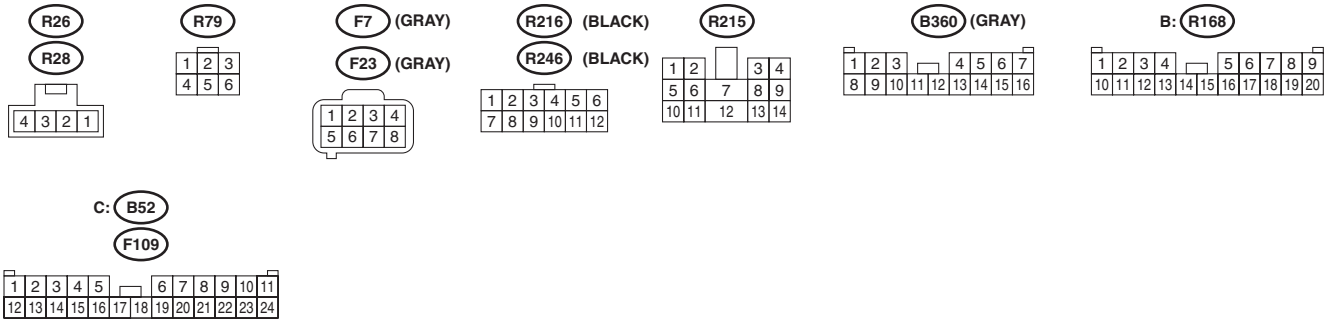
A: WIRING DIAGRAM





WI-08102

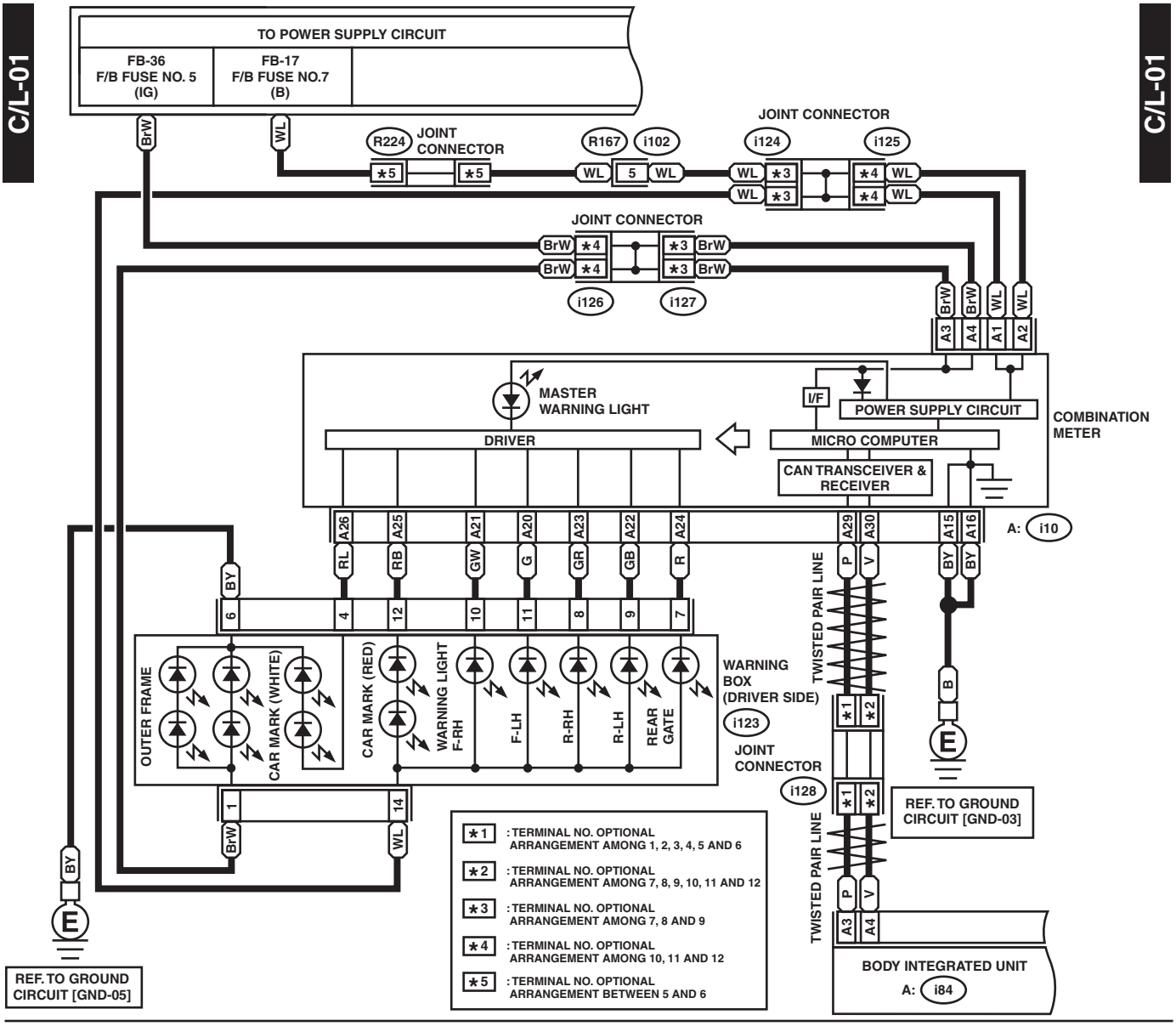

TURN-02
TURN-02
TURN-01 A
TURN-01 B
TURN-01 C
FUSE & RELAY BOX (F/B)
B: R168
C: B52
B20
B3
C10
C6
LG
RG
G
RG
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 3 AND 4
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 5 AND 6
R216
THROUGH JOINT CONNECTOR
R246
B360
THROUGH JOINT CONNECTOR
F109
TRAILER CONNECTOR
RG 2
LG 4
L 1
B 6
R79
L 10 L
R215
R247
REAR COMBINATION LIGHT LH
R28
REAR COMBI-NATION LIGHT RH
R26
FRONT TURN SIGNAL LIGHT LH
F23
FRONT TURN SIGNAL LIGHT RH
F7
BG
WR
REF. TO GROUND CIRCUIT [GND-06]
REF. TO GROUND CIRCUIT [GND-06]
REF. TO GROUND CIRCUIT [GND-01]

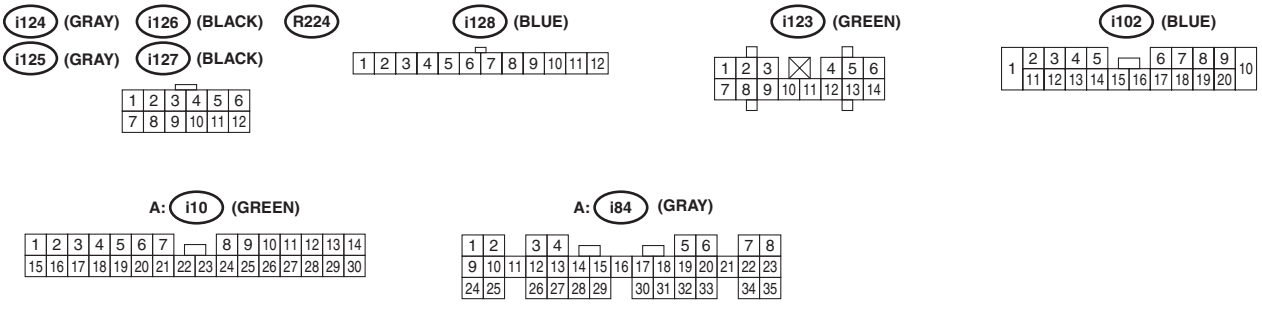

R26
R28
R79
F7 (GRAY)
F23 (GRAY)
R216 (BLACK)
R246 (BLACK)
R215
B360 (GRAY)
B: R168
C: B52
F109

WI-08103

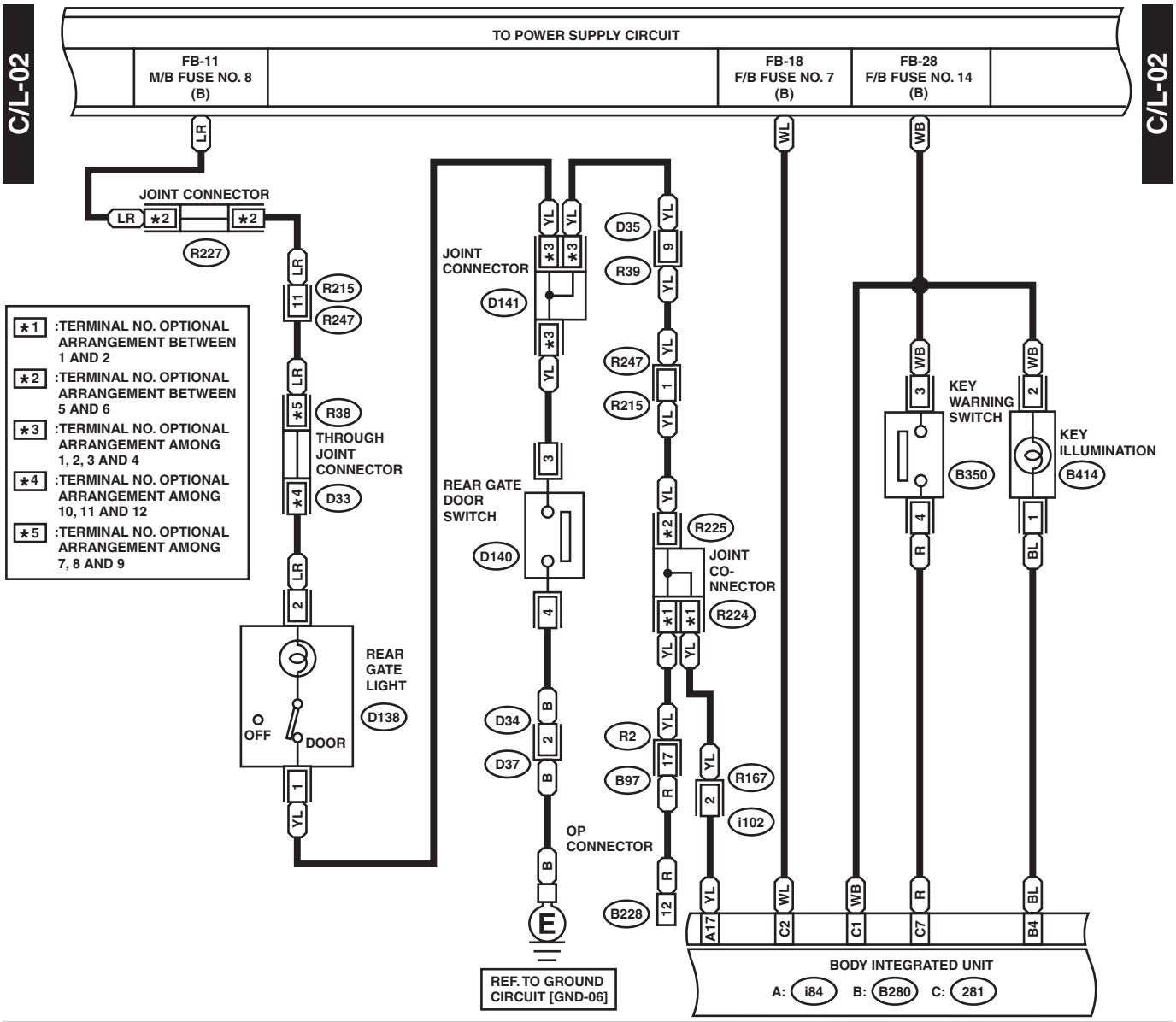
29.Interior Light System

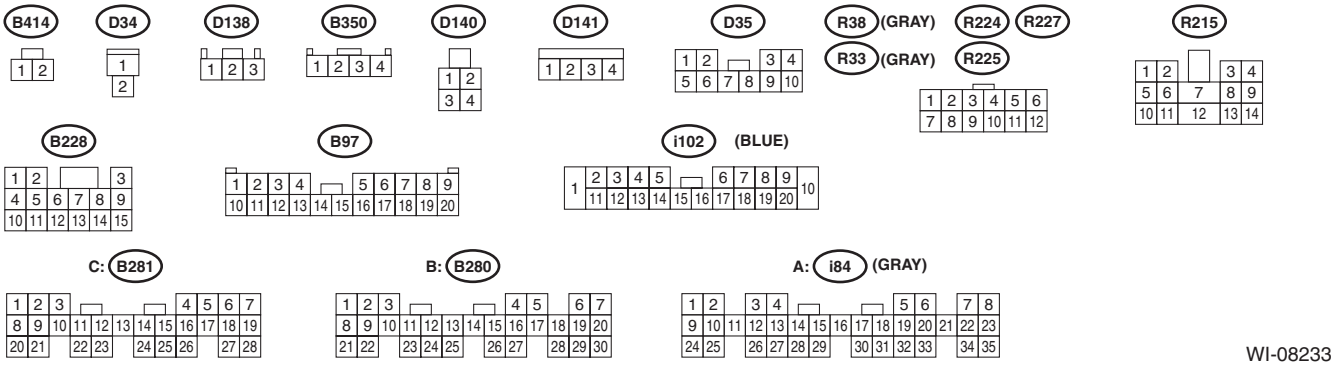
A: WIRING DIAGRAM





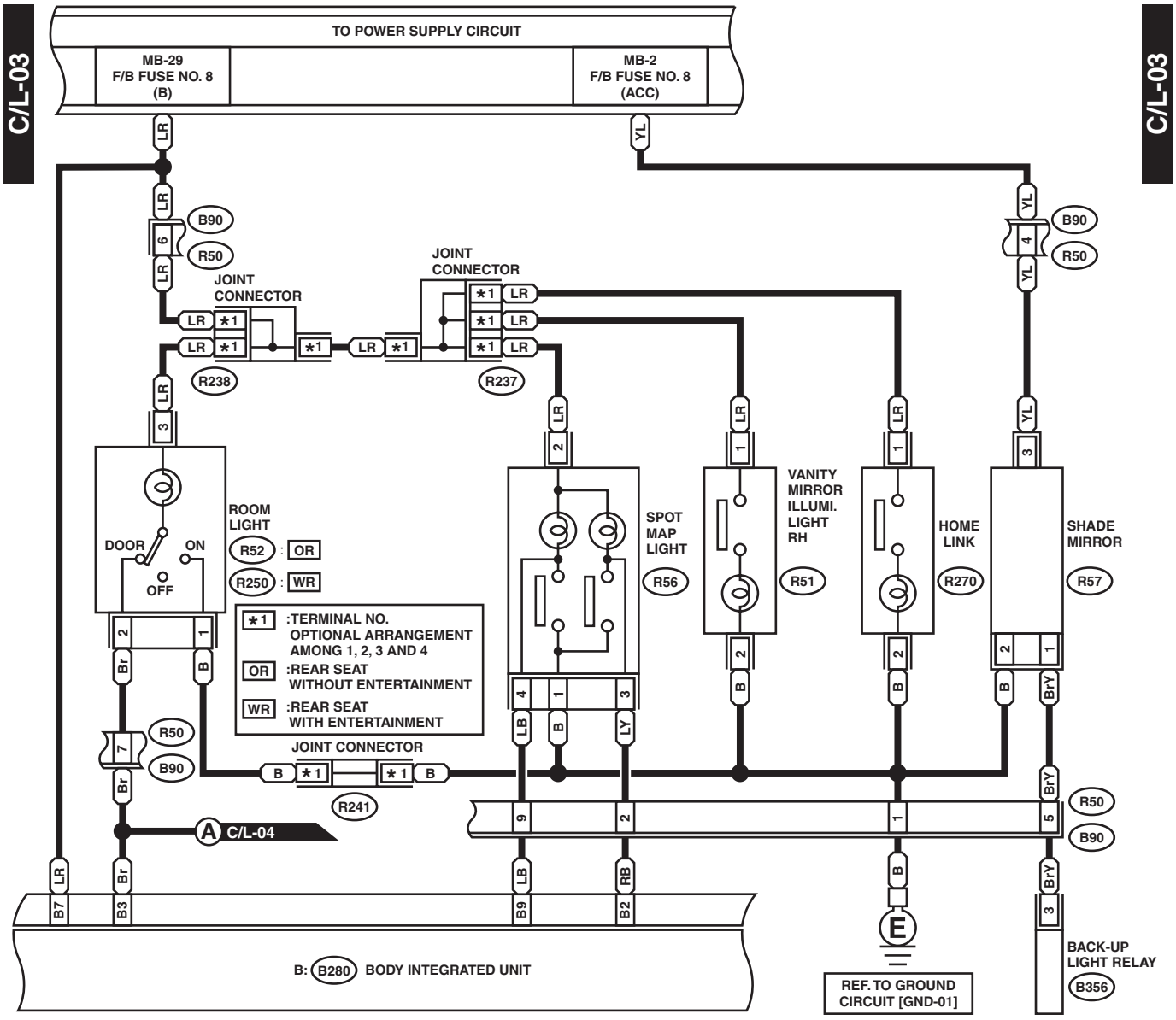
WI-08104

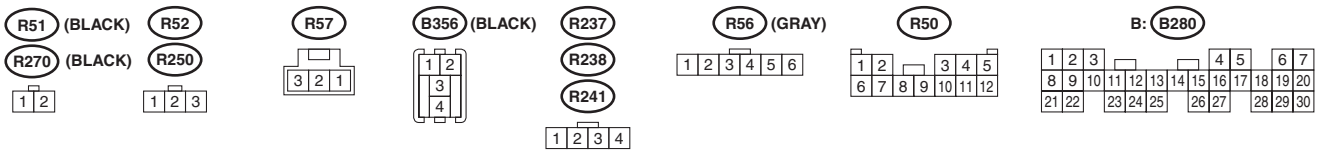

C/L-02
C/L-02
TO POWER SUPPLY CIRCUIT
FB-11
M/B FUSE NO. 8
(B)
FB-18
F/B FUSE NO. 7
(B)
FB-28
F/B FUSE NO. 14
(B)
JOINT CONNECTOR
R227
R215
R247
R38
THROUGH JOINT CONNECTOR
D33
REAR GATE LIGHT
D138
OFF
DOOR
JOINT CONNECTOR
D141
REAR GATE DOOR SWITCH
D140
D34
D37
OP CONNECTOR
B228
REF. TO GROUND CIRCUIT [GND-06]
D35
R39
R247
R215
R225
JOINT CO-NNECTOR
R224
R2
B97
R167
i102
KEY WARNING SWITCH
B350
KEY ILLUMINATION
B414
BODY INTEGRATED UNIT
A: i84 B: B280 C: 281
*1 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 1 AND 2
*2 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 5 AND 6
*3 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 1, 2, 3 AND 4
*4 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12
*5 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9


B414
D34
D138
B350
D140
D141
D35
R38 (GRAY)
R33 (GRAY)
R224
R227
R225
R215
B228
B97
i102 (BLUE)

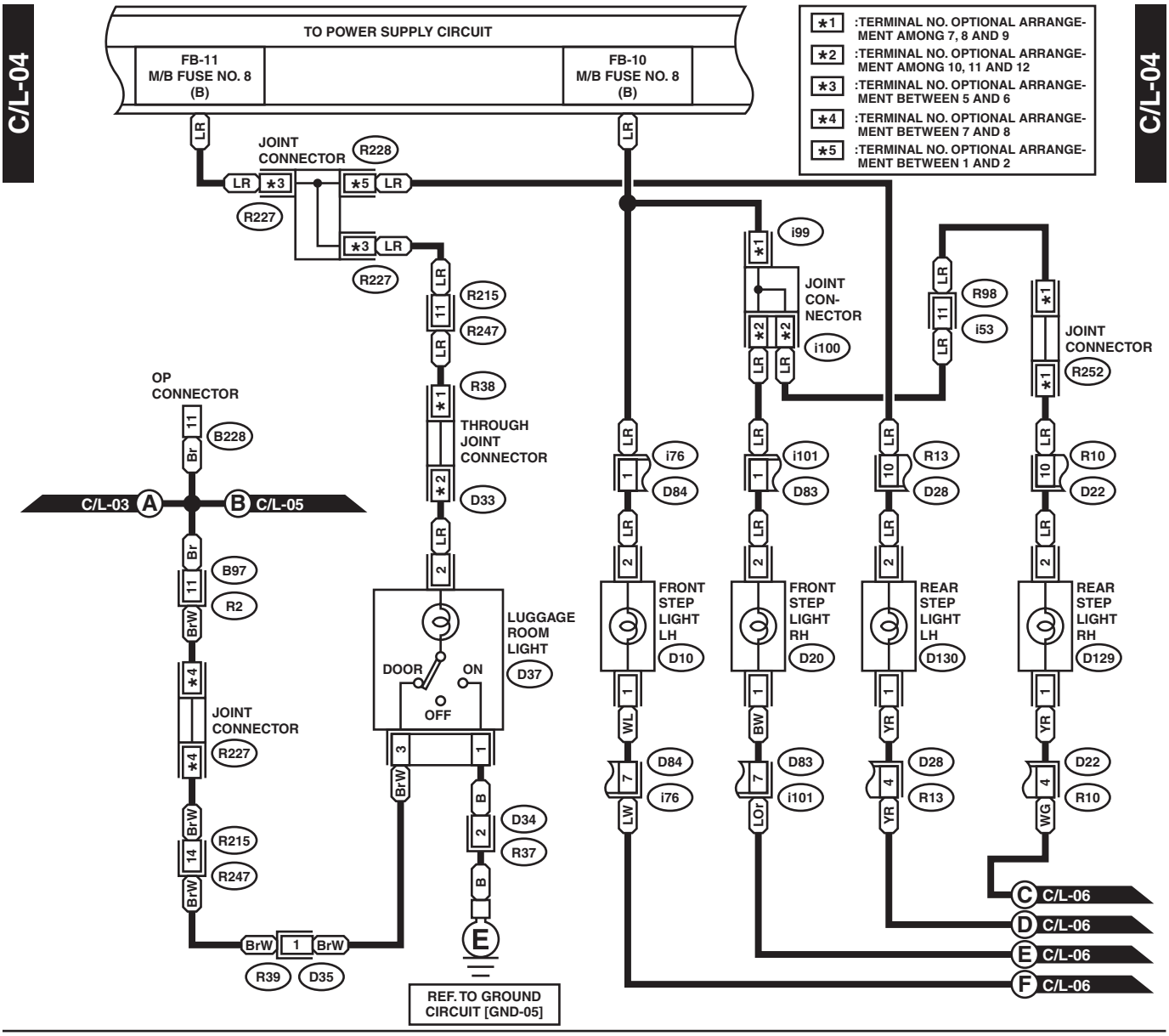
C: B281
B: B280
A: i84 (GRAY)

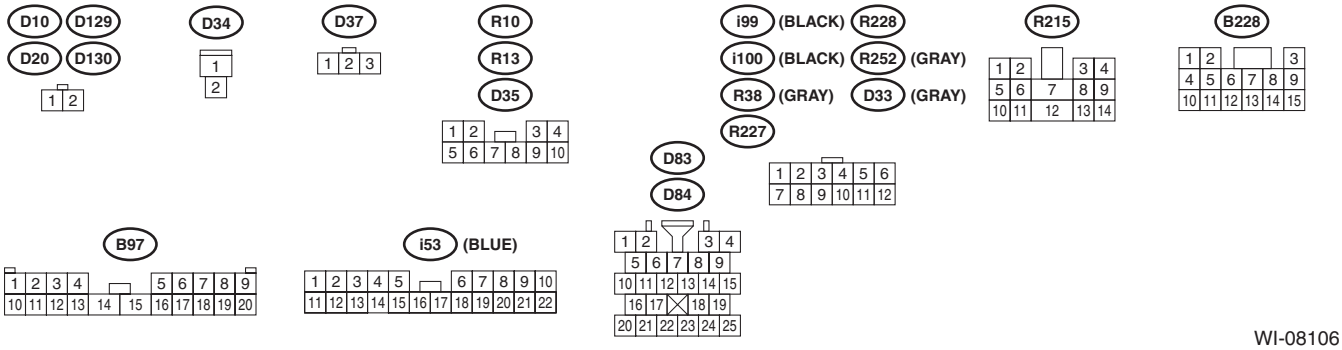
WI-08233


C/L-03
C/L-03
TO POWER SUPPLY CIRCUIT
MB-29
F/B FUSE NO. 8
(B)
MB-2
F/B FUSE NO. 8
(ACC)
B90
R50
JOINT CONNECTOR
R238
R237
ROOM LIGHT
R52 : OR
R250 : WR
DOOR
ON
OFF
*1 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 1, 2, 3 AND 4
OR :REAR SEAT WITHOUT ENTERTAINMENT
WR :REAR SEAT WITH ENTERTAINMENT
SPOT MAP LIGHT
R56
VANITY MIRROR ILLUMI. LIGHT RH
R51
HOME LINK
R270
SHADE MIRROR
R57
JOINT CONNECTOR
R241
A C/L-04
B: B280 BODY INTEGRATED UNIT
REF. TO GROUND CIRCUIT [GND-01]
BACK-UP LIGHT RELAY
B356

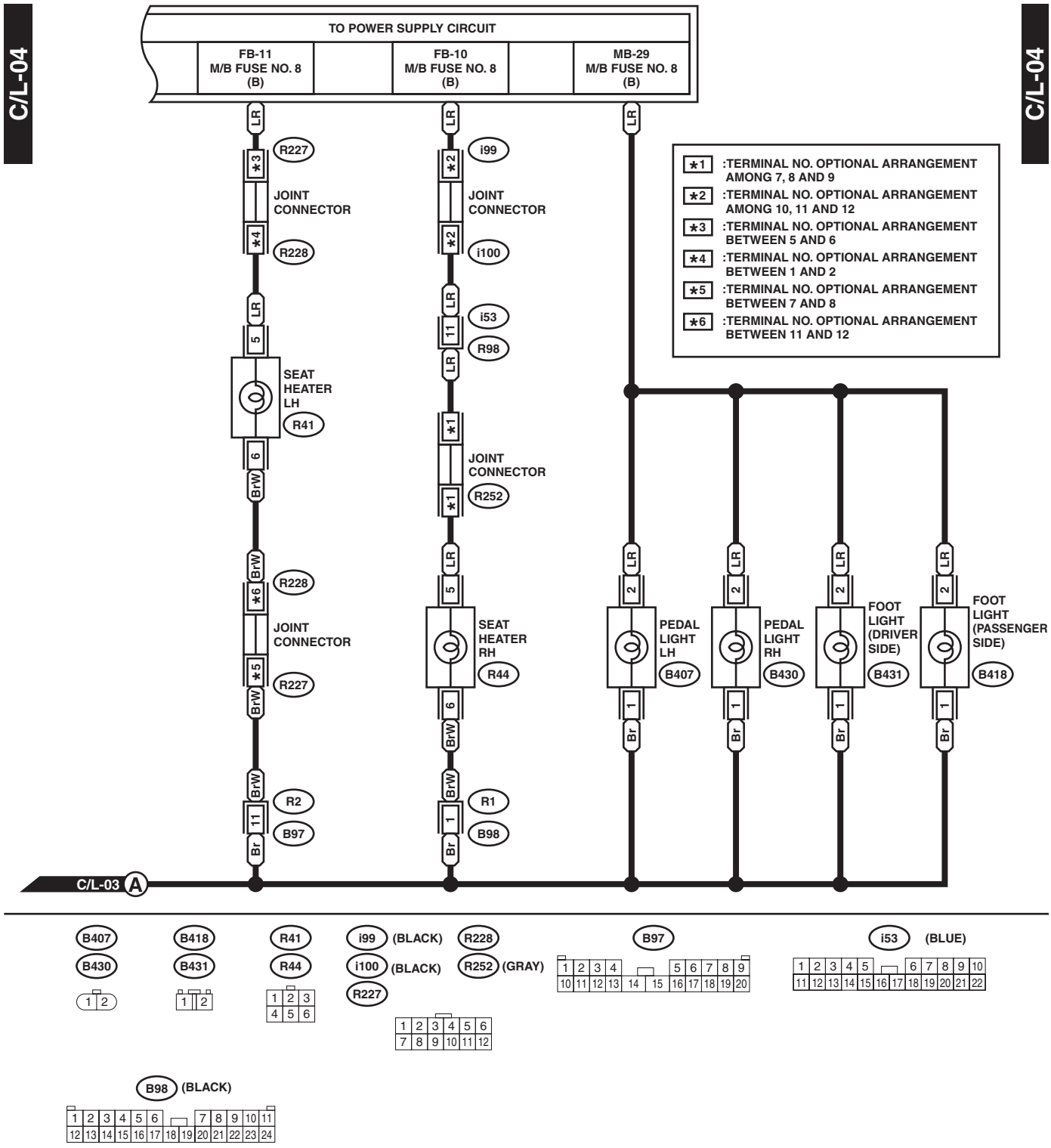

R51 (BLACK)
R270 (BLACK)
R52
R250
R57
B356 (BLACK)
R237
R238
R241
R56 (GRAY)
R50
B: B280

WI-08105


C/L-04
C/L-04
TO POWER SUPPLY CIRCUIT
FB-11 M/B FUSE NO. 8 (B)
FB-10 M/B FUSE NO. 8 (B)
*1 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9
*2 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12
*3 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 5 AND 6
*4 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 7 AND 8
*5 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 1 AND 2
JOINT CONNECTOR
R228
R227
R215
R247
R38
THROUGH JOINT CONNECTOR
D33
OP CONNECTOR
B228
C/L-03 A
B C/L-05
B97
R2
JOINT CONNECTOR
R227
R215
R247
LUGGAGE ROOM LIGHT
DOOR
ON
OFF
D37
D34
R37
REF. TO GROUND CIRCUIT [GND-05]
R39
D35
i99
JOINT CON-NECTOR
i100
i76
D84
i101
D83
FRONT STEP LIGHT LH
D10
FRONT STEP LIGHT RH
D20
R98
i53
R13
D28
REAR STEP LIGHT LH
D130
JOINT CONNECTOR
R252
R10
D22
REAR STEP LIGHT RH
D129
C C/L-06
D C/L-06
E C/L-06
F C/L-06

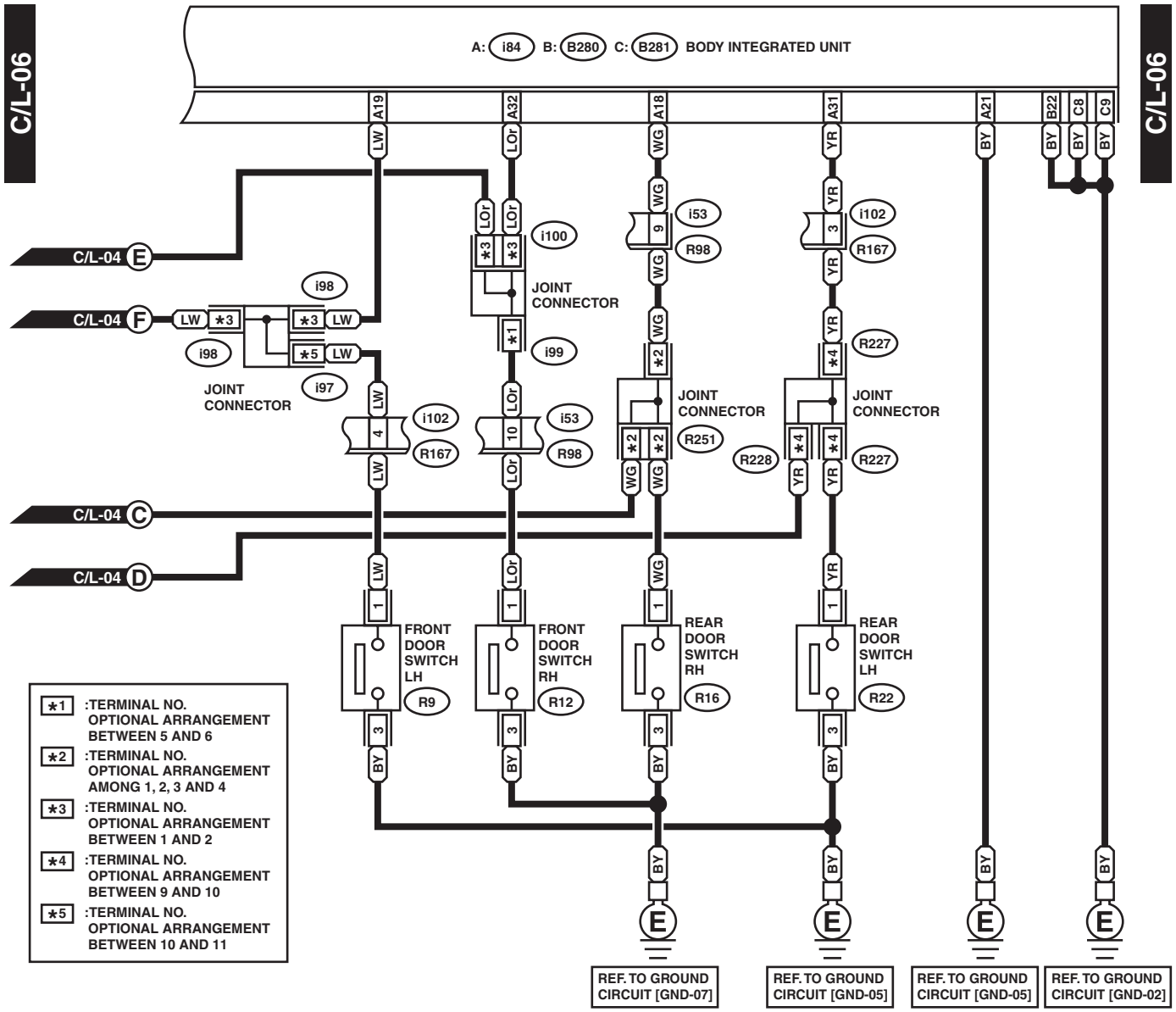

D10 D129 D20 D130
D34
D37
R10 R13 D35
i99 (BLACK) R228
i100 (BLACK) R252 (GRAY)
R38 (GRAY) D33 (GRAY)
R227
R215
B228
D83 D84
B97
i53 (BLUE)

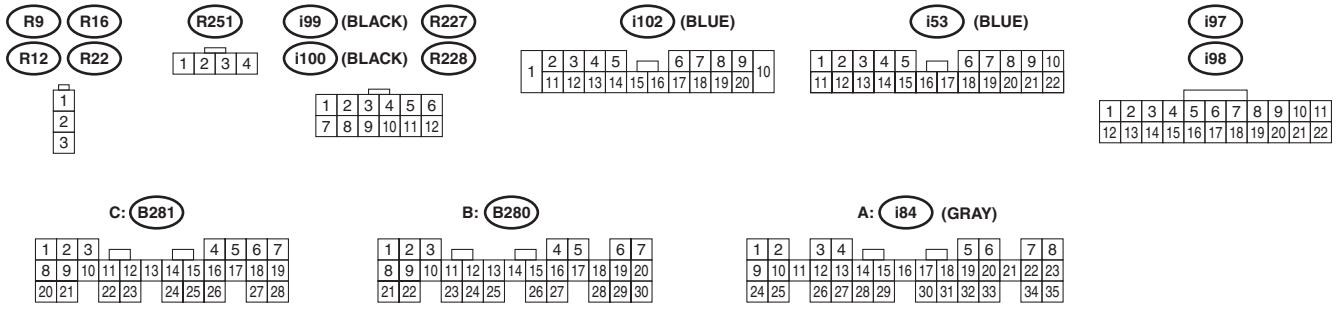
WI-08106


C/L-04
C/L-04
TO POWER SUPPLY CIRCUIT
FB-11 M/B FUSE NO. 8 (B)
FB-10 M/B FUSE NO. 8 (B)
MB-29 M/B FUSE NO. 8 (B)
LR
R227
*3
JOINT CONNECTOR
*4
R228
5
SEAT HEATER LH
R41
6
BrW
*6
JOINT CONNECTOR
*5
R227
11
R2
B97
Br
i99
*2
JOINT CONNECTOR
i100
i53
11
R98
*1
JOINT CONNECTOR
R252
5
SEAT HEATER RH
R44
6
1
R1
B98
2
PEDAL LIGHT LH
B407
PEDAL LIGHT RH
B430
FOOT LIGHT (DRIVER SIDE)
B431
FOOT LIGHT (PASSENGER SIDE)
B418
*1 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9
*2 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12
*3 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 5 AND 6
*4 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 1 AND 2
*5 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 7 AND 8
*6 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 11 AND 12
C/L-03 A

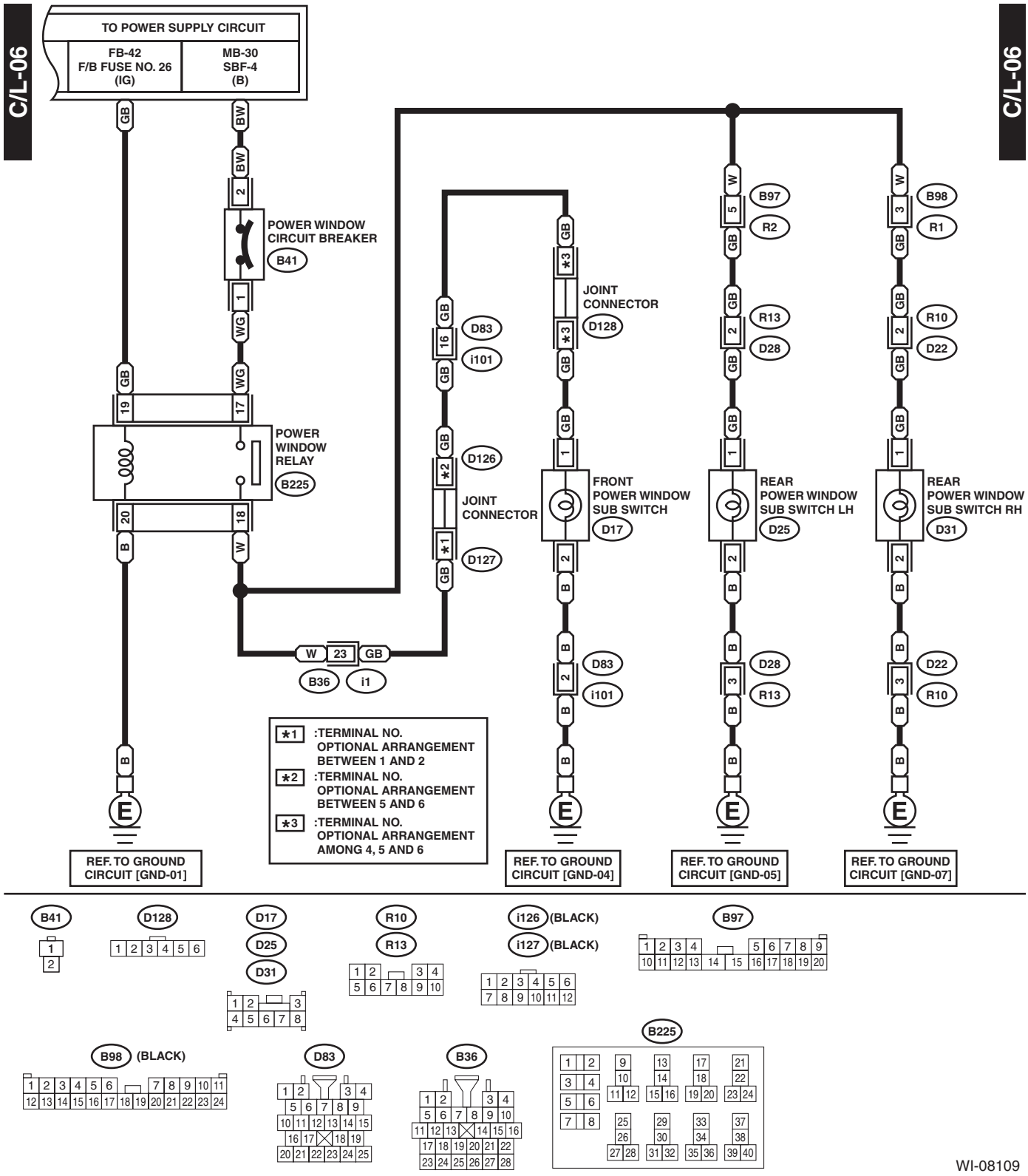
B407
B430
B418
B431
R41
R44
i99 (BLACK)
i100 (BLACK)
R227
R228
R252 (GRAY)
B97
i53 (BLUE)
B98 (BLACK)

WI-08107


C/L-06
C/L-06
A: i84 B: B280 C: B281 BODY INTEGRATED UNIT
A19
A32
A18
A31
A21
B22
C8
C9
LW
LOr
WG
YR
BY
C/L-04 E
C/L-04 F
C/L-04 C
C/L-04 D
i100
i53
R98
i102
R167
R227
i98
i99
i97
JOINT CONNECTOR
R251
R228
FRONT DOOR SWITCH LH
FRONT DOOR SWITCH RH
REAR DOOR SWITCH RH
REAR DOOR SWITCH LH
R9
R12
R16
R22
*1 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 5 AND 6
*2 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 1, 2, 3 AND 4
*3 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 1 AND 2
*4 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 9 AND 10
*5 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 10 AND 11
REF. TO GROUND CIRCUIT [GND-07]
REF. TO GROUND CIRCUIT [GND-05]
REF. TO GROUND CIRCUIT [GND-05]
REF. TO GROUND CIRCUIT [GND-02]


R9 R16 R12 R22
R251
i99 (BLACK) R227
i100 (BLACK) R228
i102 (BLUE)
i53 (BLUE)
i97
i98
C: B281
B: B280
A: i84 (GRAY)

WI-08108

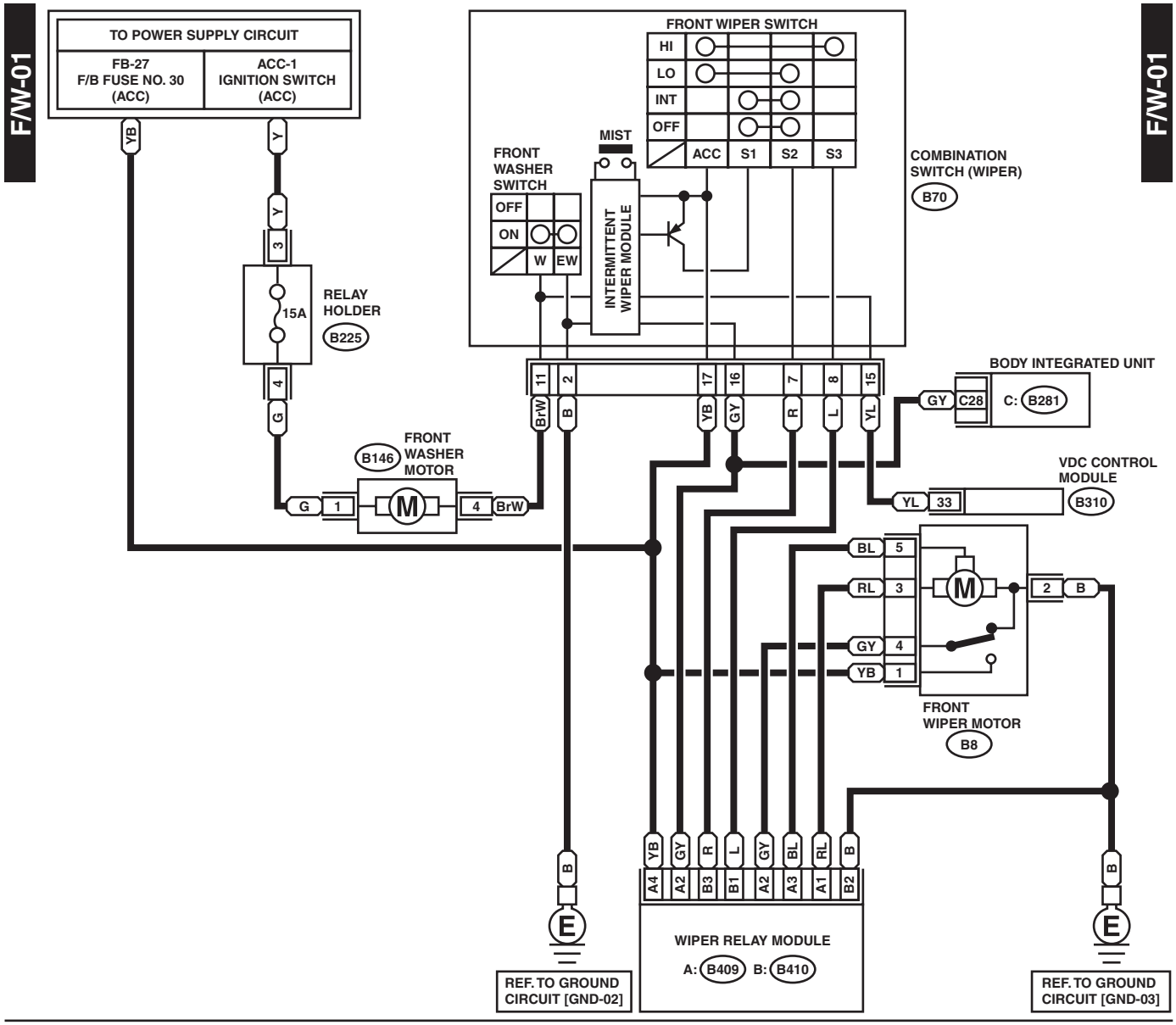

C/L-06
C/L-06
TO POWER SUPPLY CIRCUIT
FB-42
F/B FUSE NO. 26
(IG)
MB-30
SBF-4
(B)
POWER WINDOW
CIRCUIT BREAKER
B41
POWER
WINDOW
RELAY
B225
JOINT
CONNECTOR
D128
JOINT
CONNECTOR
D126
D127
D83
i101
FRONT
POWER WINDOW
SUB SWITCH
D17
REAR
POWER WINDOW
SUB SWITCH LH
D25
REAR
POWER WINDOW
SUB SWITCH RH
D31
B97
R2
R13
D28
B98
R1
R10
D22
W
23
GB
B36
i1
*1 :TERMINAL NO.
OPTIONAL ARRANGEMENT
BETWEEN 1 AND 2
*2 :TERMINAL NO.
OPTIONAL ARRANGEMENT
BETWEEN 5 AND 6
*3 :TERMINAL NO.
OPTIONAL ARRANGEMENT
AMONG 4, 5 AND 6
REF. TO GROUND
CIRCUIT [GND-01]
REF. TO GROUND
CIRCUIT [GND-04]
REF. TO GROUND
CIRCUIT [GND-05]
REF. TO GROUND
CIRCUIT [GND-07]

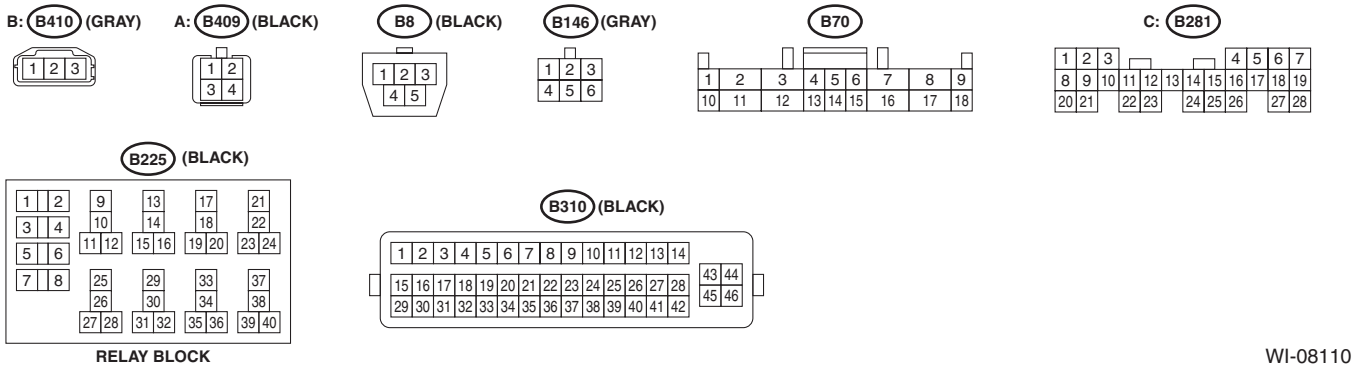
B41
D128
D17
D25
D31
R10
R13
i126 (BLACK)
i127 (BLACK)
B97
B98 (BLACK)
D83
B36
B225

WI-08109

30.Front Wiper and Washer System

A: WIRING DIAGRAM

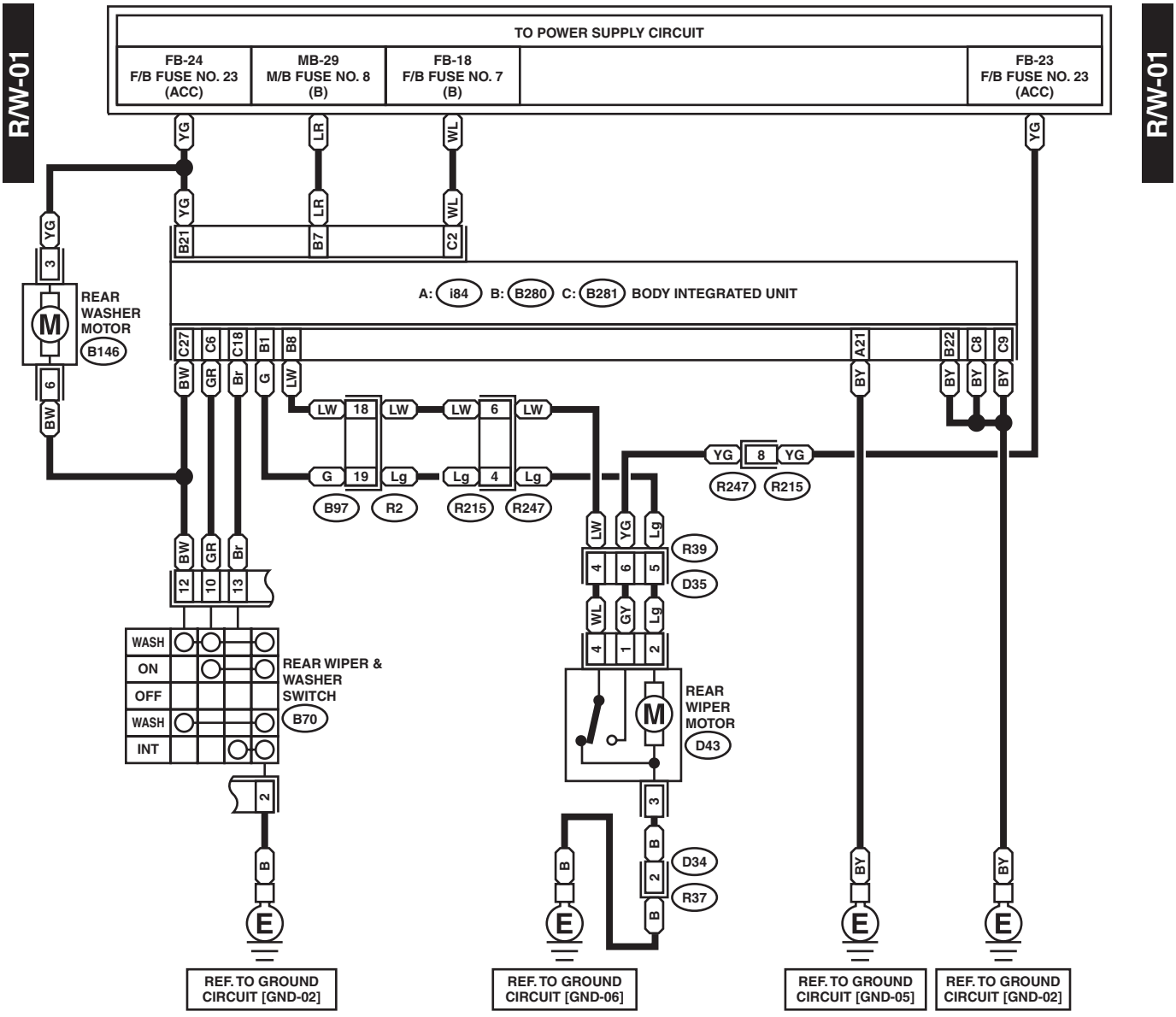


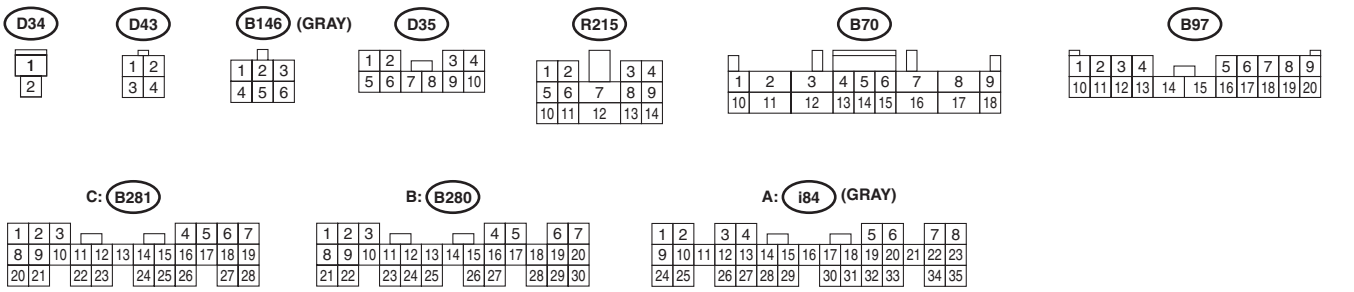


WI-08110

31.Rear Wiper and Washer System

A: WIRING DIAGRAM



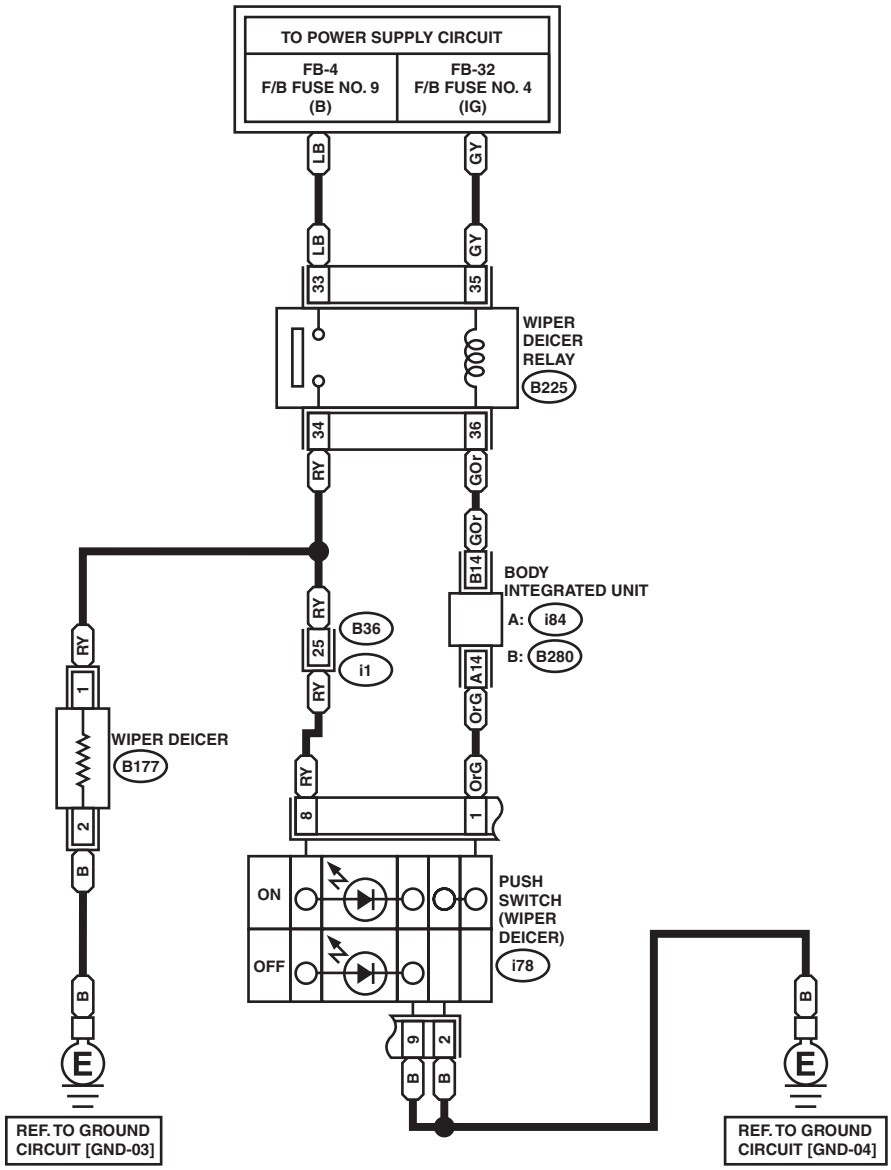


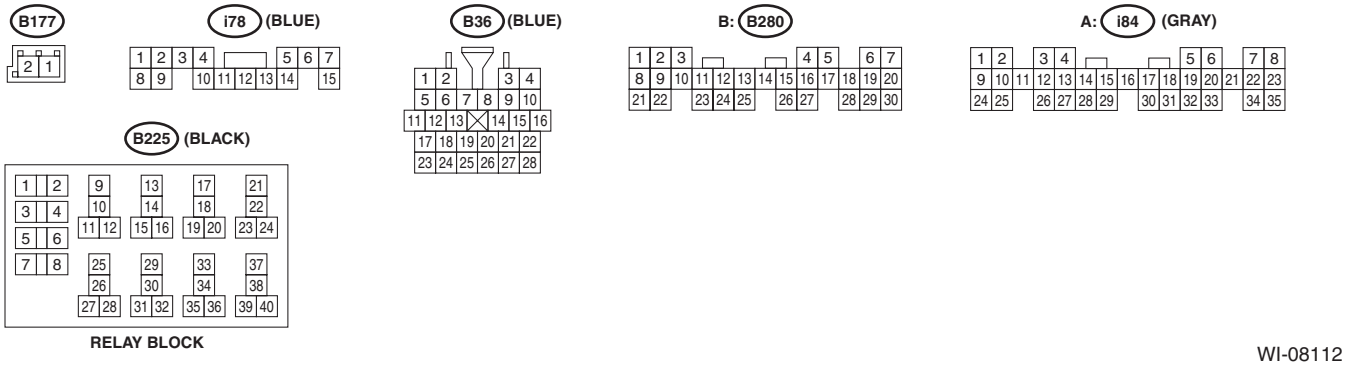
WI-08111

32.Wiper Deicer System

A: WIRING DIAGRAM

W/D-01



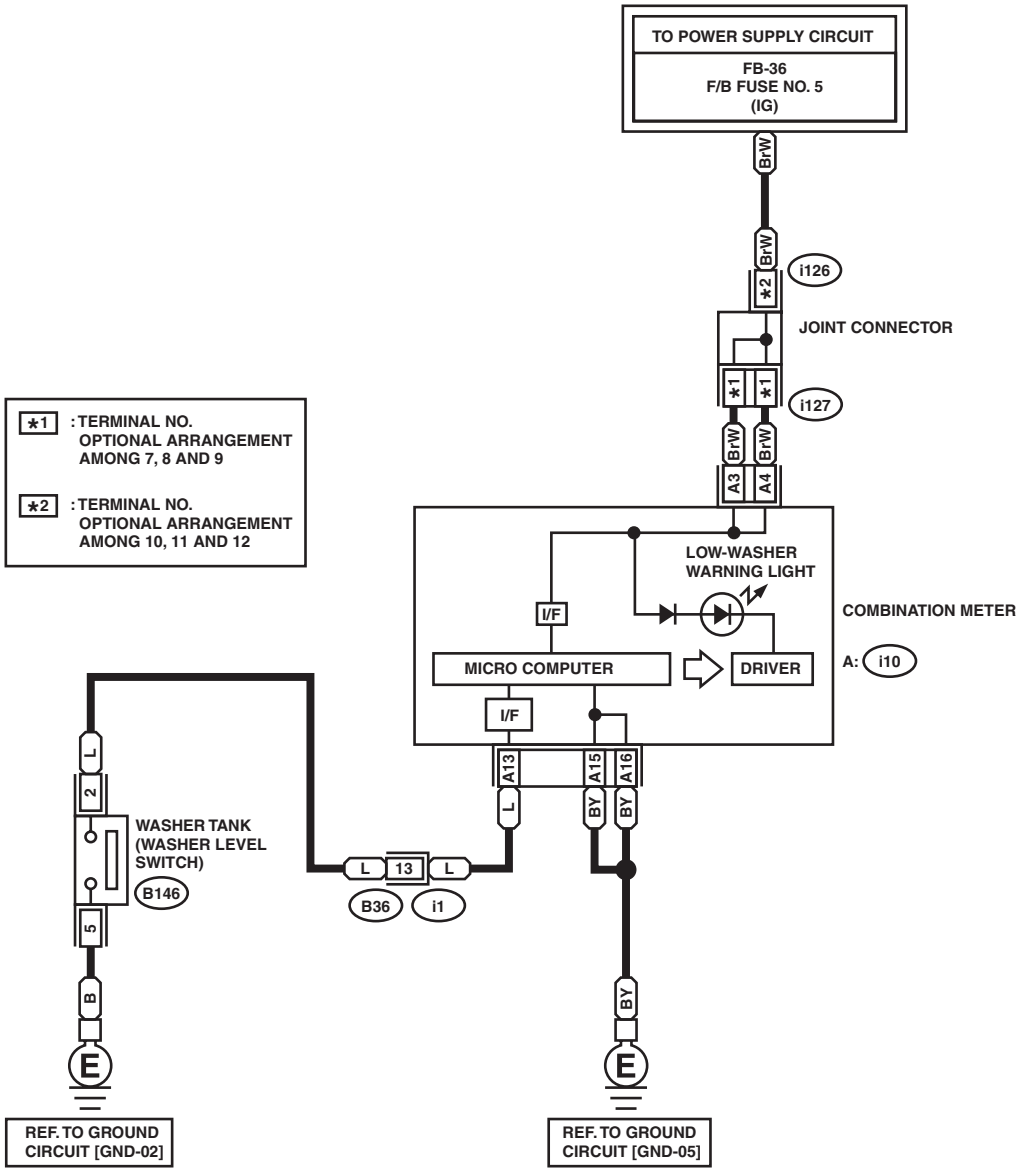


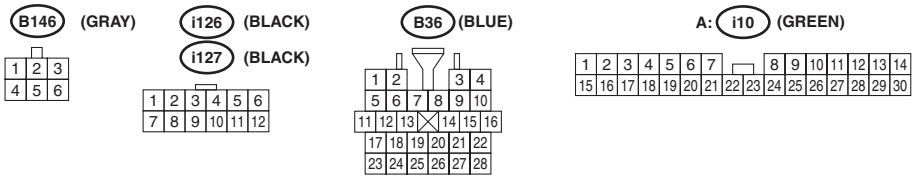
WI-08112

33.Water Level Warning Light System

A: WIRING DIAGRAM

W/L-01

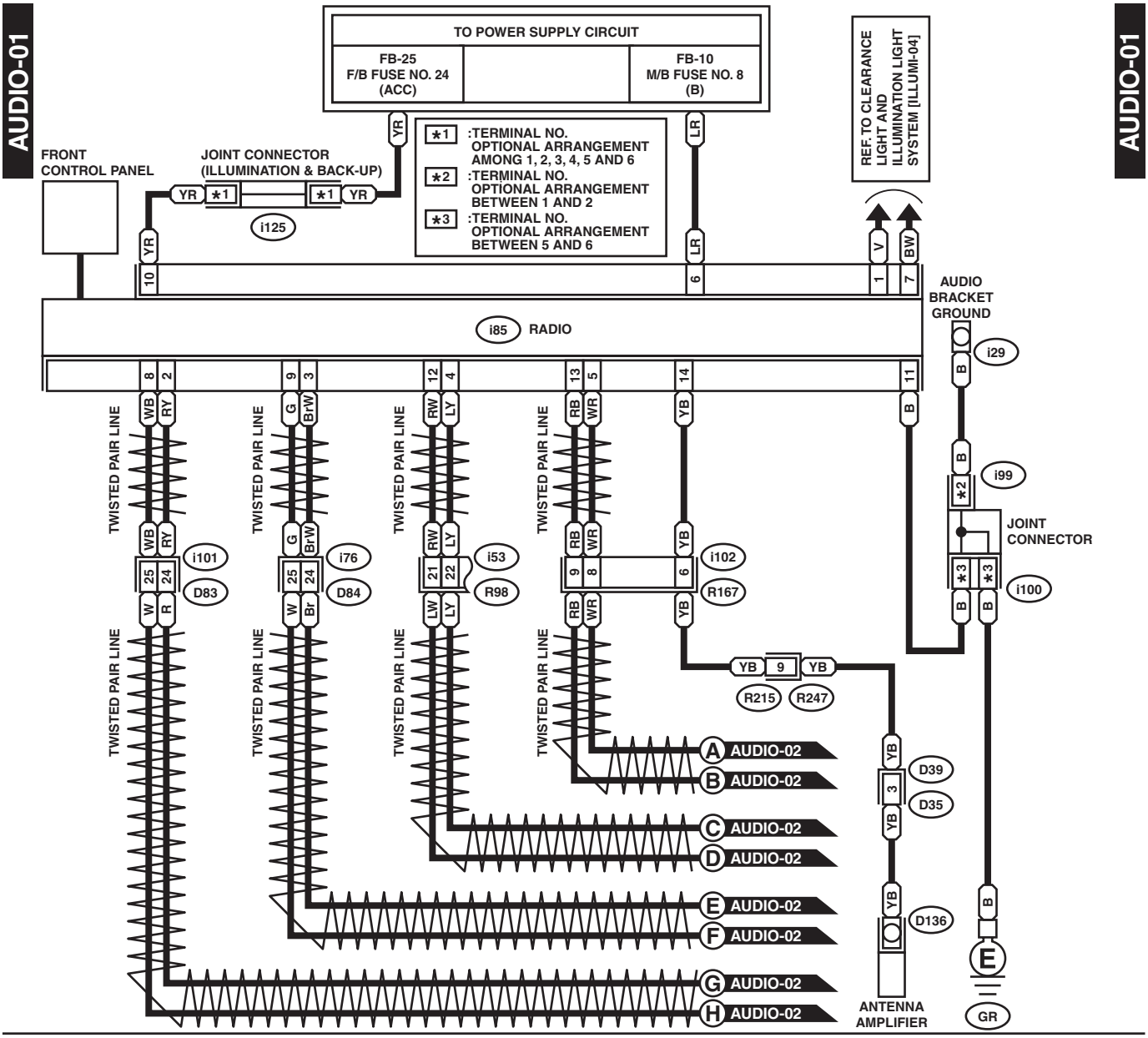




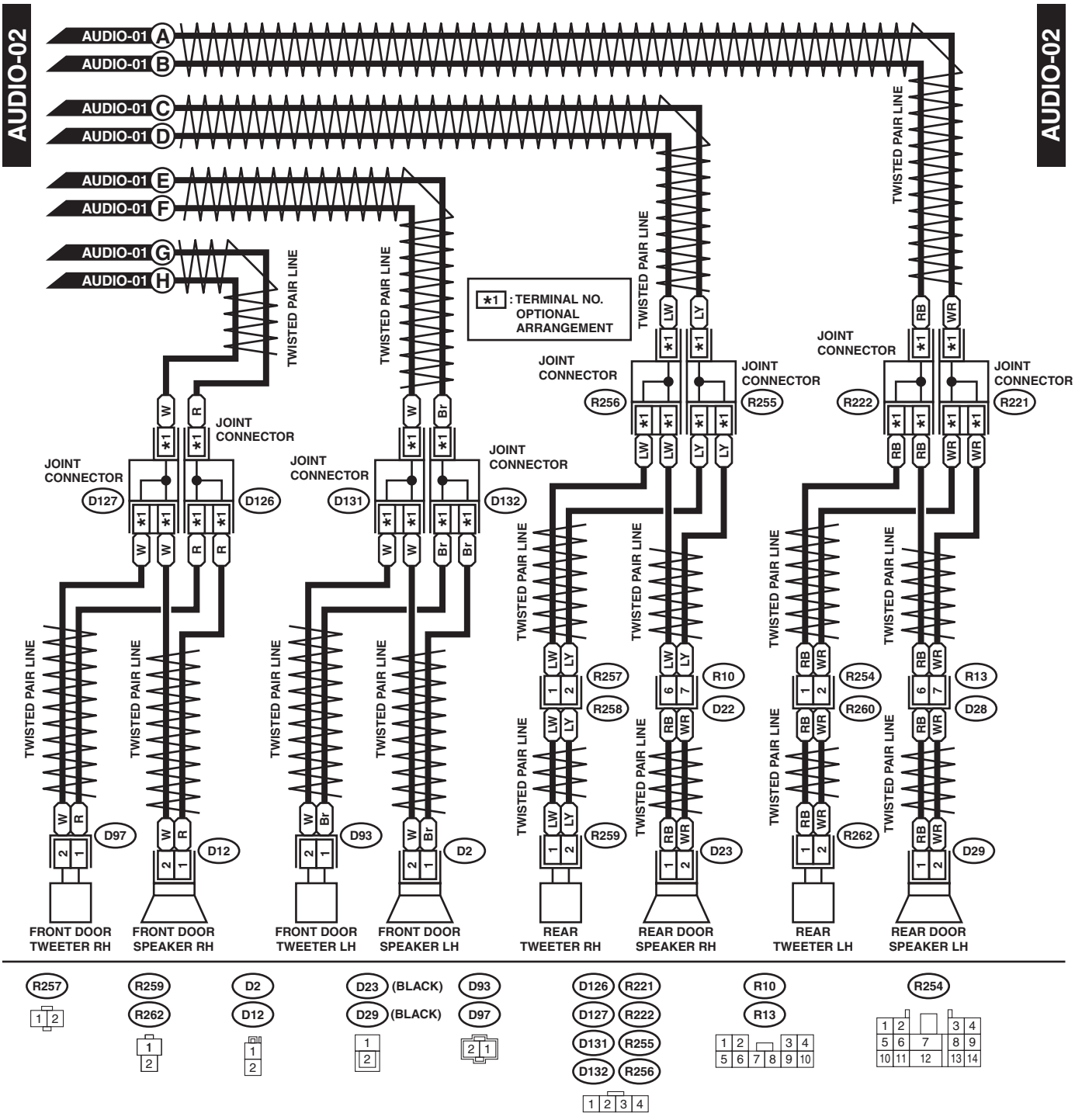
WI-08321

34.Audio System

A: WIRING DIAGRAM



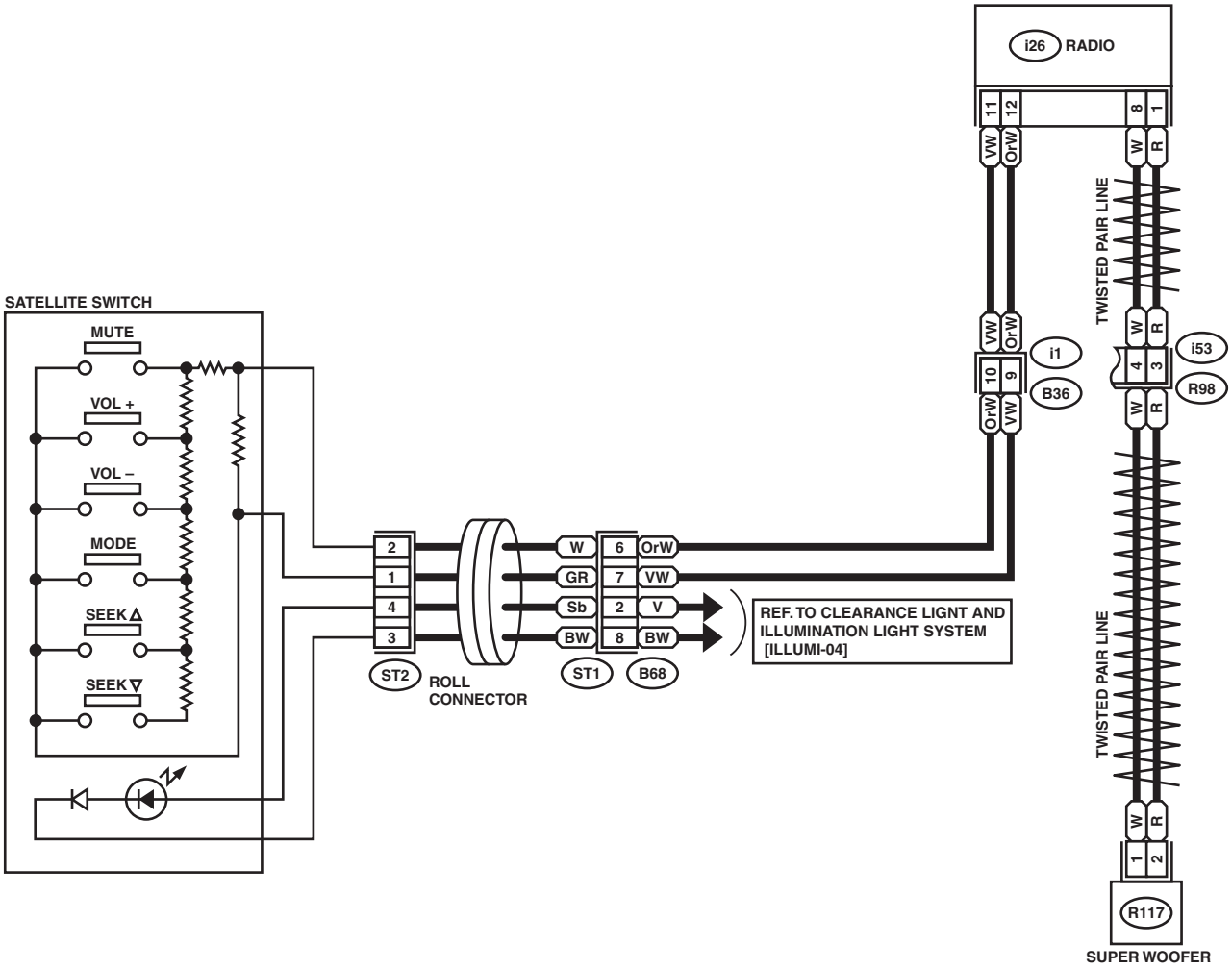
WI-08113

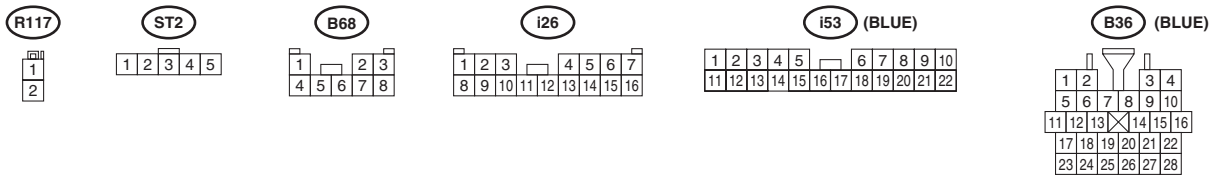

AUDIO-02
AUDIO-02
AUDIO-01 A
AUDIO-01 B
AUDIO-01 C
AUDIO-01 D
AUDIO-01 E
AUDIO-01 F
AUDIO-01 G
AUDIO-01 H
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT
TWISTED PAIR LINE
JOINT CONNECTOR
D127
D126
D131
D132
R256
R255
R222
R221
R257
R258
R259
R10
D22
D23
R254
R260
R262
R13
D28
D29
D97
D12
D93
D2
FRONT DOOR TWEETER RH
FRONT DOOR SPEAKER RH
FRONT DOOR TWEETER LH
FRONT DOOR SPEAKER LH
REAR TWEETER RH
REAR DOOR SPEAKER RH
REAR TWEETER LH
REAR DOOR SPEAKER LH
R257
R259
R262
D2
D12
D23 (BLACK)
D29 (BLACK)
D93
D97
D126
D127
D131
D132
R221
R222
R255
R256
R10
R13
R254

WI-08309

AUDIO-03

AUDIO-03

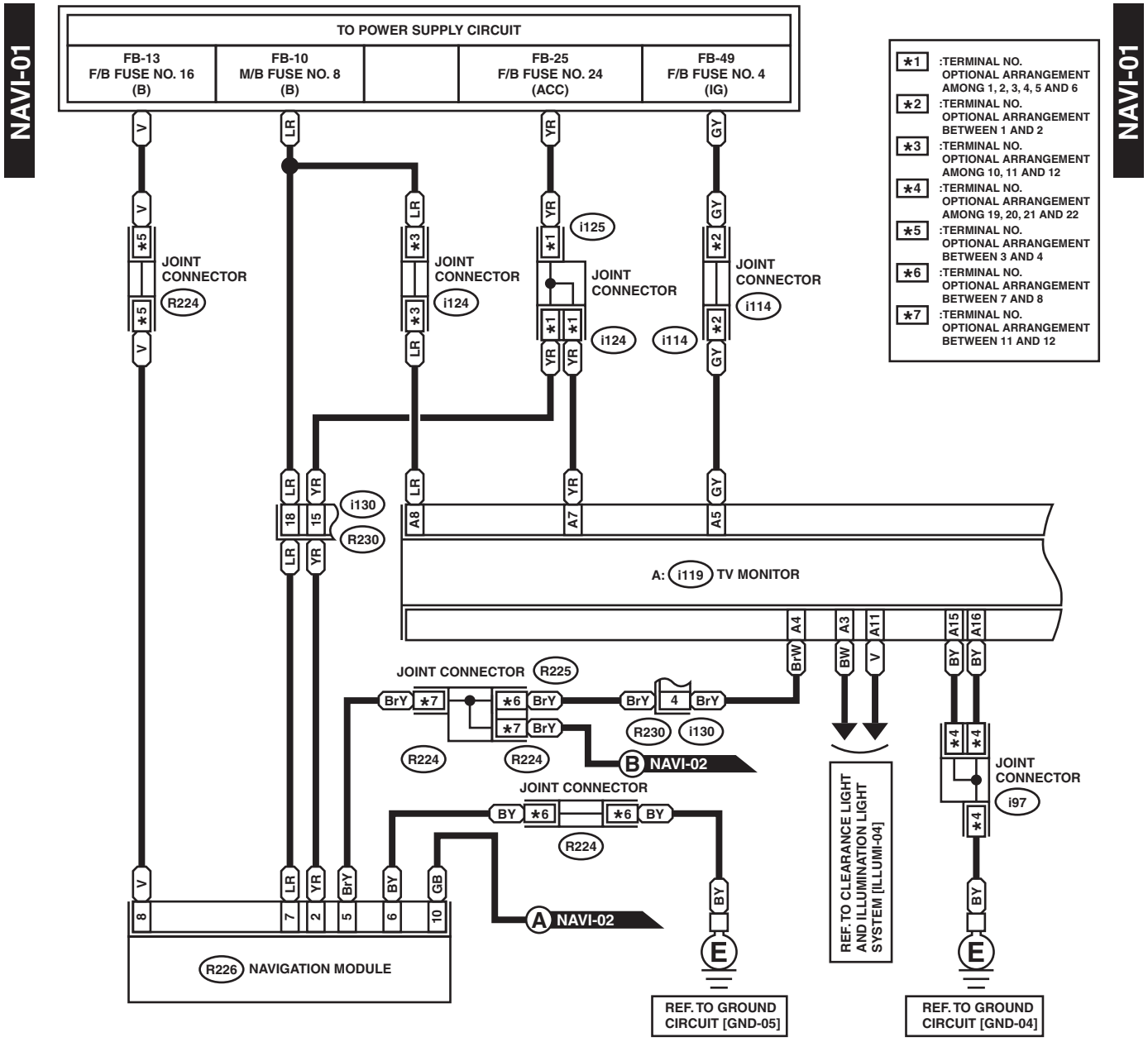


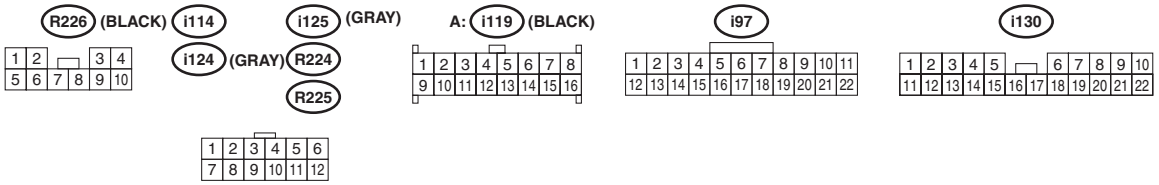


WI-08114

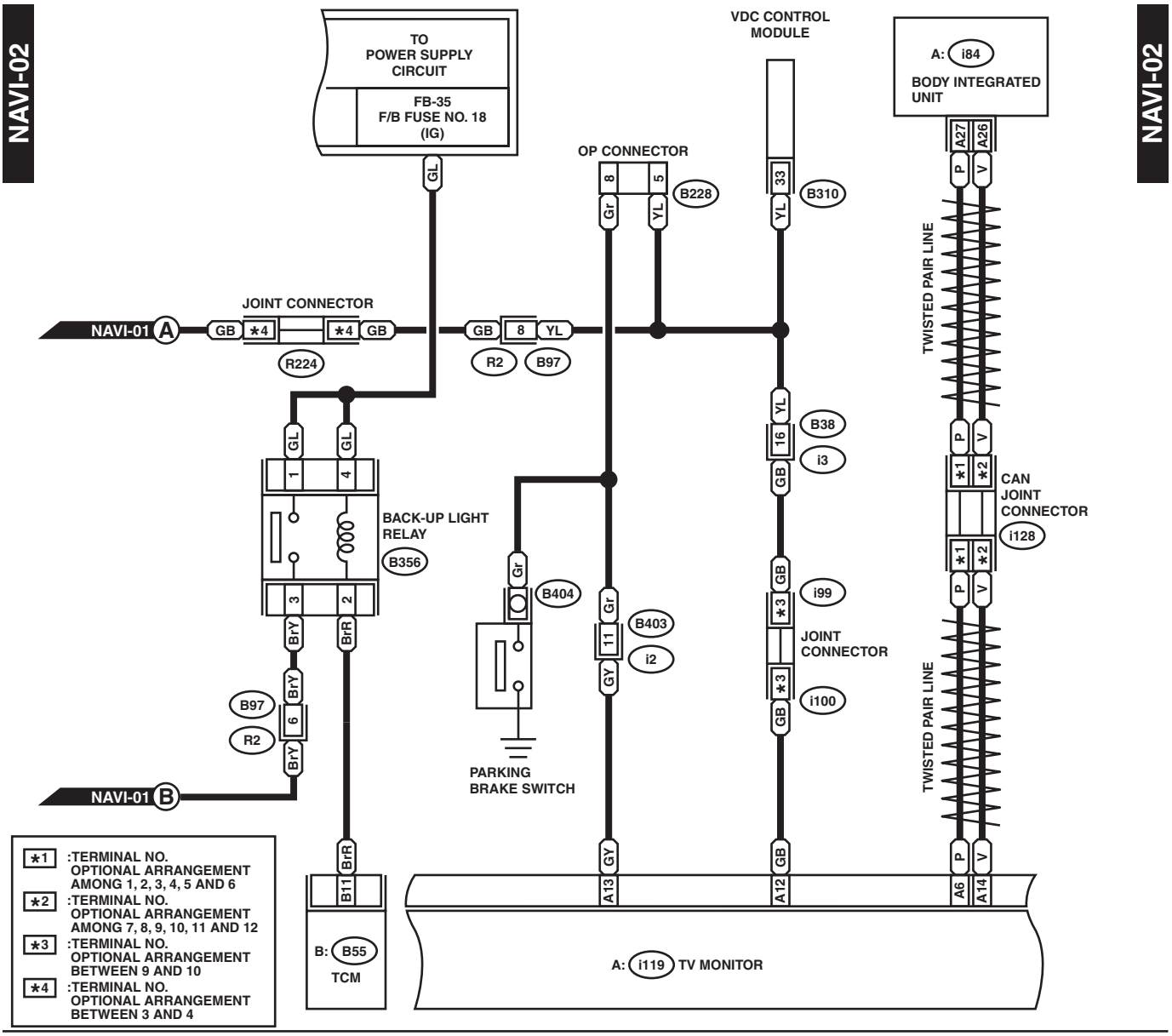
35.Navigation System

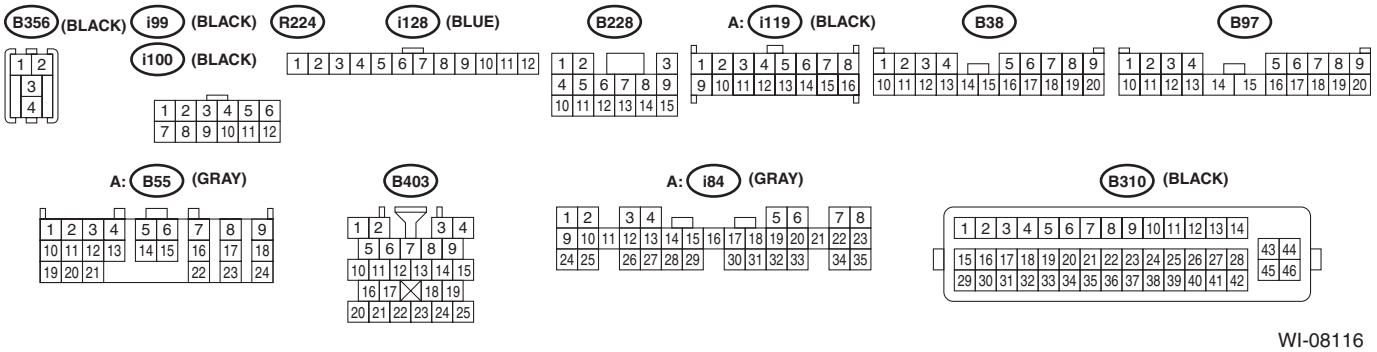
A: WIRING DIAGRAM





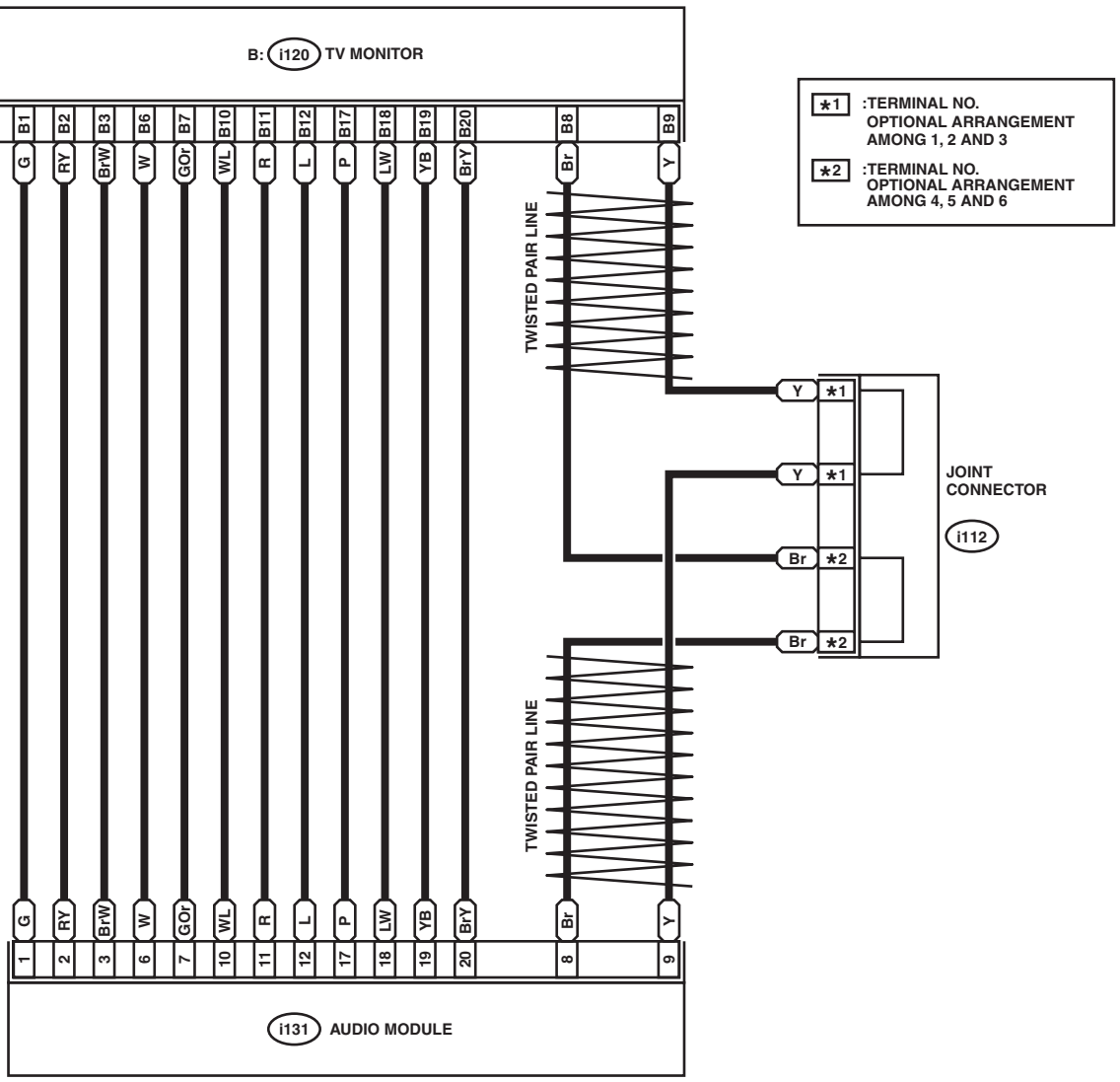
WI-08115

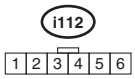

NAVI-02
NAVI-02
TO POWER SUPPLY CIRCUIT
FB-35 F/B FUSE NO. 18 (IG)
GL
VDC CONTROL MODULE
A: i84
BODY INTEGRATED UNIT
OP CONNECTOR
B228
B310
TWISTED PAIR LINE
JOINT CONNECTOR
NAVI-01 A
R224
R2
B97
B38
i3
CAN JOINT CONNECTOR
i128
BACK-UP LIGHT RELAY
B356
B404
B403
i2
i99
JOINT CONNECTOR
i100
PARKING BRAKE SWITCH
NAVI-01 B
B: B55 TCM
A: i119 TV MONITOR
*1 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 1, 2, 3, 4, 5 AND 6
*2 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 7, 8, 9, 10, 11 AND 12
*3 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 9 AND 10
*4 :TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 3 AND 4

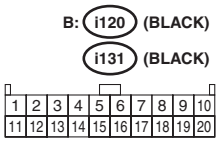

B356 (BLACK)
i99 (BLACK)
i100 (BLACK)
R224
i128 (BLUE)
B228
A: i119 (BLACK)
B38
B97
A: B55 (GRAY)
B403
A: i84 (GRAY)
B310 (BLACK)

WI-08116

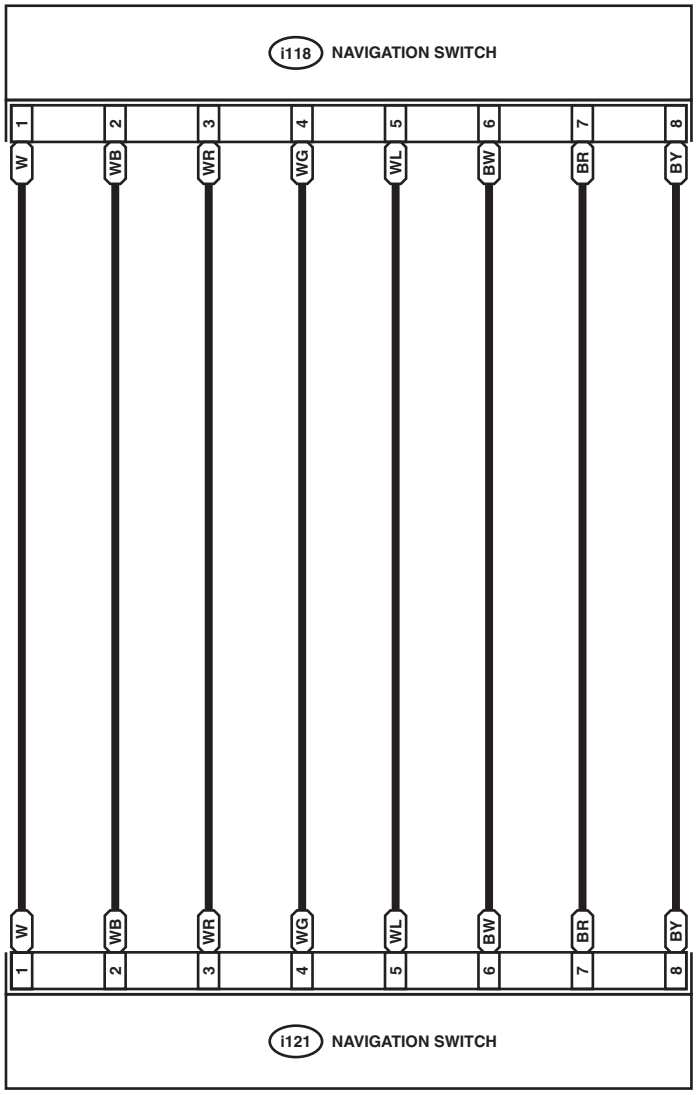
NAVI-03







WI-08117



NAVI-04

i118 (BLACK)

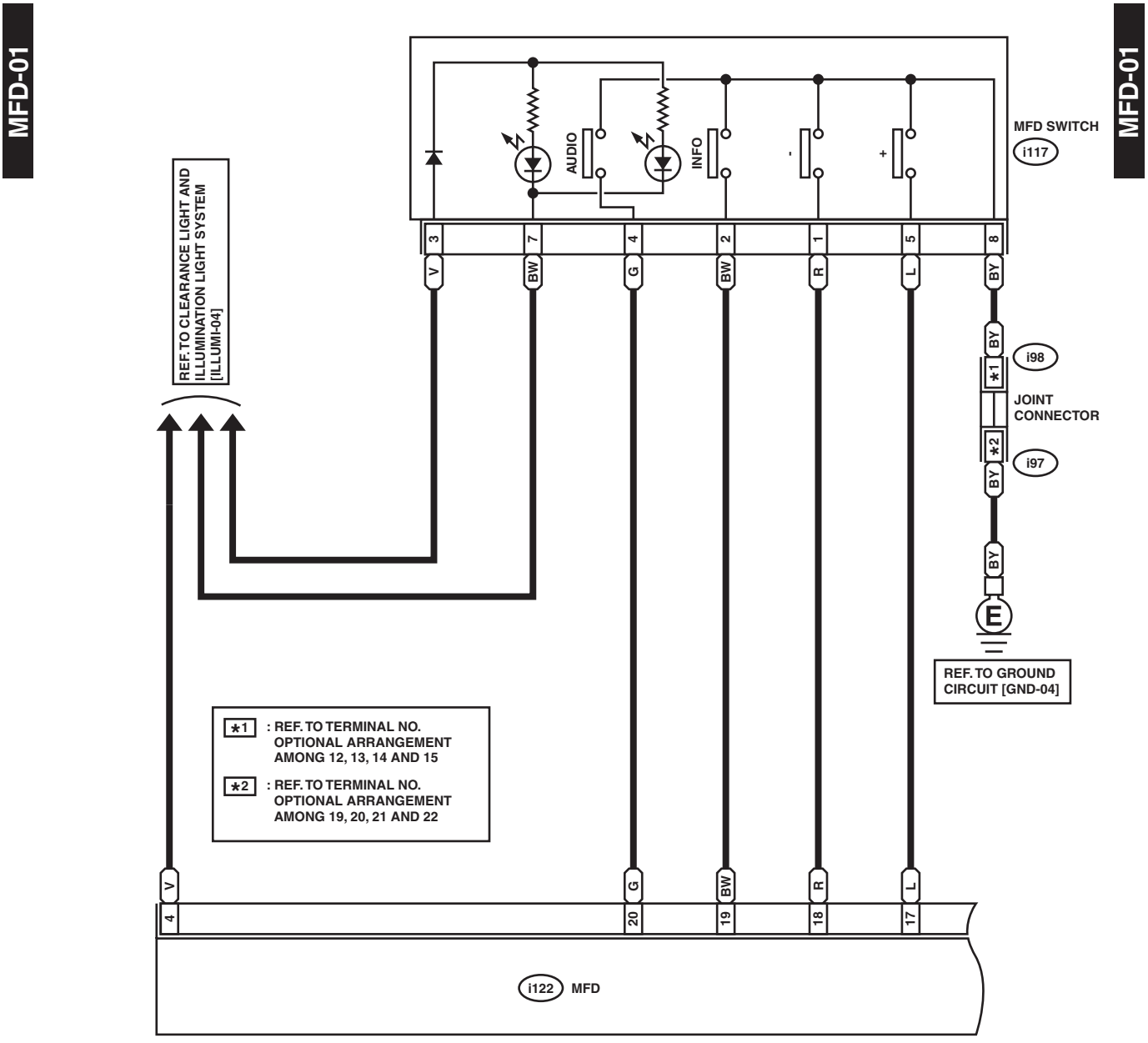
i121 (BLACK)

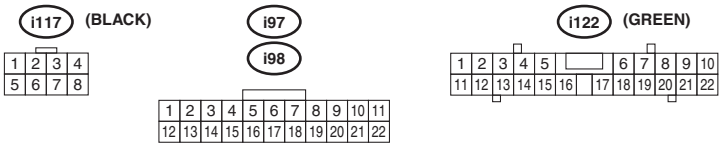
1	2	3	4
5	6	7	8

WI-08118

36.Multi-function Display (MFD) System

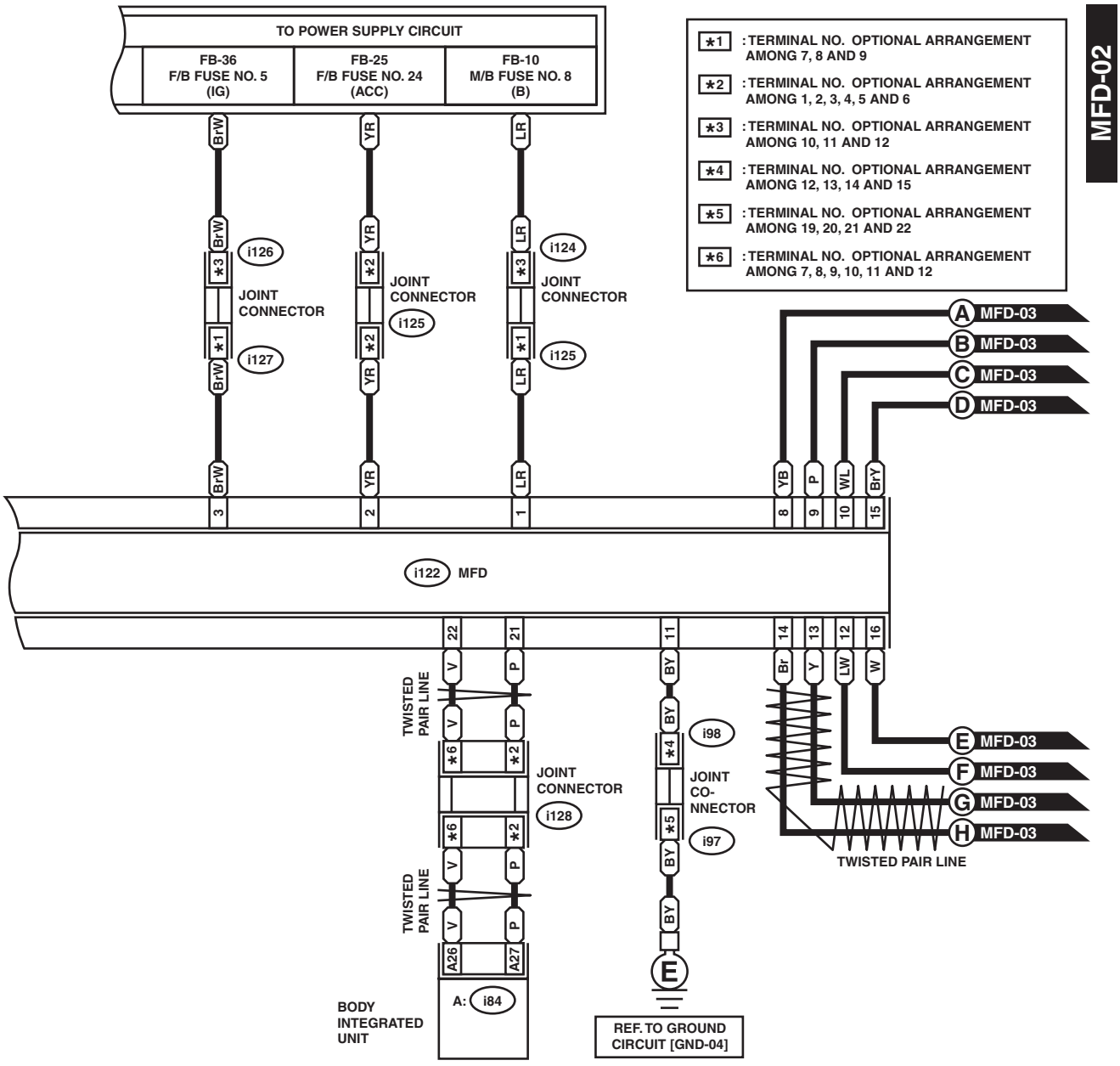
A: WIRING DIAGRAM

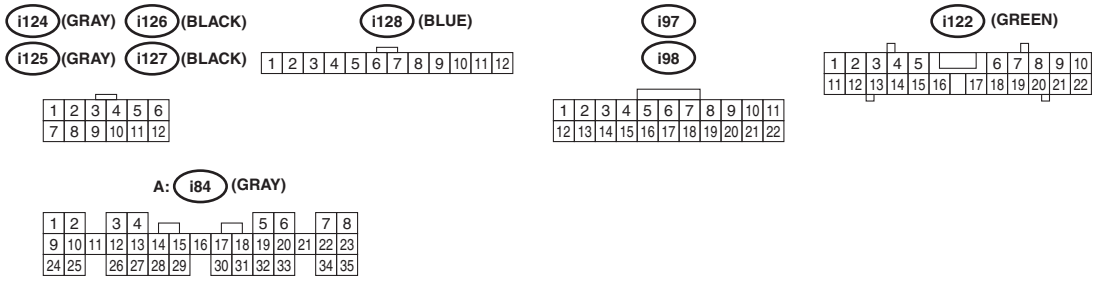




WI-08119

MFD-02

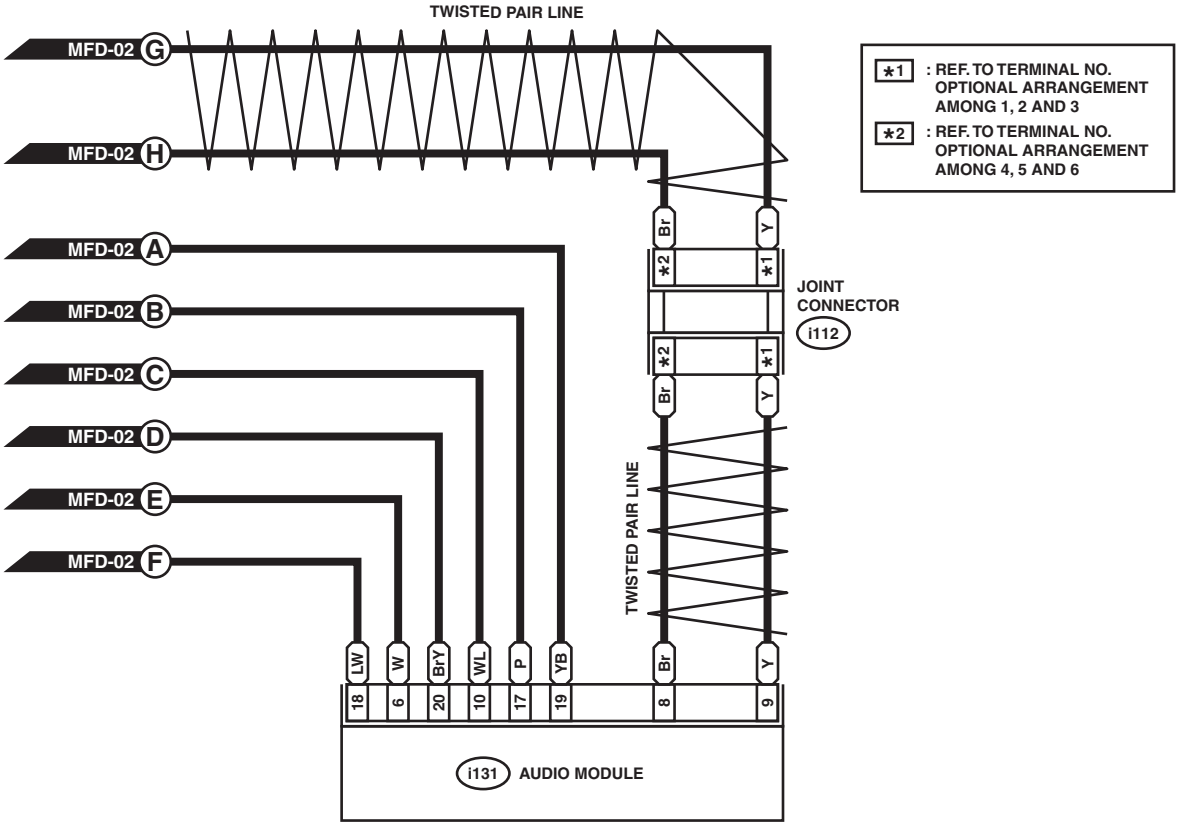


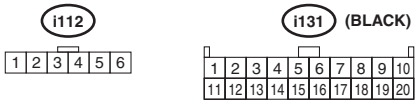


WI-08310

MFD-03

MFD-03

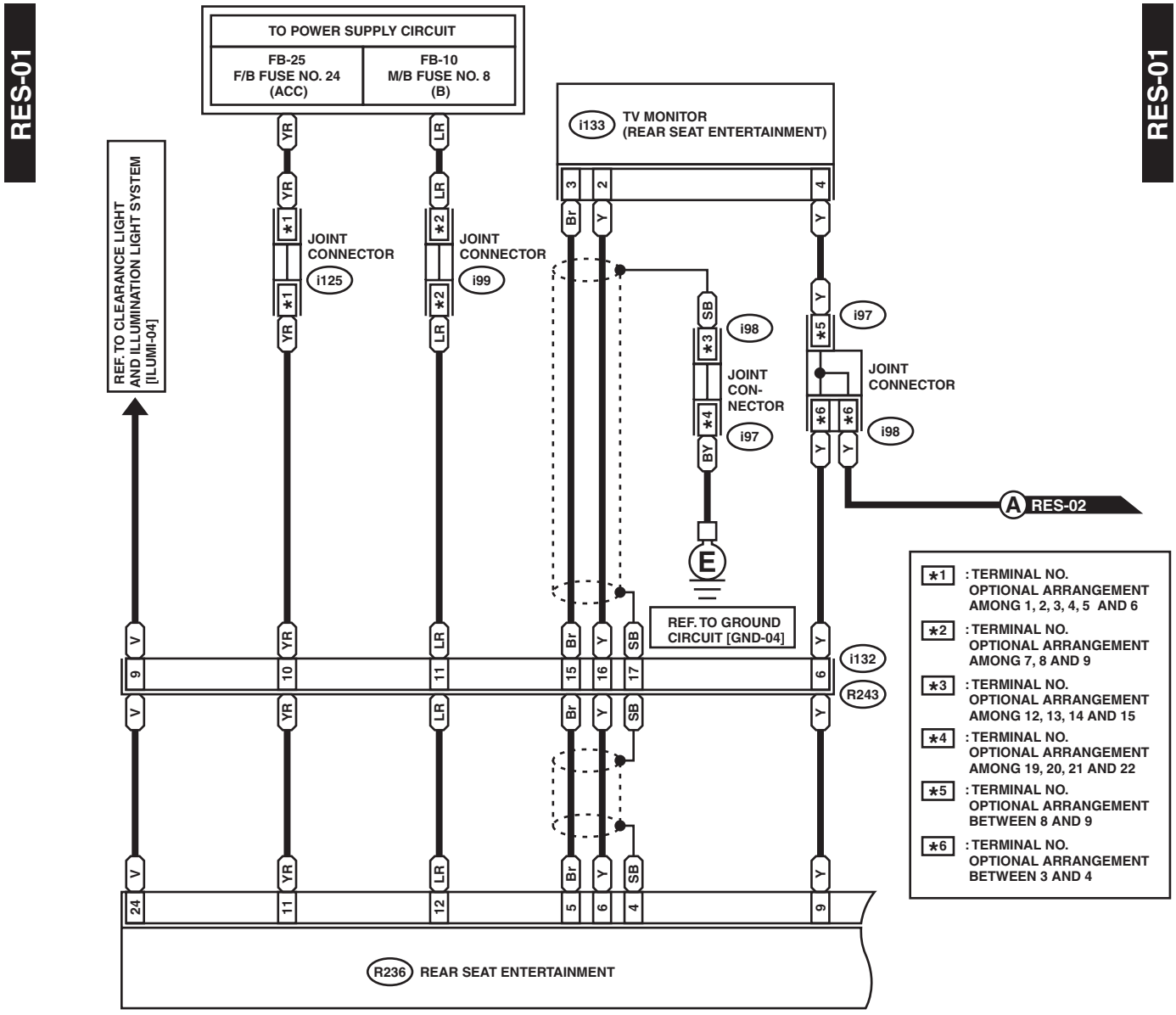


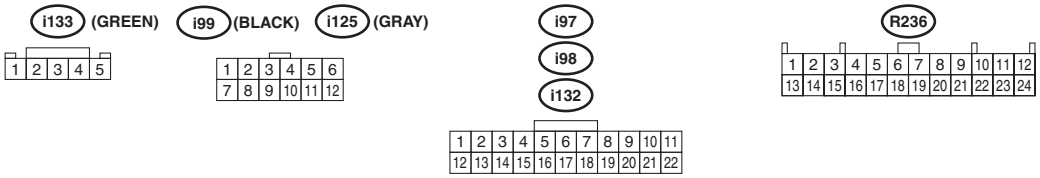


WI-08120

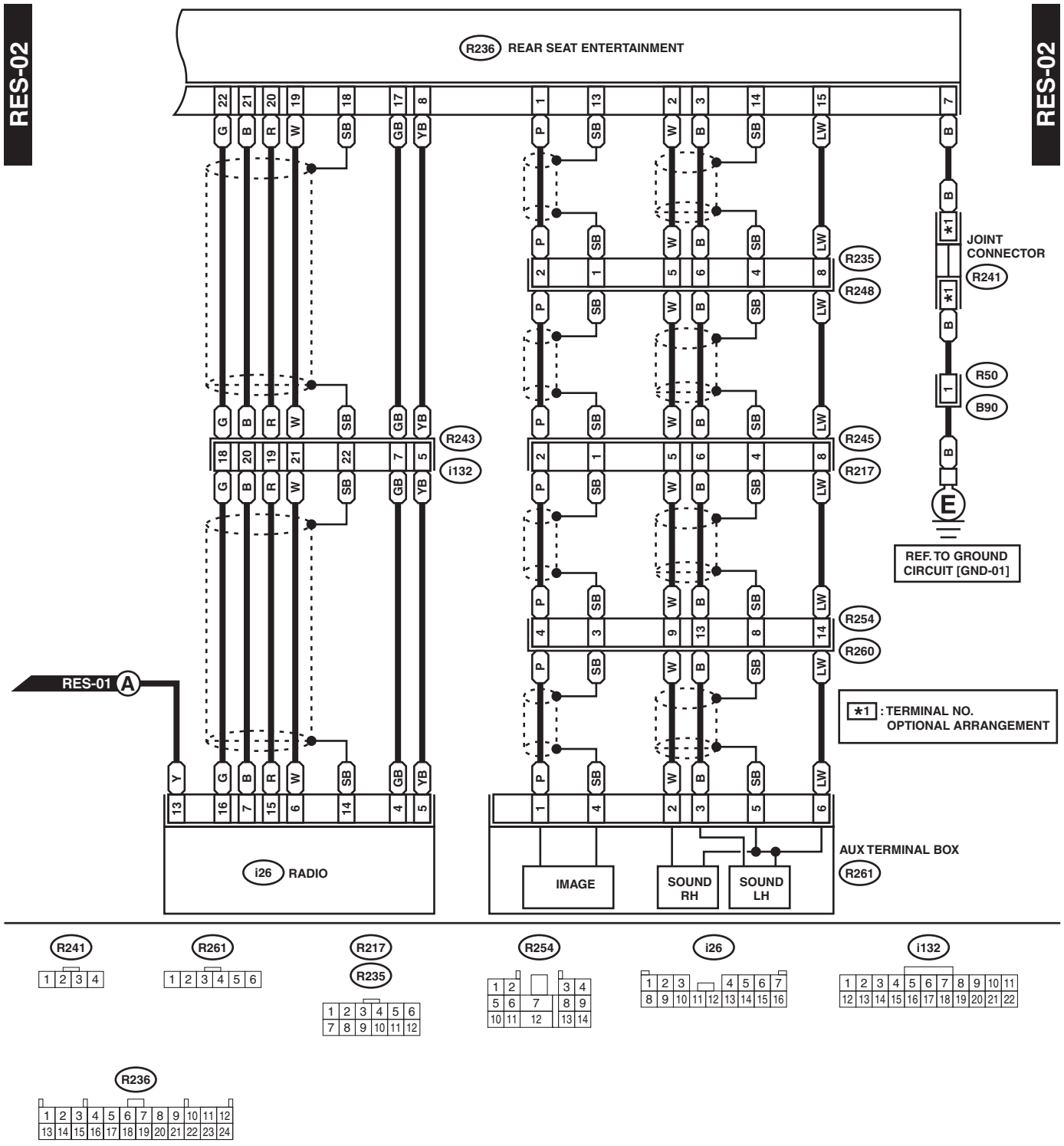
37.Rear Entertainment System

A: WIRING DIAGRAM





WI-08121

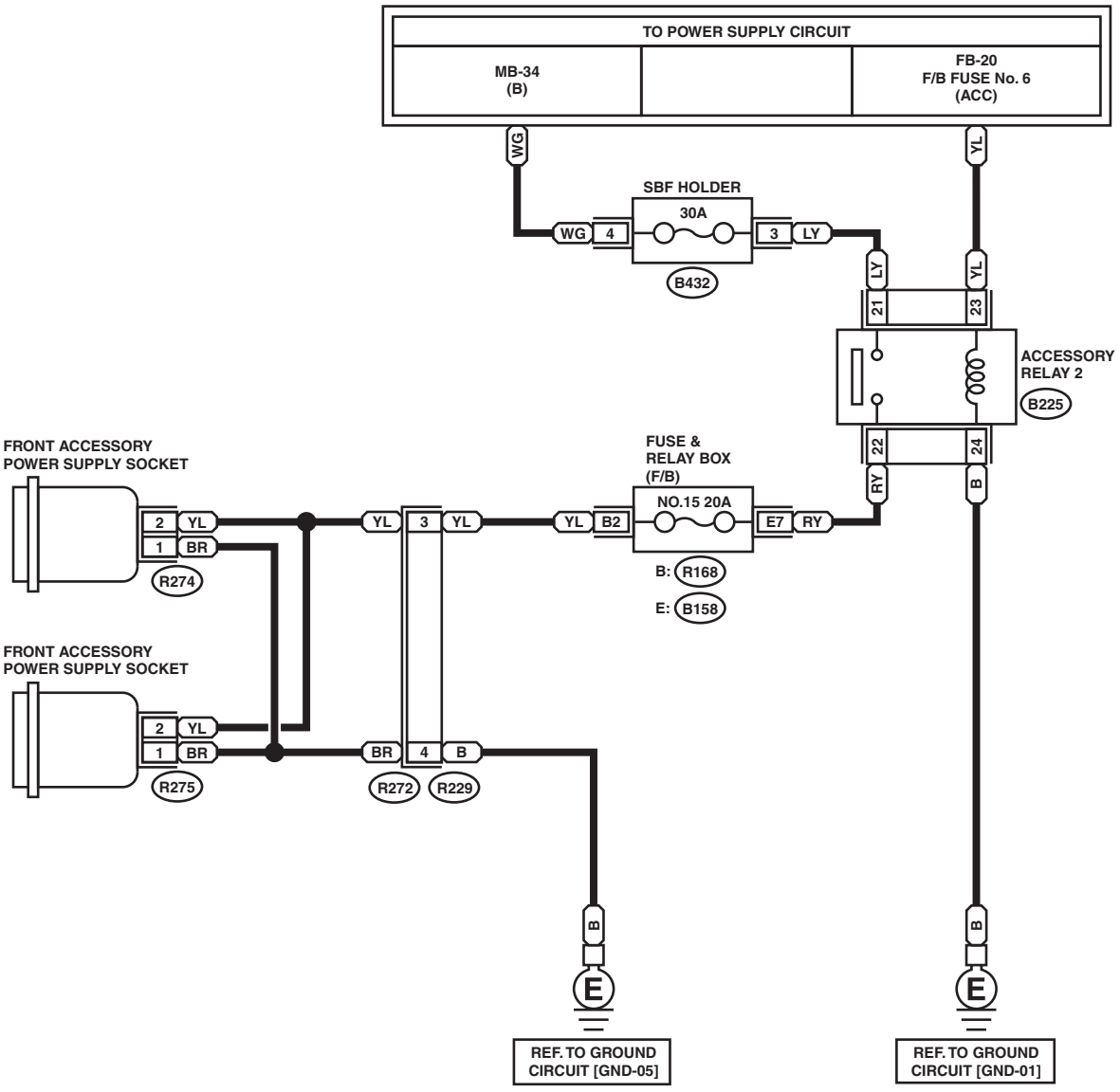

RES-02
RES-02
R236 REAR SEAT ENTERTAINMENT
R235
R248
R243
i132
R245
R217
R254
R260
R241
JOINT CONNECTOR
R50
B90
E
REF. TO GROUND CIRCUIT [GND-01]
RES-01 A
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT
i26 RADIO
IMAGE
SOUND RH
SOUND LH
AUX TERMINAL BOX
R261
R241
R261
R217
R235
R254
i26
i132
R236

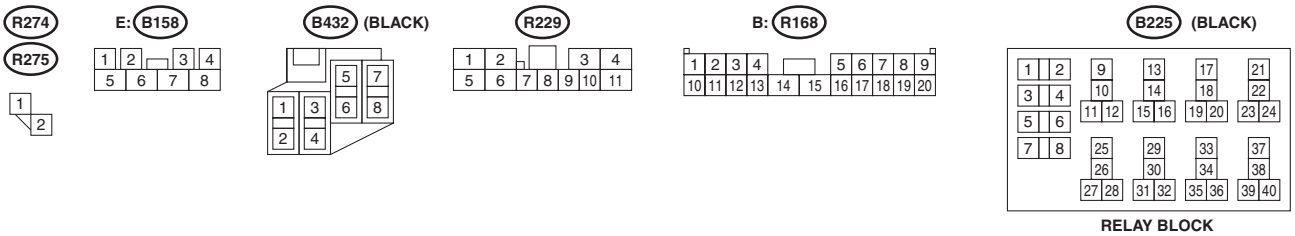
WI-08122

38.Front Accessory Power Supply Socket System

A: WIRING DIAGRAM

FAPS-01



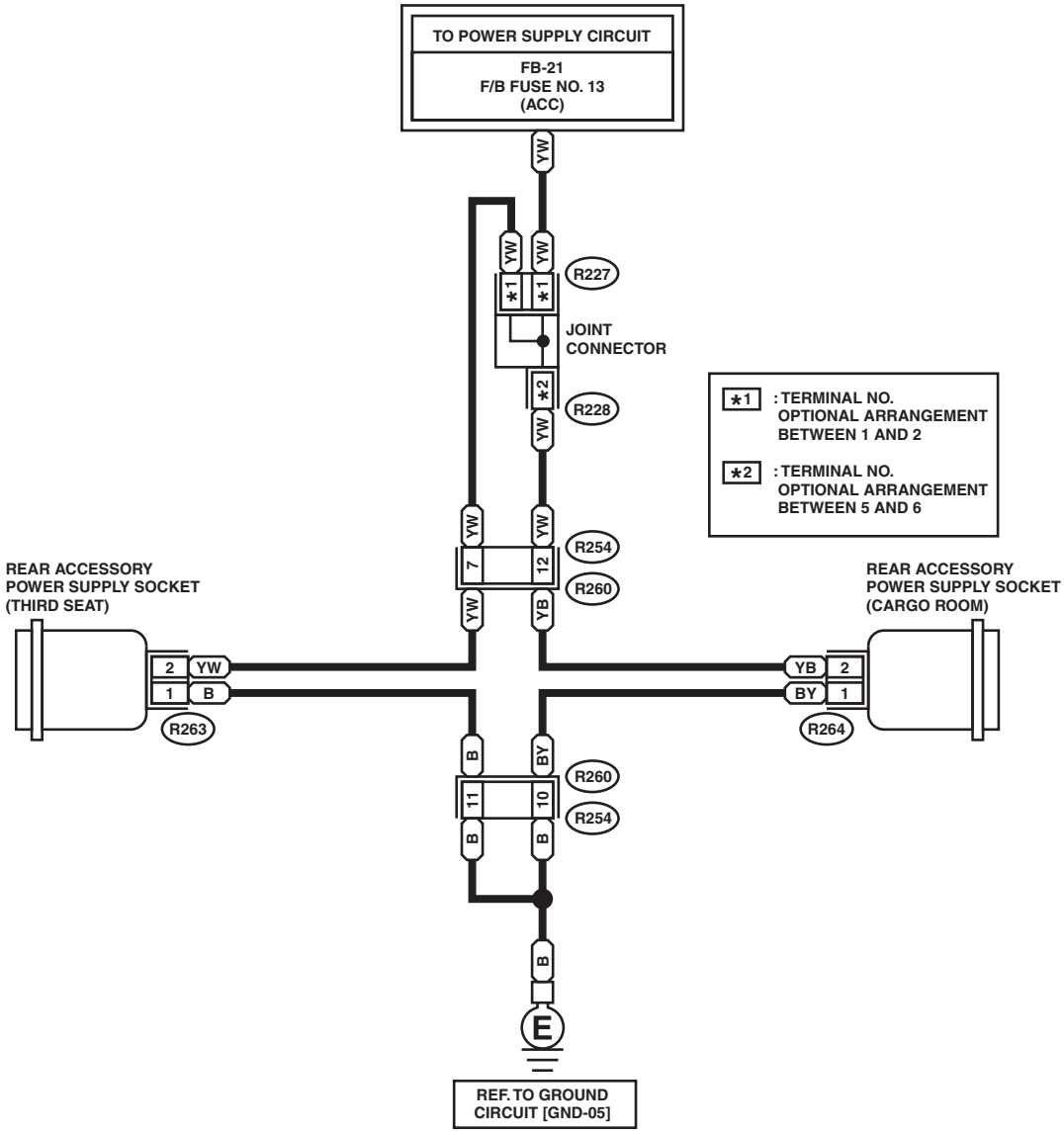


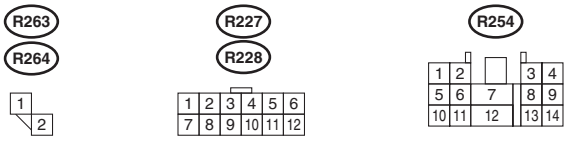
WI-08123

39.Rear Accessory Power Supply Socket System

A: WIRING DIAGRAM

RAPS-01

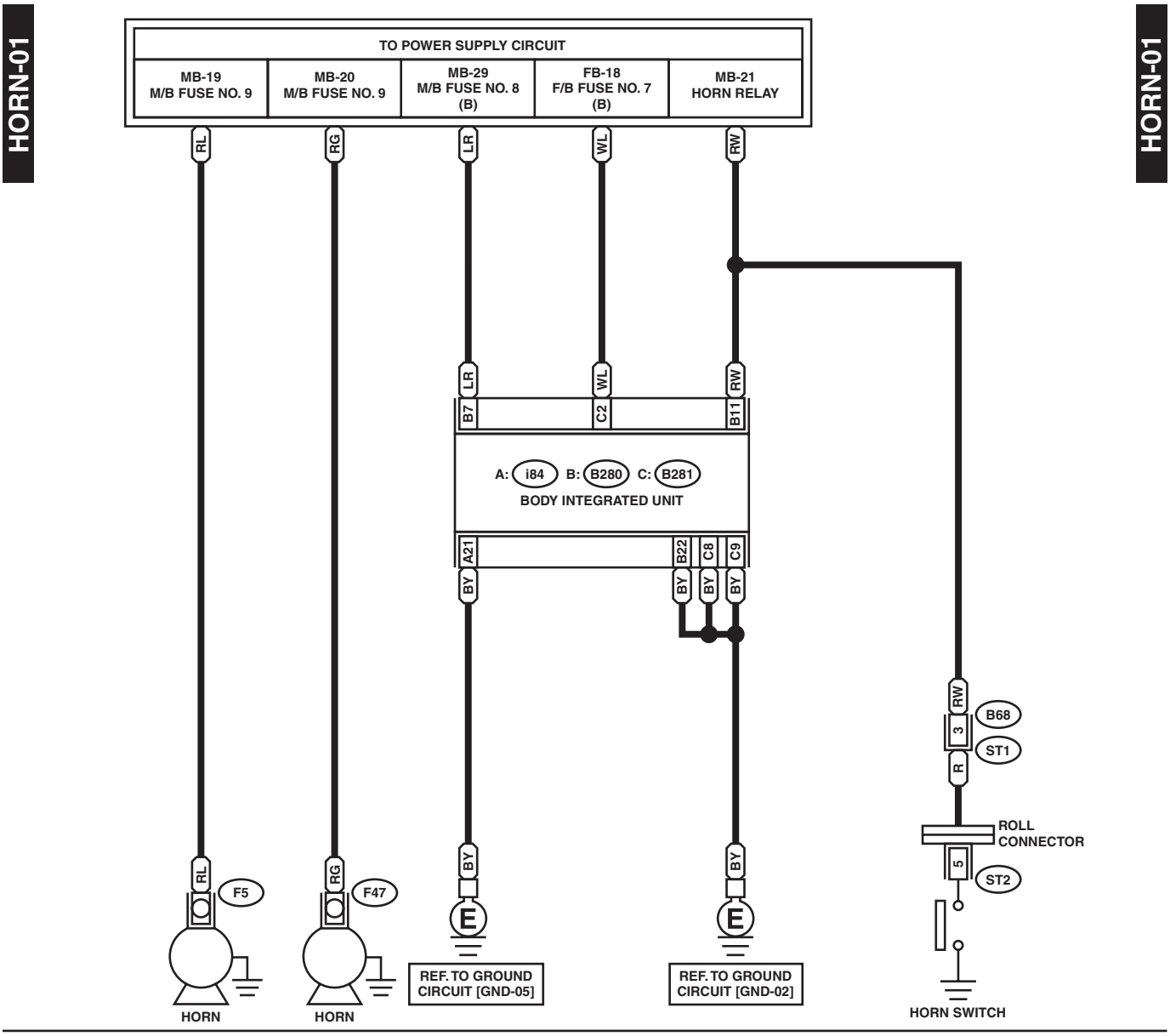




WI-08124

40.Horn System

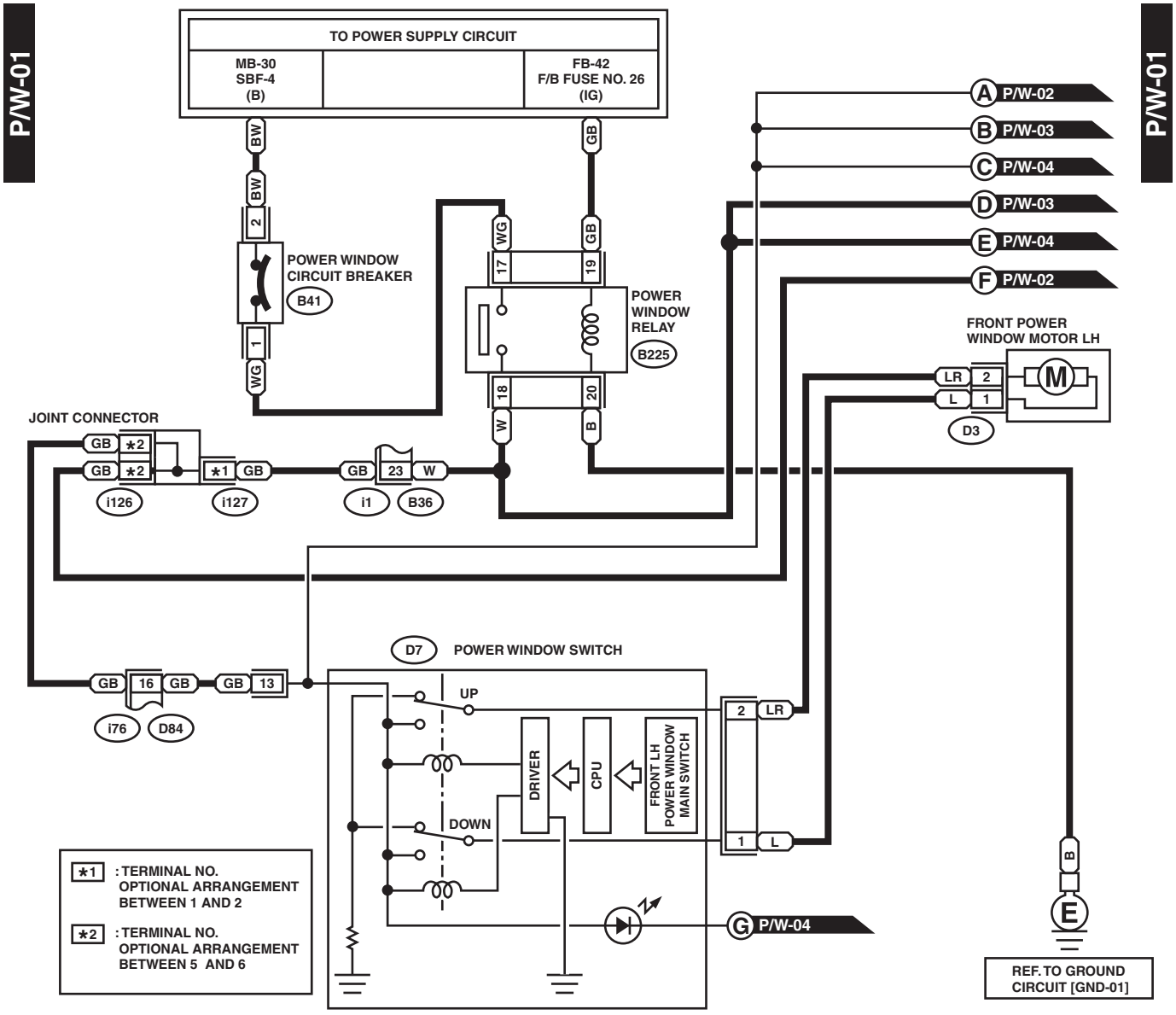
A: WIRING DIAGRAM

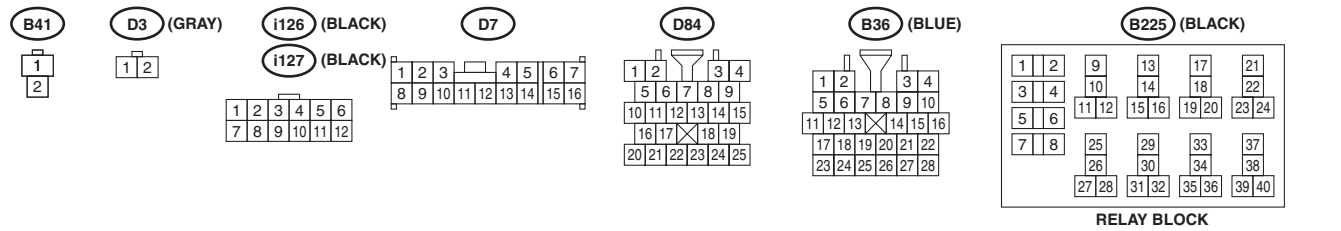


WI-08125

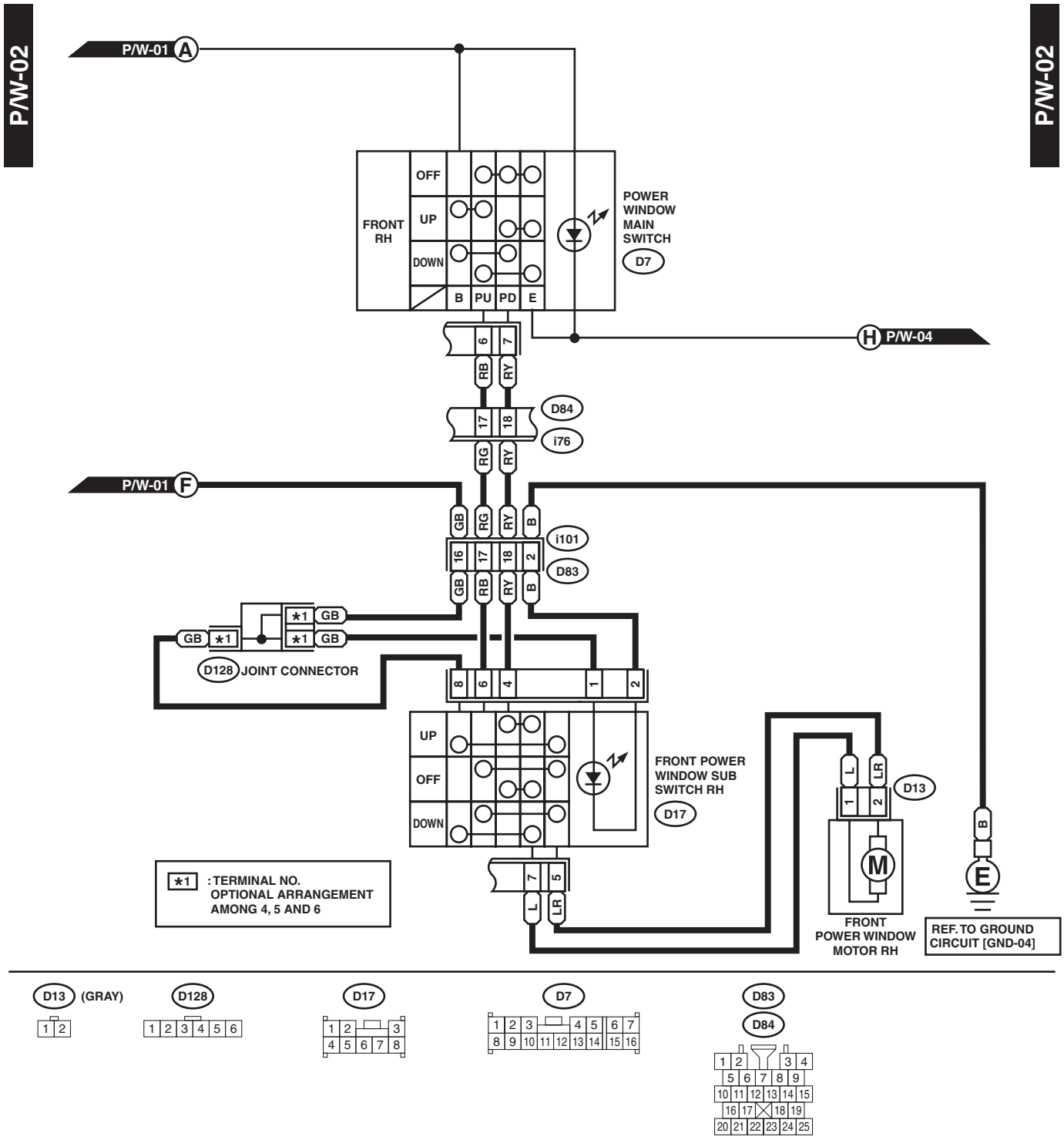
41.Power Window System

A: WIRING DIAGRAM



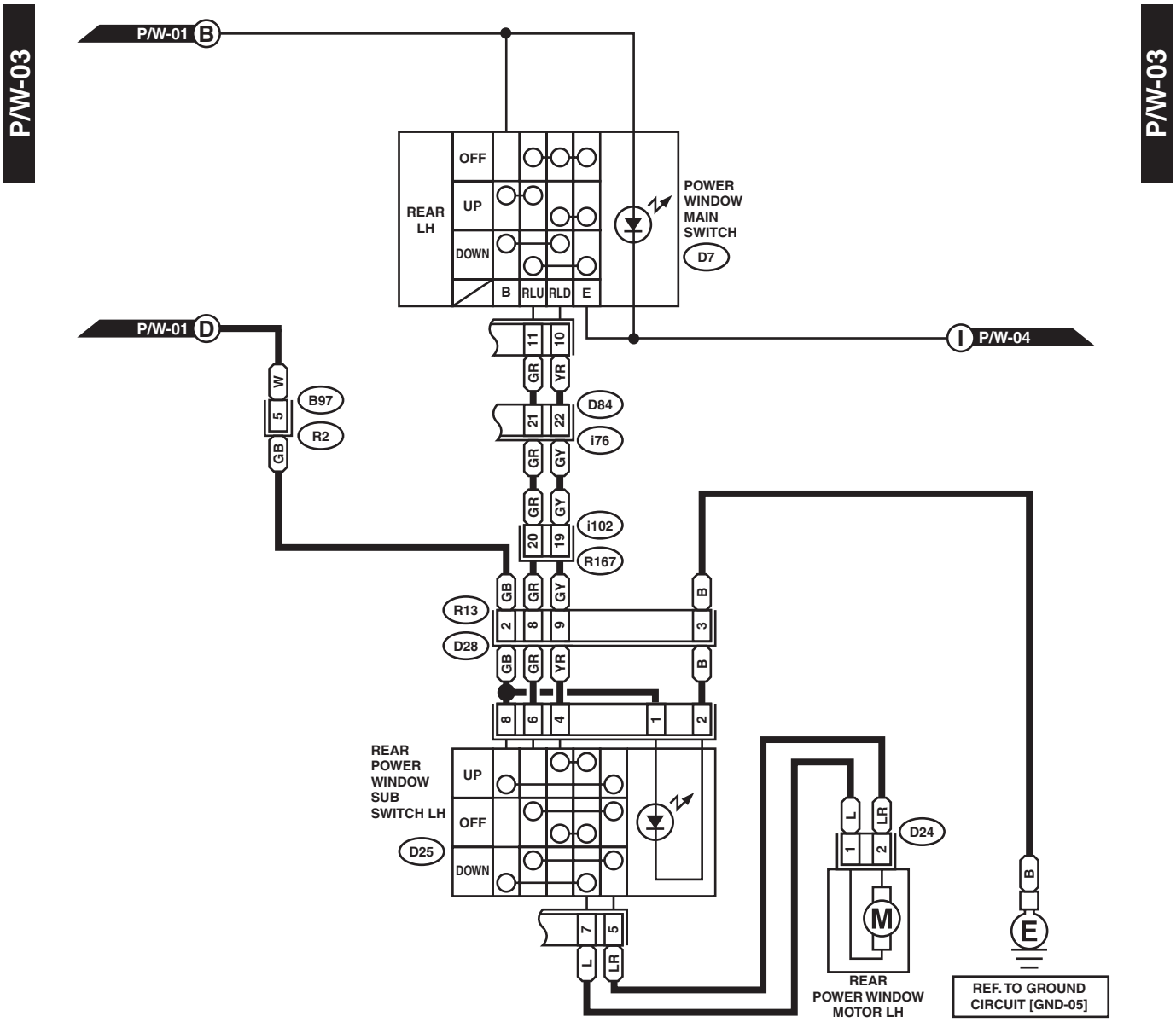


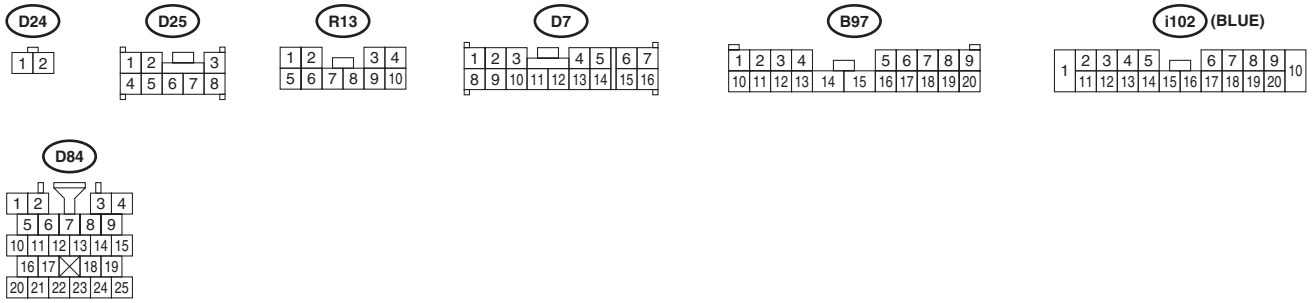
WI-08126


P/W-02
P/W-01 A
FRONT RH
OFF
UP
DOWN
B
PU
PD
E
POWER WINDOW MAIN SWITCH
D7
H P/W-04
6
7
RB
RY
D84
17
18
i76
RG
RY
P/W-01 F
GB
RG
RY
B
i101
16
17
18
2
D83
GB
RB
RY
B
*1
GB
GB
*1
*1
GB
D128 JOINT CONNECTOR
8
6
4
1
2
UP
OFF
DOWN
FRONT POWER WINDOW SUB SWITCH RH
D17
7
5
L
LR
L
LR
D13
1
2
M
B
E
FRONT POWER WINDOW MOTOR RH
REF. TO GROUND CIRCUIT [GND-04]
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 4, 5 AND 6

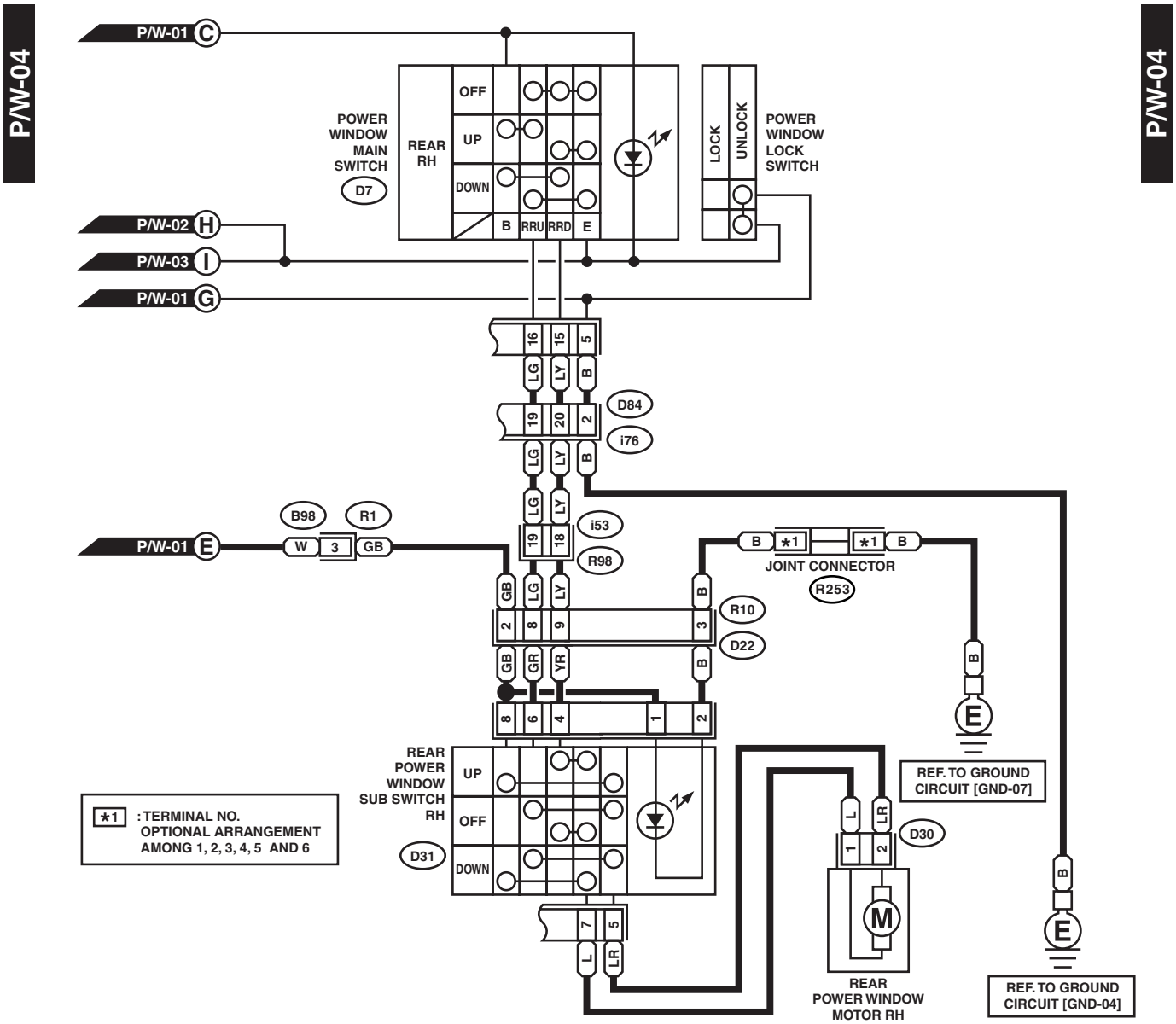
D13 (GRAY)
1 2
D128
1 2 3 4 5 6
D17
1 2 3
4 5 6 7 8
D7
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
D83
D84
1 2 3 4
5 6 7 8 9
10 11 12 13 14 15
16 17 18 19
20 21 22 23 24 25

WI-08127


P/W-03
P/W-03
P/W-01 B
P/W-01 D
I P/W-04
REAR LH
OFF
UP
DOWN
B
RLU
RLD
E
POWER WINDOW MAIN SWITCH
D7
11
10
GR
YR
D84
21
22
i76
GR
GY
GR
GY
i102
20
19
R167
W
5
B97
R2
GB
GB
GR
GY
B
R13
2
8
9
3
D28
GB
GR
YR
B
8
6
4
1
2
REAR POWER WINDOW SUB SWITCH LH
UP
OFF
DOWN
D25
7
5
L
LR
L
LR
D24
1
2
M
B
E
REAR POWER WINDOW MOTOR LH
REF. TO GROUND CIRCUIT [GND-05]


D24
D25
R13
D7
B97
i102 (BLUE)
D84

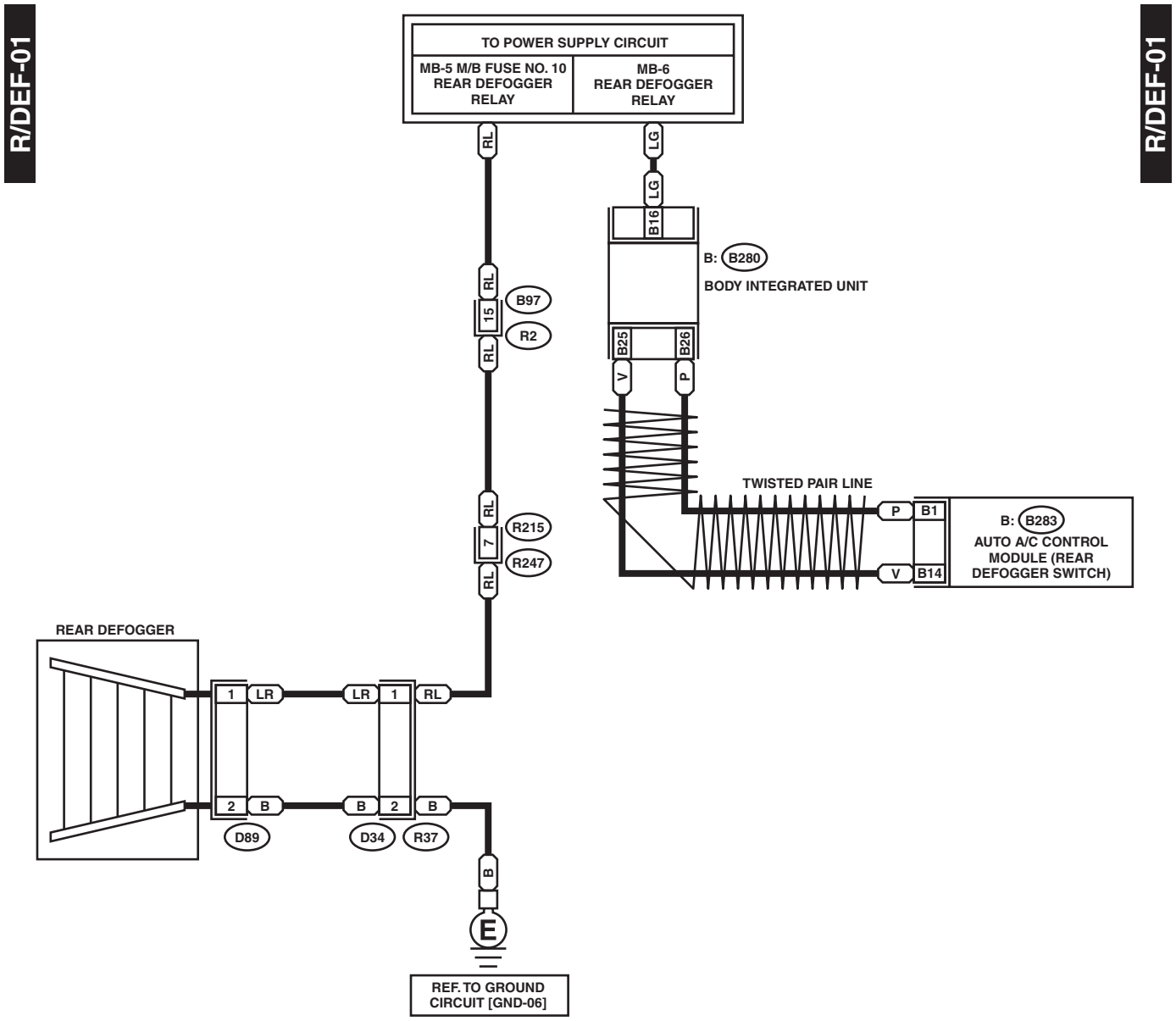
WI-08128

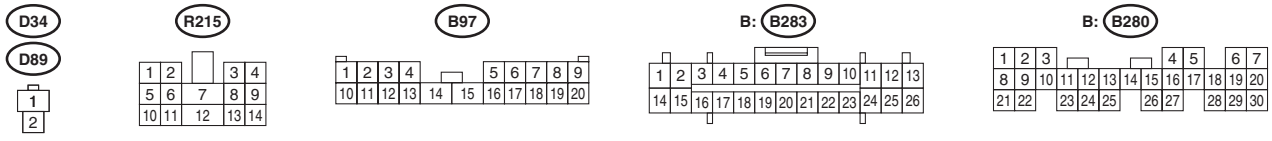

P/W-04
P/W-01 C
POWER WINDOW MAIN SWITCH
D7
REAR RH
OFF
UP
DOWN
B
RRU
RRD
E
LOCK
UNLOCK
POWER WINDOW LOCK SWITCH
P/W-02 H
P/W-03 I
P/W-01 G
16
15
5
LG
LY
B
D84
19
20
2
i76
B98
R1
P/W-01 E
W
3
GB
i53
18
R98
B
*1
JOINT CONNECTOR
R253
R10
D22
GB
GR
YR
8
6
4
1
REF. TO GROUND CIRCUIT [GND-07]
REAR POWER WINDOW SUB SWITCH RH
D31
L
LR
D30
M
REAR POWER WINDOW MOTOR RH
REF. TO GROUND CIRCUIT [GND-04]
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 1, 2, 3, 4, 5 AND 6
D30 (GRAY)
D31
R10
R253
D7
i53 (BLUE)
B98 (BLACK)
D84

WI-08129

42.Rear Defogger System

A: WIRING DIAGRAM

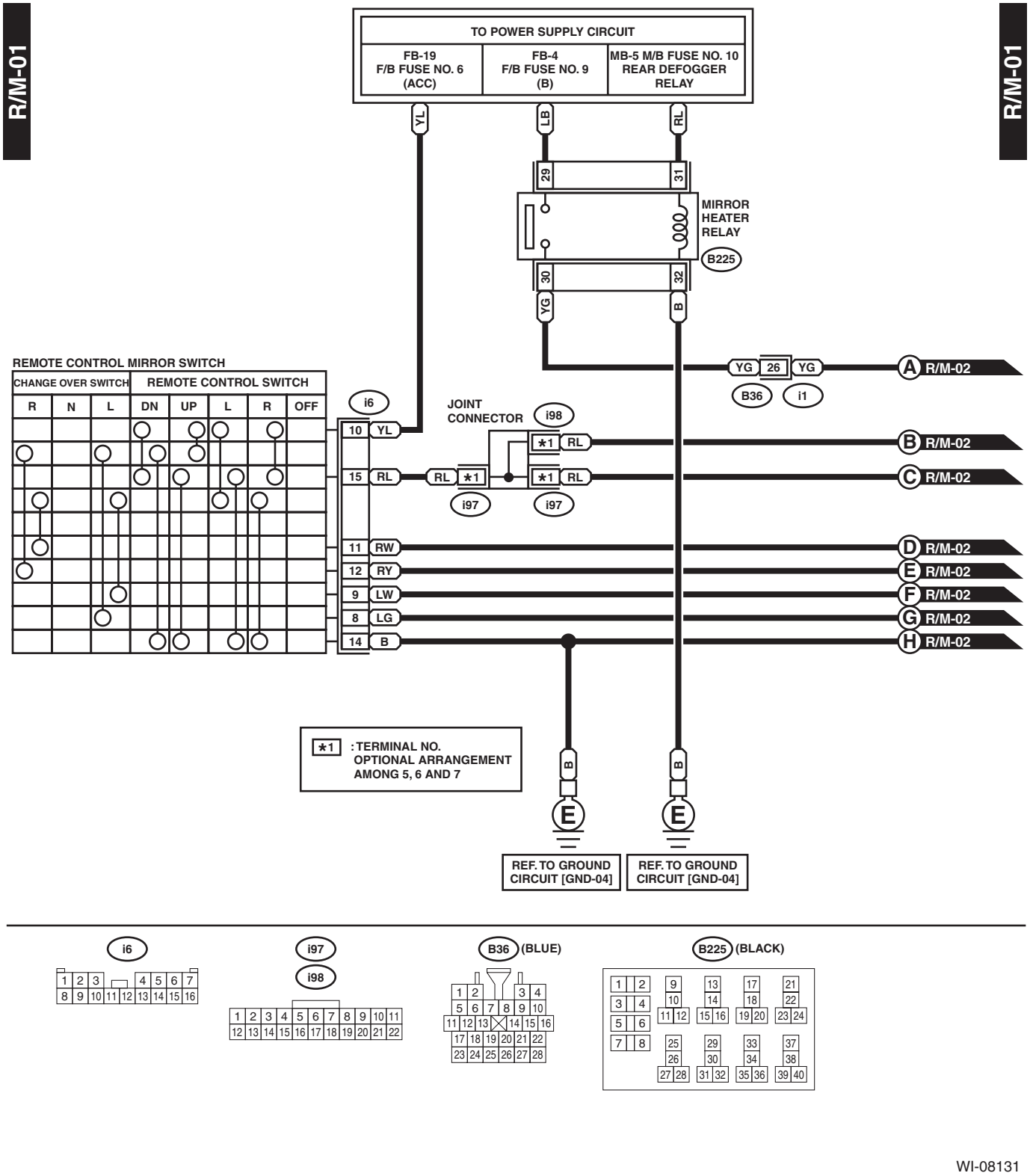




WI-08130

43.Remote Control Mirror System

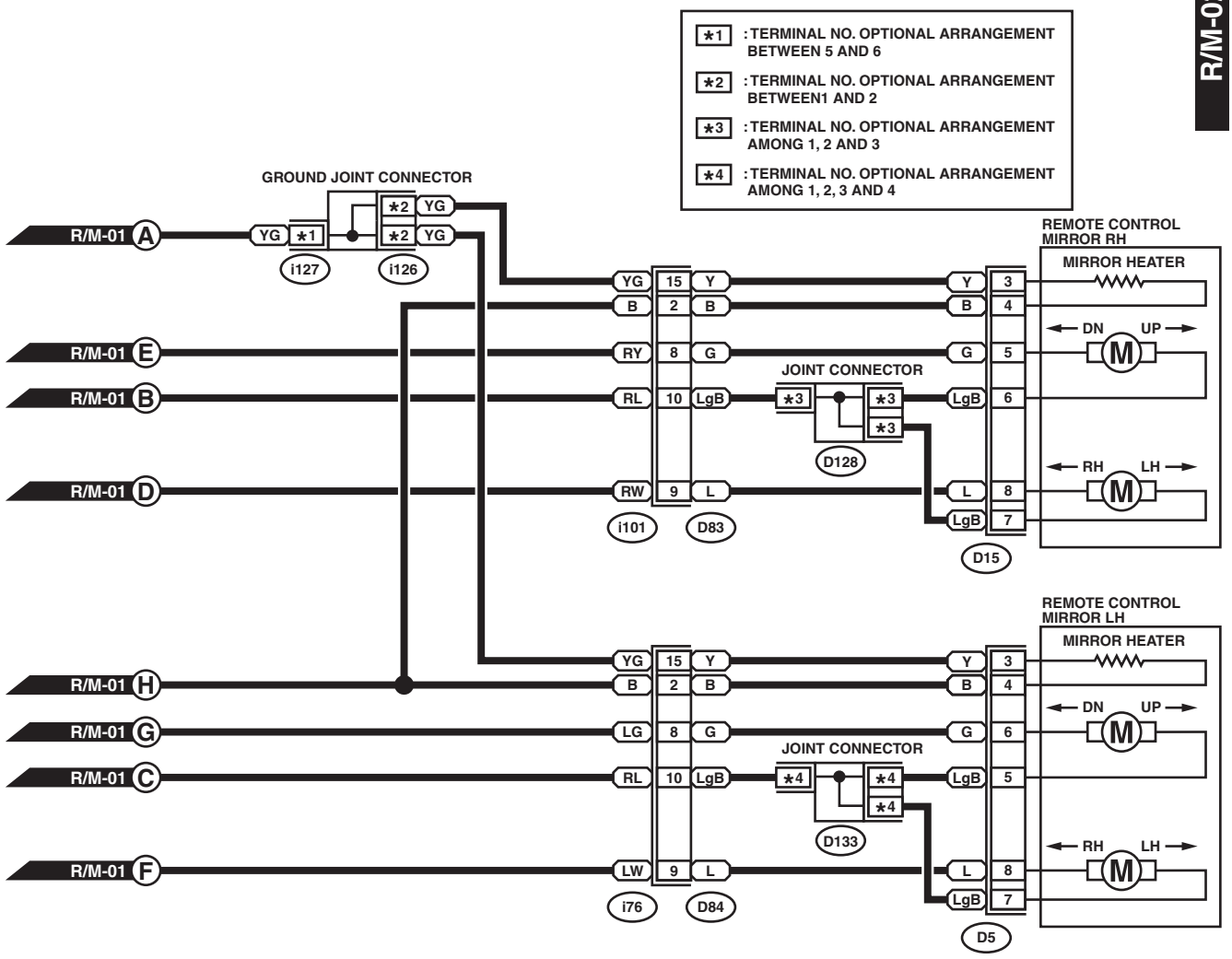
A: WIRING DIAGRAM

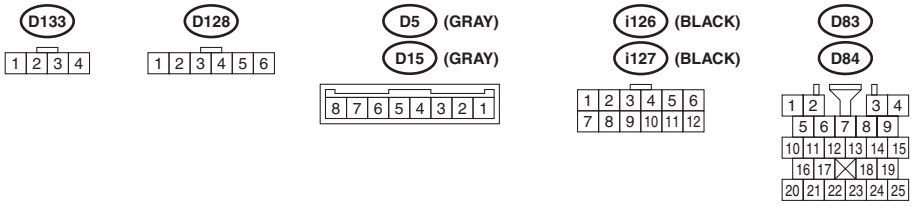


WI-08131

R/M-02

R/M-02





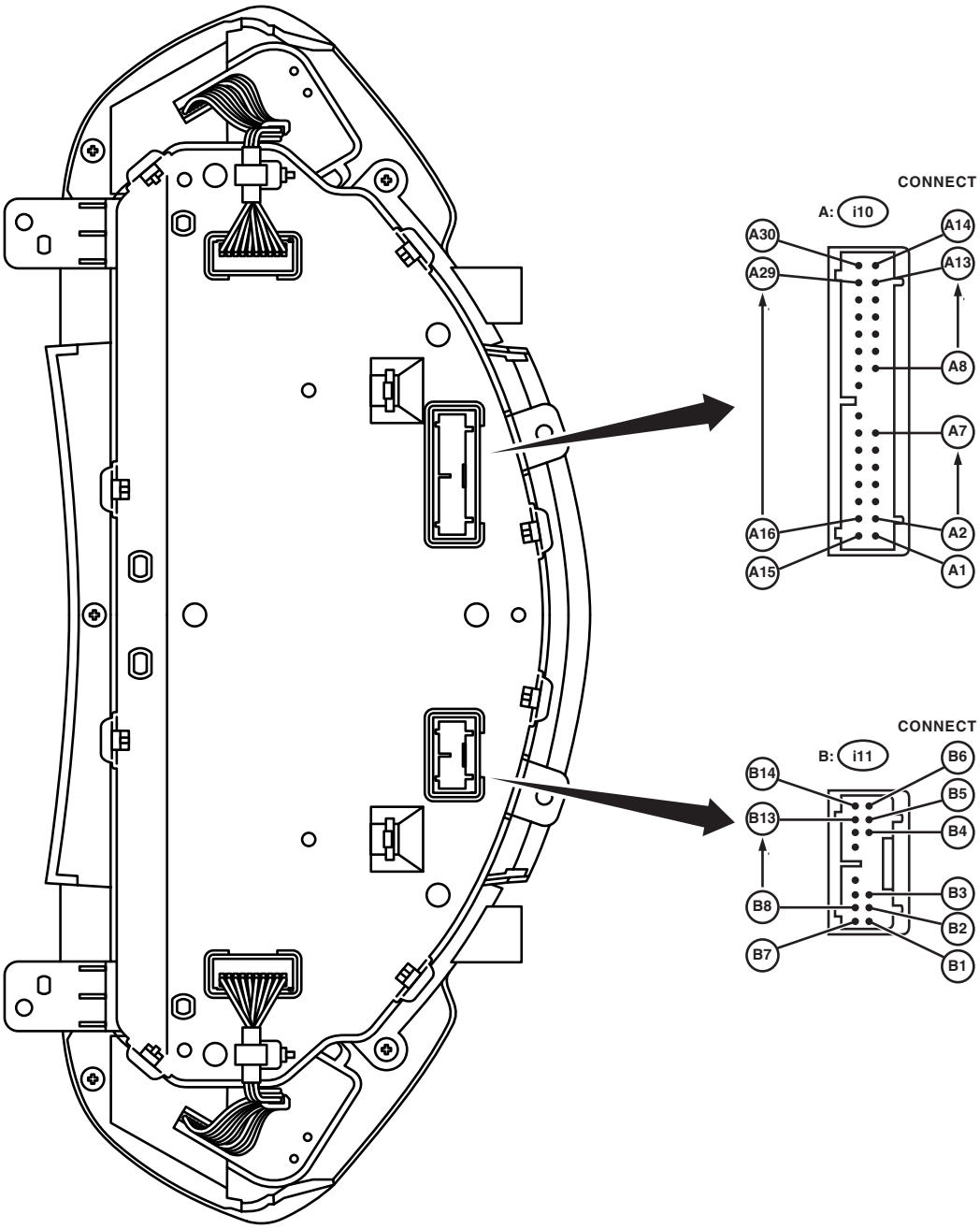
WI-08132

44.Combination Meter System

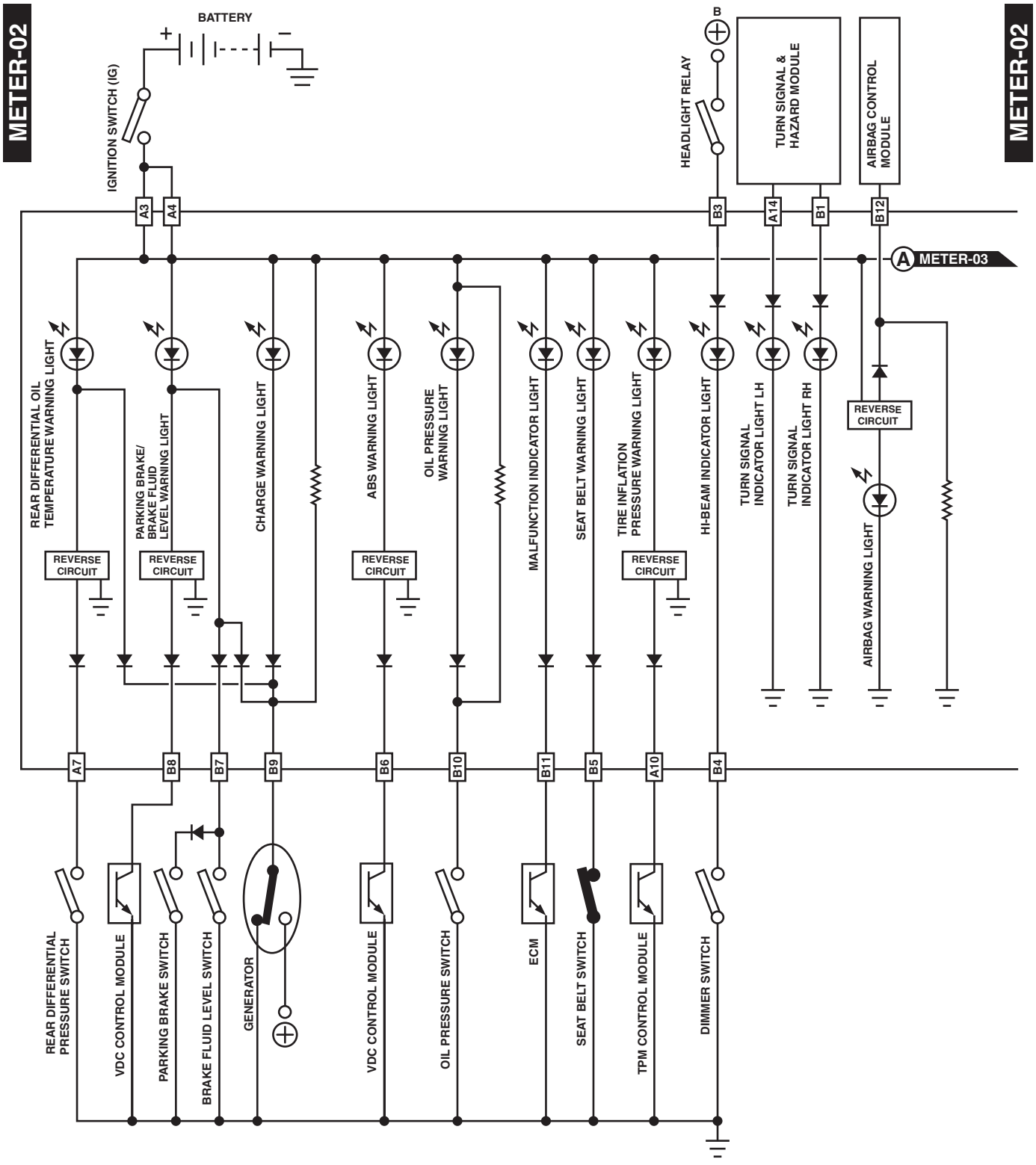
A: WIRING DIAGRAM

METER-01

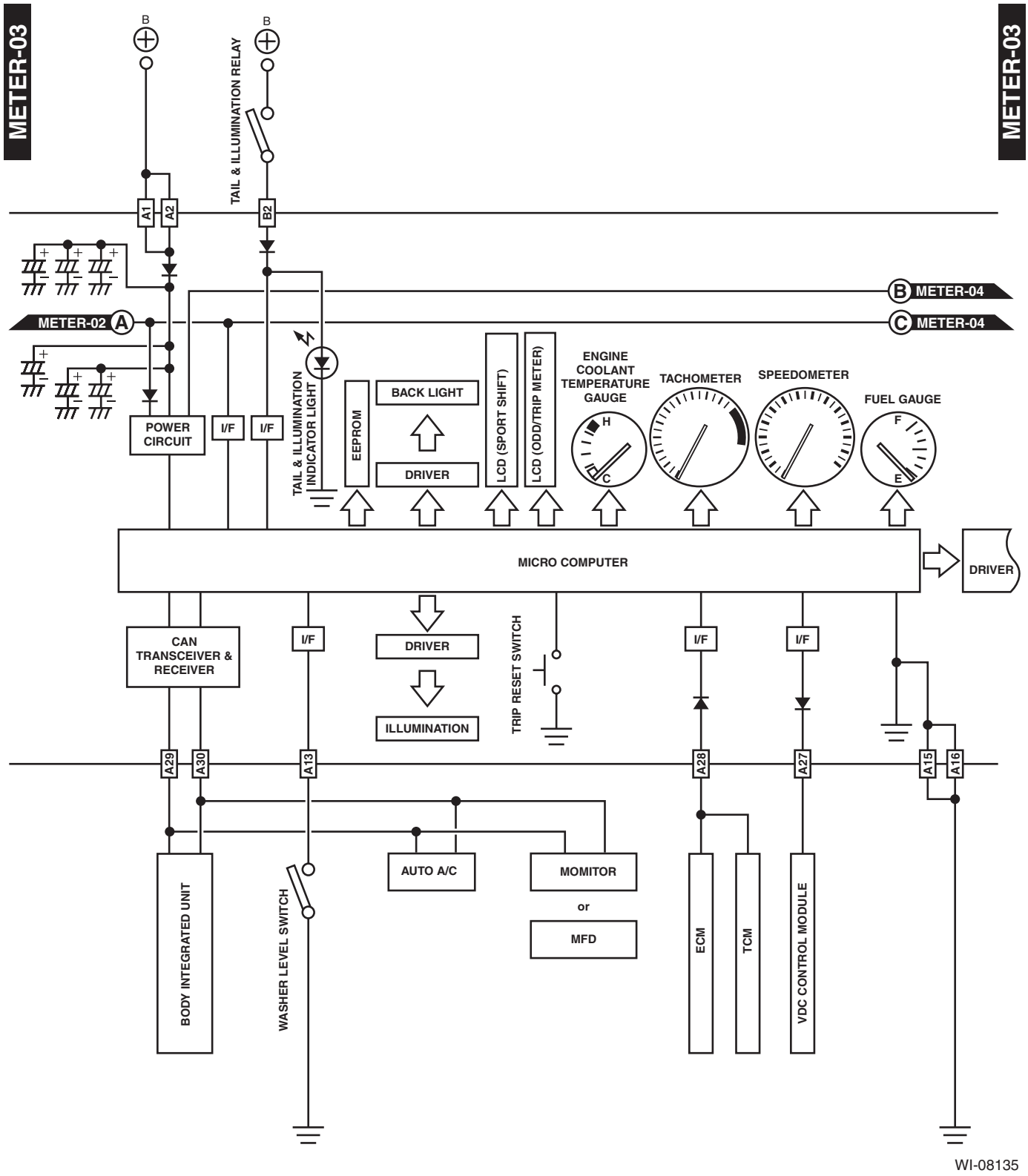
METER-01



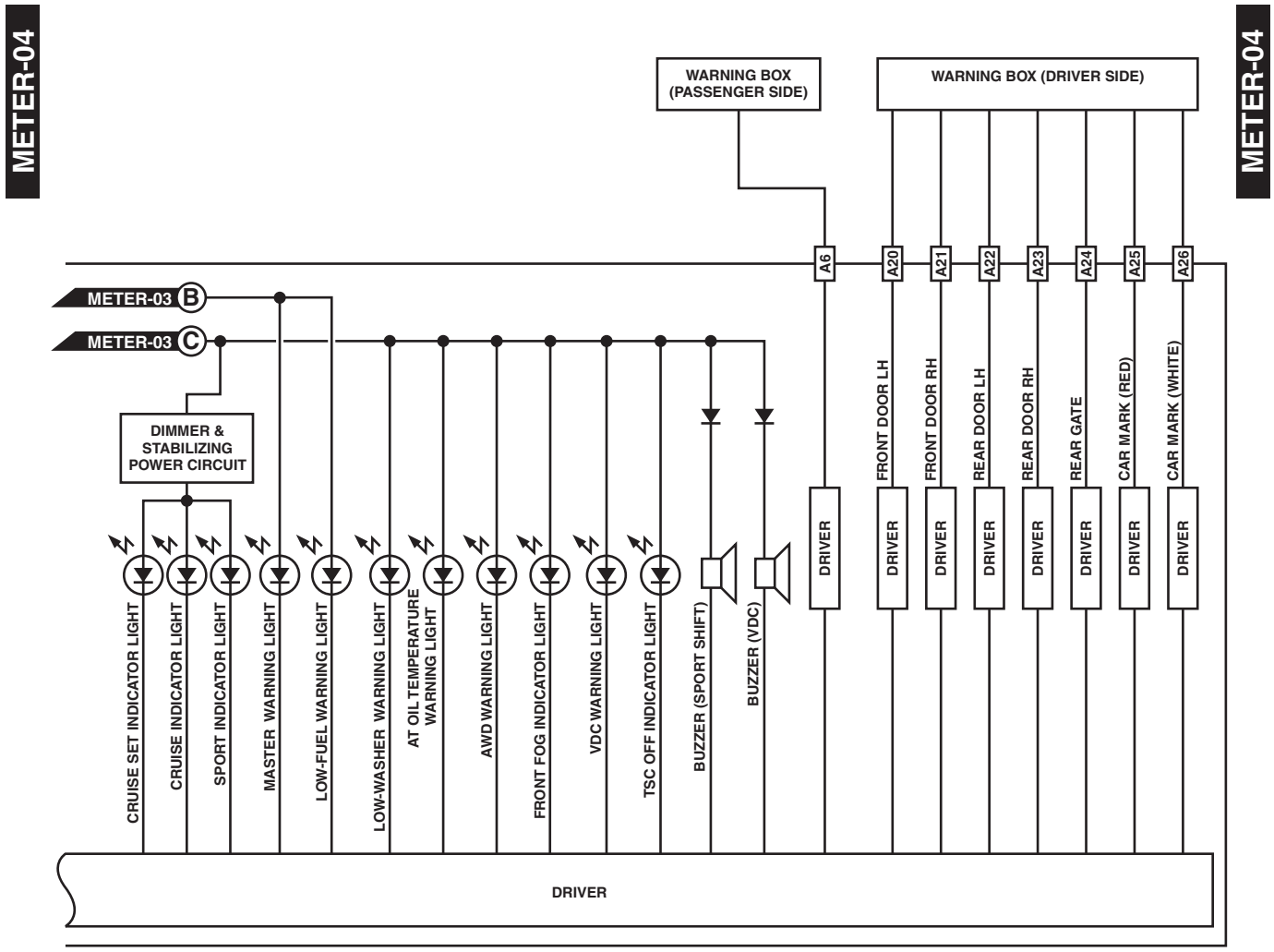
WI-08133


METER-02
METER-02
BATTERY
IGNITION SWITCH (IG)
HEADLIGHT RELAY
TURN SIGNAL & HAZARD MODULE
AIRBAG CONTROL MODULE
A3
A4
B3
A14
B1
B12
A METER-03
REAR DIFFERENTIAL OIL TEMPERATURE WARNING LIGHT
PARKING BRAKE/ BRAKE FLUID LEVEL WARNING LIGHT
CHARGE WARNING LIGHT
ABS WARNING LIGHT
OIL PRESSURE WARNING LIGHT
MALFUNCTION INDICATOR LIGHT
SEAT BELT WARNING LIGHT
TIRE INFLATION PRESSURE WARNING LIGHT
HI-BEAM INDICATOR LIGHT
TURN SIGNAL INDICATOR LIGHT LH
TURN SIGNAL INDICATOR LIGHT RH
REVERSE CIRCUIT
AIRBAG WARNING LIGHT
A7
B8
B7
B9
B6
B10
B11
B5
A10
B4
REAR DIFFERENTIAL PRESSURE SWITCH
VDC CONTROL MODULE
PARKING BRAKE SWITCH
BRAKE FLUID LEVEL SWITCH
GENERATOR
VDC CONTROL MODULE
OIL PRESSURE SWITCH
ECM
SEAT BELT SWITCH
TPM CONTROL MODULE
DIMMER SWITCH

WI-08134


METER-03
METER-03
B
B
TAIL & ILLUMINATION RELAY
A1
A2
B2
METER-02 A
B METER-04
C METER-04
POWER CIRCUIT
I/F
I/F
TAIL & ILLUMINATION INDICATOR LIGHT
EEPROM
BACK LIGHT
DRIVER
LCD (SPORT SHIFT)
LCD (ODD/TRIP METER)
ENGINE COOLANT TEMPERATURE GAUGE
TACHOMETER
SPEEDOMETER
FUEL GAUGE
H
C
F
E
MICRO COMPUTER
DRIVER
CAN TRANSCEIVER & RECEIVER
I/F
DRIVER
ILLUMINATION
TRIP RESET SWITCH
I/F
I/F
A29
A30
A13
A28
A27
A15
A16
BODY INTEGRATED UNIT
WASHER LEVEL SWITCH
AUTO A/C
MOMITOR
or
MFD
ECM
TCM
VDC CONTROL MODULE

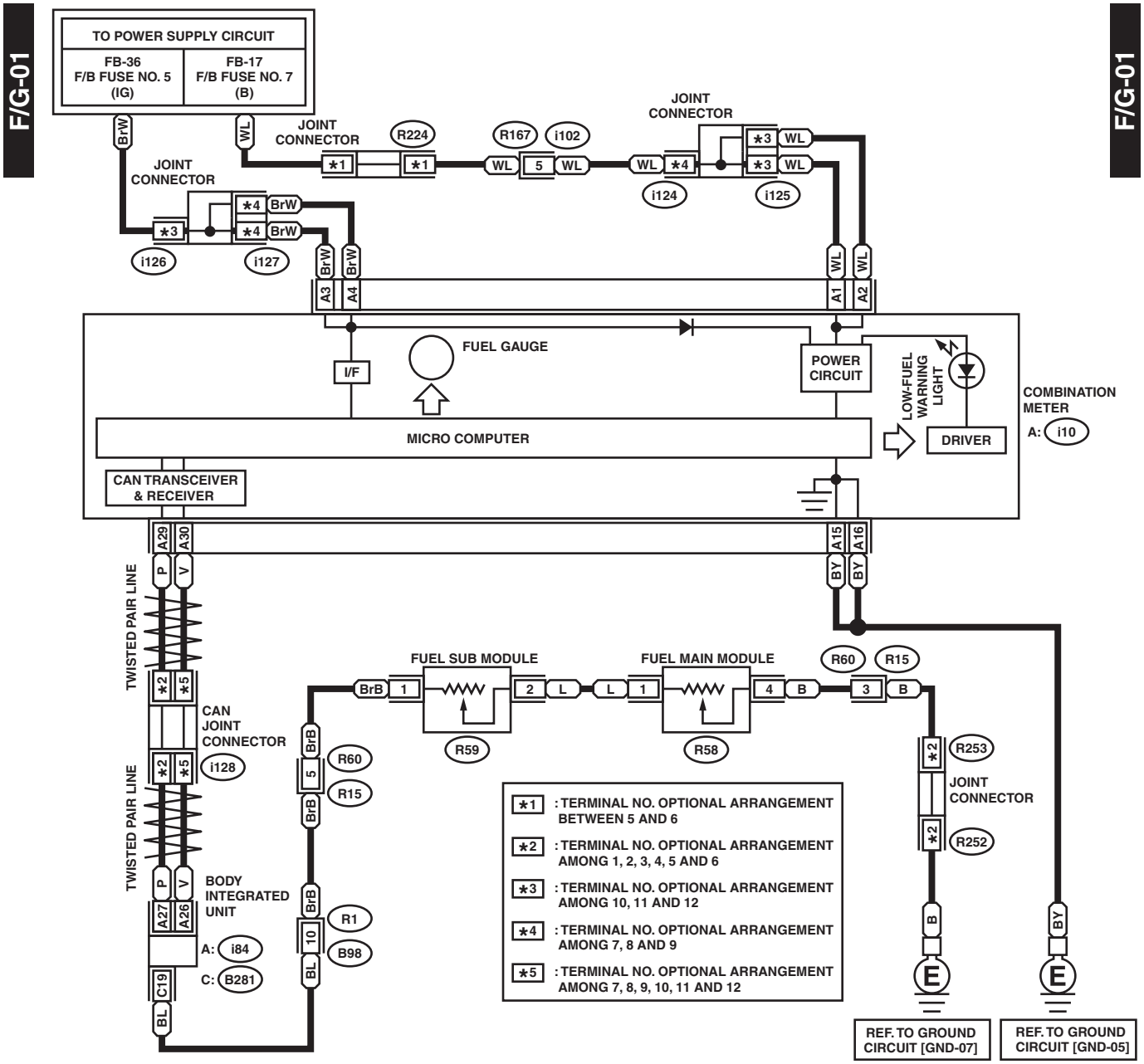
WI-08135

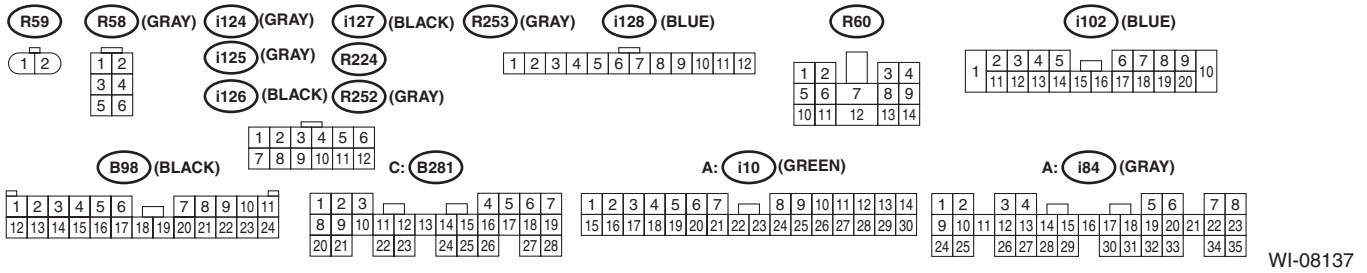

METER-04
METER-04
WARNING BOX (PASSENGER SIDE)
WARNING BOX (DRIVER SIDE)
A6
A20
A21
A22
A23
A24
A25
A26
METER-03 B
METER-03 C
DIMMER & STABILIZING POWER CIRCUIT
CRUISE SET INDICATOR LIGHT
CRUISE INDICATOR LIGHT
SPORT INDICATOR LIGHT
MASTER WARNING LIGHT
LOW-FUEL WARNING LIGHT
LOW-WASHER WARNING LIGHT
AT OIL TEMPERATURE WARNING LIGHT
AWD WARNING LIGHT
FRONT FOG INDICATOR LIGHT
VDC WARNING LIGHT
TSC OFF INDICATOR LIGHT
BUZZER (SPORT SHIFT)
BUZZER (VDC)
DRIVER
FRONT DOOR LH
FRONT DOOR RH
REAR DOOR LH
REAR DOOR RH
REAR GATE
CAR MARK (RED)
CAR MARK (WHITE)
DRIVER

WI-08136

45.Fuel Gauge System

A: WIRING DIAGRAM



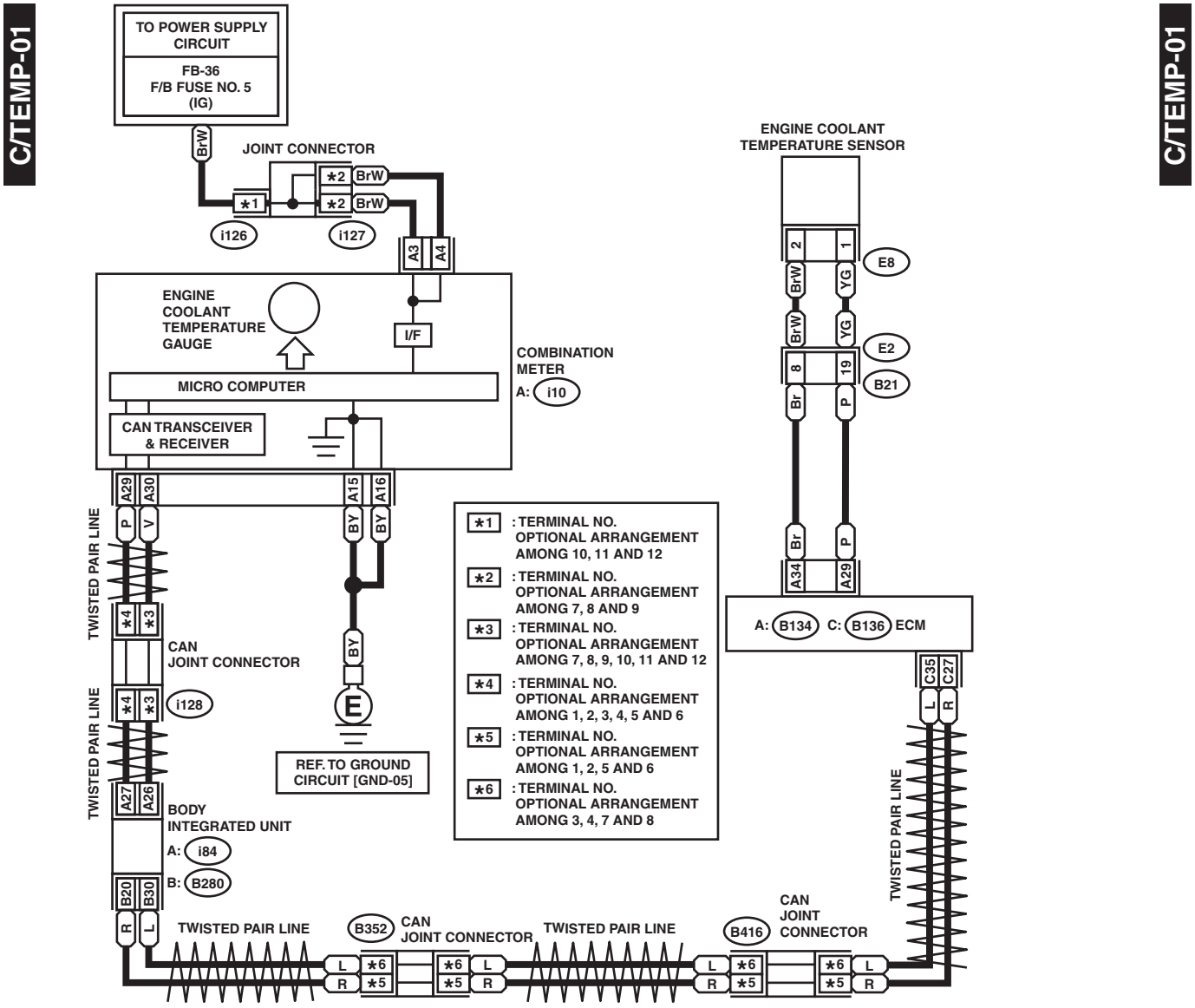


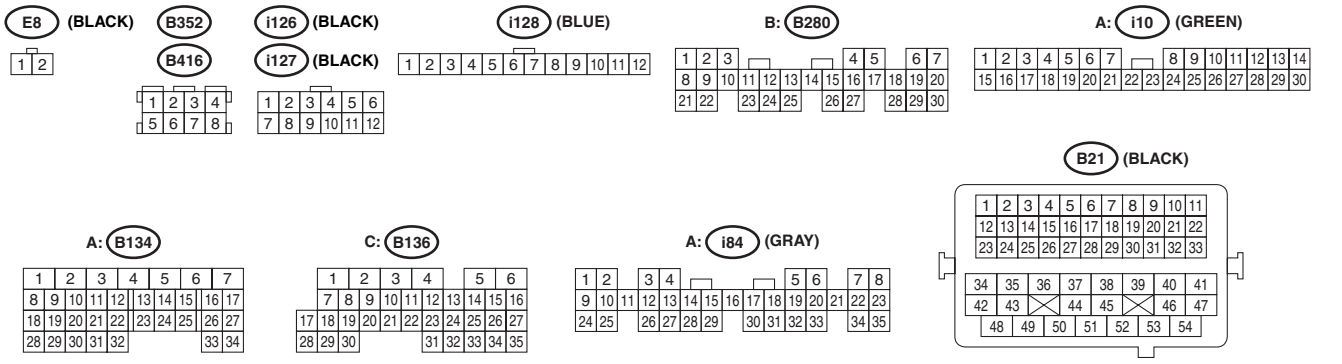
WI-08137

46.Water Temperature Gauge System

A: WIRING DIAGRAM

C/TEMP-01



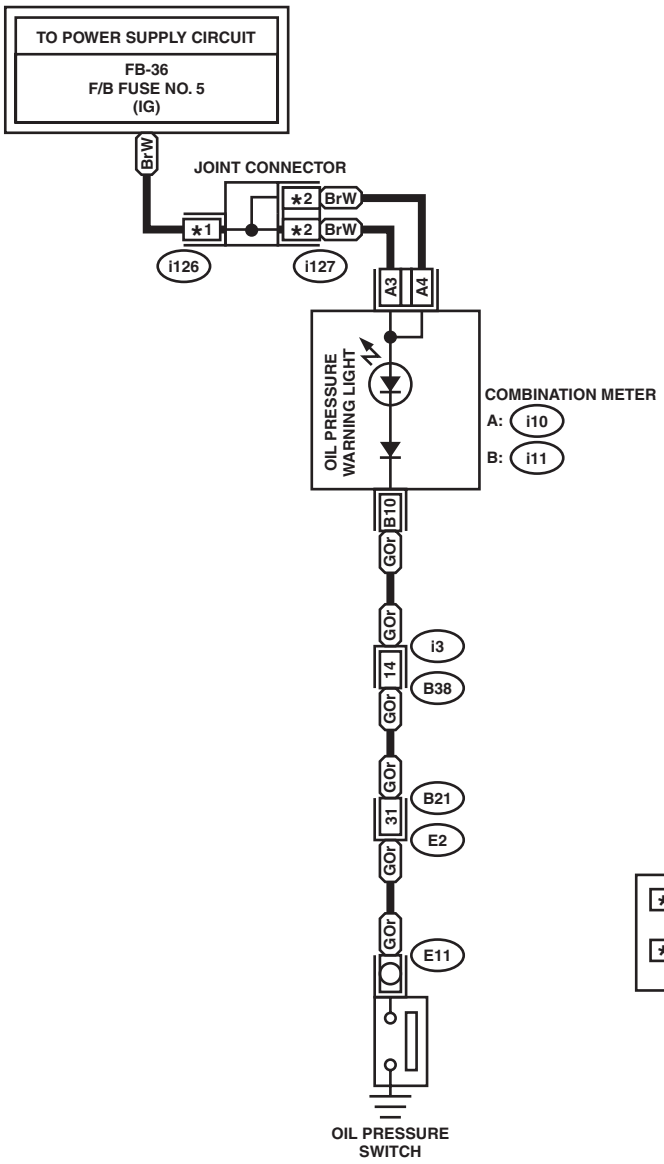


WI-08138

47.Oil Pressure Warning Light System

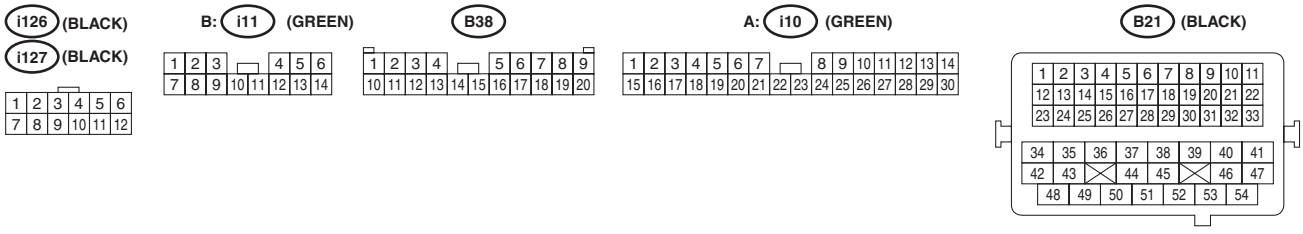
A: WIRING DIAGRAM

OIL/P-01



*1 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 10, 11 AND 12

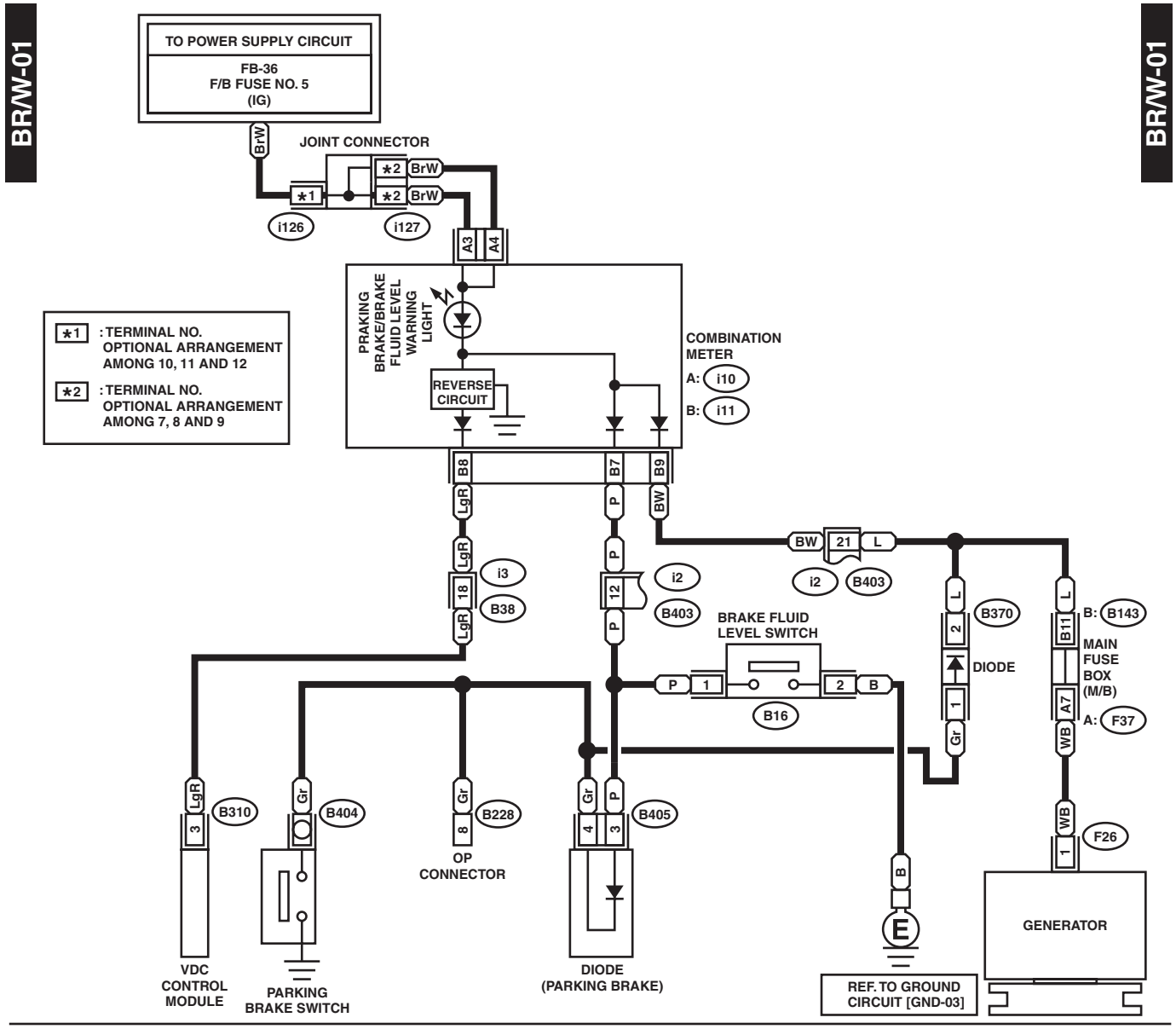
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 7, 8 AND 9

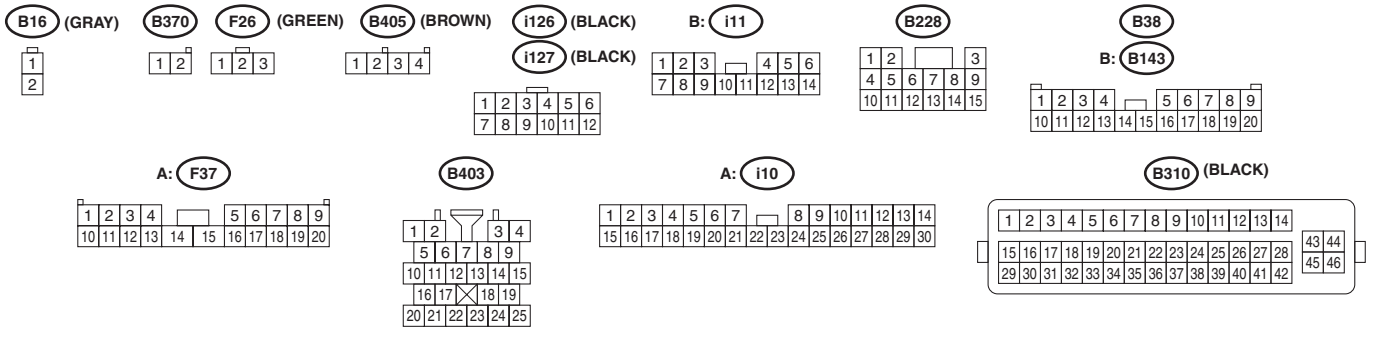


WI-08139

48.Parking Brake and Brake Fluid Level Warning System

A: WIRING DIAGRAM

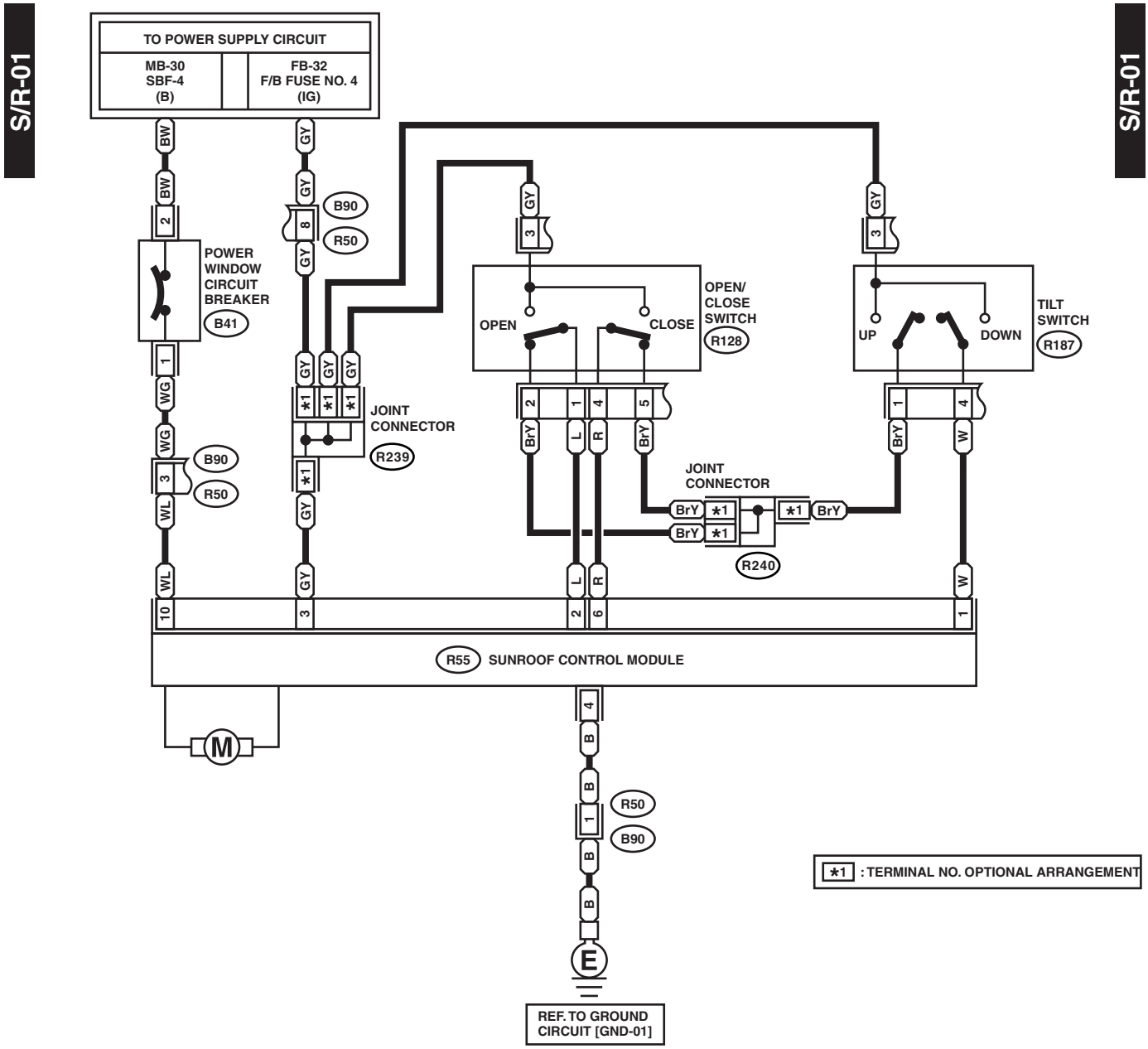


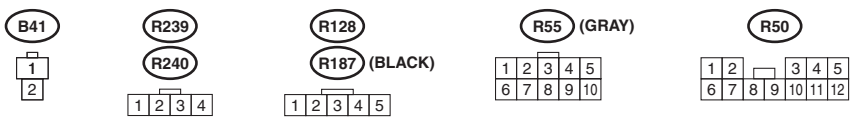


WI-08140

49.Sunroof Control System

A: WIRING DIAGRAM

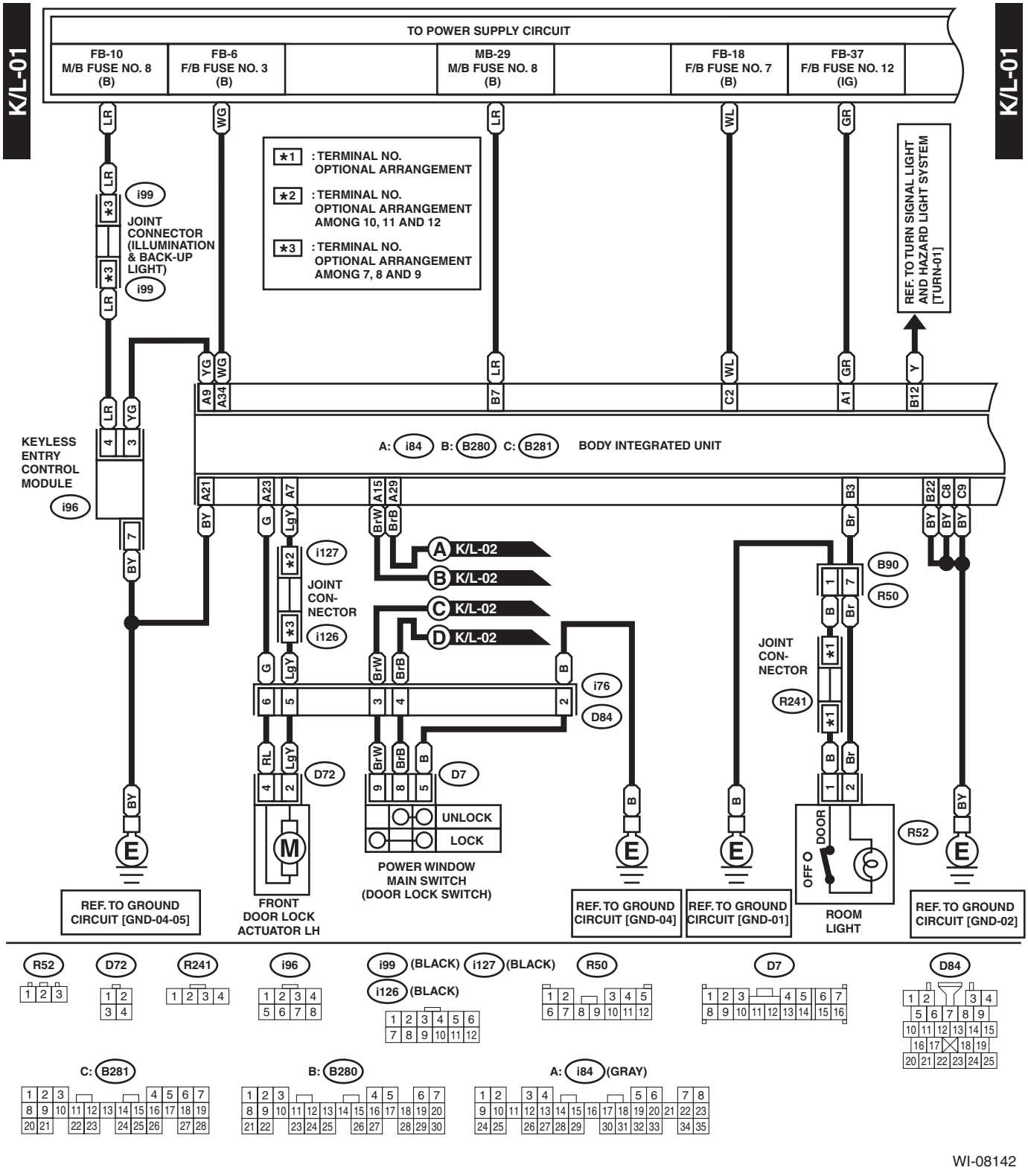




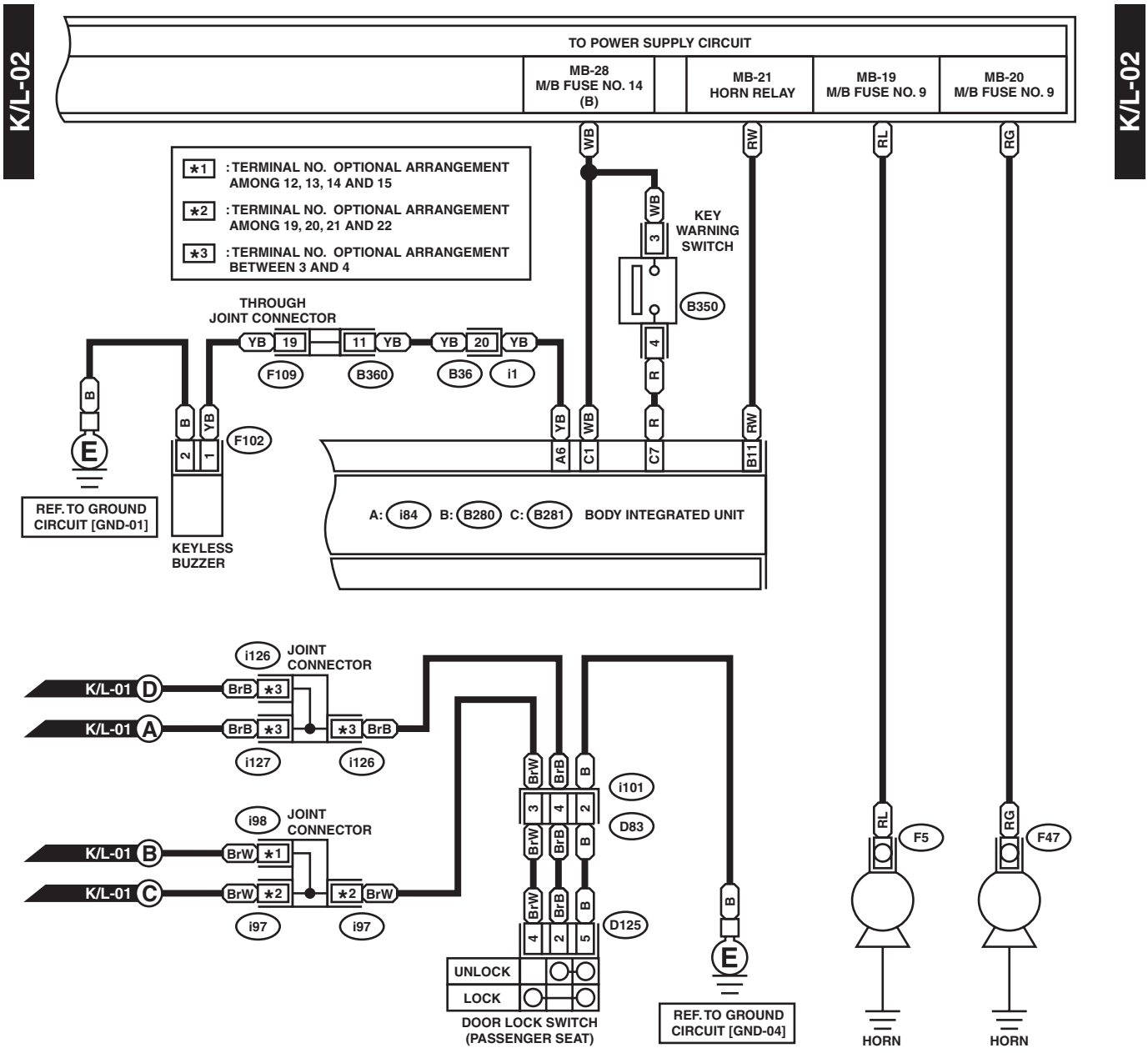
WI-08141

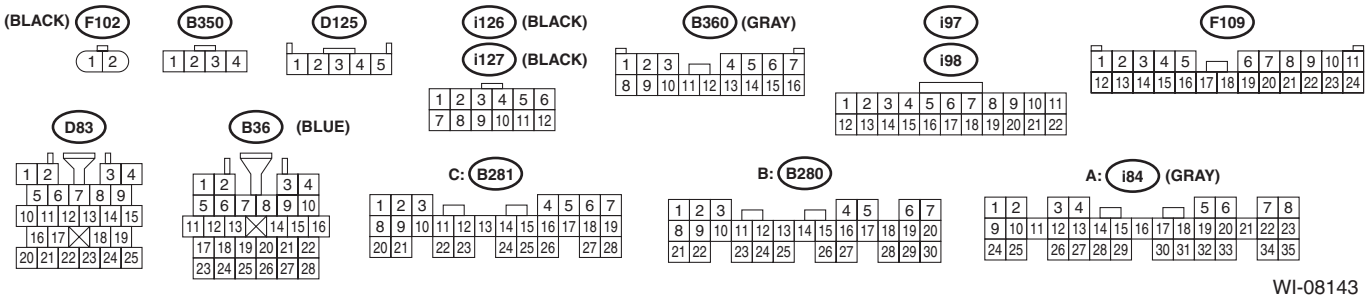
50.Keyless Entry System

A: WIRING DIAGRAM



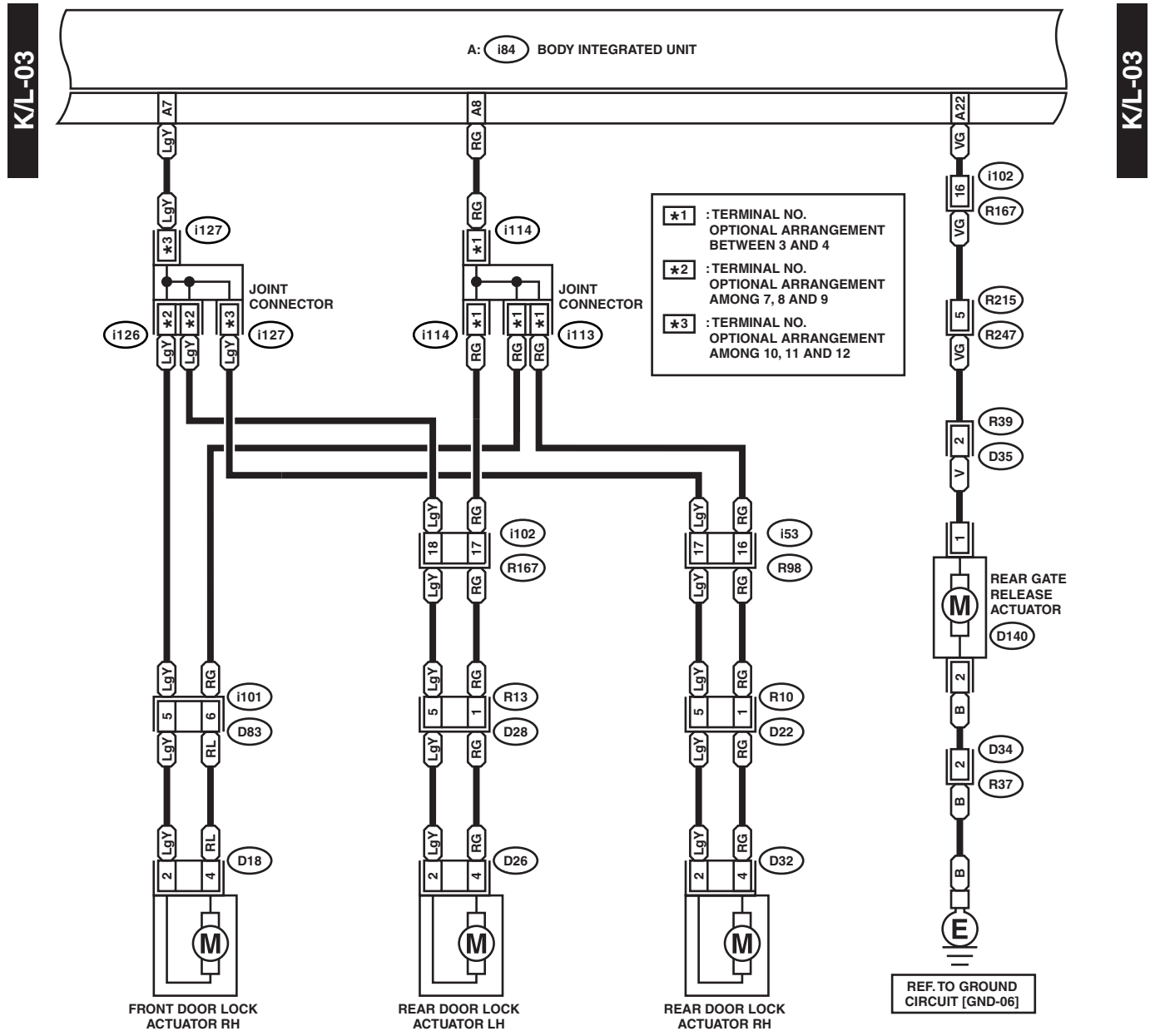
WI-08142

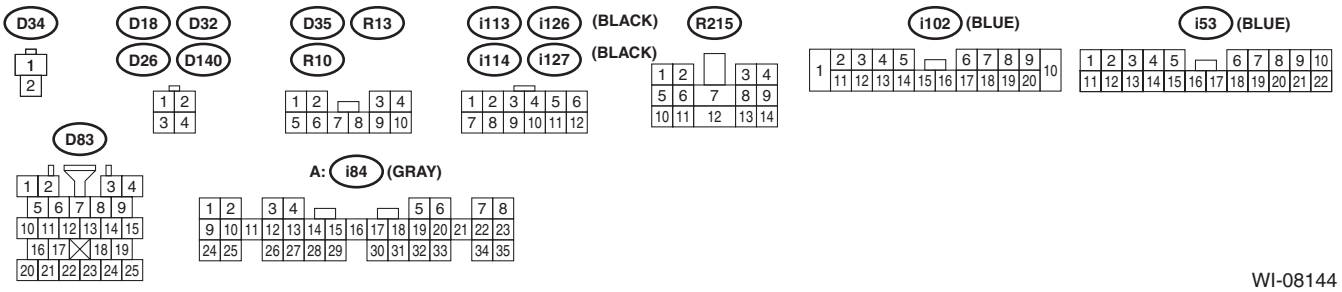

K/L-02
K/L-02
TO POWER SUPPLY CIRCUIT
MB-28
M/B FUSE NO. 14
(B)
MB-21
HORN RELAY
MB-19
M/B FUSE NO. 9
MB-20
M/B FUSE NO. 9
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 12, 13, 14 AND 15
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG 19, 20, 21 AND 22
*3 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 3 AND 4
KEY WARNING SWITCH
B350
THROUGH JOINT CONNECTOR
F109
B360
B36
i1
F102
REF. TO GROUND CIRCUIT [GND-01]
KEYLESS BUZZER
A: i84 B: B280 C: B281 BODY INTEGRATED UNIT
i126 JOINT CONNECTOR
i127
i98 JOINT CONNECTOR
i97
i101
D83
D125
UNLOCK
LOCK
DOOR LOCK SWITCH (PASSENGER SEAT)
REF. TO GROUND CIRCUIT [GND-04]
F5
F47
HORN
HORN


(BLACK) F102
B350
D125
i126 (BLACK)
i127 (BLACK)
B360 (GRAY)
i97
i98
F109
D83
B36 (BLUE)
C: B281
B: B280
A: i84 (GRAY)

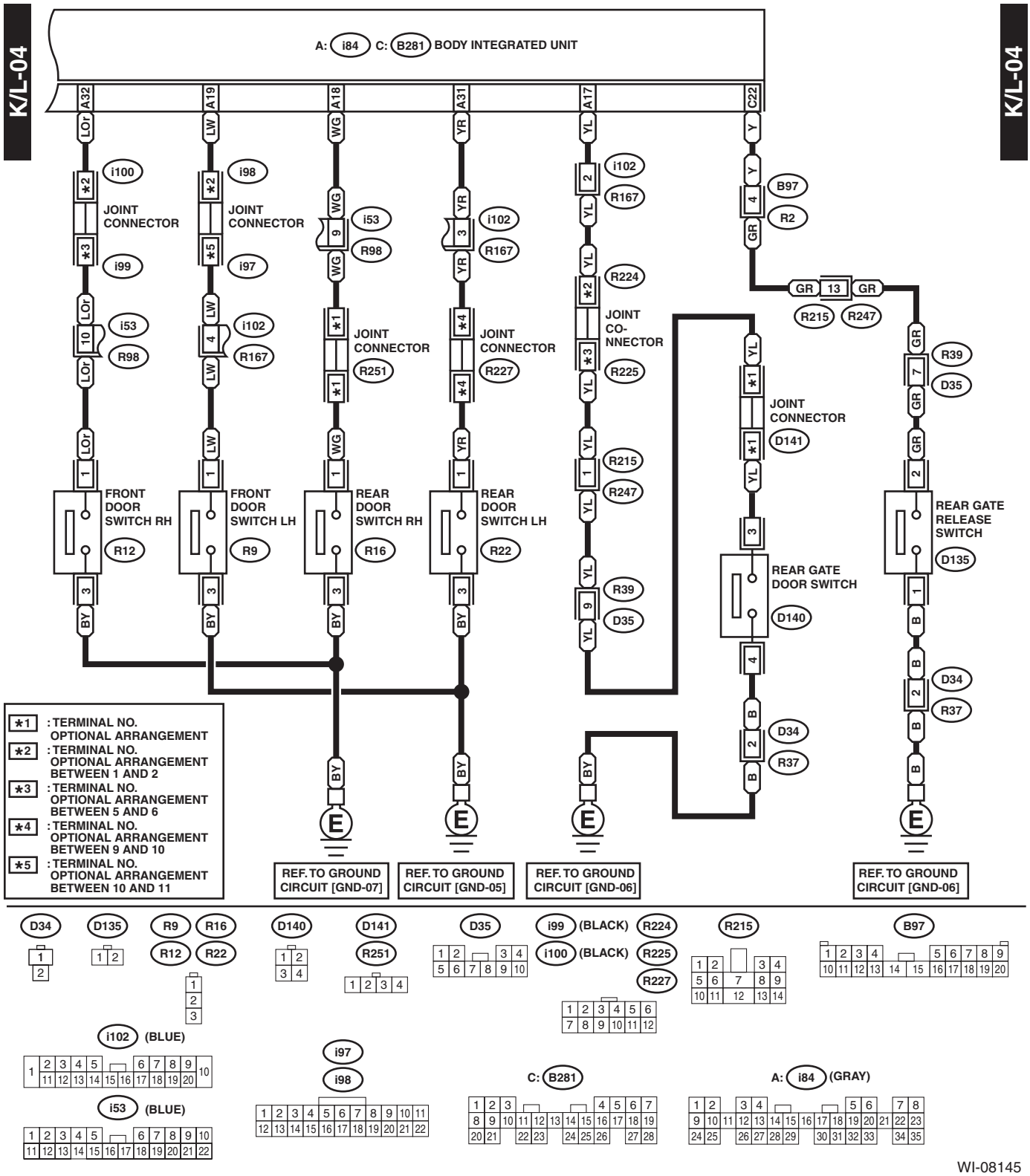
WI-08143

K/L-03





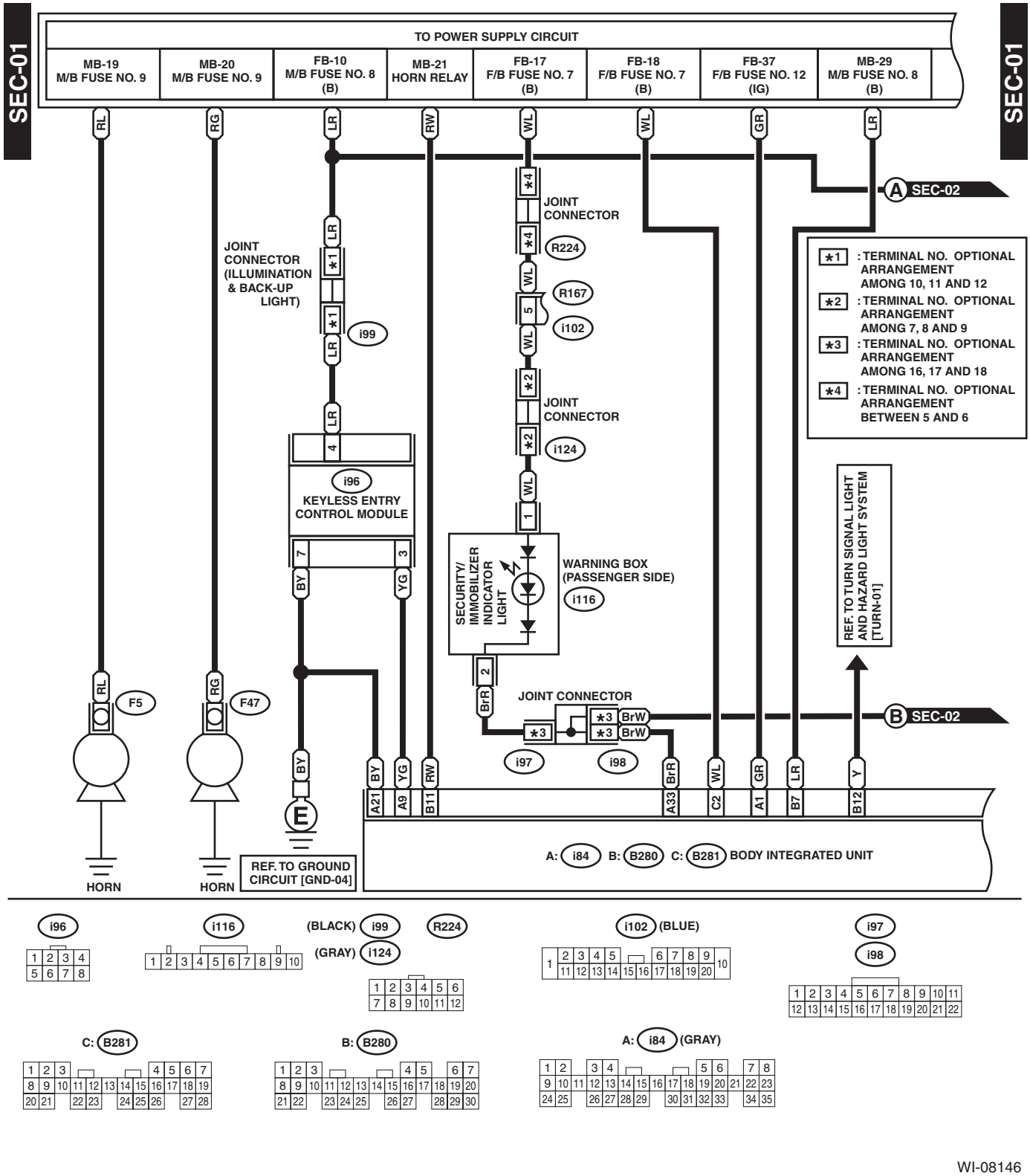
WI-08144


K/L-04
K/L-04
A: i84 C: B281 BODY INTEGRATED UNIT
A32
A19
A18
A31
A17
C22
LOr
LW
WG
YR
YL
Y
i100
i98
i53
i102
i102
R167
B97
R2
JOINT CONNECTOR
i99
i97
R98
R167
R251
R227
R224
R225
GR 13 GR
R215 R247
JOINT CONNECTOR
JOINT CONNECTOR
JOINT CO-NNECTOR
JOINT CONNECTOR
D141
R39
D35
FRONT DOOR SWITCH RH
FRONT DOOR SWITCH LH
REAR DOOR SWITCH RH
REAR DOOR SWITCH LH
REAR GATE DOOR SWITCH
REAR GATE RELEASE SWITCH
R12
R9
R16
R22
D140
D135
R215
R247
R39
D35
D34
R37
BY
E
REF. TO GROUND CIRCUIT [GND-07]
REF. TO GROUND CIRCUIT [GND-05]
REF. TO GROUND CIRCUIT [GND-06]
REF. TO GROUND CIRCUIT [GND-06]
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 1 AND 2
*3 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 5 AND 6
*4 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 9 AND 10
*5 : TERMINAL NO. OPTIONAL ARRANGEMENT BETWEEN 10 AND 11
D34
D135
R9
R16
R12
R22
D140
D141
R251
D35
i99 (BLACK)
i100 (BLACK)
R224
R225
R227
R215
B97
i102 (BLUE)
i53 (BLUE)
i97
i98
C: B281
A: i84 (GRAY)

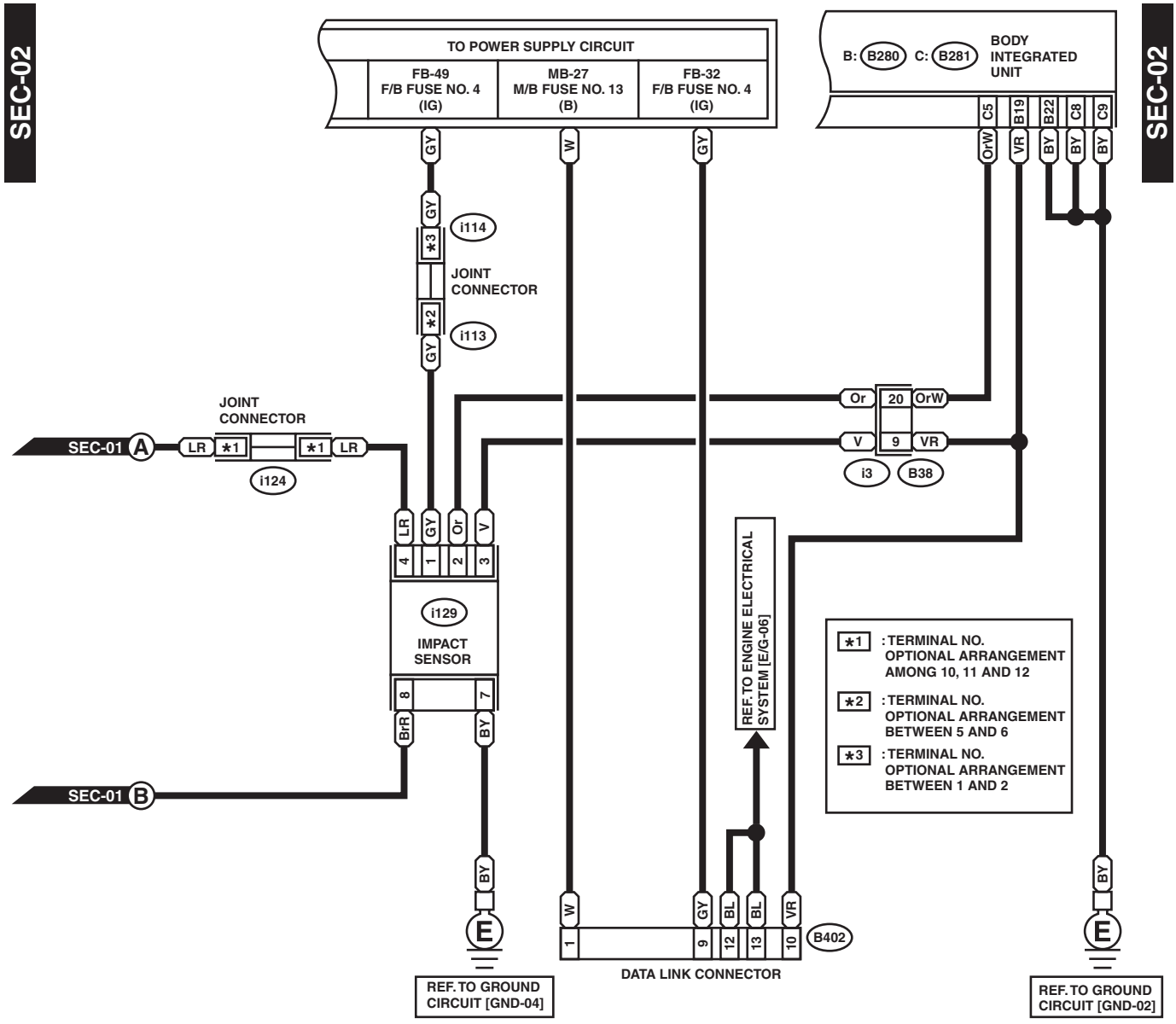
WI-08145

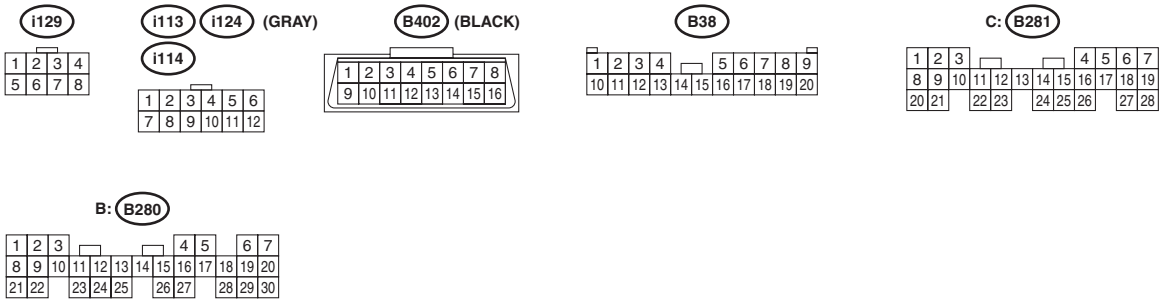
51.Security System

A: WIRING DIAGRAM



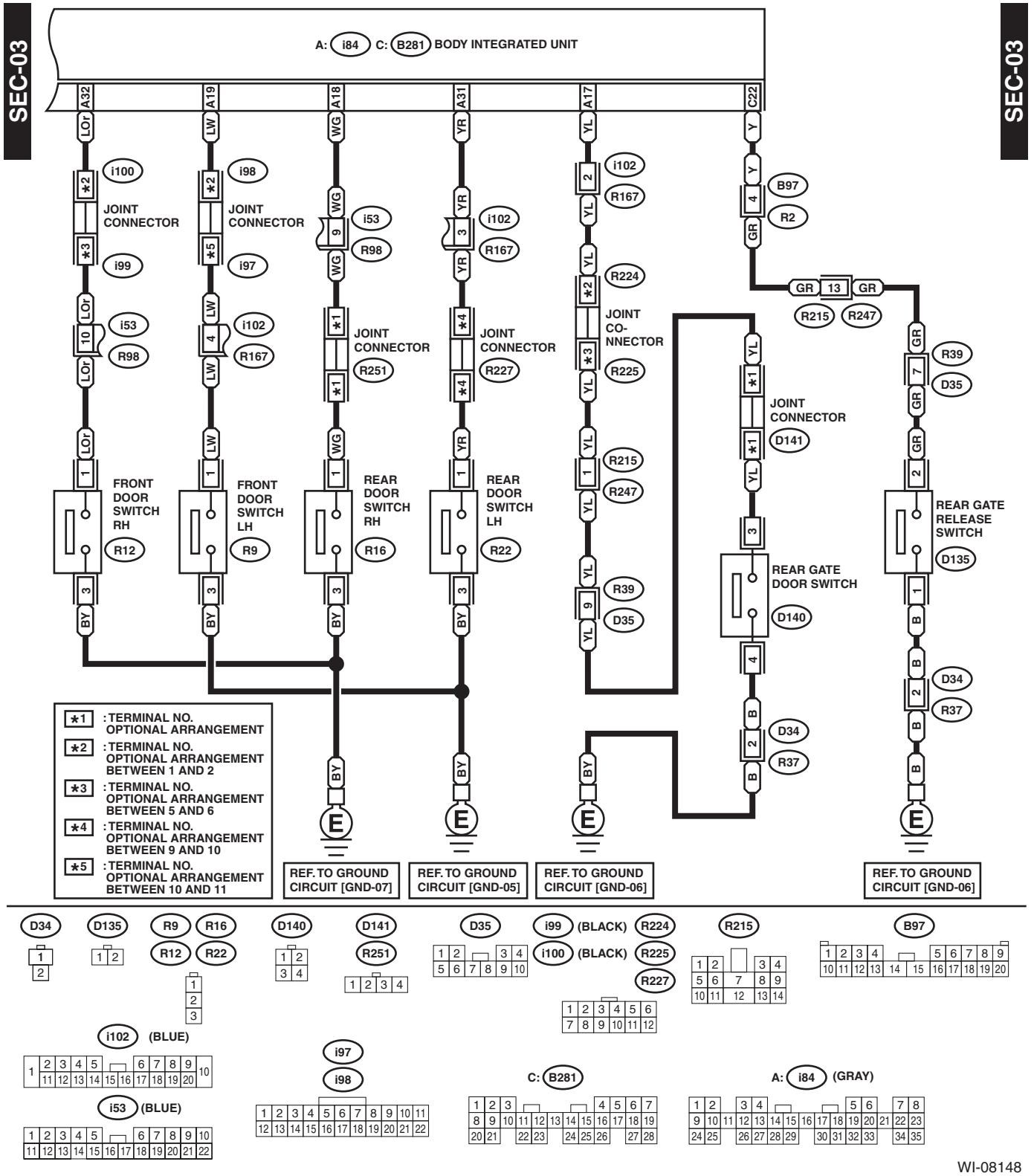
WI-08146


SEC-02
SEC-02
TO POWER SUPPLY CIRCUIT
FB-49
F/B FUSE NO. 4
(IG)
MB-27
M/B FUSE NO. 13
(B)
FB-32
F/B FUSE NO. 4
(IG)
B: B280 C: B281
BODY
INTEGRATED
UNIT
C5
B19
B22
C8
C9
OrW
VR
BY
BY
BY
GY
W
GY
i114
*3
JOINT
CONNECTOR
*2
i113
JOINT
CONNECTOR
SEC-01 A
LR
*1
*1
LR
i124
Or
20
OrW
V
9
VR
i3
B38
LR
GY
Or
V
4
1
2
3
i129
IMPACT
SENSOR
8
7
BrR
BY
SEC-01 B
REF. TO ENGINE ELECTRICAL
SYSTEM [E/G-06]
*1 : TERMINAL NO.
OPTIONAL ARRANGEMENT
AMONG 10, 11 AND 12
*2 : TERMINAL NO.
OPTIONAL ARRANGEMENT
BETWEEN 5 AND 6
*3 : TERMINAL NO.
OPTIONAL ARRANGEMENT
BETWEEN 1 AND 2
BY
W
GY
BL
BL
VR
1
9
12
13
10
B402
DATA LINK CONNECTOR
E
E
REF. TO GROUND
CIRCUIT [GND-04]
REF. TO GROUND
CIRCUIT [GND-02]


i129
i113
i124
(GRAY)
i114
B402
(BLACK)
B38
C: B281
B: B280

WI-08147

SEC-03

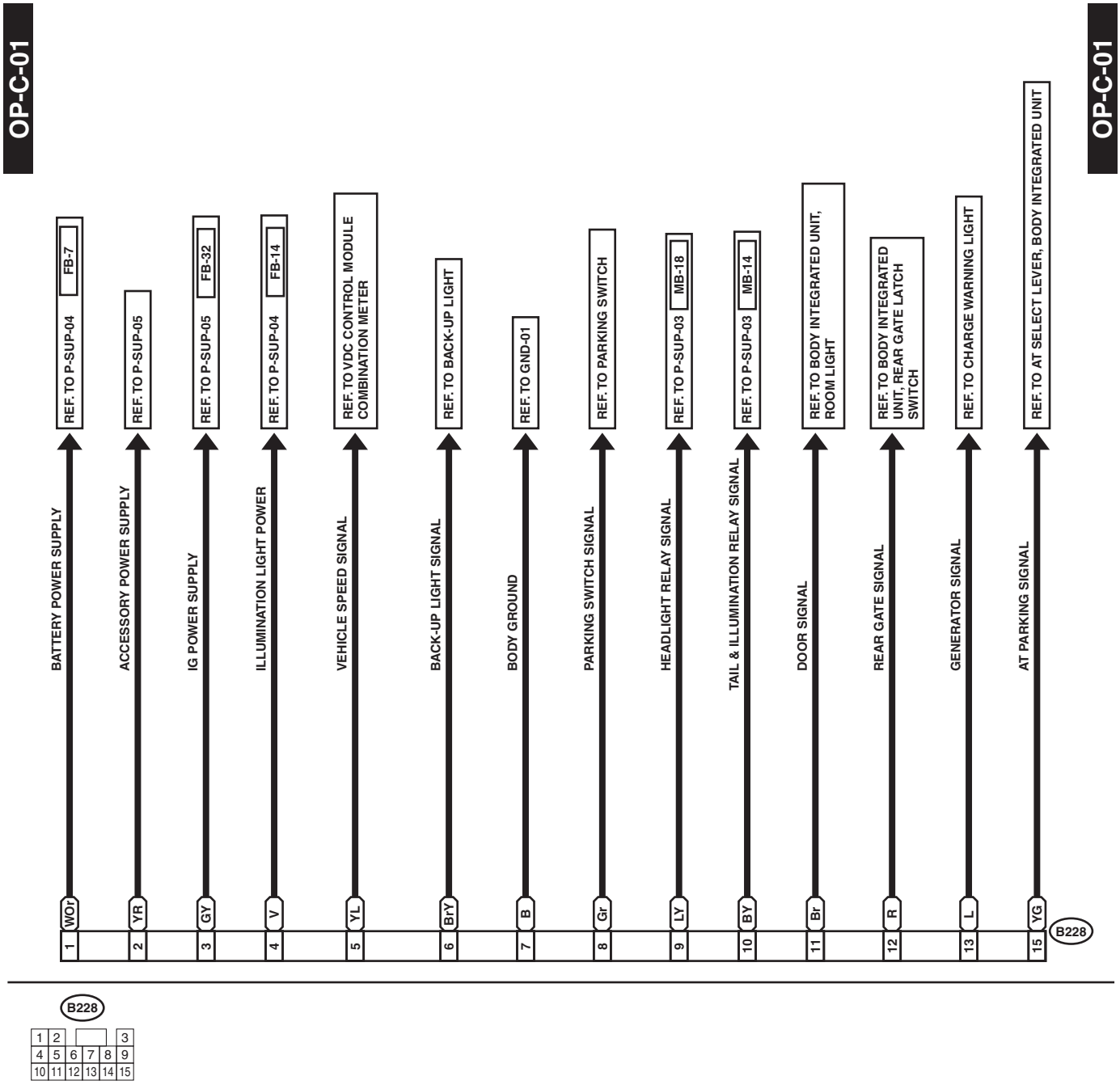


WI-08148

SEC-03

52.Option Connector System

A: WIRING DIAGRAM

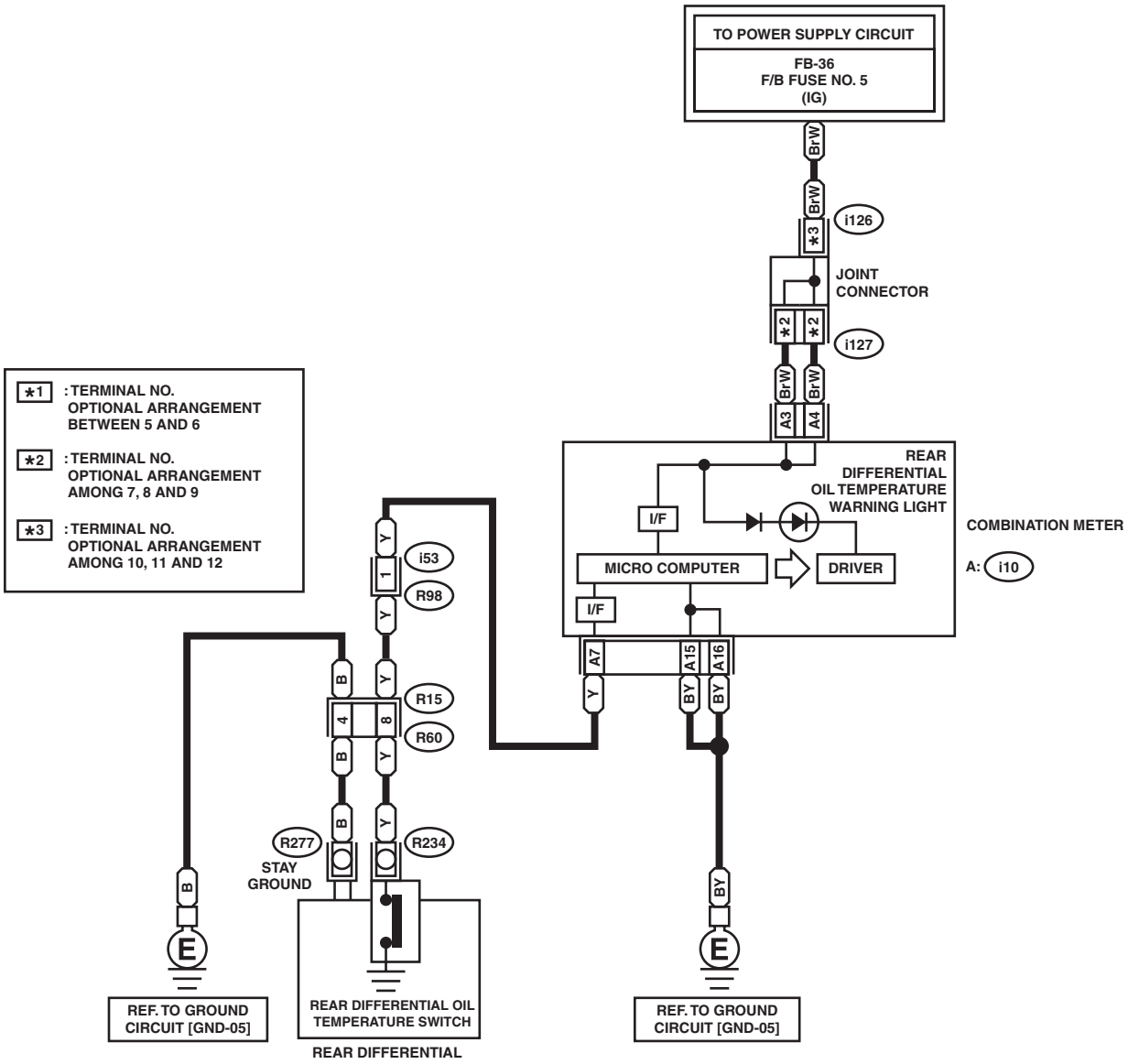


WI-08149

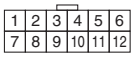
53.Rear Differential Oil Temperature Warning Light System

A: WIRING DIAGRAM

D/T-01

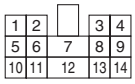


i126 (BLACK)

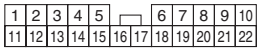


i127 (BLACK)

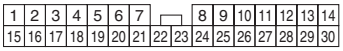
R60



i53 (BLUE)



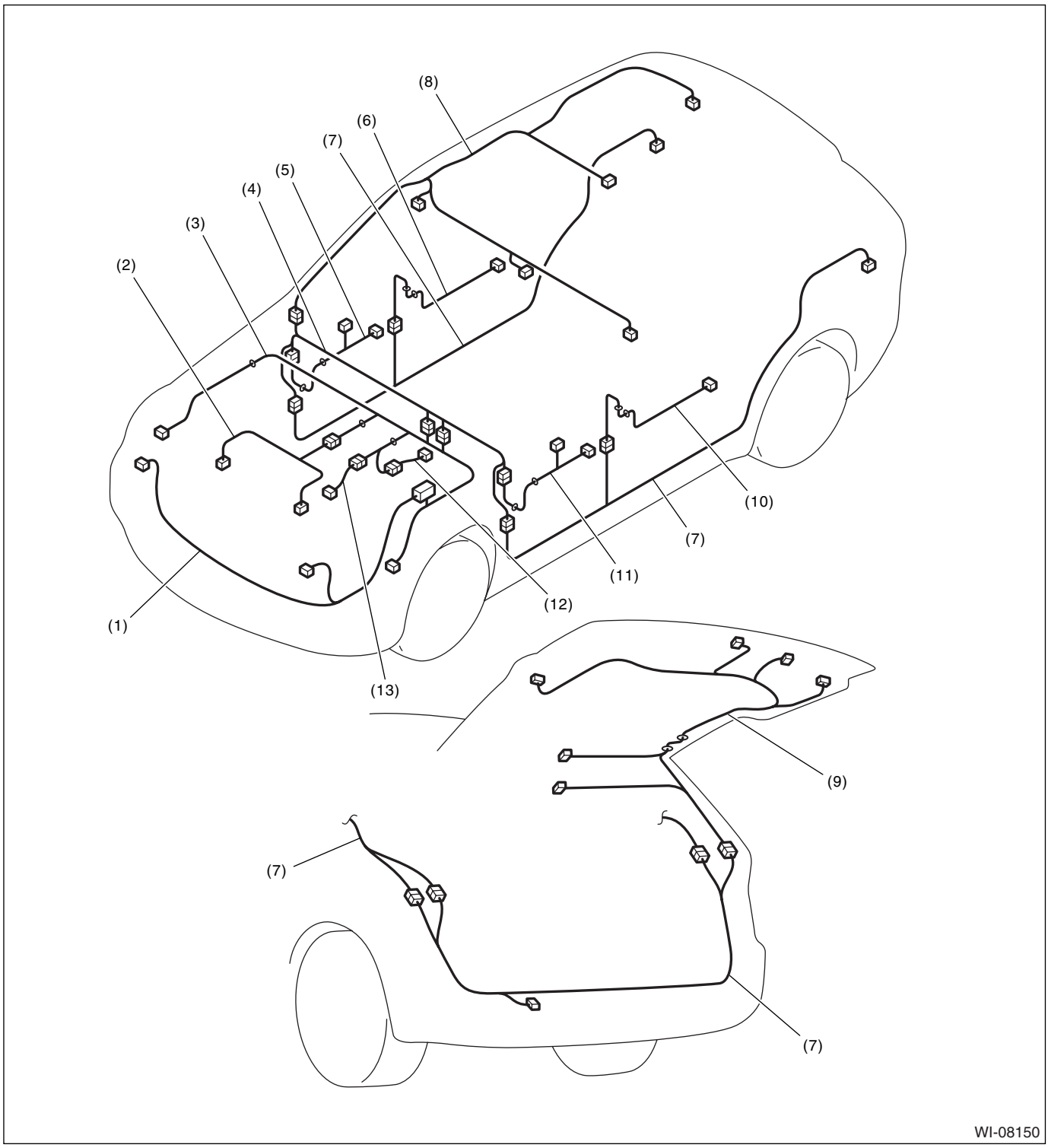
A: i10



WI-08322

54.Harness Components Location

A: LOCATION



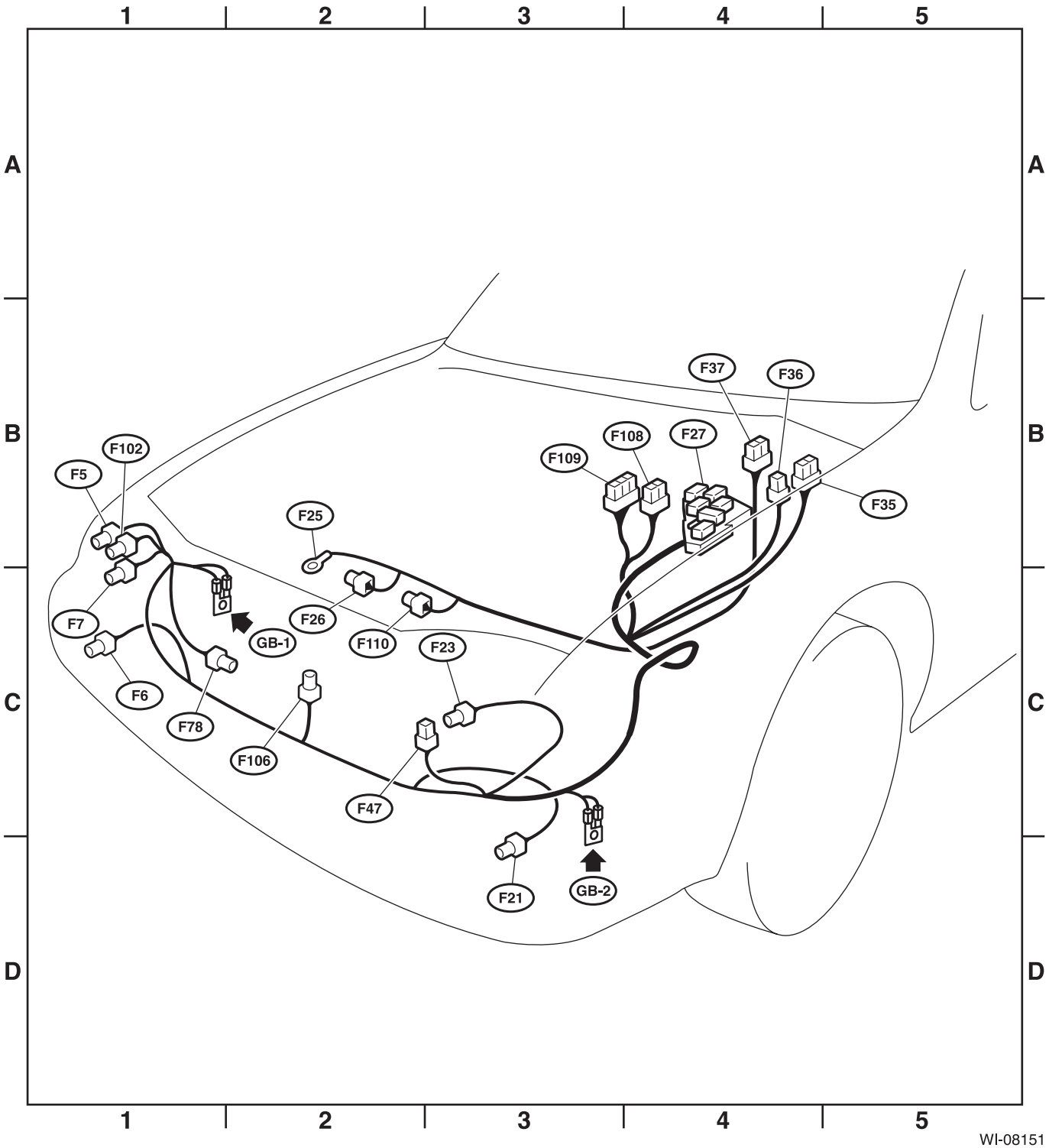
(1) Front wiring harness
(2) Engine wiring harness
(3) Bulkhead wiring harness
(4) Instrument panel wiring harness
(5) Front door cord RH
(6) Rear door cord RH
(7) Rear wiring harness
(8) Roof cord
(9) Rear gate cord
(10) Rear door cord LH
(11) Front door cord LH
(12) Transmission cord
(13) Rear oxygen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

55.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	C-1		Headlight and front clearance light & front turn signal light RH
F21	2	Gray	D-3		Front fog light LH
F23	8	Gray	C-3		Headlight and front clearance light & front turn signal light LH
F25	1	★	C-2		Generator terminal B
F26	3	Green	C-2		Generator
F27	31	Black	B-4		A/C 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	B-2		Ambient sensor
F102	2	Black	B-2		Keyless buzzer
F106	3	Gray	C-2		PWM controller
F108	18	Gray	B-4		Through joint connector
F109	24	★	B-3		
F110	1	Black	C-2		Magnet clutch
★: White or natural color					

Front Wiring Harness



56.Bulkhead Wiring Harness (In Engine Compartment)

A: LOCATION

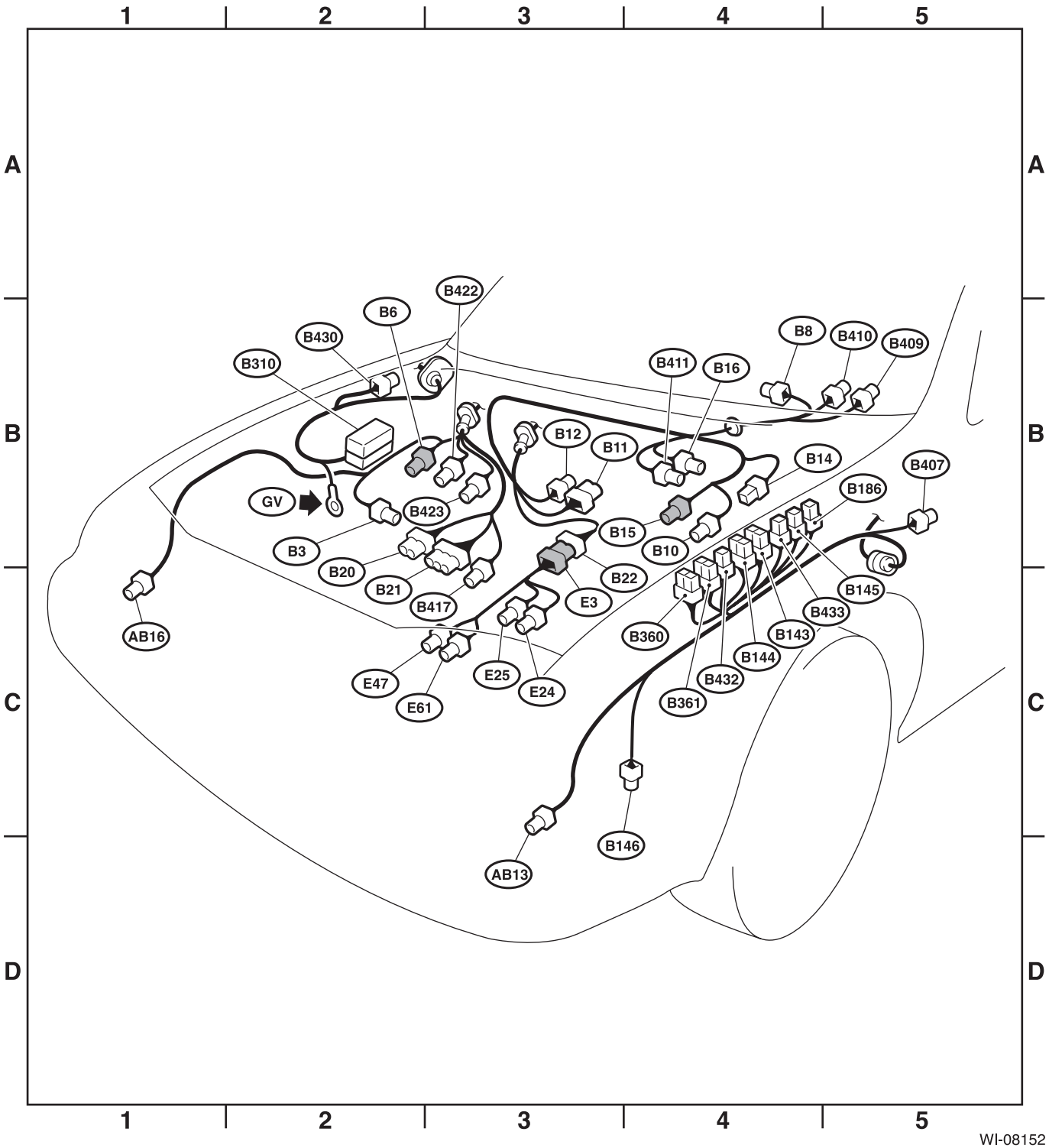
Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B3	5	Black	B-2		Air flow sensor
B6	2	Gray	B-2		Front ABS wheel speed sensor RH
B8	5	Black	B-4		Front wiper motor
B10	4	Gray	B-4		Pressure switch
B11	20	Gray	B-3	T4	Transmission
B12	8	Brown	B-3	T3	
B14	1	Black	B-3		Starter (Magnet)
B15	2	Gray	B-4		Front ABS wheel speed sensor LH
B16	2	Gray	B-4		Brake fluid level switch
B20	16	Brown	B-3	E1	Engine wiring harness
B21	54	Black	B-3	E2	
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		Washer motor & washer tank
B186	8	★	B-4		Main fuse box (M/B)
B310	46	Black	B-2		VDC control module
B360	16	Gray	C-4	F109	Through joint connector
B361	14	Gray	B-4	F108	
B407	2	Black	B-5		Paddle light LH
B409	4	Black	B-5		Wiper relay unit
B410	3	Gray	B-5		
B411	3	Black	B-4		Pressure sensor
B417	2	Gray	C-3		Vacuum pump
B422	4	Black	B-3		Vacuum pump relay
B423	8	Black	B-3		Relay box
B430	2	Black	B-2		Paddle 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	C-1		Front sub sensor RH

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
E3	16	Brown	A-3	B22	Bulkhead wiring harness
E24	4	Light gray	C-3		Front oxygen (A/F) sensor LH
E25	4	Dark gray	B-4		Rear oxygen sensor LH
E47	4	Light gray	C-3		Front oxygen (A/F) sensor RH
E61	4	Dark gray	C-3		Rear oxygen sensor RH

Bulkhead Wiring Harness (In Engine Compartment)



57.Bulkhead Wiring Harness (In Compartment)

A: LOCATION

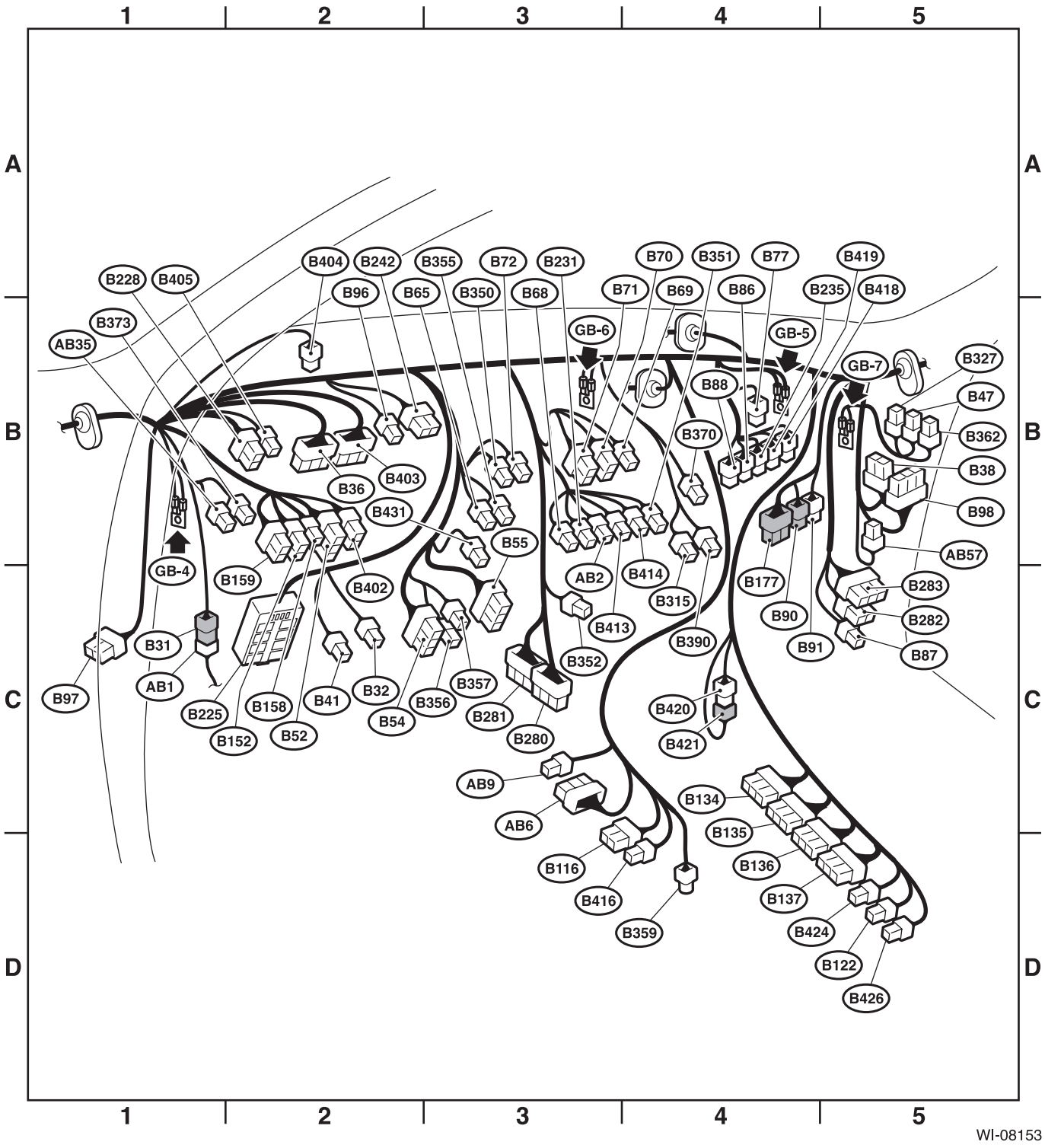
Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B31	12	Yellow	C-1	AB1	Airbag wiring harness
B32	8	★	C-2		Turn signal & hazard unit
B36	28	Blue	B-2	i1	Instrument panel wiring harness
B38	20	★	B-5	i3	
B41	2	★	C-2		Power window circuit breaker
B47	6	Brown	B-5		Main relay
B52	24	★	B-2		Fuse & relay box (F/B)
B54	24	★	C-2		TCM
B55	24	Gray	C-3		
B65	4	Black	B-3		Stop light and brake switch
B68	8	★	B-3		Roll connector
B69	4	★	B-3		Parking light switch
B70	18	★	B-3		Combination switch (Wiper & washer switch)
B71	17	★	B-3		Combination switch (Front fog light switch) (Lighting switch)
B72	6	★	B-3		Ignition switch
B77	7	Green	B-4		Mode actuator
B86	5	★	B-4		Blower fan controller
B87	2	★	C-5		Blower fan motor
B88	2	★	B-4		Evaporation thermo switch
B90	12	★	B-4	R50	Roof cord
B91	7	Green	B-4		FRESH/RECIRC actuator
B96	8	Black	B-2		Daytime running light control module
B97	20	★	C-1	R1	Rear wiring harness
B98	24	Black	B-5	R2	
B116	12	★	C-4		AT select lever
B122	8	★	D-5		Joint connector
B134	34	★	C-4		ECM
B135	35	★	C-4		
B136	35	★	C-4		
B137	31	★	D-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

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B225	40	Black	C-2		Seat heater relay
					Starter relay
					Power window relay
					Fuse (Relay block)
					Blower fan relay
					Front fog light relay
					Mirror heater relay
					Rear fog light relay
					Wiper deicer relay
B228	15	★	B-2		OP connector
B231	4	★	B-3		Steering angle sensor
B235	7	Green	B-4		Passenger's side air mix actuator
B242	10	★	B-2		Daytime running light control module
B280	30	★	C-3		Body integrated unit
B281	28	★	C-3		
B282	16	★	C-5		Auto A/C control module
B283	26	★	C-5		Auto A/C control module (Rear defogger switch)
B315	6	Black	B-4		Accelerator pedal position sensor
B327	6	Brown	B-5		Rear oxygen sensor relay
B350	4	★	B-3		Key warning switch & key lock solenoid
B351	2	Black	B-4		Antenna
B352	8	★	C-3		CAN joint connector
B355	8	★	B-3		
B356	4	Black	C-3		Back-up light relay
B357	4	Black	C-3		P-VIGN relay
B359	5	Black	D-4		Yaw rate sensor
B362	8	Black	B-5		Relay holder
B370	2	Black	B-4		Diode
B373	2	★	B-1		Fuse box
B390	7	Green	B-4		Driver's side air mix 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	4	Brown	B-2		Diode (Daytime running light & parking)
B413	2	★	B-3		In vehicle temperature sensor
B414	2	★	B-4		Key illumination

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B416	8	★	D-4		CAN joint connector
B418	2	★	B-4		Foot light (Passenger's side)
B419	7	★	B-4		Blower fan relay
B420	2	Green	C-4		Test mode connector
B421	2	Green	C-4		
B424	8	★	D-5		Joint connector
B426	8	★	D-5		
B431	2	★	B-3		Foot light (Driver's side)
★: White or natural color					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB1	12	Yellow	C-1	B31	Bulkhead wiring harness
AB2	4	Yellow	B-4	AB7	Inflator (Driver's seat) (Roll connector)
AB6	28	Yellow	C-3		Airbag control module
AB9	4	Yellow	C-3	C-3	Inflator (Passenger's seat)
AB35	2	Black	B-1		Fuse & relay box (F/B)
AB55	2	Yellow	B-5	AB57	Rear wiring harness

Bulkhead Wiring Harness (In Compartment)

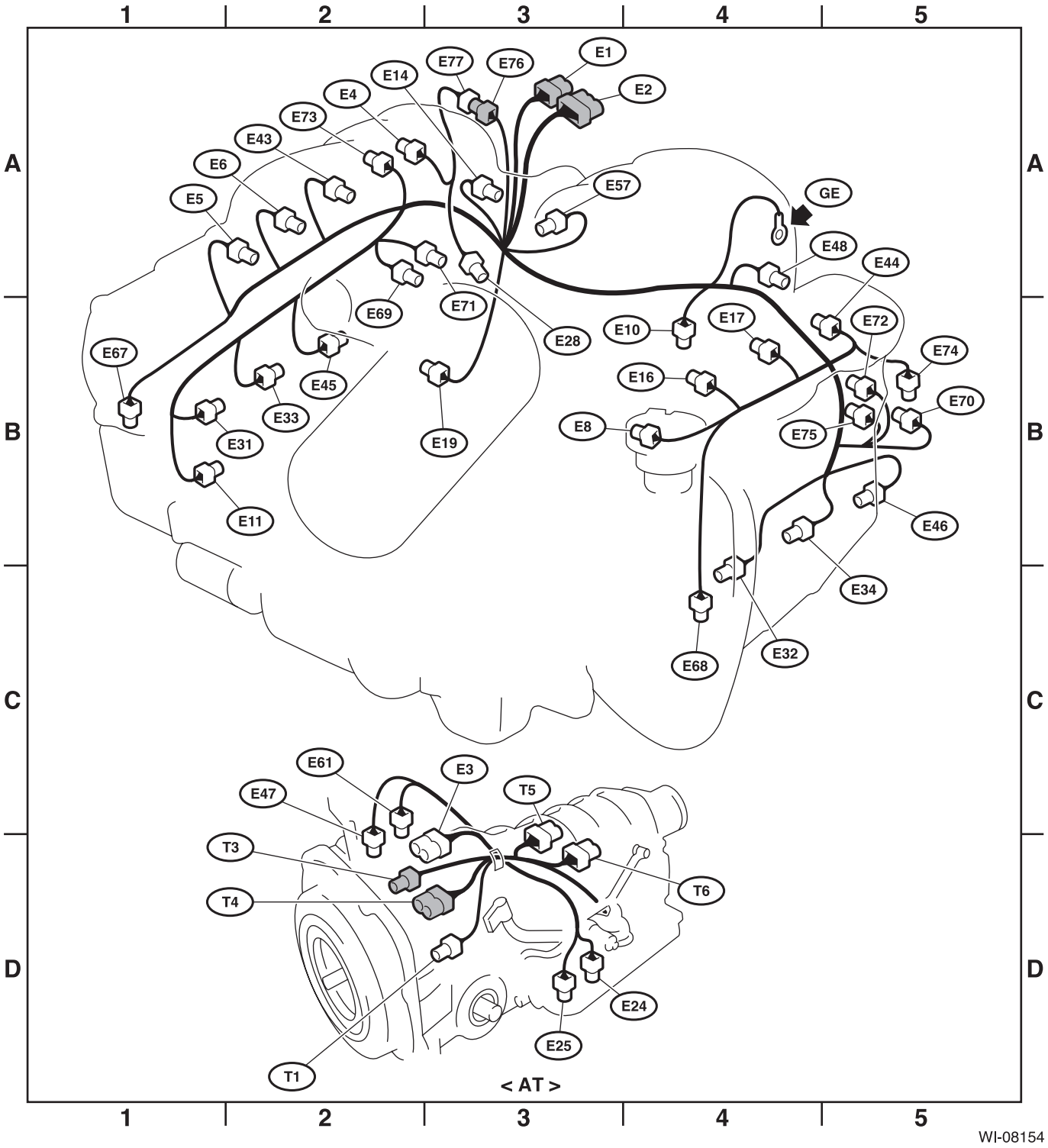


58.Engine Wiring Harness and Transmission Cord

A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
E1	16	Brown	A-3	B20	Bulkhead wiring harness
E2	54	Black	A-3	B21	
E4	2	Blue	A-2		CPC Solenoid
E5	2	Dark gray	A-2		Fuel injector No.1
E6	2	Dark gray	A-2		Fuel injector No.3
E8	2	Black	B-4		Engine coolant temperature sensor
E10	2	Light gray	B-4		Crankshaft position sensor
E11	1	★	B-1		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
E19	1	★	B-3		Power steering oil pressure switch
E28	3	Black	A-3		Intake manifold pressure sensor
E31	3	Black	B-1		Ignition coil No.1
E32	3	Black	C-4		Ignition coil No.2
E33	3	★	B-2		Ignition coil No.3
E34	3	★	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	Black	B-2		Ignition coil No.5
E46	3	Black	B-5		Ignition coil No.6
E48	2	Blue	A-4		Knock sensor 2
E57	6	Black	A-3		Electronic throttle control
E67	2	Blue	B-1		Intake oil flow control solenoid valve RH
E68	2	Blue	C-4		Intake oil flow control solenoid valve LH
E69	2	Blue	A-2		Oil switching solenoid valve RH
E70	2	Blue	B-5		Oil switching solenoid valve LH
E71	1	★	A-3		Variable valve lift diagnosis oil pressure switch RH
E72	1	★	B-5		Variable valve lift diagnosis oil pressure switch LH
E73	3	Gray	A-2		Camshaft position sensor RH
E74	3	Gray	B-5		Camshaft position sensor LH
E75	2	Black	B-5		Oil temperature sensor
E76	6	Dark gray	A-3	E77	Engine wiring harness
E77	10	Dark gray	A-3	E76	
★: White or natural color					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
T1	3	★	D-3		Torque converter turbine speed sensor 1
T3	8	Brown	D-2	B12	Bulkhead wiring harness
T4	20	★	D-3	B11	
T5	16	Green	D-3		Control valve assembly
T6	12	Green	D-3		
★: White or natural color					


1
2
3
4
5
A
B
C
D
E1
E2
E4
E5
E6
E10
E11
E14
E16
E17
E19
E24
E25
E28
E31
E32
E33
E34
E43
E44
E45
E46
E47
E48
E57
E61
E67
E68
E69
E70
E71
E72
E73
E74
E75
E76
E77
E8
GE
T1
T3
T4
T5
T6
< AT >
WI-08154

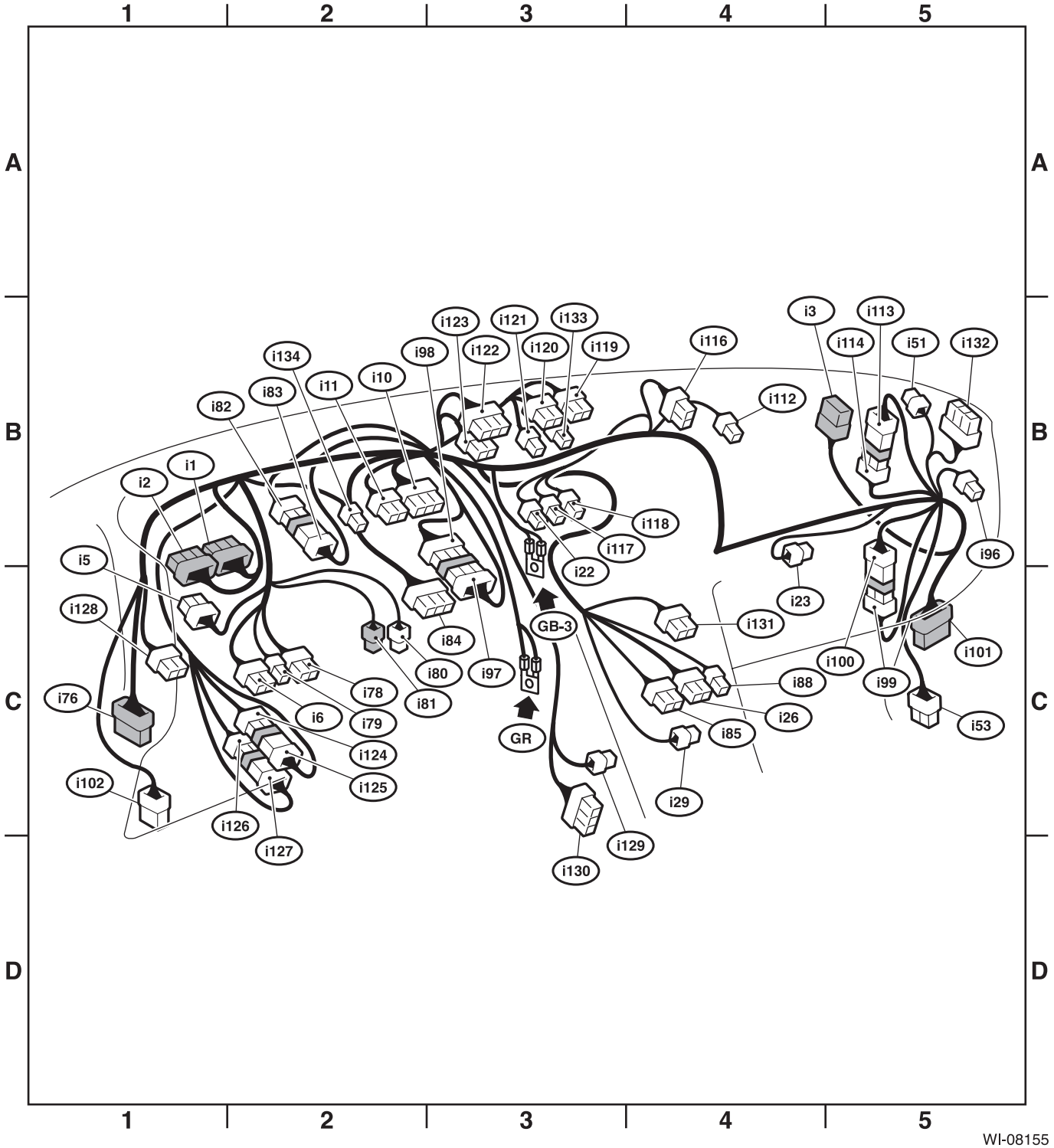
59.Instrument Panel Wiring Harness

A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
i1	28	Blue	B-1	B36	Bulkhead wiring harness
i2	25	★	B-1	B37	
i3	20	★	B-5	B38	
i5	20	★	C-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-3		Hazard switch
i23	2	★	B-4		Glove box illumination
i26	16	★	C-4		Audio
i29	1	Black	C-4		Audio bracket earth
i51	2	★	B-5		Sunload sensor
i53	22	Blue	C-5	R98	Rear wiring harness
i76	25	★	C-1	D83	Front door cord LH
i78	15	Blue	C-2		Push switch
i79	6	★	C-2		Illumination control module
i80	1	★	C-2		Diagnosis connector
i81	1	★	C-2		
i82	12	Blue	B-2		Joint connector
i83	12	Blue	B-2		
i84	35	Gray	B-3		Body integrated unit
i85	14	★	C-4		Audio
i88	8	Black	C-4		A/C control panel
i96	8	★	B-5		Keyless entry control module
i97	22	★	B-3		Joint connector
i98	22	★	B-3		
i99	12	Black	B-5		
i100	12	Black	B-5		
i101	25	★	C-5	D84	Front door cord RH
i102	20	Blue	C-1	R167	Rear wiring harness
i112	6	★	B-4		Joint connector
i113	12	★	B-5		
i114	12	★	B-5		
i116	10	Green	B-4		Warning box (Passenger's side)
i117	8	Black	B-3		MFD switch
i118	8	Black	B-3		Navigation system switch
i119	16	Black	B-3		TV monitor
i120	20	Black	B-3		
i121	8	Black	B-3		Navigation system switch
i122	22	Green	B-3		MFD
i123	14	Green	B-3		Warning box (Driver's side)
i124	12	Gray	C-2		Joint connector
i125	12	Gray	C-2		
i126	12	Black	C-1		
i127	12	Black	C-2		
i128	12	Blue	C-1		CAN joint connector
i129	8	★	C-3		Impact sensor

Instrument Panel Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
i130	22	★	C-3	R230	Rear wiring harness LH (CTR)
i131	20	Black	C-4		Audio unit
i132	22	★	B-5	R243	Roof harness
i133	5	Green	B-3		TV monitor (Rear entertainment)
i134	3	★	B-2		Turn signal hazard relay (Sound)
★: White or natural color					



60.Rear Wiring Harness

A: LOCATION

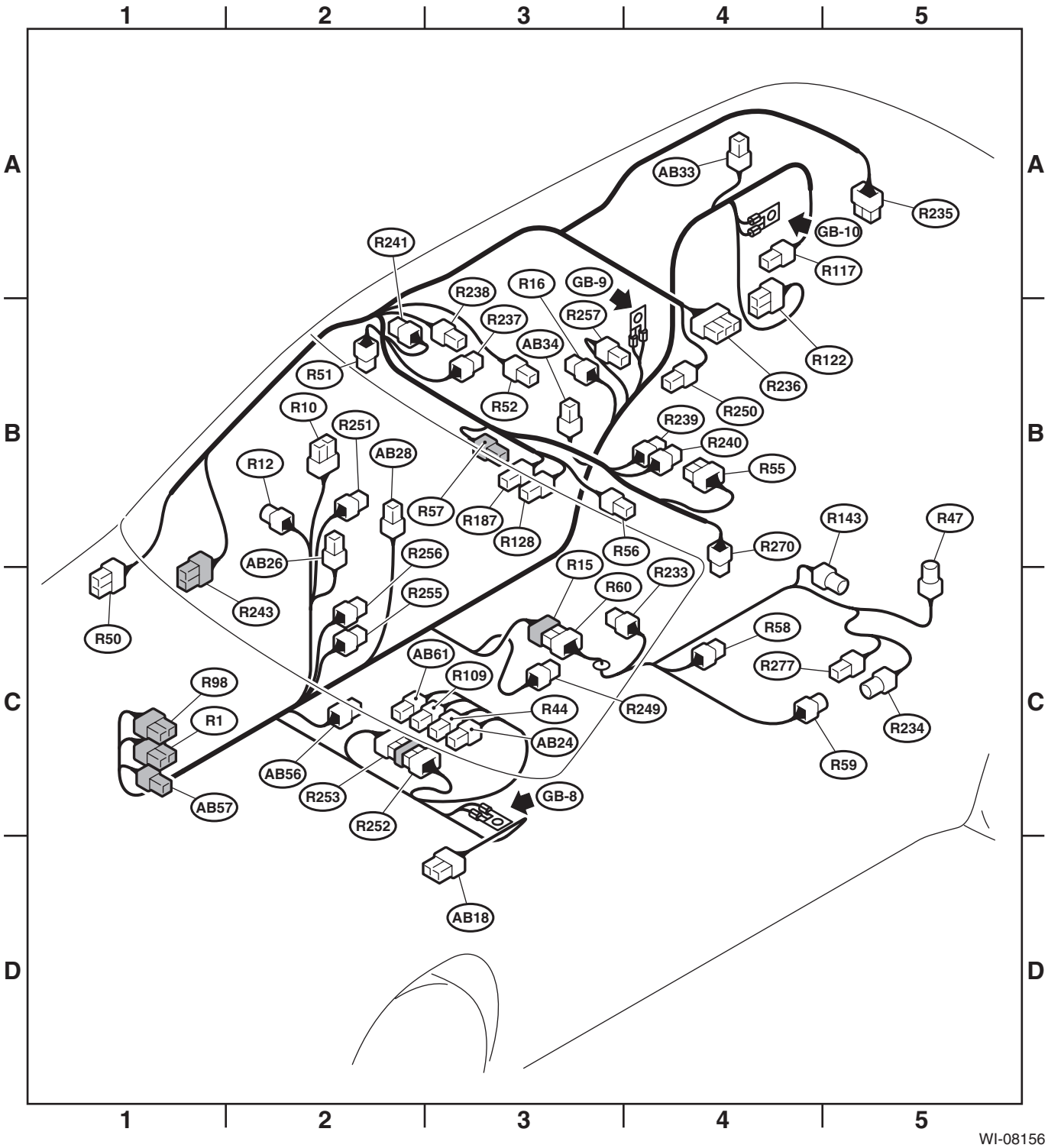
1. RIGHT HAND

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
R1	24	Black	C-1	B98	Bulkhead wiring harness
R10	10	★	B-3	D22	Rear door cord (Passenger's side)
R12	3	★	B-2		Front door switch RH
R15	14	★	C-3	R60	Fuel cord 1
R16	3	★	B-3		Rear door switch RH
R44	6	★	C-3		Seat heater & second-row seat foot light RH
R47	3	Black	C-5		Fuel tank pressure sensor
R50	12	★	C-1	B90	Bulkhead wiring harness
R51	2	Black	B-2		Vanity mirror illumination light RH
R52	3	★	B-3		Room light
R55	10	Gray	B-4		Sunroof control unit & motor
R56	6	Gray	B-3		Spot map light
R57	3	★	B-3		Rearview mirror
R58	6	Gray	C-4		Fuel gauge main unit
R59	2	★	C-4		Fuel gauge sub unit
R60	14	★	C-3	R15	Rear wiring harness
R98	22	Blue	C-1	i53	Instrument panel wiring harness
R109	2	Black	C-3		Power seat RH
R117	2	★	A-4		Super woofer
R122	10	Black	B-4		Fuel pump relay control unit
R128	5	★	B-3		Open/Close switch
R143	2	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 gear oil temperature switch
R235	10	★	A-5	R245	Tail harness
R236	24	★	B-4		Rear seat entertainment
R237	4	★	B-3		Joint connector
R238	4	★	B-3		
R239	4	★	B-4		
R240	4	★	B-4		
R241	4	★	B-2		
R243	22	★	C-1	i132	Instrument panel wiring harness
R249	2	Gray	C-3		Rear ABS wheel speed sensor RH
R250	3	★	B-4		Room light
R251	4	★	B-2		Joint connector
R252	12	Gray	C-2		
R253	12	Gray	C-2		
R255	4	★	C-2		
R256	4	★	C-2		
R257	2	★	B-3		Rear tweeter RH

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
R270	2	Black	B-4		Home link
R277	1	Black	C-5		Bracket earth (Rear differential gear oil temperature switch)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB18	20	Yellow	D-3		Airbag control module
AB24	2	Yellow	C-3		Inflator (Side) RH
AB26	2	Black	B-2		Pretensioner RH
AB28	4	Yellow	B-2		Side airbag sensor RH
AB33	2	Yellow	A-4		Inflator (Curtain) RH
AB34	4	Yellow	B-3		Curtain airbag sensor RH
AB56	3	Brown	C-2		Belt tensioner sensor
AB57	2	Yellow	C-1	AB55	Bulkhead harness
AB61	6	Gray	C-2	AB59	Occupant detection control module
★: White or natural color					

Rear Wiring Harness



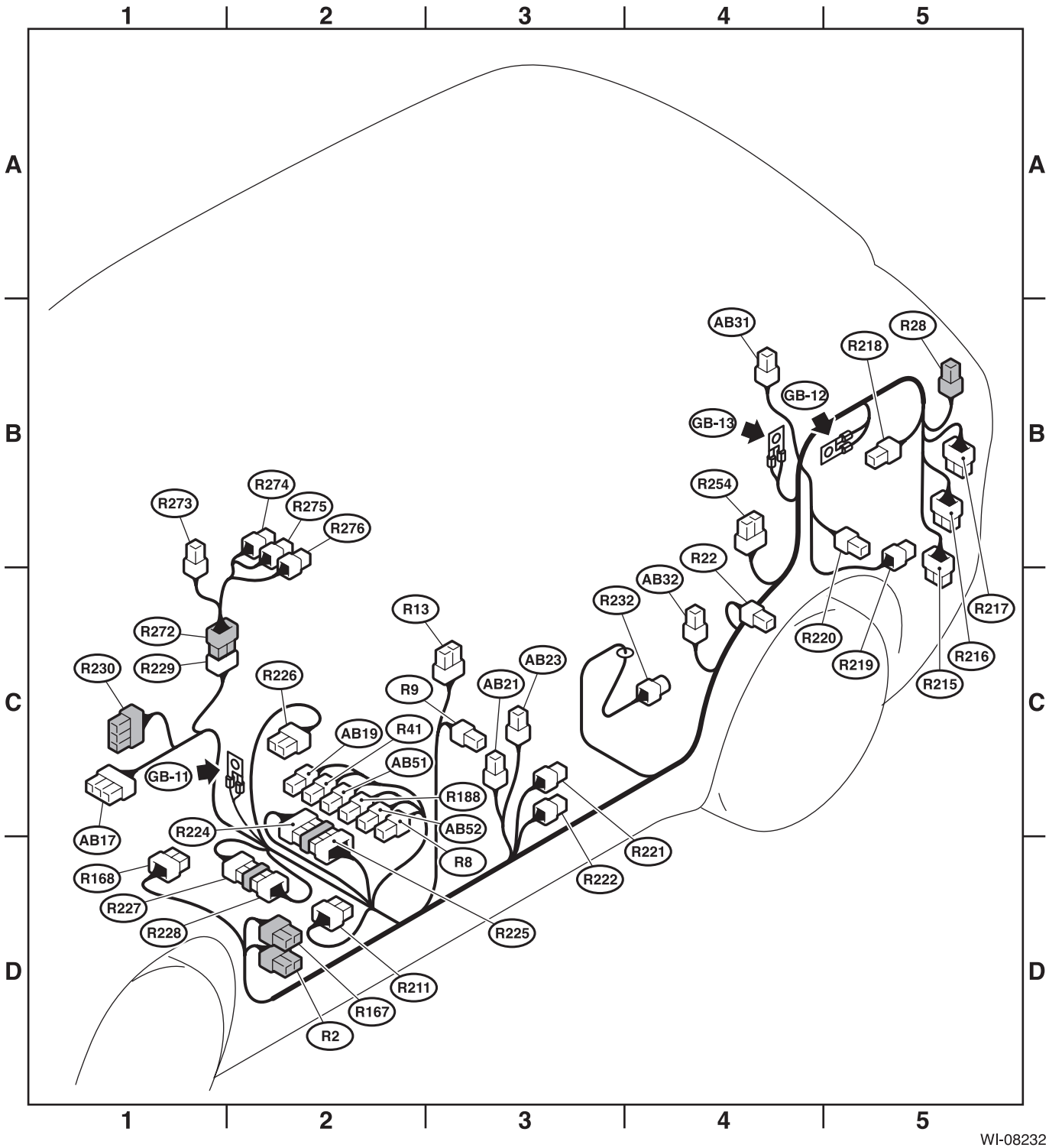
2. LEFT HAND

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
R2	20	Black	D-2	B98	Bulkhead wiring harness
R8	4	★	C-2		Front seat belt switch LH
R9	3	★	C-3		Front door cord switch LH
R13	10	★	C-3	D28	Rear door cord (Driver's side)
R22	3	★	C-4		Rear door switch LH
R28	4	★	B-5		Rear combination light LH
R41	6	★	C-2		Seat heater & second-row seat foot light LH
R167	20	Blue	D-2	i102	Instrument panel wiring harness (Driver's seat)
R168	20	★	D-1		Fuse & relay box (F/B)
R188	2	Black	C-2		Power seat LH
R211	12	★	D-2		TPM control module
R215	14	★	B-5	R247	Tail harness
R216	12	Black	B-5	R246	Tail harness (Joint connector)
R217	10	★	B-5	R248	Tail harness (Rear entertainment)
R218	4	★	B-5		Rear cooler relay
R219	4	★	B-5		Blower fan resistor
R220	2	★	B-5		Blower motor
R221	4	★	C-3		Joint connector
R222	4	★	C-3		
R224	12	★	D-2		
R225	12	★	D-2		
R226	10	Black	C-2		Navigation module
R227	12	★	D-2		Joint connector
R228	12	★	D-2		
R229	11	★	C-1	R272	Console pocket
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		Adapter code
R272	11	★	C-1	R229	Rear harness
R273	2	★	B-1		Cup holder illumination
R274	2	★	B-2		Front accessory power supply socket
R275	2	★	B-2		
R276	10	★	B-2		Blower fan switch

★: White or natural color

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB17	20	Yellow	C-1		Airbag control module
AB19	2	Yellow	C-2		Inflator (Side) LH
AB21	2	Black	C-3		Pretensioner LH
AB23	4	Yellow	C-3		Side airbag sensor LH
AB31	2	Yellow	B-4		Inflator (Curtain) LH
AB32	4	Yellow	C-4		Curtain airbag sensor LH
AB51	2	Yellow	C-2		Buckle switch
AB52	2	Yellow	C-2		Seat position sensor LH

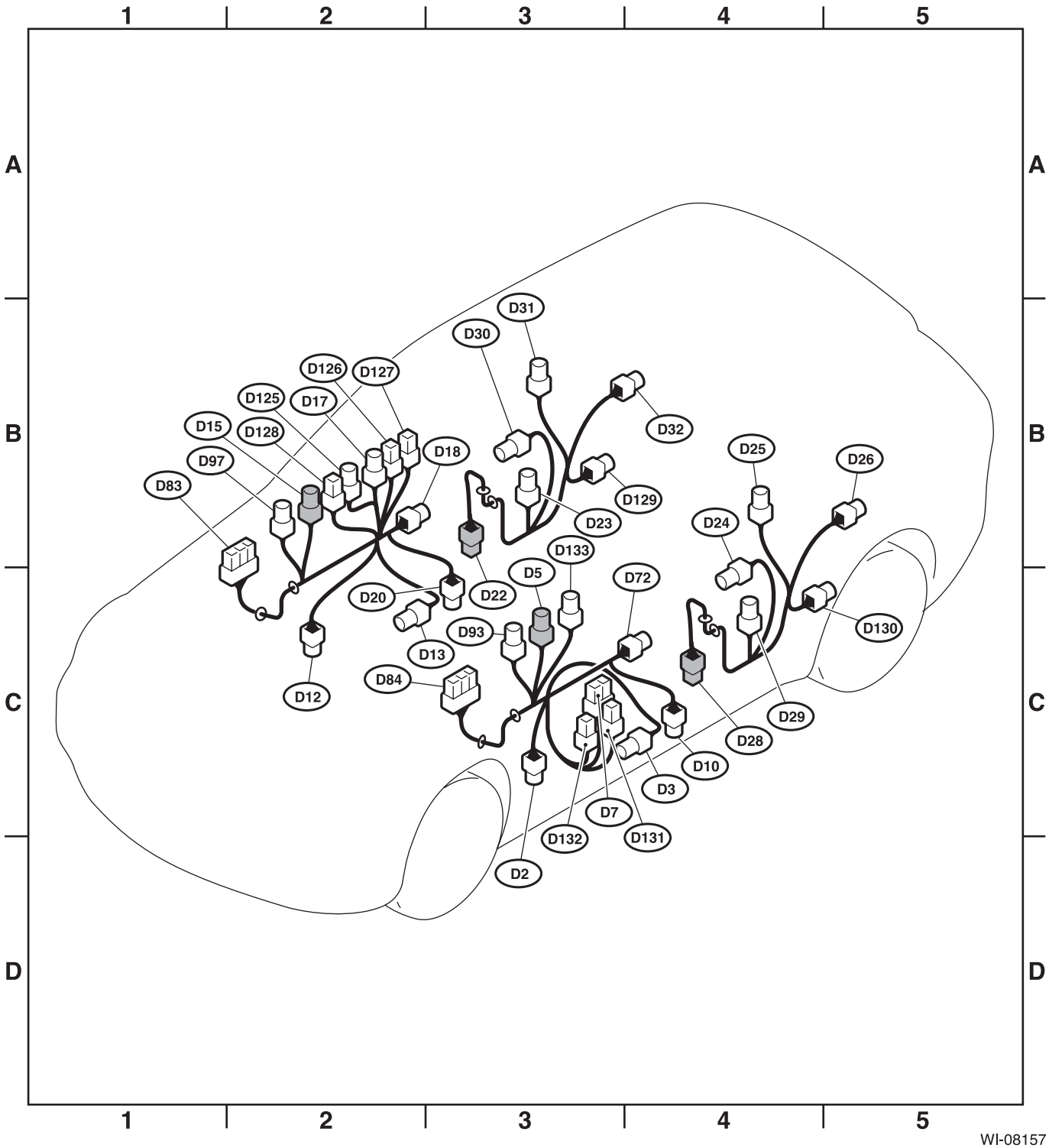
Rear Wiring Harness



61.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
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
D17	8	★	B-2		Front power window sub switch RH
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
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
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
D83	25	★	B-2	i76	Instrument panel wiring harness
D84	25	★	C-3	i101	
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	6	★	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					


1
2
3
4
5
A
B
C
D
D31
D30
D126
D127
D125
D17
D15
D128
D97
D83
D18
D32
D129
D23
D25
D26
D24
D133
D5
D72
D20
D22
D93
D13
D84
D12
D130
D29
D28
D10
D3
D7
D132
D131
D2
WI-08157

62.Rear Wiring Harness and Rear Gate Cord

A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
D33	12	Gray	C-4	R38	Rear wiring harness
D34	2	★	C-4	R37	
D35	10	★	C-4	R39	
D37	3	★	B-3		Luggage room light
D39	2	★	B-3		High-mounted stop light
D43	4	★	B-4		Rear wiper motor
D44	2	★	B-4		License plate light LH
D87	2	★	B-5		Back-up light RH
D89	2	★	B-5		Rear defogger
D91	2	★	B-3		Back-up light LH
D134	2	Gray	B-3		Tail light LH
D135	2	★	B-4		Rear gate release switch
D136	1	★	B-3		Antenna amplifier
D137	2	★	B-4		Licence plate light RH
D138	3	★	B-5		Gate light
D139	2	Gray	B-5		Tail light RH
D140	4	★	A-4		Rear gate release actuator & door switch
D141	4	★	B-4		Joint connector
★: 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	Gray	C-4	D33	
R39	10	★	C-4	D35	
R79	6	★	D-3		Trailer connector
R215	14	★	B-5	R247	Tail harness
R216	12	Black	B-5	R246	Tail harness (Joint connector)
R217	10	★	B-5	R248	Tail harness (Rear entertainment)
R235	10	★	A-5	R245	Tail harness
R245	10	★	C-4	R235	Roof code (Rear entertainment)
R246	12	Black	C-2	R216	Rear wiring harness (Joint connector)
R247	14	★	C-1	R215	Rear wiring harness
R248	10	★	C-2	R217	
★: White or natural color					

Rear Wiring Harness and Rear Gate Cord

