

GENERAL DESCRIPTION

CONTROL SYSTEMS

1. General Description

A: SPECIFICATIONS

Item	Specification
Swing torque of rod against MT gear shift lever N (kgf, lb)	3.7 (0.38, 0.84) or less

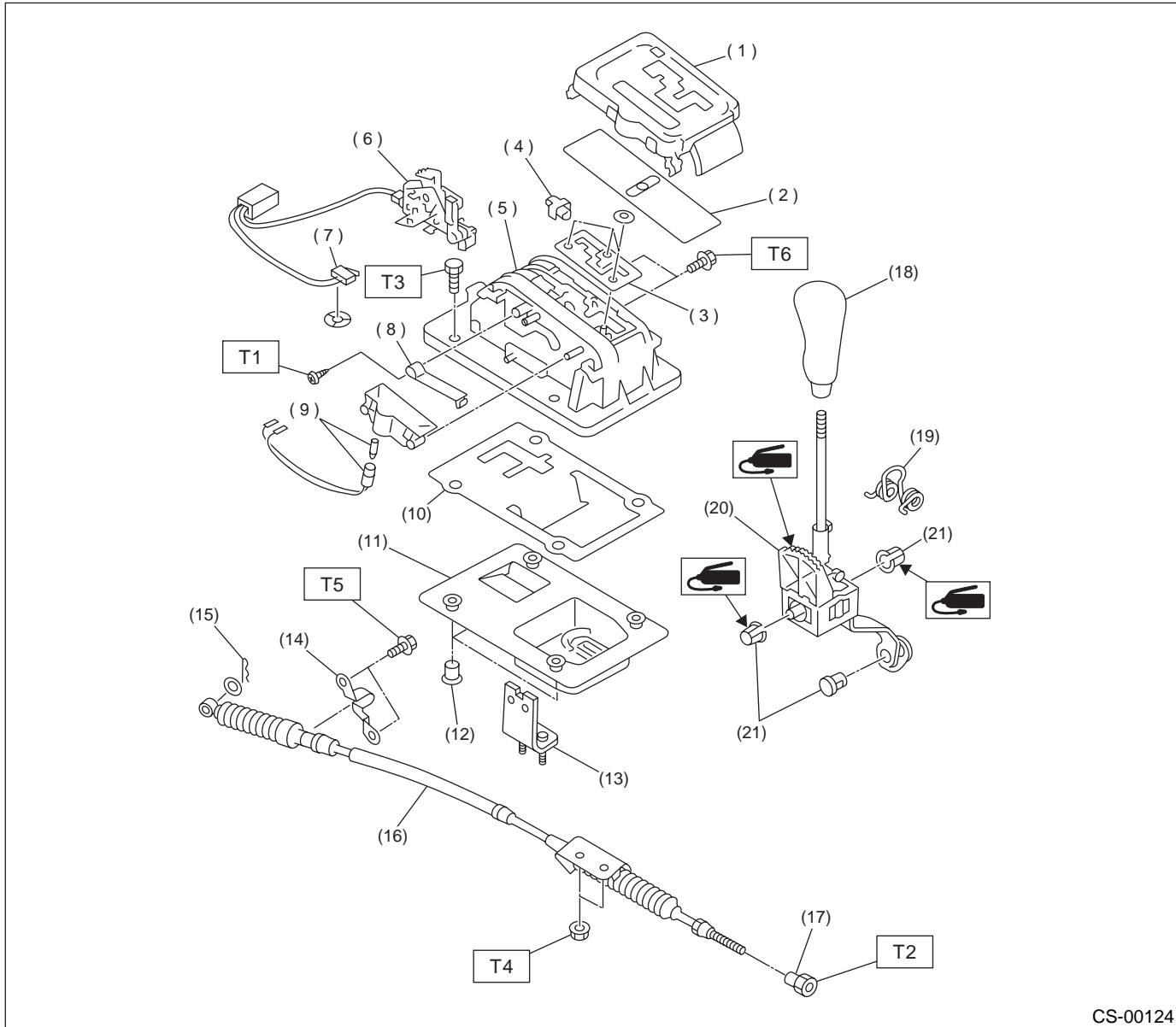
CS-2

GENERAL DESCRIPTION

CONTROL SYSTEMS

B: COMPONENT

1. AT SELECT LEVER (EXCEPT SPORT SHIFT MODEL)



CS-00124

- | | | |
|-------------------------|------------------------|--------------|
| (1) Indicator cover | (11) Rubber boot | (21) Bushing |
| (2) Slider | (12) Washer | |
| (3) Pattern plate | (13) Cable bracket | |
| (4) Stopper | (14) Cable clamp | |
| (5) Frame | (15) Snap pin | |
| (6) Solenoid ASSY | (16) Outer cable | |
| (7) "P" position switch | (17) Nut | |
| (8) Detent spring | (18) Grip | |
| (9) Illumination bulb | (19) Spring | |
| (10) Plate | (20) Select lever ASSY | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 4.9 (0.50, 3.6)

T2: 7.5 (0.76, 5.5)

T3: 13 (1.3, 9.4)

T4: 18 (1.8, 13.0)

T5: 33 (3.4, 25)

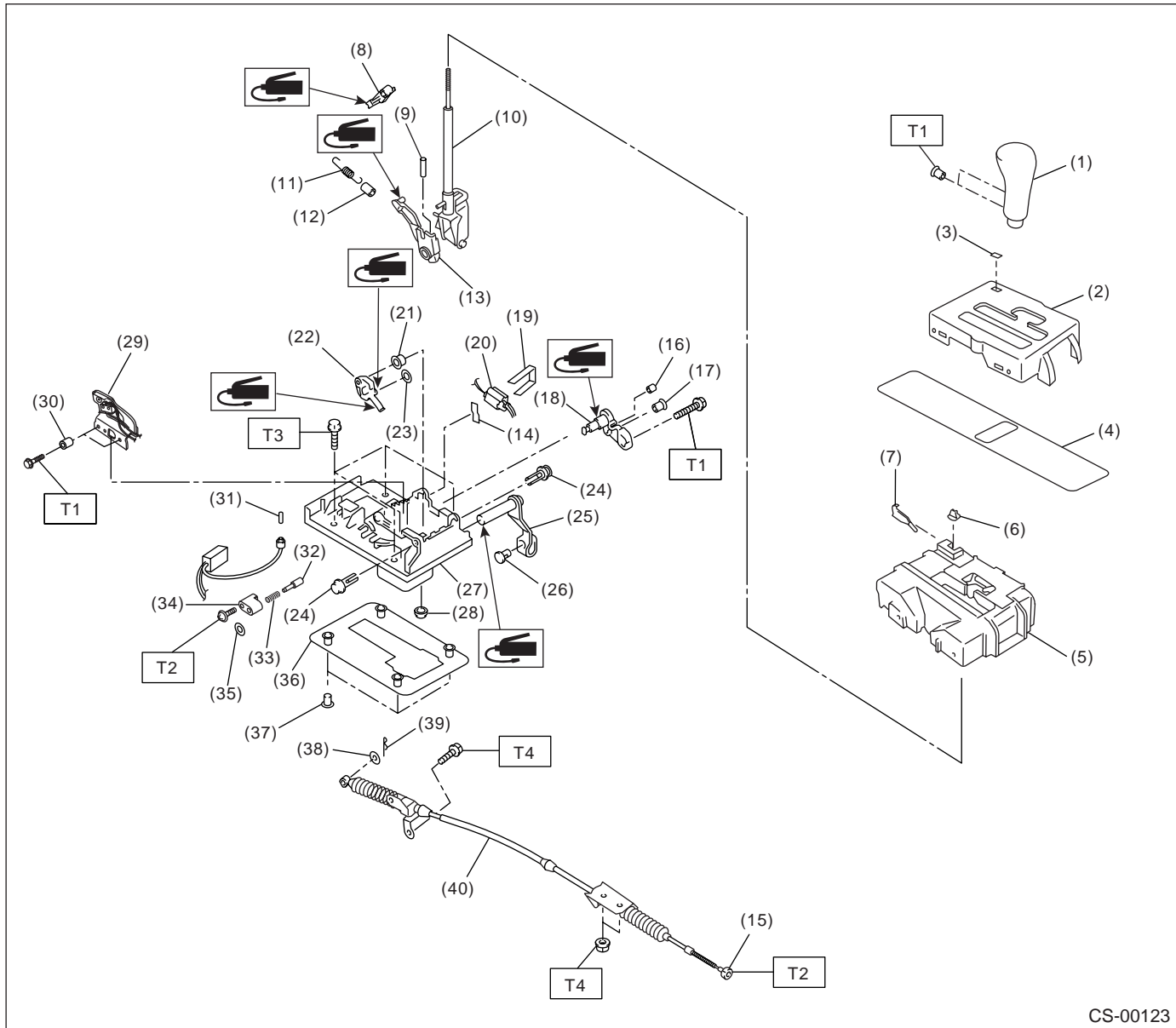
T6: 51 (5.2, 38)

CS-3

GENERAL DESCRIPTION

CONTROL SYSTEMS

2. AT SELECT LEVER (SPORT SHIFT MODEL)



CS-00123

- | | | |
|--------------------|--------------------------|-------------------|
| (1) Grip | (16) Bushing | (31) Bulb |
| (2) Cover | (17) Bushing | (32) Rod |
| (3) Cover | (18) Lock plate B | (33) Spring |
| (4) Blind | (19) Clamp | (34) Bushing |
| (5) Guide plate | (20) Shift lock solenoid | (35) Clip |
| (6) Button | (21) Bushing | (36) Packing |
| (7) Spring | (22) Lock plate A | (37) Spacer |
| (8) Detent arm | (23) Spacer | (38) Washer |
| (9) Spring pin | (24) Clip | (39) Snap pin |
| (10) Lever | (25) Arm | (40) Select cable |
| (11) Detent spring | (26) Bushing COMPL | |
| (12) Tube | (27) Base plate | |
| (13) Arm bracket | (28) Grommet | |
| (14) Cushion | (29) Bracket guide COMPL | |
| (15) Nut A | (30) Spacer | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 2.0 (0.2, 1.4)

T2: 7.5 (0.76, 5.5)

T3: 13 (1.3, 9.4)

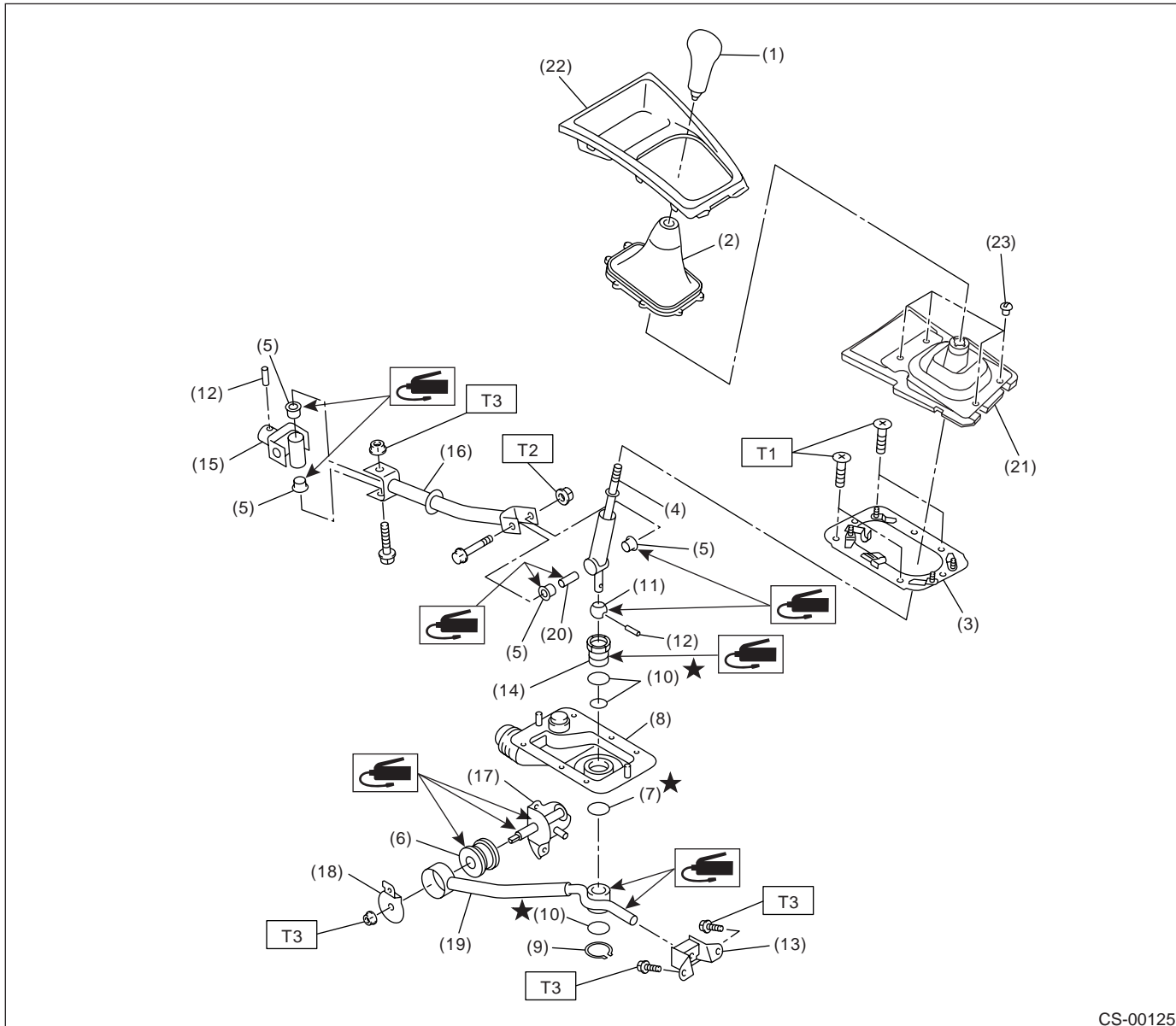
T4: 18 (1.8, 13.0)

CS-4

GENERAL DESCRIPTION

CONTROL SYSTEMS

3. MT GEAR SHIFT LEVER



CS-00125

- | | | |
|---------------------|---------------------|------------------------------|
| (1) Gear shift knob | (10) O-ring | (19) Stay |
| (2) Console boot | (11) Bushing A | (20) Spacer |
| (3) Plate COMPL | (12) Spring pin | (21) Boot and insulator ASSY |
| (4) Lever | (13) Cushion rubber | (22) Front cover |
| (5) Bushing | (14) Bushing B | (23) Clamp |
| (6) Bushing | (15) Joint | |
| (7) Lock wire | (16) Rod | |
| (8) Boot | (17) Bracket | |
| (9) Snap ring | (18) Washer | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 7.5 (0.76, 5.5)

T2: 12 (1.2, 8.7)

T3: 18 (1.8, 13.0)

CS-5

GENERAL DESCRIPTION

CONTROL SYSTEMS

C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Before disconnecting electrical connectors, be sure to disconnect the ground cable from battery.

CS-6

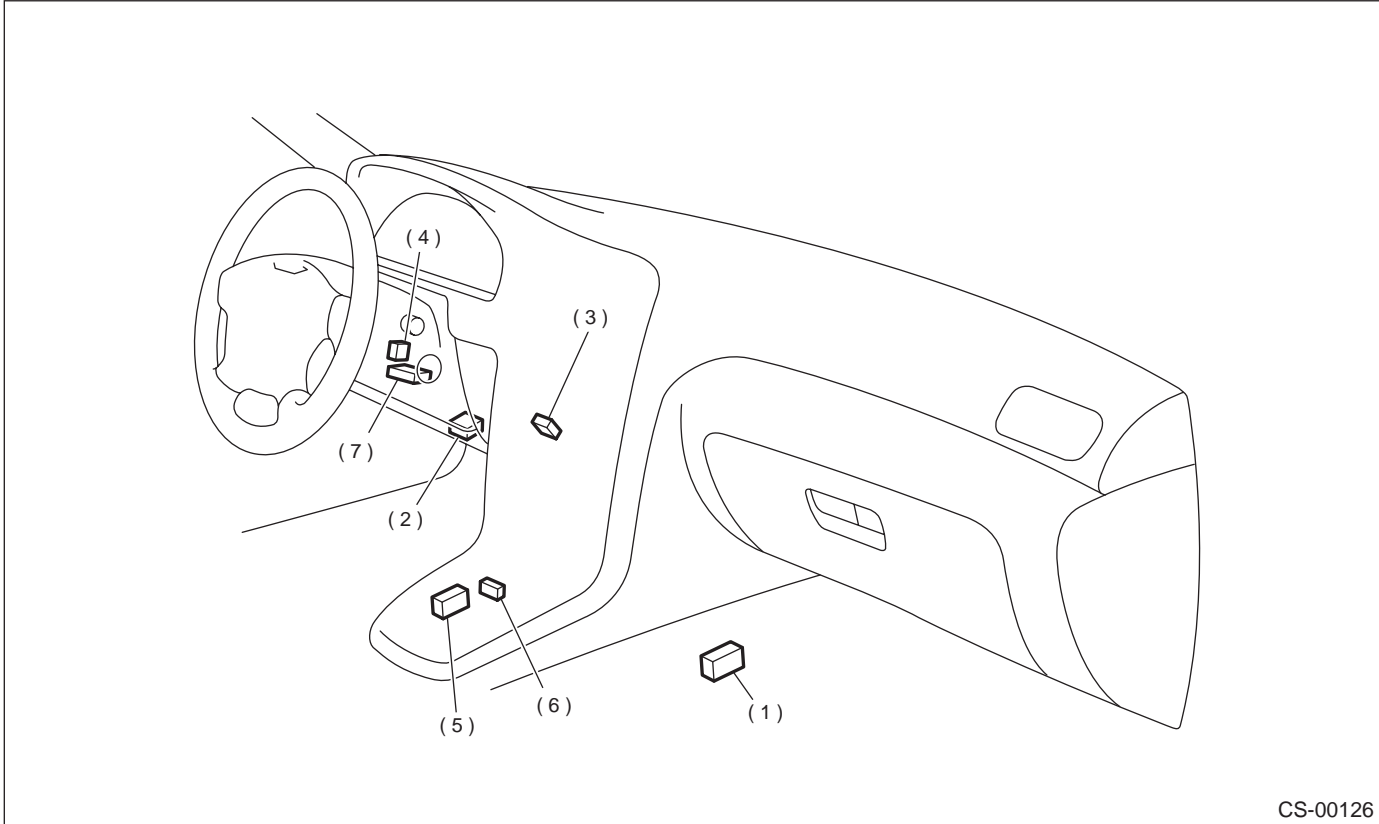
Vehicle-id:
SIE-id::C:CAUTION

ELECTRICAL COMPONENT

CONTROL SYSTEMS

2. Electrical Component

A: LOCATION



- (1) Inhibitor switch
- (2) Integrated module
- (3) Stop light switch

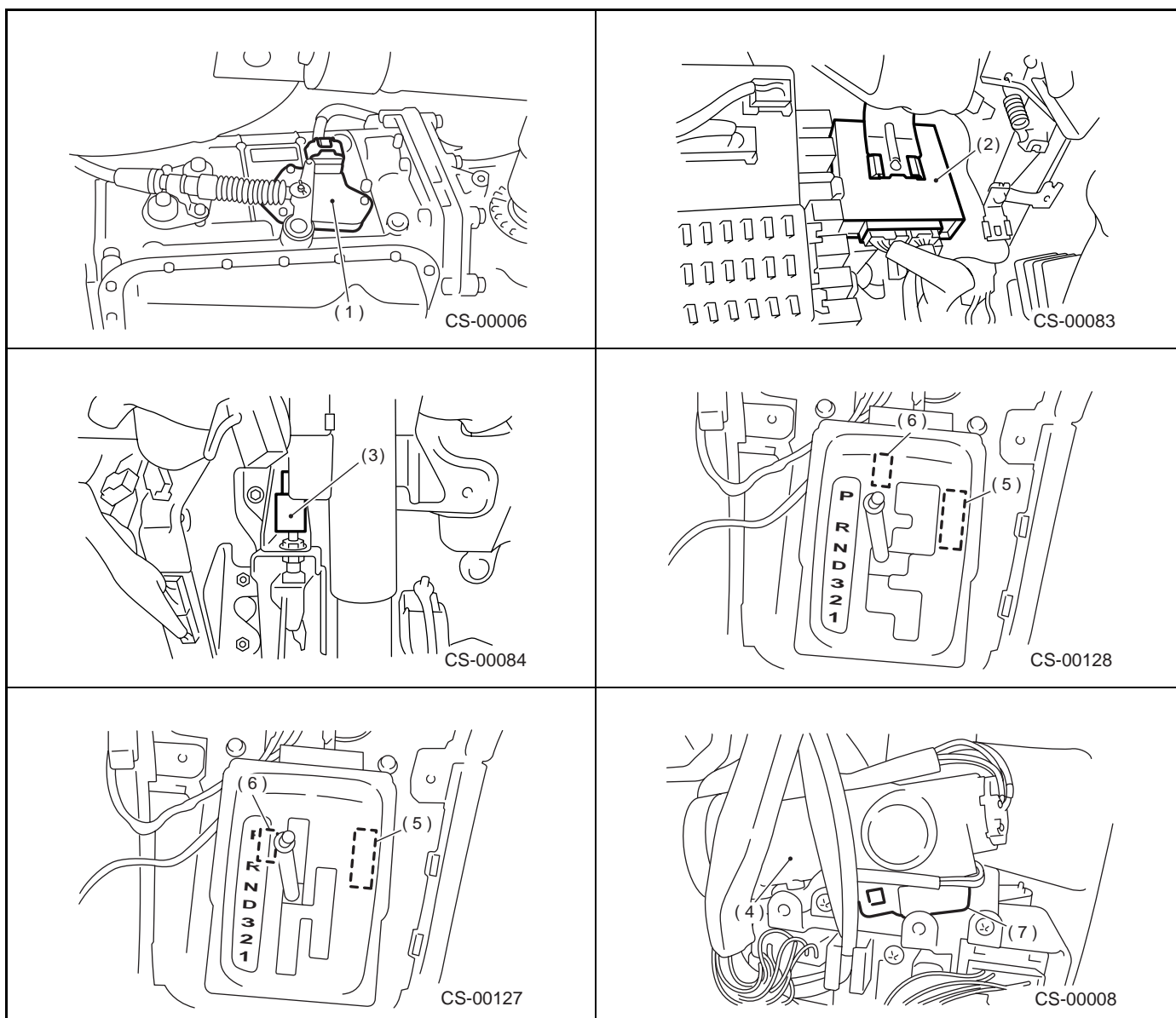
- (4) Key warning switch
- (5) Shift lock solenoid
- (6) "P" position switch

- (7) Key lock solenoid

CS-7

ELECTRICAL COMPONENT

CONTROL SYSTEMS



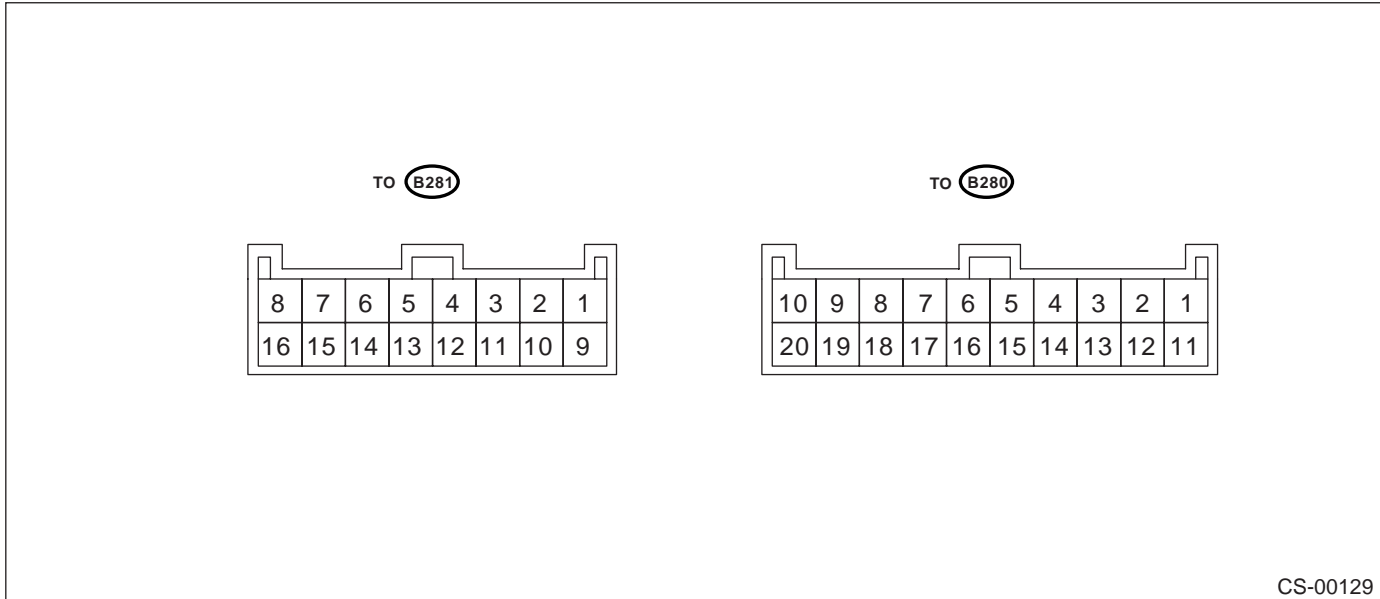
CS-8

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

3. AT Shift Lock System

A: ELECTRICAL SPECIFICATION



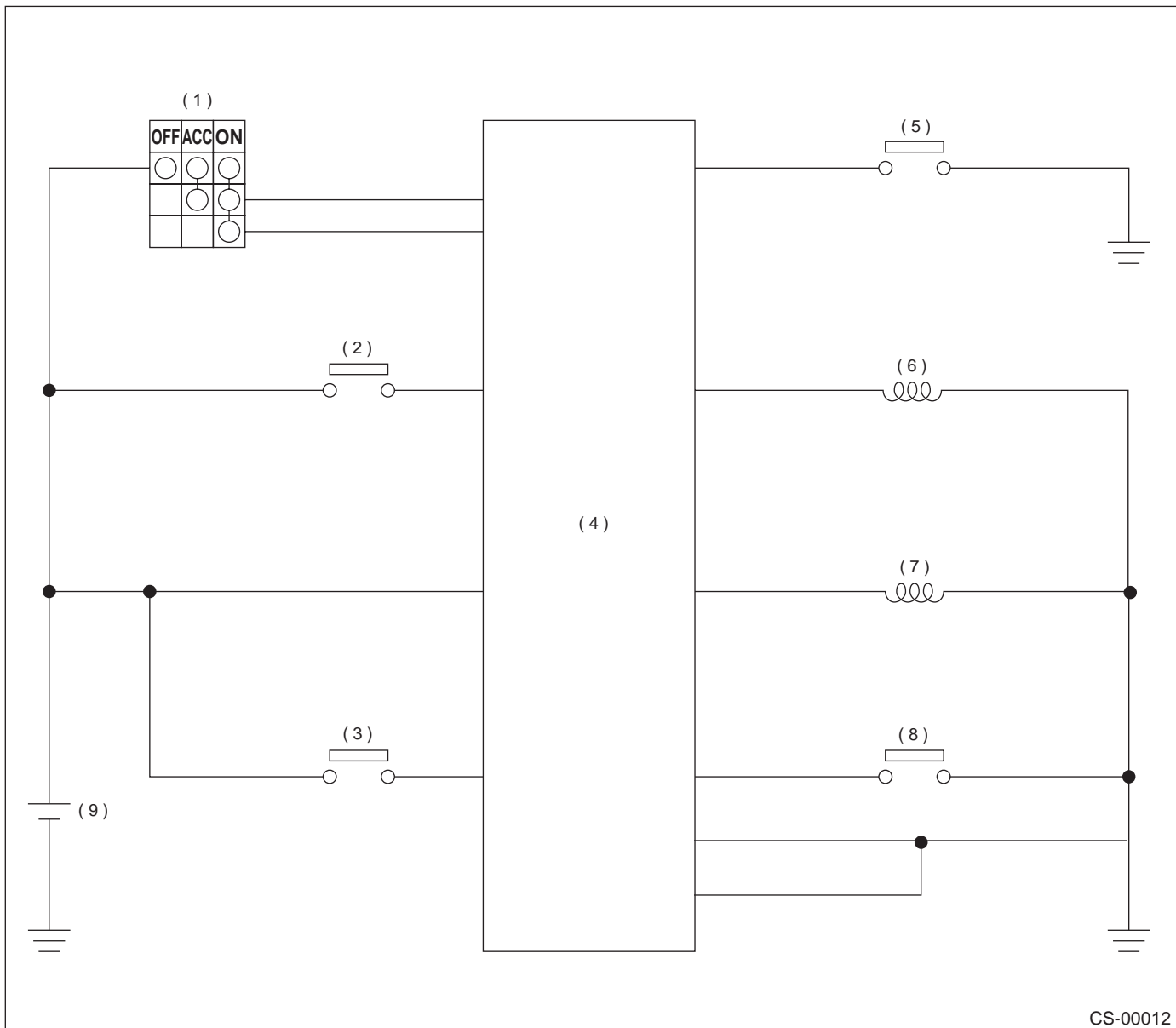
Contents	To Connector No.	Terminal No.	Input/Output signal
			Measured value and measuring conditions
Battery power supply	B281	2	9 — 16 V
Ignition power supply	B280	19	10 — 15 V when ignition switch is at ON or START.
ACC power supply	B280	10	10 — 15 V when ignition switch is at ACC or ON.
Inhibitor Switch ("P" position)	B280	5	0 V when select lever is in "P" position. 9 — 16 V when select lever is in other positions than "P" position.
Stop light switch	B280	9	9 — 16 V when stop light switch is ON. 0 V when stop light switch is OFF.
"P" position switch	B280	6	0 V when select lever is in "P" position. 9 — 16 V when select lever is in other positions than "P" position.
Shift lock solenoid signal	B281	9	8.5 — 16 V when shift lock is released. 0 V when shift lock is operating.
Key warning switch signal	B280	20	9 — 16 V when key is inserted. 0 V when key is removed.
Key lock solenoid signal	B281	3	Pulse is output when switching key lock between locked and unlocked. 0 V at other conditions than above.
Ground	B281	4	—
Ground	B281	13	—

CS-9

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

B: SCHEMATIC



- (1) Ignition switch
- (2) Stop light switch
- (3) Key warning switch

- (4) Integrated module
- (5) Inhibitor switch
- (6) Key lock solenoid

- (7) Shift lock solenoid
- (8) "P" position switch
- (9) Battery

CS-10

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

C: INSPECTION

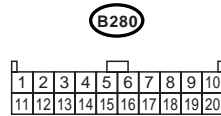
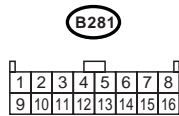
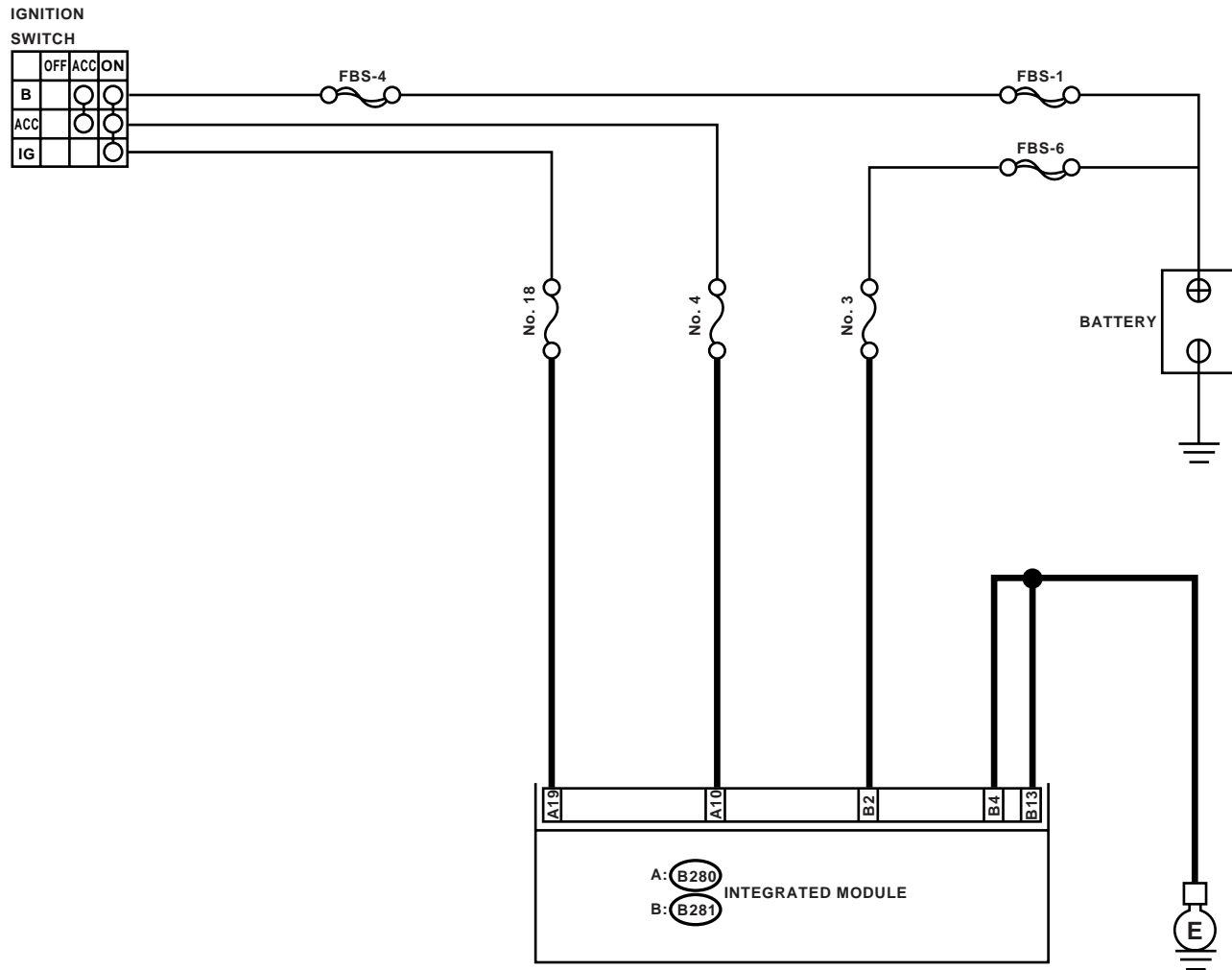
Step	Value	Yes	No
1 CHECK SHIFT LOCK. 1) Turn the ignition switch ON. 2) Move the select lever to "P" position. While the brake pedal is depressed, can select lever move from "P" range to other positions?	Select lever can be moved.	Go to step 2.	Inspect "SELECT LEVER SHIFT LOCK CANNOT BE RELEASED". <Ref. to CS-18, SELECT LEVER SHIFT LOCK CANNOT BE RELEASED, INSPECTION, AT Shift Lock System.>
2 CHECK SHIFT LOCK. While the brake pedal is not depressed, can select lever move from "P" range to other positions?	Select lever can be moved.	Inspect "SELECT LEVER CANNOT BE SHIFT LOCKED". <Ref. to CS-14, SELECT LEVER CANNOT BE SHIFT LOCKED, INSPECTION, AT Shift Lock System.>	Go to step 3.
3 CHECK KEY INTERLOCK. When the select lever is in other than "P" position, does ignition switch turn to "LOCK" position?	Ignition switch can be turned to LOCK.	Inspect "KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED". <Ref. to CS-18, SELECT LEVER SHIFT LOCK CANNOT BE RELEASED, INSPECTION, AT Shift Lock System.>	Go to step 4.
4 CHECK KEY INTERLOCK. When the select lever is in "P" position, does ignition switch turn to "LOCK" position?	Ignition switch can be turned to LOCK.	AT shift lock system is normal.	Inspect "KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED". <Ref. to CS-18, SELECT LEVER SHIFT LOCK CANNOT BE RELEASED, INSPECTION, AT Shift Lock System.>

CS-11

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

1. INTEGRATED MODULE POWER SUPPLY AND GROUND LINE WIRING DIAGRAM:



CS-00130

CS-12

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Value	Yes	No
1 CHECK FUSE. Remove the fuse (No. 3, 4 and 18). Is the fuse (No. 3, 4 or 18) blown out?	Fuse is blown out.	Replace the fuse (No. 3, 4 or 18). If the replaced fuse (No. 3, 4 or 18) has blown out easily, repair short circuit in harness between fuse and integrated module.	Go to step 2.
2 CHECK HARNESS CONNECTOR BETWEEN INTEGRATED MODULE AND BODY GROUND. 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between integrated module and chassis ground. Connector & terminal (B281) No. 4 — Chassis ground: (B281) No. 13 — Chassis ground: Is the measured value less than specified value?	1 Ω	Go to step 3.	Repair the open circuit in harness between integrated module and body ground.
3 CHECK BATTERY POWER SUPPLY. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltages between integrated module and chassis ground. Connector & terminal (B281) No. 2 (+) — Chassis ground (-): Is the measured value more than specified value?	9 V	Go to step 4.	Repair the open circuit harness between battery and integrated module, and poor contact in coupling connector.
4 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ACC. 2) Measure the voltage between integrated module and chassis ground. Connector & terminal (B280) No. 10 (+) — Chassis ground (-): Is the measured value more than specified value?	9 V	Go to step 5.	Repair the open circuit harness between battery and integrated module, and poor contact in coupling connector.
5 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltage between integrated module and chassis ground. Connector & terminal (B280) No. 19 (+) — Chassis ground (-): Is the measured value more than specified value?	9 V	Go to step 6.	Repair the open circuit harness between battery and integrated module, and poor contact in coupling connector.
6 CHECK POOR CONTACT. Is there poor contact in power supply and ground line circuit?	Poor contact in connector.	Repair the poor contact.	Replace the integrated module.

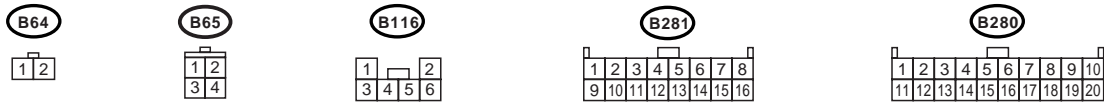
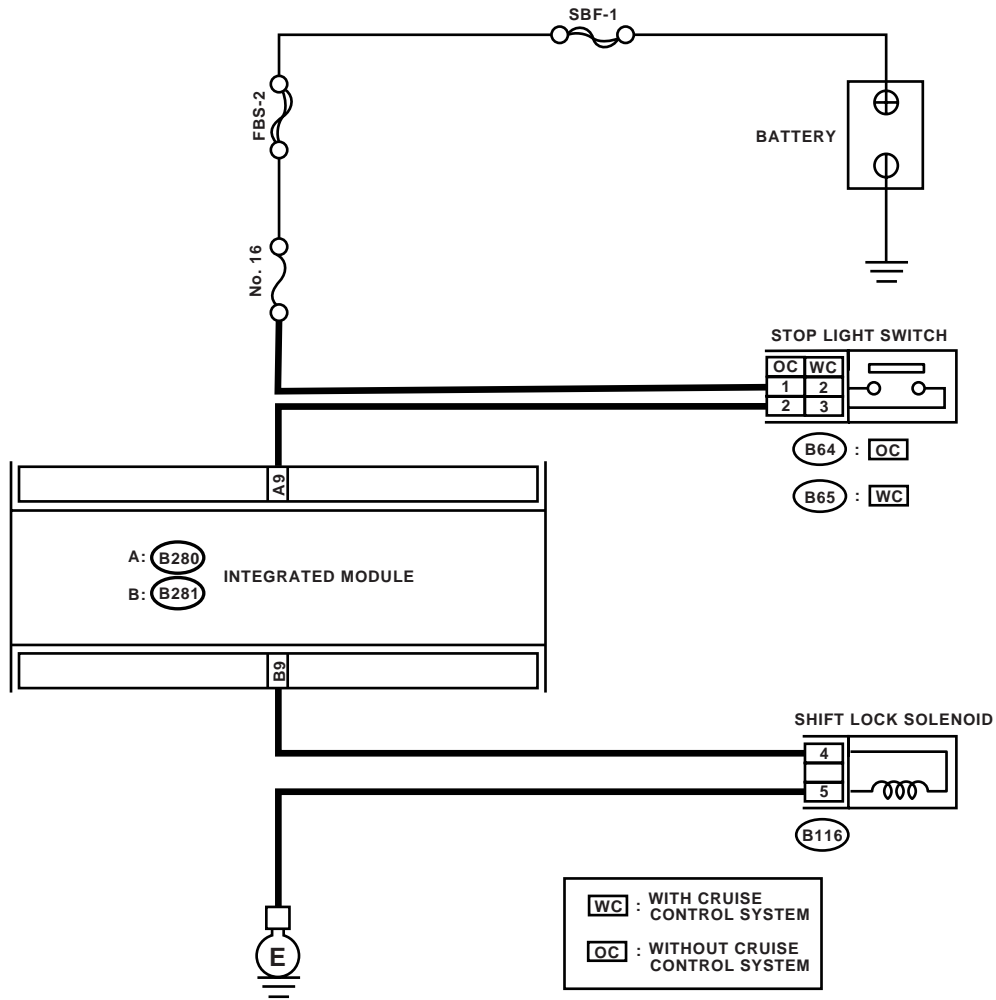
CS-13

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

2. SELECT LEVER CANNOT BE SHIFT LOCKED

WIRING DIAGRAM:



CS-00131

CS-14

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Value	Yes	No
1 CHECK STOP LIGHT SWITCH. Depress the brake pedal. Does the stop light turn on?	Stop light turns on.	Go to step 2.	Inspect the stop light system.
2 CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND INTEGRATED MODULE. 1) Turn the ignition switch to OFF. 2) Disconnect the integrated module and stop light switch connector. 3) Measure the resistance of harness between stop light switch and integrated module. Connector & terminal <i>Without cruise control system</i> (B64) No. 2 — (B280) No. 9: <i>With cruise control system</i> (B65) No. 3 — (B280) No. 9: Is the measured value more than specified value?	1 M Ω	Repair the open circuit in harness between integrated module and stop light switch.	Go to step 3.
3 CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND INTEGRATED MODULE. Measure the resistance of harness between stop light switch and chassis ground. Connector & terminal <i>Without cruise control system</i> (B64) No. 2 — Chassis ground: <i>With cruise control system</i> (B65) No. 3 — Chassis ground: Is the measured value less than specified value?	1 Ω	Repair the short circuit in harness between integrated module and stop light switch.	Go to step 4.
4 CHECK HARNESS BETWEEN INTEGRATED MODULE AND SHIFT LOCK SOLENOID. 1) Disconnect the shift lock solenoid connector. 2) Measure the resistance of harness between integrated module and shift lock solenoid. Connector & terminal (B117) No. 4 — (B281) No. 9: Is the measured value more than specified value?	1 M Ω	Repair the open circuit in harness between integrated module and shift lock solenoid.	Go to step 5.
5 CHECK HARNESS BETWEEN INTEGRATED MODULE AND SHIFT LOCK SOLENOID. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B116) No. 4 — Chassis ground: Is the measured value less than specified value?	1 Ω	Repair the short circuit in harness between integrated module and shift lock solenoid.	Go to step 6.
6 CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B116) No. 5 — Chassis ground: Is the measured value more than specified value?	1 M Ω	Repair the open circuit in harness between shift lock solenoid and body ground.	Go to step 7.

CS-15

AT SHIFT LOCK SYSTEM**CONTROL SYSTEMS**

	Step	Value	Yes	No
7	CHECK SHIFT LOCK SOLENOID. Measure the resistance of shift lock solenoid connector terminals. Terminal No. 4 — No. 5: Is the measured value within specified value?	20 — 40 Ω	Go to step 8 .	Replace the shift lock solenoid.
8	CHECK SHIFT LOCK SOLENOID. Connect the battery with shift lock solenoid connector terminal and operate solenoid. Terminal No. 4 (+) — No. 5 (-): Does the shift lock solenoid operate properly?	Shift lock solenoid operates.	Go to step 9 .	Replace the shift lock solenoid.
9	CHECK POOR CONTACT. Is there poor contact in key lock circuit?	Poor contact in connector.	Repair the poor contact.	Replace the integrated module.

CS-16

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

MEMO:

CS-17

Vehicle-id:
SIE-id::C:INSPECTION

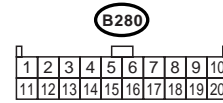
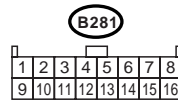
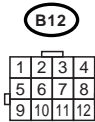
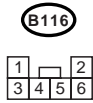
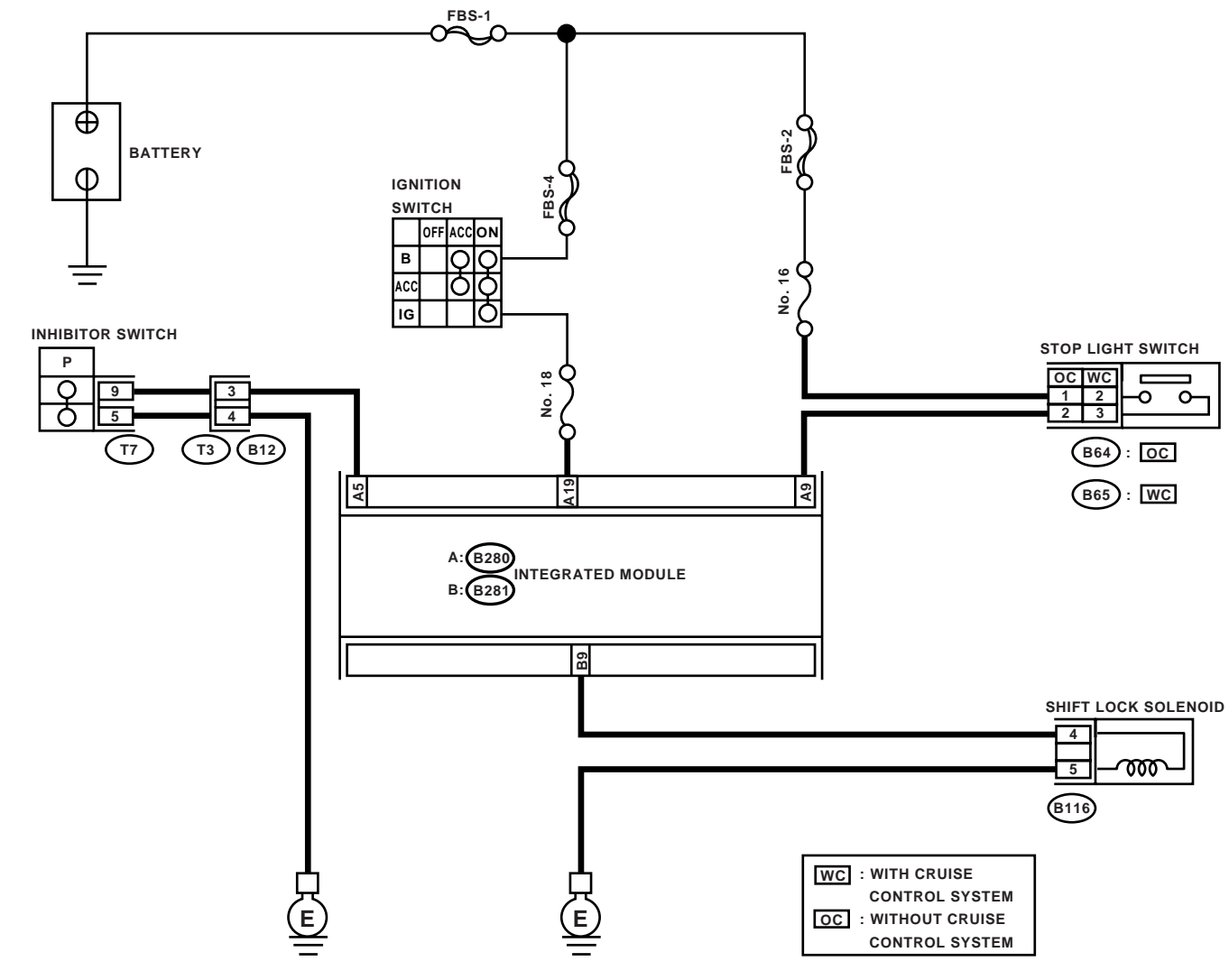
~

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

3. SELECT LEVER SHIFT LOCK CANNOT BE RELEASED

WIRING DIAGRAM:



CS-00132

CS-18

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Value	Yes	No
1 CHECK INHIBITOR SWITCH. 1) Turn the ignition switch to ON (engine OFF). 2) Move the select lever from "P" to "1" range. Are combination meter indicator light and select lever "P", "R", "N", "3", "2" and "1" correctly matched?	Select lever and indicator light correctly match.	Go to step 2.	Adjust the inhibitor switch and select cable.
2 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltage between integrated module and chassis ground. Connector & terminal (B280) No. 19 (+) — Chassis ground (-): Is the measured value more than specified value?	9 V	Go to step 3.	Repair the open circuit harness between battery and integrated module, and poor contact in coupling connector.
3 CHECK HARNESS BETWEEN INHIBITOR SWITCH AND INTEGRATED MODULE. 1) Turn the ignition switch to OFF. 2) Disconnect the connector of transmission harness and integrated module. 3) Measure the resistance of harness between integrated module and chassis ground. Connector & terminal (B281) No. 5 — Chassis ground: Is the measured value less than specified value?	1 Ω	Repair the short circuit in harness between integrated module and transmission connector.	Go to step 4.
4 CHECK HARNESS BETWEEN INHIBITOR SWITCH AND INTEGRATED MODULE. Measure the resistance of harness between integrated module and inhibitor switch. Connector & terminal (B12) No. 3 — (B280) No. 5: Is the measured value more than specified value?	1 M Ω	Repair the open circuit in harness between integrated module and transmission connector	Go to step 5.
5 CHECK HARNESS BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND. Measure the resistance of harness between integrated module and chassis ground. Connector & terminal (B12) No. 4 — Chassis ground: Is the measured value less than specified value?	1 Ω	Go to step 6.	Repair the open circuit in harness between integrated module and chassis ground.
6 CHECK INHIBITOR SWITCH. 1) Move the select lever to "P" position. 2) Measure the resistance of transmission harness connector terminals. Connector & terminal (T3) No. 3 — No. 4: Is the measured value more than specified value?	1 M Ω	Repair or replace the inhibitor switch.	Go to step 7.

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Value	Yes	No
7 CHECK OUTPUT SIGNAL FOR INTEGRATED MODULE. 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between integrated module and chassis ground. Connector & terminal (B280) No. 5 (+) — Chassis ground (-): Is the measured value within specified value?	9 — 16 V	Go to step 8.	Go to step 16.
8 CHECK STOP LIGHT SWITCH. Depress the brake pedal. Does the stop light turn on?	Stop light turns on.	Go to step 9.	Inspect the stop light system.
9 CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE. 1) Depress the brake pedal. 2) Measure the voltage between integrated module and chassis ground. Connector & terminal (B280) No. 9 (+) — Chassis ground (-): Is the measured value more than specified value?	9 V	Go to step 10.	Repair the open or short circuit in harness between integrated module and stop light switch.
10 CHECK HARNESS BETWEEN INTEGRATED MODULE AND SHIFT LOCK SOLENOID. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from shift lock solenoid and integrated module. 3) Measure the resistance of harness between integrated module and shift lock solenoid. Connector & terminal (B281) No. 9 — (B117) No. 4: Is the measured value more than specified value?	1 M Ω	Repair the open circuit in harness between integrated module and shift lock solenoid.	Go to step 11.
11 CHECK HARNESS BETWEEN INTEGRATED MODULE AND SHIFT LOCK SOLENOID. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B281) No. 9 — Chassis ground: Is the measured value less than specified value?	10 Ω	Go to step 12.	Repair the short circuit in harness between integrated module and shift lock solenoid.
12 CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND. Measure the resistance of harness between shift lock solenoid and chassis ground. Connector & terminal (B116) No. 5 — Chassis ground: Is the measured value less than specified value?	1 Ω	Go to step 13.	Repair the open circuit in harness between shift lock solenoid and chassis ground.
13 CHECK SHIFT LOCK SOLENOID. Measure the resistance of shift lock solenoid connector terminals. Terminal No. 4 — No. 5: Is the measured value within specified value?	20 — 40 Ω	Go to step 14.	Replace the shift lock solenoid.

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Value	Yes	No
14 CHECK SHIFT LOCK SOLENOID. Connect the battery with shift lock solenoid connector terminal and operate solenoid. Terminal No. 4 (+) — No. 5 (-): Is the shift lock solenoid operating properly?	Shift lock solenoid operates.	Go to step 15.	Replace the shift lock solenoid.
15 CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE. 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltage between integrated module and chassis ground. Connector & terminal (B281) No. 9 (+) — Chassis ground (-): Is the measured value more than specified value?	8.5 V	Go to step 16.	Replace the integrated module.
16 CHECK POOR CONTACT. Is there poor contact in key lock circuit?	Poor contact in connector.	Repair the poor contact.	Replace the integrated module.

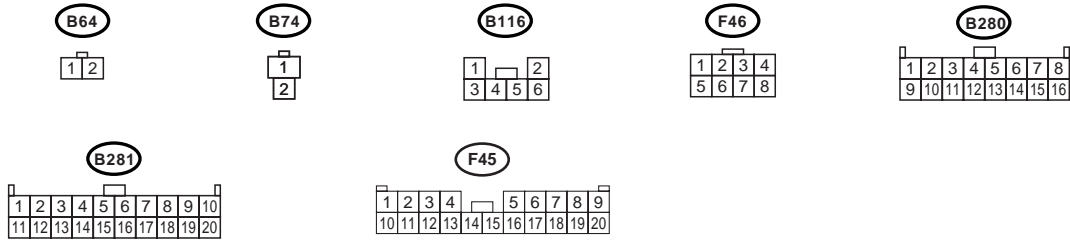
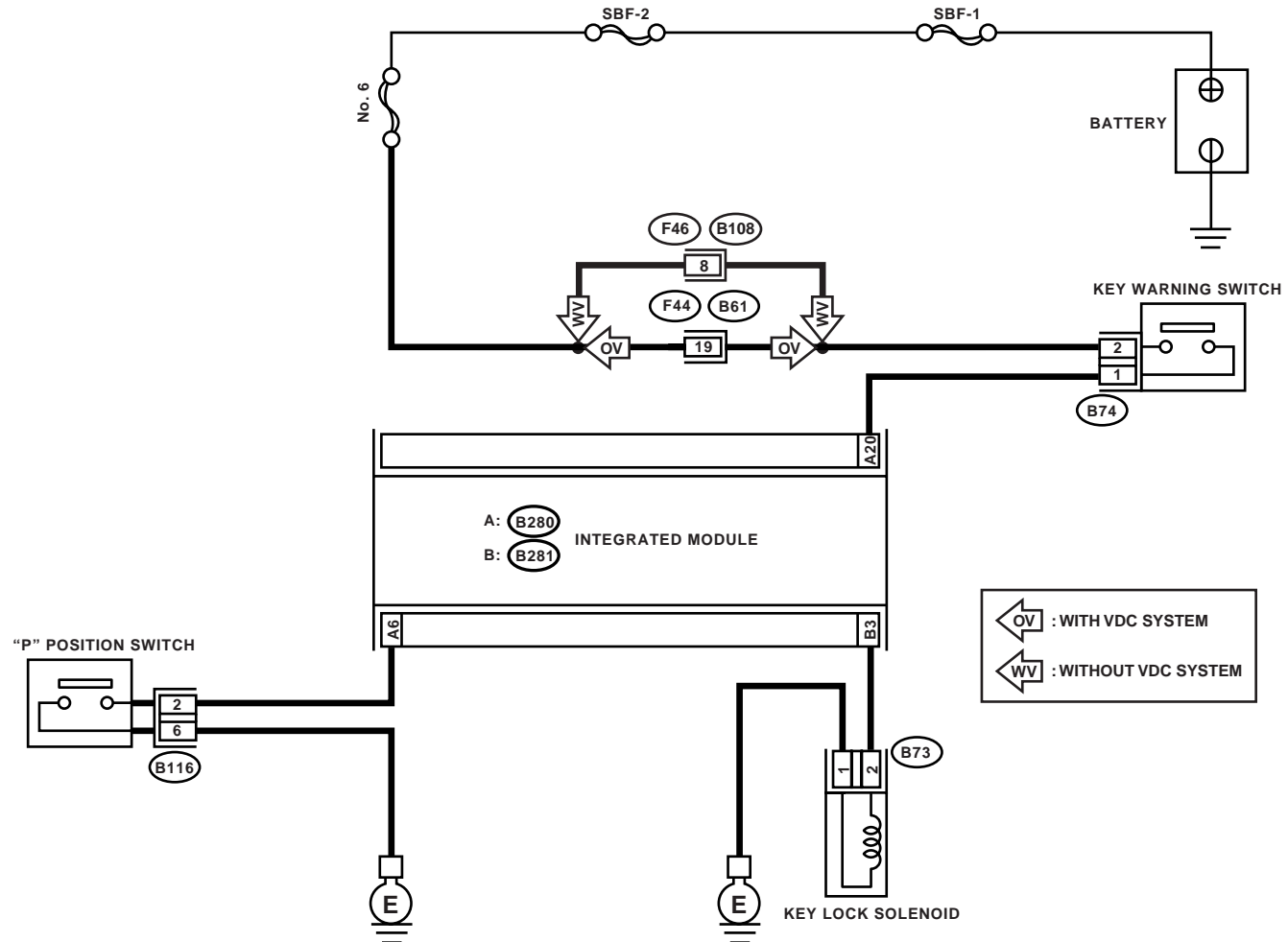
CS-21

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

4. KEY INTERLOCK DOES NOT LOCK OR RELEASE

WIRING DIAGRAM:



CS-00133

CS-22

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Value	Yes	No
1 CHECK HARNESS BETWEEN BATTERY AND KEY WARNING SWITCH. 1) Disconnect the connector key warning switch. 2) Measure the voltage of harness between key warning switch and chassis ground. Connector & terminal (B74) No. 2 (+) — Chassis ground (-): Is the measured value within specified value?	9 — 16 V	Go to step 2.	Repair the open or short circuit in harness between battery and key warning switch.
2 CHECK KEY WARNING SWITCH. Measure the resistance of key warning switch connector terminals. Terminal No. 1 — No. 2: Is the measured value more than specified value?	1 MΩ	Replace the key warning switch.	Go to step 4.
3 CHECK KEY WARNING SWITCH. 1) Remove the key. 2) Measure the resistance of key warning switch connector terminals. Terminal No. 1 — No. 2: Is the measured value more than specified value?	1 MΩ	Go to step 4.	Replace the key warning switch.
4 CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY WARNING SWITCH. 1) Disconnect the integrated module connector. 2) Measure the voltage of harness integrated module and chassis ground. Connector & terminal (B280) No. 20 (+) — Chassis ground (-): Is the measured value more than specified value?	9 V	Go to step 5.	Repair the open circuit in harness between integrated module and key warning switch.
5 CHECK HARNESS BETWEEN INTEGRATED MODULE AND KEY LOCK SOLENOID. 1) Disconnect the connector of key lock solenoid. 2) Measure the resistance of harness between integrated module and key lock solenoid. Connector & terminal (B73) No. 2 — (B281) No. 3: Is the measured value more than specified value?	1 MΩ	Repair the open circuit in harness between integrated module and key lock solenoid.	Go to step 6.
6 CHECK HARNESS BETWEEN INTEGRATED MODULE AND KEY LOCK SOLENOID. Measure the resistance of harness between integrated module and chassis ground. Connector & terminal (B281) No. 3 — Chassis ground: Is the measured value more than specified value?	1 Ω	Go to step 7.	Repair the short circuit in harness between integrated module and key lock solenoid.

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Value	Yes	No
7 CHECK HARNESS BETWEEN KEY LOCK SOLENOID AND CHASSIS GROUND. Measure the resistance of harness between key lock solenoid and chassis ground. Connector & terminal (B73) No. 1 — Chassis ground: Is the measured value less than specified value?	10 Ω	Go to step 8.	Repair the open circuit in harness between key lock solenoid and chassis ground.
8 CHECK KEY LOCK SOLENOID. Measure the resistance of key lock solenoid connector terminals. Terminal No. 1 — No. 2: Is the measured value within specified value?	4 — 8 Ω	Go to step 14.	Replace the key lock solenoid.
9 CHECK HARNESS BETWEEN “P” POSITION SWITCH AND CHASSIS GROUND. Measure the resistance of harness between “P” position switch and chassis ground. Connector & terminal (B116) No. 2 — Chassis ground: Is the measured value less than specified value?	1 Ω	Go to step 10.	Repair the short circuit in harness between “P” position switch and integrated module.
10 CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND “P” POSITION SWITCH. 1) Disconnect the connector from “P” position switch. 2) Measure the resistance of harness between integrated module and “P” position switch. Connector & terminal (B116) No. 2 — (B281) No. 6: Is the measured value more than specified value?	1 MΩ	Repair the open circuit in harness between integrated module and “P” position switch.	Go to step 11.
11 CHECK HARNESS BETWEEN “P” POSITION SWITCH AND CHASSIS GROUND. Measure the resistance of harness “P” position switch and chassis ground. Connector & terminal (B116) No. 6 — Chassis ground: Is the measured value more than specified value?	1 MΩ	Go to step 12.	Repair the open circuit in harness between “P” position switch and chassis ground.
12 CHECK “P” POSITION SWITCH. 1) Move the select lever to “P” position. 2) Measure resistance between “P” position switch connector terminals. Terminal No. 2 — No. 6: Is the measured value less than specified value?	1 Ω	Go to step 13.	Replace the “P” position switch.

AT SHIFT LOCK SYSTEM

CONTROL SYSTEMS

Step	Value	Yes	No
13 CHECK "P" POSITION SWITCH. 1) Move the select lever to other than "P" position. 2) Measure resistance between "P" position switch connector terminals. Terminal No. 2 — No. 6: Is the measured value more than specified value?	1 M Ω	Go to step 14.	Replace the "P" position switch.
14 CHECK OUTPUT SIGNAL FOR INTEGRATED MODULE. 1) Connect all connectors. 2) Turn the ignition switch to ON (engine OFF). 3) Move the select lever to "P" position. 4) Press the brake pedal. 5) Measure the voltage between integrated module connector and chassis ground. Connector & terminal (B281) No. 3 (+) — Chassis ground (-): Is the measured value within specified value?	7.5 — 16 V	Go to step 15.	Replace the integrated module.
15 CHECK POOR CONTACT. Is there poor contact in AT shift lock circuit?	Poor contact in connector.	Repair the poor contact.	Replace the integrated module.

CS-25

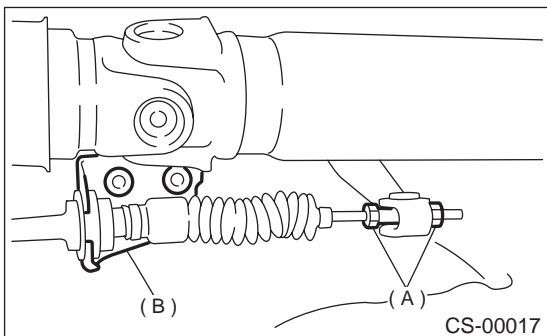
SELECT LEVER

CONTROL SYSTEMS

4. Select Lever

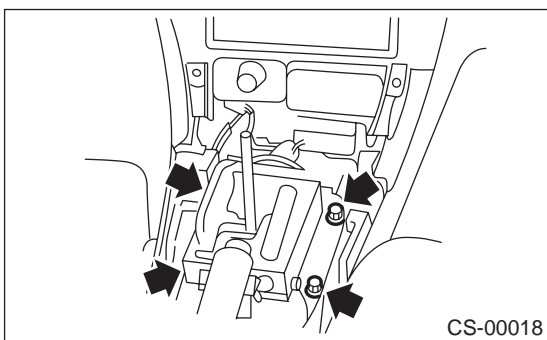
A: REMOVAL

- 1) Set the vehicle on a lift.
 - 2) Disconnect the ground cable from battery.
 - 3) Move the select lever to "N" position.
 - 4) Lift-up the vehicle.
 - 5) Remove the rear exhaust pipe and muffler.
- 2.5 L model
<Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
- 3.0 L model
<Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
- 6) Remove the heat shield cover. (If equipped)
 - 7) Disconnect the cable from select lever, and then remove the cable bracket.



- (A) Adjusting nuts
(B) Cable bracket

- 8) Lower the vehicle.
- 9) Remove the console box. <Ref. to EI-36, REMOVAL, Console Box.>
- 10) Disconnect the connectors, then remove the four bolts to take out the select lever assembly from body.

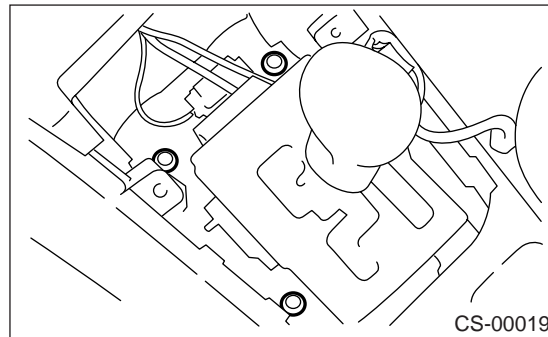


B: INSTALLATION

- 1) Mount the select lever onto the vehicle body.
- 2) Tighten the four bolts to install the select lever to vehicle body, then connect the connector.

Tightening torque:

13 N·m (1.3 kgf·m, 9.4 ft·lb)



- 3) Install the console box. <Ref. to EI-34, INSTALLATION, Glove Box.>
- 4) Set the location of select lever at "N" position.
- 5) Lift-up the vehicle.
- 6) Set the location of range select lever to "N" position.
- 7) Insert the thread portion of the other inner cable and into connector hole of the select lever, and fix the other outer cable end to bracket.

Tightening torque:

18 N·m (1.8 kgf·m, 13.0 ft·lb)

- 8) Adjust the select cable position. <Ref. to CS-32, ADJUSTMENT, Select Cable.>
 - 9) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.
 - 10) Install the heat shield cover. (If equipped)
 - 11) Install the rear exhaust pipe and muffler.
- 2.5 L model
<Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
- 3.0 L model
<Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>
- 12) Inspect the following items. If the following inspection reveals problems, adjust the select cable and inhibitor switch. <Ref. to CS-32, ADJUSTMENT, Select Cable.> and <Ref. to AT-50, ADJUSTMENT, Inhibitor Switch.>

- (1) The engine starts operating when select lever is in position "P" or "N", but not in other positions.
- (2) The back-up light is lit when the select lever is in position "R", but not in other positions.

CS-26

SELECT LEVER

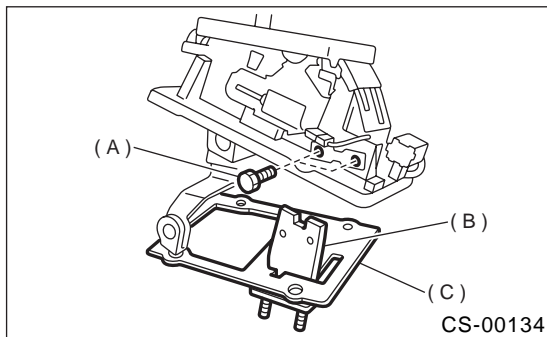
CONTROL SYSTEMS

(3) Select lever and indicator positions are matched.

C: DISASSEMBLY

1. EXCEPT SPORT SHIFT MODEL

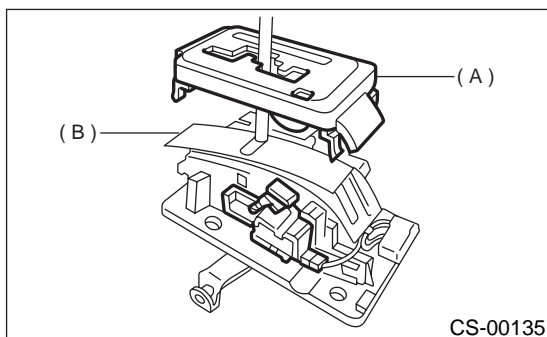
- 1) Remove four washers and then detach rubber boot.
- 2) Remove bolts and then remove cable bracket and plate.



- (A) Bolt
- (B) Cable bracket
- (C) Plate

3) Twist the select lever grip and then remove select lever grip.

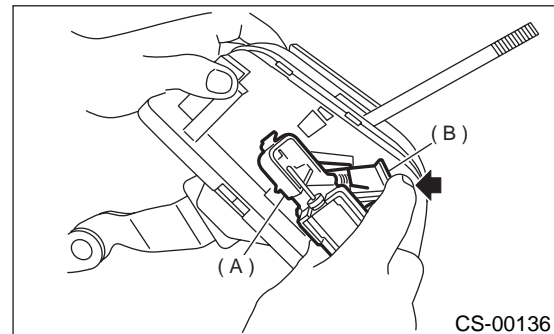
4) Detach indicator cover and pattern plate.



- (A) Indicator cover
- (B) Pattern plate

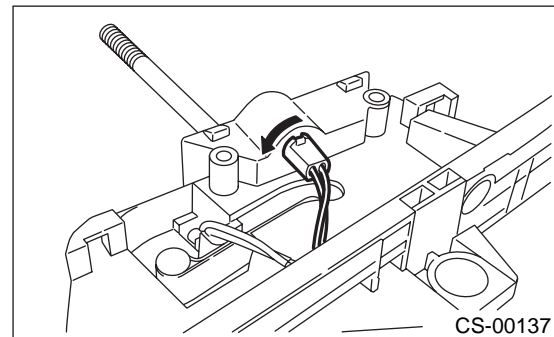
5) Disconnect solenoid assembly connector.

6) While pressing shift lock cancel button, remove shift lock solenoid assembly.



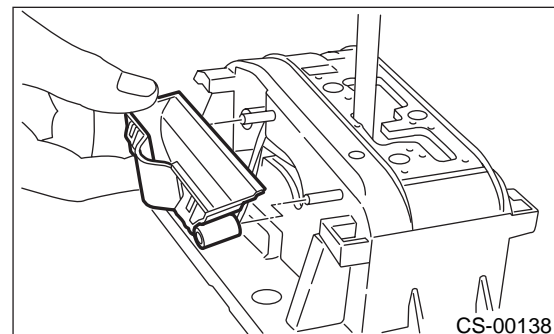
- (A) Shift lock solenoid ASSY
- (B) Button

7) Remove illumination light.



8) Remove illumination bulb.

9) Remove illumination light cover.

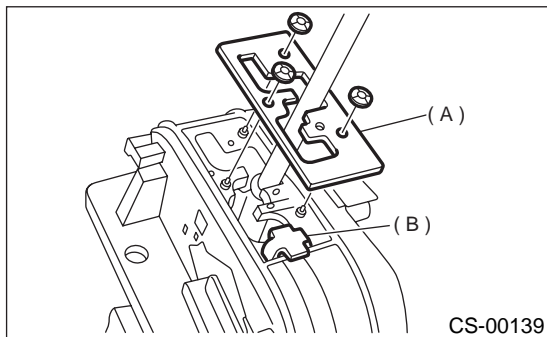


CS-27

SELECT LEVER

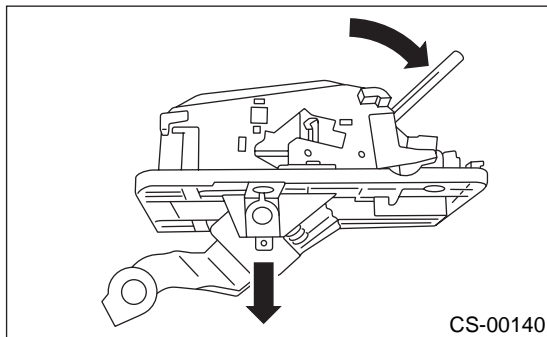
CONTROL SYSTEMS

10) Remove stopper.

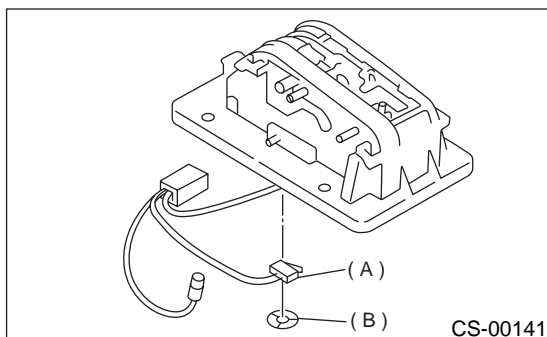


- (A) Pattern plate
- (B) Stopper

11) Tilt lever forward and pull down to separate it from frame.

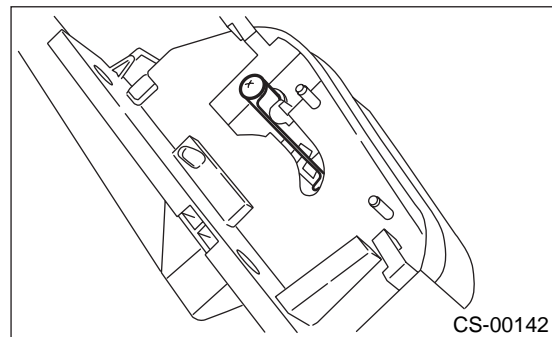


12) Remove clip, and "P" position switch with harness.



- (A) "P" position switch
- (B) Clip

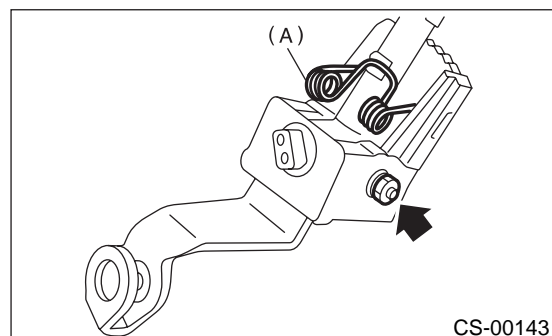
13) Remove detent spring



14) Remove spring.

CAUTION:
Wear goggles. Do not allow spring to fly out during removal.

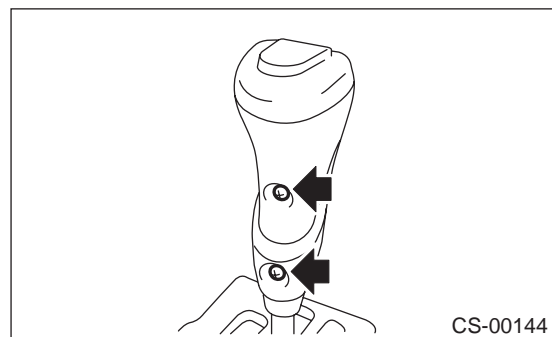
15) Remove bolt and then disconnect lever upper and lever lower.



- (A) Spring

2. SPORT SHIFT MODEL

- 1) Remove the packing.
- 2) Remove the grip.



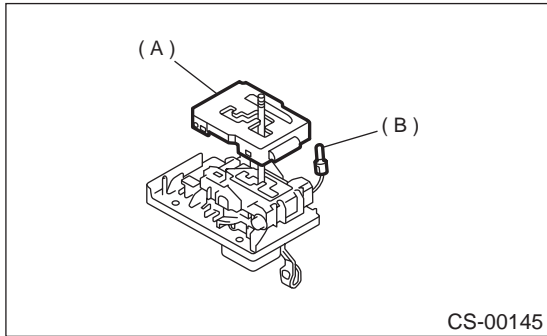
SELECT LEVER

CONTROL SYSTEMS

3) Remove the indicator light, and then remove the indicator cover.

NOTE:

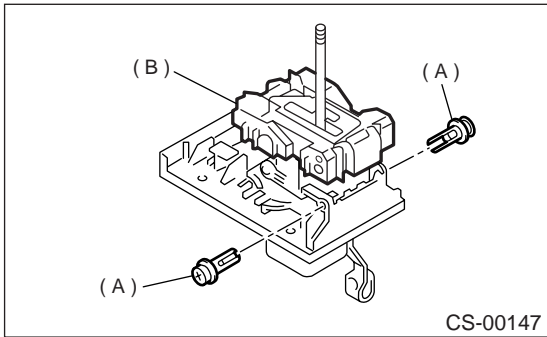
Be careful not to break the indicator light during removal.



- (A) Indicator cover
- (B) Indicator light

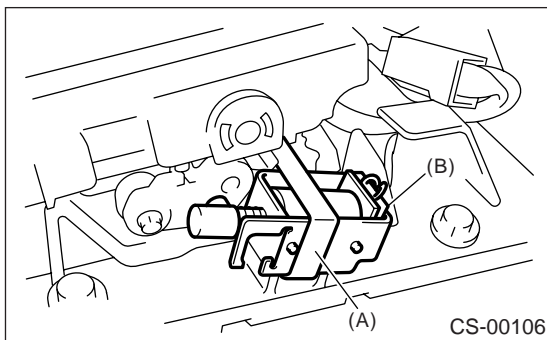
4) Remove the slider.

5) Remove the clips, and then remove the guide plate.



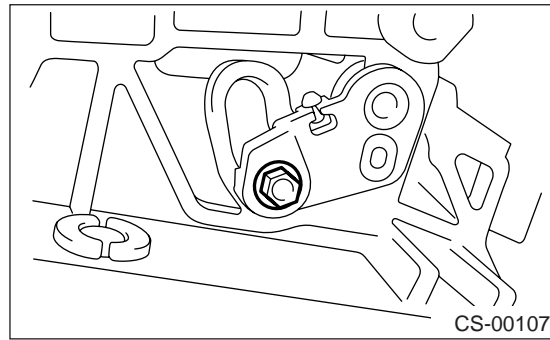
- (A) Clips
- (B) Guide plate

6) Remove the clamp, shift lock solenoid and cushion.

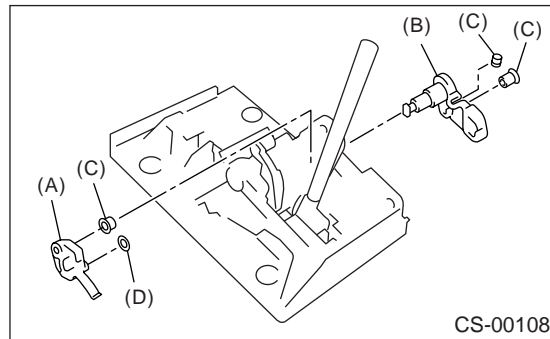


- (A) Clamp
- (B) Shift lock solenoid

7) Remove the bolt.

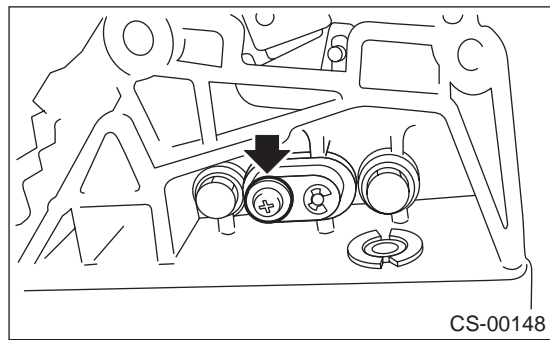


8) Remove the lock plate A, B, bushing and spacer.

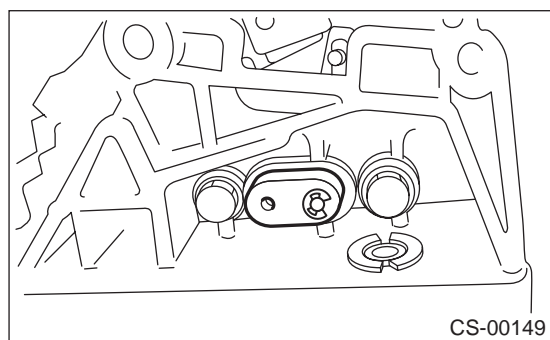


- (A) Lock plate A
- (B) Lock plate B
- (C) Bushing
- (D) Spacer

9) Remove the screw.



10) Remove the bushing.

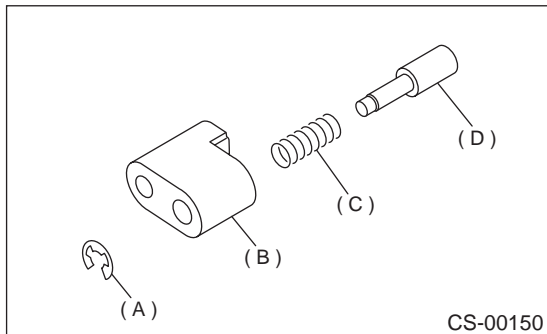


CS-29

SELECT LEVER

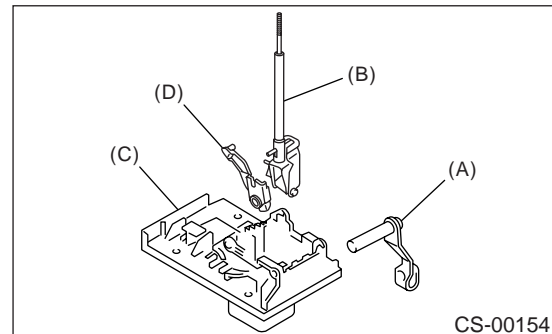
CONTROL SYSTEMS

11) Remove the clip, and then remove the rod and the spring.



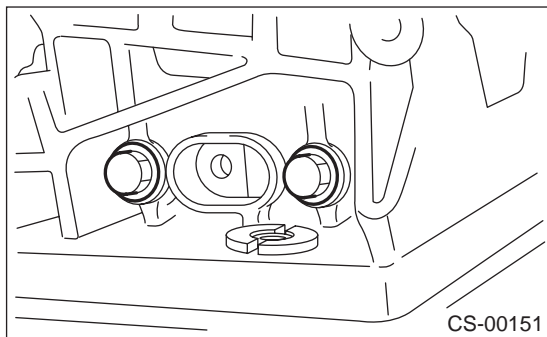
- (A) Clip
- (B) Bushing
- (C) Spring
- (D) Rod

15) Remove the arm and then take away the lever and arm bracket from plate.

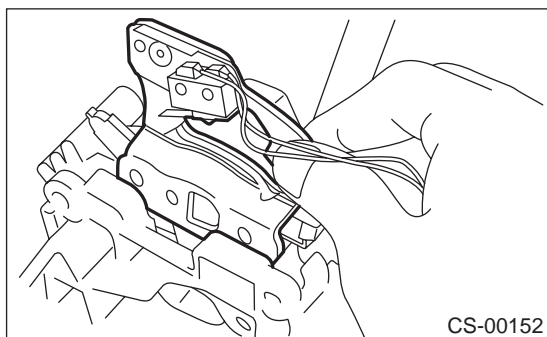


- (A) Arm
- (B) Lever
- (C) Base plate
- (D) Arm bracket

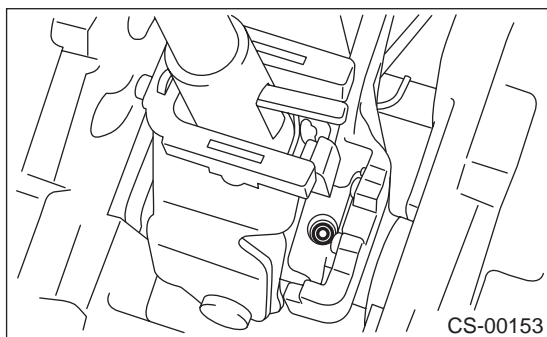
12) Remove the bolt.



13) Remove the bracket guide COMPL.



14) Remove the grommet, and then extract spring pin from the top.



16) Remove the spring, and then remove the detent arm.

D: ASSEMBLY

- 1) Clean all parts before assembly.
- 2) Apply grease [SUNLIGHT 2 (Part No. 003602010) or equivalent] to each parts. <Ref. to CS-3, AT SELECT LEVER (EXCEPT SPORT SHIFT MODEL), COMPONENT, General Description.> and <Ref. to CS-4, AT SELECT LEVER (SPORT SHIFT MODEL), COMPONENT, General Description.>
- 3) Assembly is in the reverse order of disassembly.
- 4) After completion of fitting, transfer the select lever to range "P" — "1", then check whether the indicator and select lever agree, whether the pointer and position mark agree and what the operating force is.

E: INSPECTION

- 1) Inspect the removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
- 2) Confirm the following parts for operating condition before assembly. Moving condition of the select lever COMPL, it should move smoothly.

CS-30

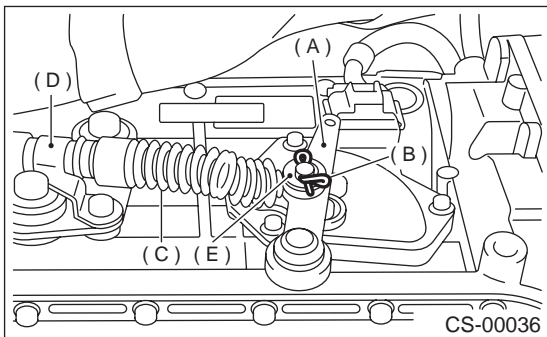
SELECT CABLE

CONTROL SYSTEMS

5. Select Cable

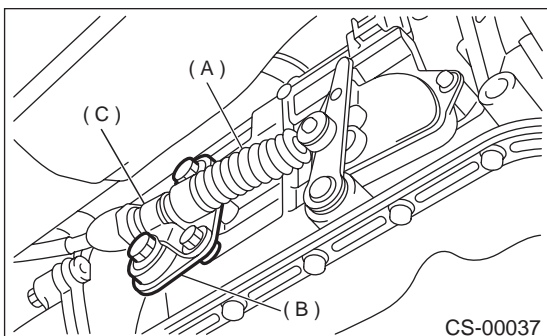
A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Prior to removal, set the lever to "N" position.
- 4) Lift-up the vehicle.
- 5) Remove the front and center exhaust pipe.
2.5 L model
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>
3.0 L model
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
- 6) Remove the heat shield cover. (If equipped)
- 7) Remove the snap pin from range select lever.



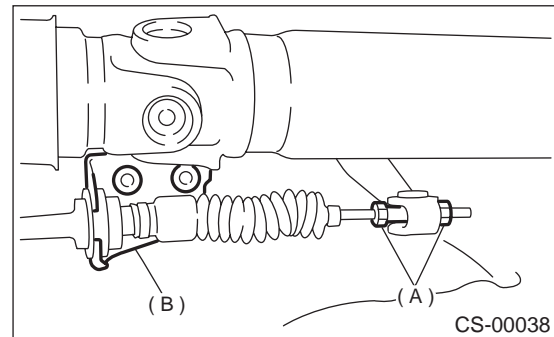
- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Clamp
- (E) Washer

- 8) Remove the plate assembly from transmission case.



- (A) Select cable
- (B) Plate ASSY
- (C) Clamp

- 9) Disconnect the cable from select lever, and then remove the cable bracket.



- (A) Adjusting nuts
- (B) Cable bracket

- 10) Remove the select cable from plate assembly.

B: INSTALLATION

- 1) Install the select cable to base plate.

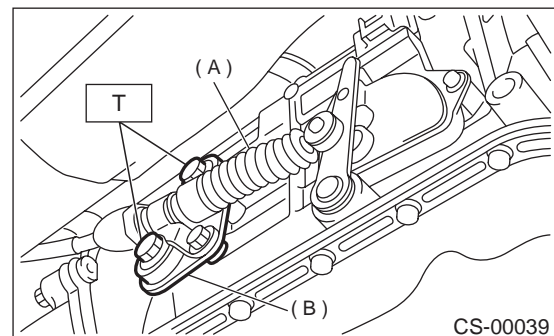
Tightening torque:

18 N·m (1.8 kgf·m, 13.0 ft·lb)

- 2) Install the select cable to range select lever.
- 3) Install the plate assembly to transmission.

Tightening torque:

T: 24.5 N·m (2.5 kgf·m, 18.1 ft·lb)



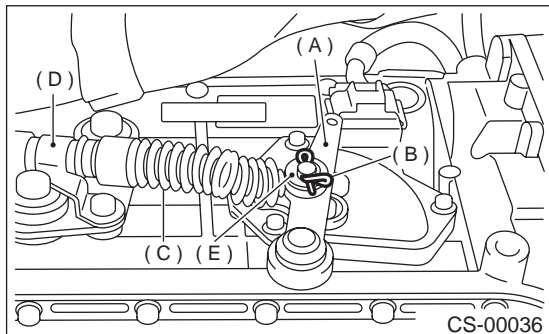
- (A) Select cable
- (B) Plate ASSY

CS-31

SELECT CABLE

CONTROL SYSTEMS

4) Install the washer and snap pin to range select lever.



- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Clamp
- (E) Washer

5) Move the select lever to "N" position, then adjust the select cable position. <Ref. to CS-32, ADJUSTMENT, Select Cable.>

6) Install the heat shield cover. (If equipped)

7) Install the front and center exhaust pipe.

2.5 L model

<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>

3.0 L model

<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>

C: INSPECTION

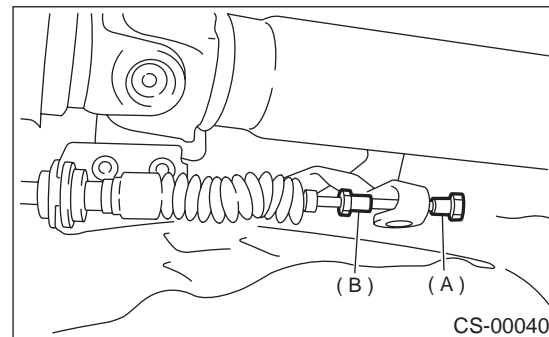
Check the removed cable and replace if damaged, rusty, or malfunctioning.

- 1) Check for smooth operation of the cable.
- 2) Check the inner cable for damage and rust.
- 3) Check the outer cable for damage, bends, and cracks.
- 4) Check the boot for damage, cracks, and deterioration.
- 5) Move the select lever from "P" position to "1" position. You should be able to feel the detentes in each position. If the detentes cannot be felt or the position pointer is improperly aligned, adjust the cable.

D: ADJUSTMENT

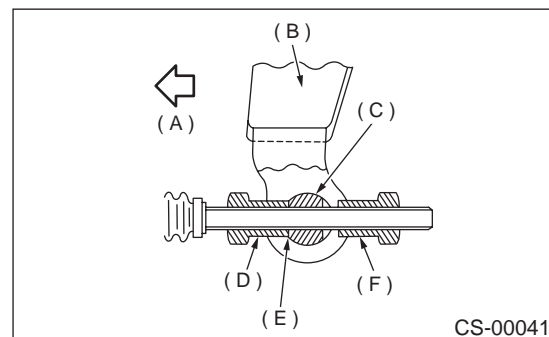
- 1) Set the vehicle on a lift.
- 2) Set the lever to "N" position.
- 3) Lift-up the vehicle.
- 4) Remove the rear exhaust pipe and muffler.
- 5) Remove the heat shield cover. (If equipped)

6) Loosen the adjusting nut on each side.



- (A) Adjusting nut A
- (B) Adjusting nut B

7) Turn the adjusting nut B until it lightly touches the connector.

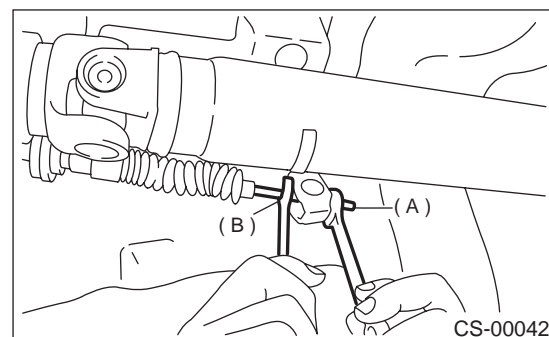


- (A) Front side
- (B) Select lever
- (C) Connector
- (D) Adjusting nut B
- (E) Contact point
- (F) Adjusting nut A

8) While preventing the adjusting nut B from moving with a wrench, 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

CS-32

SELECT CABLE

CONTROL SYSTEMS

- 9) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.
- 10) Install in the reverse order of removal.

CS-33

Vehicle-id:
SIE-id::D:ADJUSTMENT

AT SHIFT LOCK SOLENOID AND “P” POSITION SWITCH

CONTROL SYSTEMS

6. AT Shift Lock Solenoid and “P” Position Switch

A: REMOVAL

- 1) Remove the select lever. <Ref. to CS-26, REMOVAL, Select Lever.>
- 2) Remove AT shift lock solenoid and “P” position switch.<Ref. to CS-27, DISASSEMBLY, Select Lever.>

C: INSPECTION

B: INSTALLATION

- 1) Install AT shift lock solenoid and “P” position switch. <Ref. to CS-30, ASSEMBLY, Select Lever.>
- 2) Install the select lever. <Ref. to CS-26, INSTALLATION, Select Lever.>

Step	Value	Yes	No
1 CHECK SHIFT LOCK SOLENOID. Measure the resistance of shift lock solenoid connector terminals. <i>Terminal</i> No. 4 — No. 5 Is the measured value within specified value?	20 — 40 Ω	Go to step 2.	Replace the shift lock solenoid and “P” position switch assembly.
2 CHECK SHIFT LOCK SOLENOID. Connect the battery with shift lock solenoid connector terminal, operate solenoid. <i>Terminal</i> No. 4 (+) — No. 5 (-) Is the shift lock solenoid operating properly?	Shift lock solenoid operates.	Go to step 3.	Replace the shift lock solenoid and “P” position switch assembly.
3 CHECK “P” POSITION SWITCH. 1) Move the select lever to “P” position. 2) Measure resistance between “P” position switch connector terminals. Is the measured value less than specified value?	1 Ω	Go to step 4.	Replace the “P” position switch.
4 CHECK “P” POSITION SWITCH. 1) Move the select lever to other than “P” position. 2) Measure resistance between “P” position switch connector terminals. Is the measured value more than specified value?	1 MΩ	Normal	Replace the “P” position switch.

CS-34

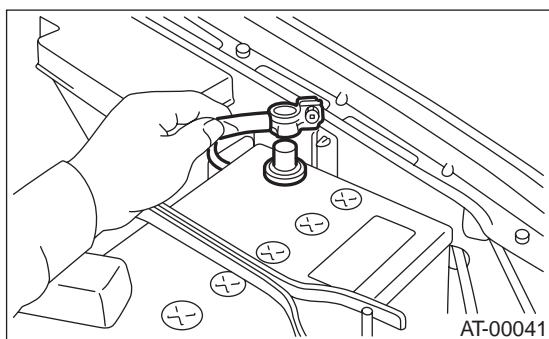
INTEGRATED MODULE

CONTROL SYSTEMS

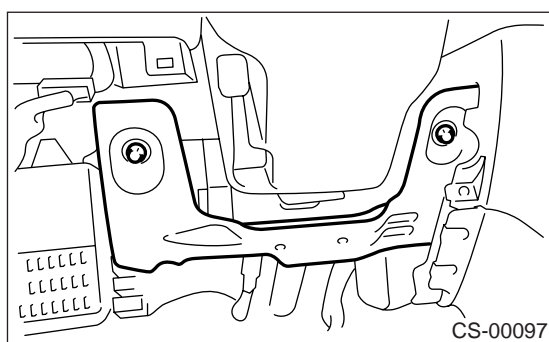
7. Integrated Module

A: REMOVAL

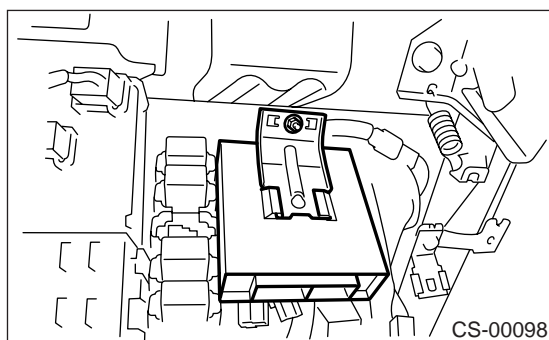
- 1) Disconnect the ground cable from battery.



- 2) Remove the lower cover.
- 3) Remove the knee bolster.



- 4) Disconnect the connector from integrated module.
- 5) Remove the integrated module.



B: INSTALLATION

Install in the reverse order of removal.

CS-35

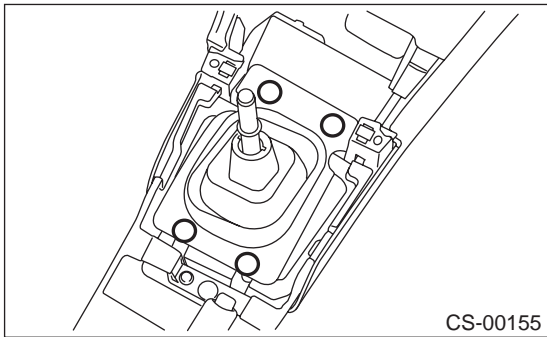
MT GEAR SHIFT LEVER

CONTROL SYSTEMS

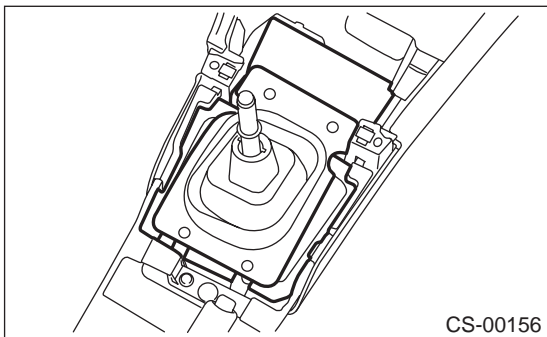
8. MT Gear Shift Lever

A: REMOVAL

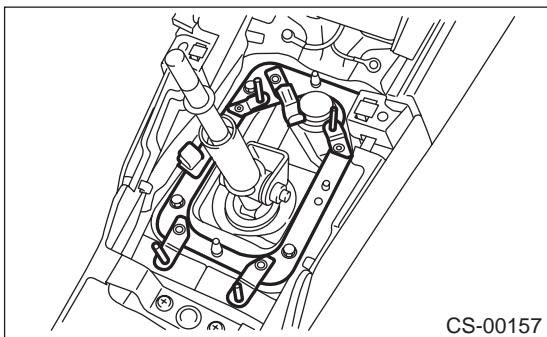
- 1) Set the vehicle on a lift.
- 2) Remove the gear shift knob.
- 3) Disconnect the ground cable from battery.
- 4) Remove the console box. <Ref. to EI-36, REMOVAL, Console Box.>
- 5) Remove the clamp.



- 6) Remove the boot and insulator assembly.

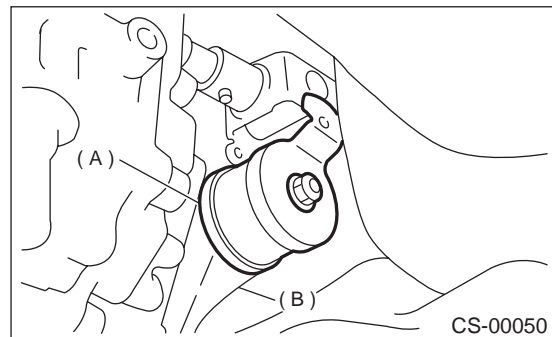


- 7) Remove the plate COMPL from body.



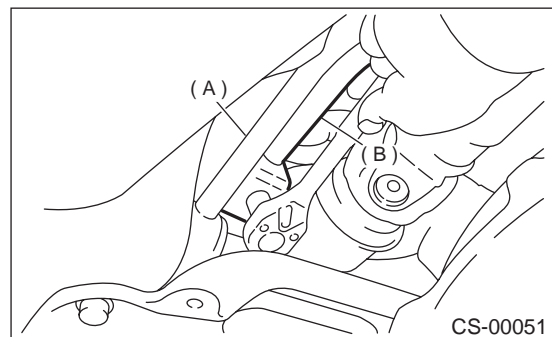
- 8) Lift-up the vehicle.
- 9) Remove the rear exhaust pipe and muffler.
2.5 L model
<Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
3.0 L model
<Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
- 10) Remove the heat shield cover.

- 11) Remove the stay from transmission bracket.



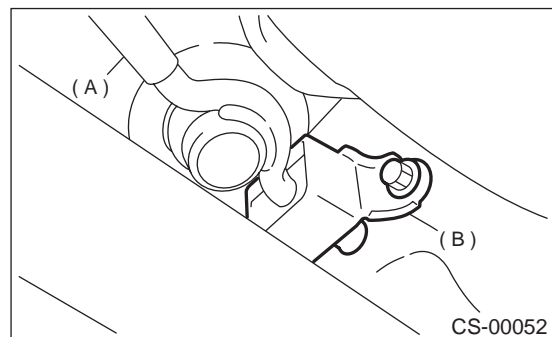
- (A) Stay
- (B) Transmission bracket

- 12) Remove the rod from joint.



- (A) Stay
- (B) Rod

- 13) Remove the cushion rubber from body.



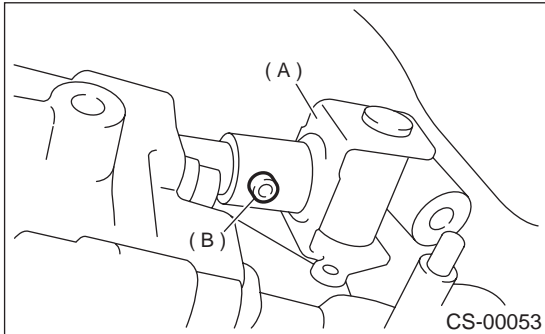
- (A) Stay
- (B) Cushion rubber

CS-36

MT GEAR SHIFT LEVER

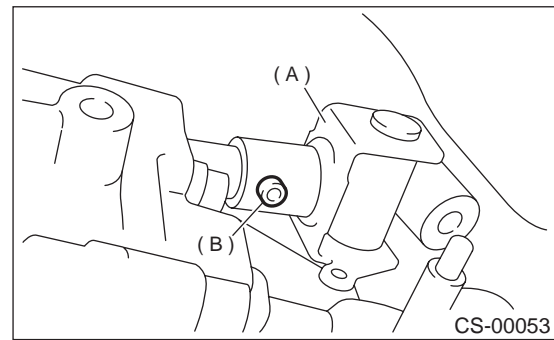
CONTROL SYSTEMS

14) Remove the spring pin, and then extract the joint.



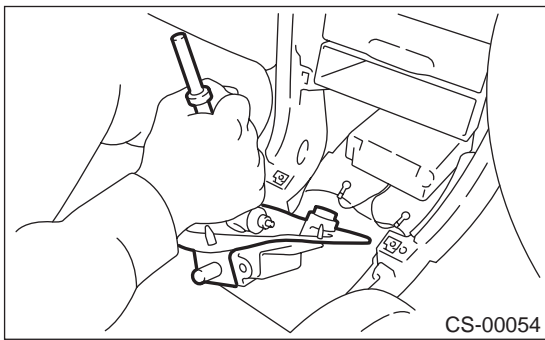
- (A) Joint
- (B) Spring pin

5) Insert the spring pin.



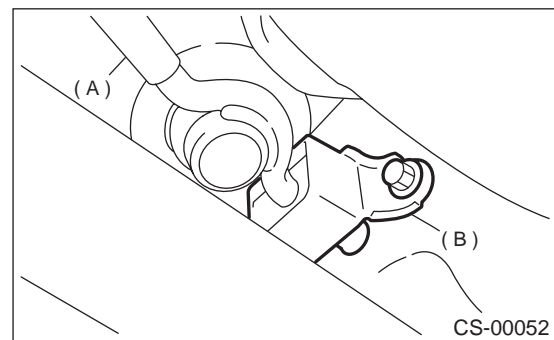
- (A) Joint
- (B) Spring pin

15) Lower the vehicle.
16) Remove the gear shift lever.



6) Mount the cushion rubber on the body.

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



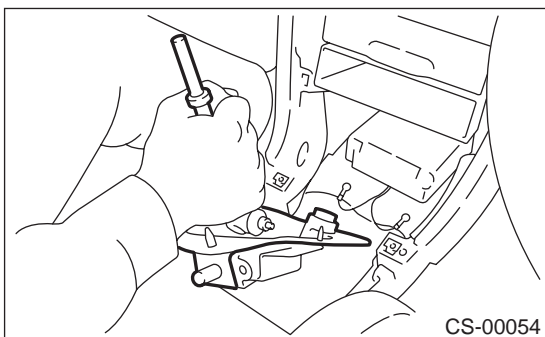
- (A) Stay
- (B) Cushion rubber

B: INSTALLATION

1) Install the joint to transmission and secure with the spring pin.
2) Insert the gear shift lever from room side.

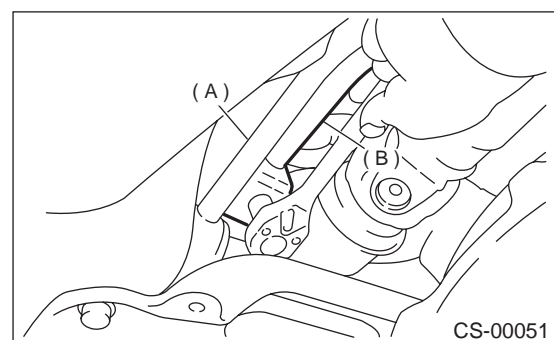
NOTE:

After inserting the rod and stay, temporarily put them onto transmission mount.



7) Connect the rod to the joint.

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



- (A) Stay
- (B) Rod

3) Lift-up the vehicle.
4) Install the joint to shifter arm.

CS-37

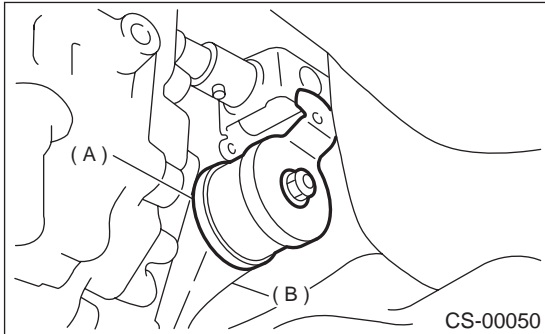
MT GEAR SHIFT LEVER

CONTROL SYSTEMS

8) Connect the stay to transmission bracket.

Tightening torque:

18 N·m (1.8 kgf-m, 13.0 ft-lb)



- (A) Stay
- (B) Transmission bracket

9) Install the heat shield cover. (If equipped)

10) Install the rear exhaust pipe and muffler.

2.5 L model

<Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

3.0 L model

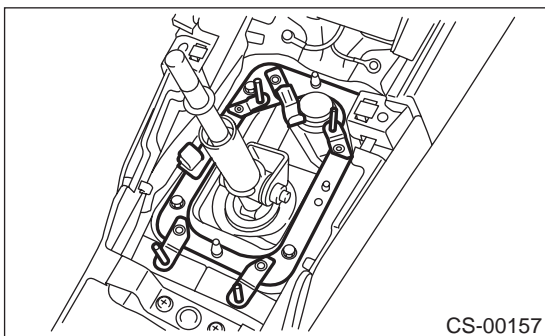
<Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>

11) Lower the vehicle.

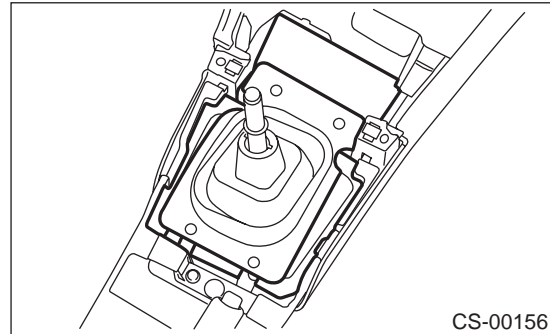
12) Install the plate COMPL to body.

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



13) Install the boot and insulator assembly to vehicle in proper direction.

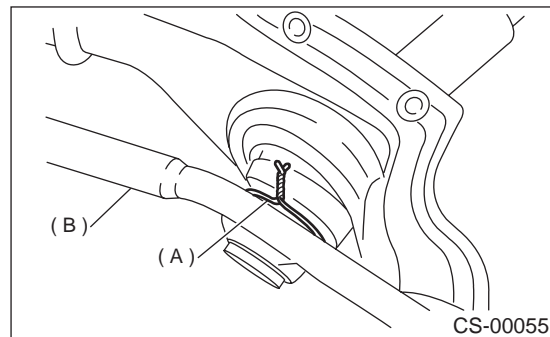


14) Install the clamp.

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

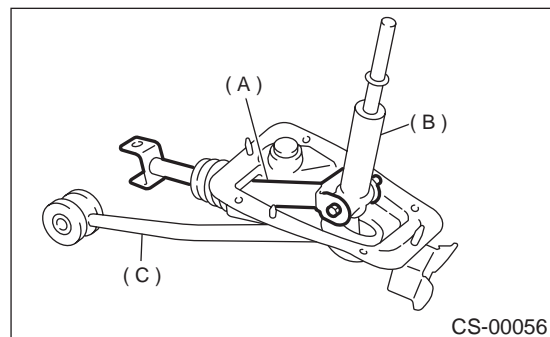
C: DISASSEMBLY

1) Disassemble the lock wire.



- (A) Lock wire
- (B) Stay

2) Remove the rod from lever.

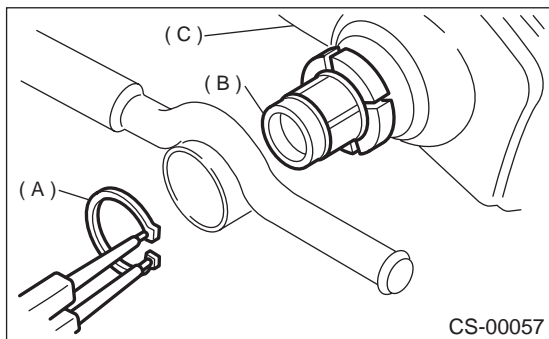


- (A) Rod
- (B) Lever
- (C) Stay

MT GEAR SHIFT LEVER

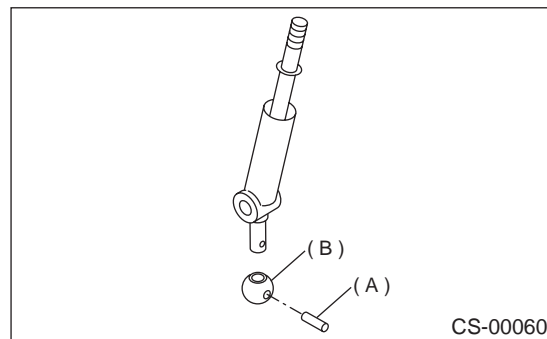
CONTROL SYSTEMS

3) Remove the snap ring from bushing B, and then disconnect the stay.



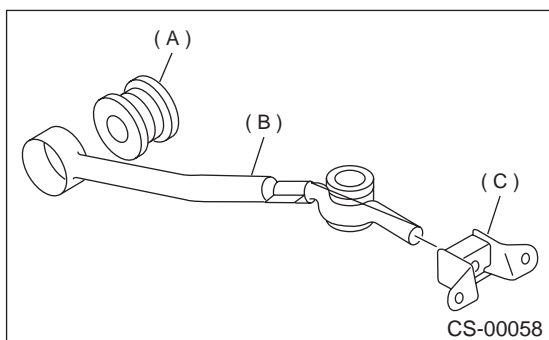
- (A) Snap ring
- (B) Bushing B
- (C) Boot

7) Draw out the spring pin, and then remove the bushing A from gear shift lever.



- (A) Spring pin
- (B) Bushing A

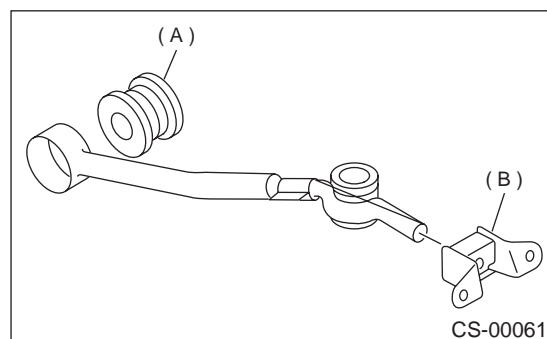
4) Remove the boot from gear shift lever.
5) Remove the bushing and cushion rubber from stay.



- (A) Bushing
- (B) Stay
- (C) Cushion rubber

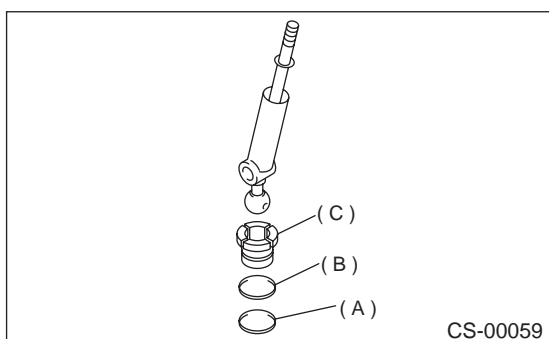
D: ASSEMBLY

1) Clean all parts before assembly.
2) Mount the bushing and cushion rubber on the stay.



- (A) Bushing
- (B) Cushion rubber

6) Remove the O-ring, and then disconnect the bushing B.



- (A) O-ring
- (B) O-ring
- (C) Bushing B

CS-39

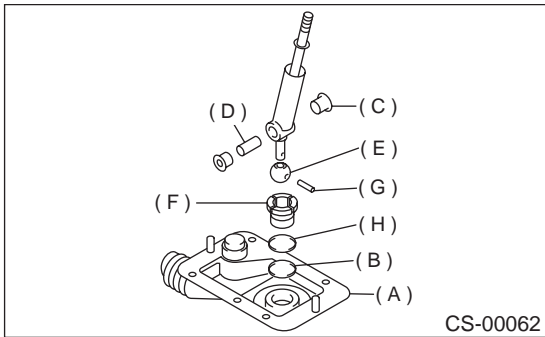
MT GEAR SHIFT LEVER

CONTROL SYSTEMS

3) Mount each part; boot, O-ring, bushing A, spacer, bushing B, bushing and spring pin on the gear shift lever.

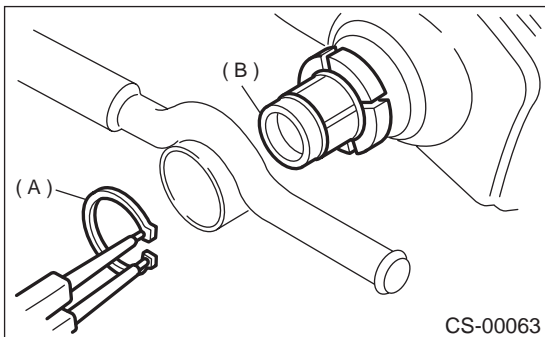
NOTE:

- Always use new O-rings.
- Apply grease [SUNLIGHT 2 (Part No.003602010) or equivalent] to the inner and side surfaces of the bushing when installing the spacer.



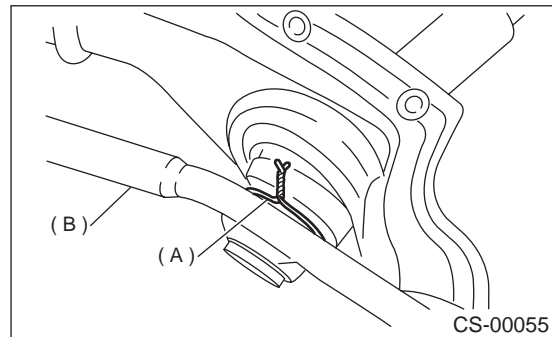
- (A) Boot
- (B) O-ring
- (C) Bushing
- (D) Spacer
- (E) Bushing A
- (F) Bushing B
- (G) Spring pin
- (H) O-ring

4) Insert the gear shift lever into boot hole.
5) Install the snap ring and stay to bushing B.



- (A) Snap ring
- (B) Bushing B

6) Tighten with a new lock wire to the extent that the boot will not come off.

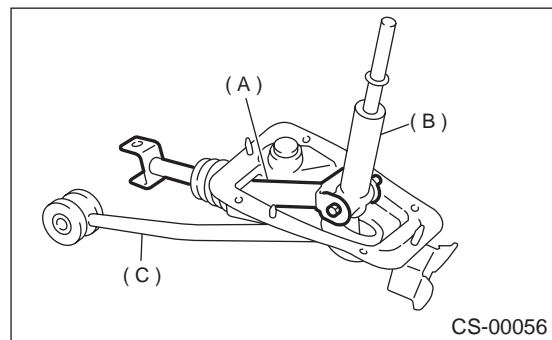


- (A) Lock wire
- (B) Stay

7) Insert the rod into boot hole.
8) Connect the rod to gear shift lever.

Tightening torque:

11.8 N·m (1.2 kgf·m, 8.7 ft·lb)



- (A) Rod
- (B) Lever
- (C) Stay

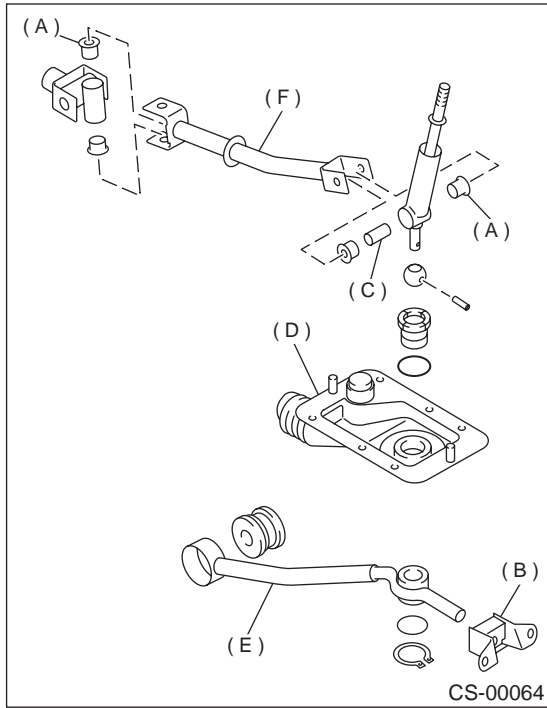
9) Check the swing torque of the rod in relation to gear shift lever.
10) Check that there is no excessive play and that parts move smoothly.

MT GEAR SHIFT LEVER

CONTROL SYSTEMS

E: INSPECTION

1) Check each part (bushing, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. Repair or replace any defective part. Determine defective parts by comparing with new parts.



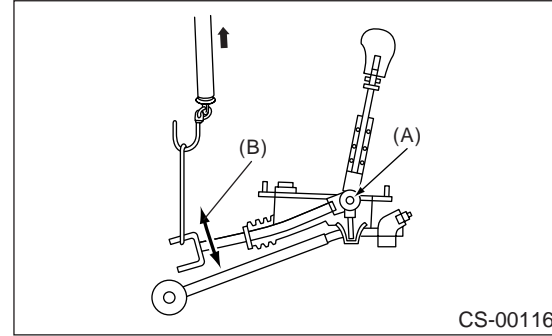
- (A) Bushing
- (B) Cushion rubber
- (C) Spacer
- (D) Boot
- (E) Stay
- (F) Rod

2) Check the swing torque of the rod in relation of gear shift lever.

If the torque exceeds specification, replace the bushing or retighten nuts.

Swing torque:

3.7 N (0.38 kgf, 0.84 lb) or less



- (A) Center of rotation
- (B) Swing torque

CS-41

GENERAL DIAGNOSTIC

CONTROL SYSTEMS

9. General Diagnostic**A: INSPECTION**

Symptom	Problem parts
Shift lock does not function.	<ul style="list-style-type: none">• Stop light switch• Shift lock solenoid• Integrated module
Shift lock cannot be released.	<ul style="list-style-type: none">• Stop light switch• Shift lock solenoid• Integrated module• Inhibitor switch
Key interlock does not function.	<ul style="list-style-type: none">• Key warning switch• "P" position switch• Key lock solenoid• Integrated module
Key interlock cannot be released.	<ul style="list-style-type: none">• Key warning switch• "P" position switch• Key lock solenoid• Integrated module
Starter does not run.	<ul style="list-style-type: none">• Inhibitor switch• Select cable• Starter circuit
Back-up light does not light up.	<ul style="list-style-type: none">• Inhibitor switch• Select cable• Back-up light circuit

CS-42

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

1. General Description

A: SPECIFICATIONS

1. TORQUE CONVERTER CLUTCH

Model	2.5 L model		3.0 L model
	Except OUT-BACK	OUTBACK	
Type	Symmetric, 3 element, single stage, 2 phase torque converter		
Stall torque ratio	1.9 — 2.1	2.1 — 2.3	1.8 — 2.0
Nominal diameter	246 mm (9.69 in)		
Stall speed (at sea level)	2,100 — 2,600 rpm	2,200 — 2,700 rpm	2,000 — 2,500 rpm
One-way clutch	Sprague type one-way clutch		

2. OIL PUMP

Type	Pracoid constant-displacement pump	
Driving method	Driven by engine	
Number of teeth	Inner rotor	9
	Outer rotor	10

3. TRANSMISSION CONTROL ELEMENT

Type	4-forward, 1-reverse, double-row planetary gears
Multi-plate clutch	3 sets
Multi-plate brake	2 sets
One-way clutch (sprague type)	1 sets

4. TRANSMISSION GEAR RATIO

Model	BRIGHTEN, L, OUT-BACK (3.0 L model)	GT, OUTBACK (2.5 L model)
1st	2.785	3.027
2nd	1.545	1.619
3rd	1.000	
4th	0.694	
Rev	2.272	

5. PLANETARY GEAR AND PLATE

	BRIGHTEN, L	GT, OUT-BACK (2.5 L model)	3.0 L model
Tooth number of front sun gear	33		
Tooth number of front pinion	21		
Tooth number of front internal gear	75		
Tooth number of rear sun gear	42	37	42
Tooth number of rear pinion	17	19	17
Tooth number of rear internal gear	75		
Drive & driven plate number of high clutch	4		5
Drive & driven plate number of low clutch	6		7
Drive & driven plate number of reverse clutch	2		
Drive & driven plate number of 2-4 brake	3		4
Drive & driven plate number of low & reverse brake	6		7

6. SELECTOR POSITION

P (Park)	Transmission in neutral, output member immovable, and engine start possible
R (Reverse)	Transmission in reverse for backing
N (Neutral)	Transmission in neutral and engine start possible
D (Drive)	Automatic gear change 1st ← 2nd ← 3rd ← 4th
3 (3rd)	Automatic gear change 1st ← 2nd ← 3rd ← 4th
2 (2nd)	2nd gear locked (Deceleration possible 2nd ← 3rd ← 4th)
1 (1st)	1st gear locked (Deceleration possible 1st ← 2nd ← 3rd ← 4th)
Control method	Hydraulic remote control

AT-2

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

7. HYDRAULIC CONTROL AND LUBRICATION

Type	Electronic/hydraulic control [Four forward speed changes by electrical signals of vehicle speed and accelerator (throttle) opening]
Fluid	Dexron III type Automatic transmission fluid
Fluid capacity	9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)
Lubrication system	Forced feed lubrication with oil pump
Oil	Automatic transmission fluid (above mentioned)

8. COOLING AND HARNESS

Cooling system	Liquid-cooled cooler incorporated in radiator
Inhibitor switch	12 poles
Transmission harness	20 poles

10.FINAL REDUCTION

Front final gear ratio	4.444 (40/9)																																																						
Lubrication oil	<p>ITEM</p> <ul style="list-style-type: none"> • Front differential gear oil <p>API Classification</p> <p>GL-5</p> <p>SAE Viscosity No. and Applicable Temperature</p> <table border="1"> <thead> <tr> <th>(°C)</th> <th>-30</th> <th>-26</th> <th>-15</th> <th>-5</th> <th>0</th> <th>15</th> <th>25</th> <th>30</th> </tr> <tr> <th>(°F)</th> <th>-22</th> <th>-15</th> <th>5</th> <th>23</th> <th>32</th> <th>59</th> <th>77</th> <th>86</th> </tr> </thead> <tbody> <tr> <td>90</td> <td colspan="8">[Bar chart showing viscosity range for 90]</td> </tr> <tr> <td>85W</td> <td colspan="8">[Bar chart showing viscosity range for 85W]</td> </tr> <tr> <td>80W</td> <td colspan="8">[Bar chart showing viscosity range for 80W]</td> </tr> <tr> <td>75W-90</td> <td colspan="8">[Bar chart showing viscosity range for 75W-90]</td> </tr> </tbody> </table> <p>AT-00001</p>	(°C)	-30	-26	-15	-5	0	15	25	30	(°F)	-22	-15	5	23	32	59	77	86	90	[Bar chart showing viscosity range for 90]								85W	[Bar chart showing viscosity range for 85W]								80W	[Bar chart showing viscosity range for 80W]								75W-90	[Bar chart showing viscosity range for 75W-90]							
(°C)	-30	-26	-15	-5	0	15	25	30																																															
(°F)	-22	-15	5	23	32	59	77	86																																															
90	[Bar chart showing viscosity range for 90]																																																						
85W	[Bar chart showing viscosity range for 85W]																																																						
80W	[Bar chart showing viscosity range for 80W]																																																						
75W-90	[Bar chart showing viscosity range for 75W-90]																																																						
Front differential oil capacity	1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)																																																						

9. TRANSFER

	MPT model		VTD model
	2.5 L model	3.0 L model	
Transfer type	Multi-plate transfer		Variable torque distribution
Drive & driven plate number of transfer clutch	5	6	3
Control method	Electronic, hydraulic type		
Lubricant	The same Automatic transmission fluid used in automatic transmission		
1st reduction gear ratio	1.000 (53/53)		

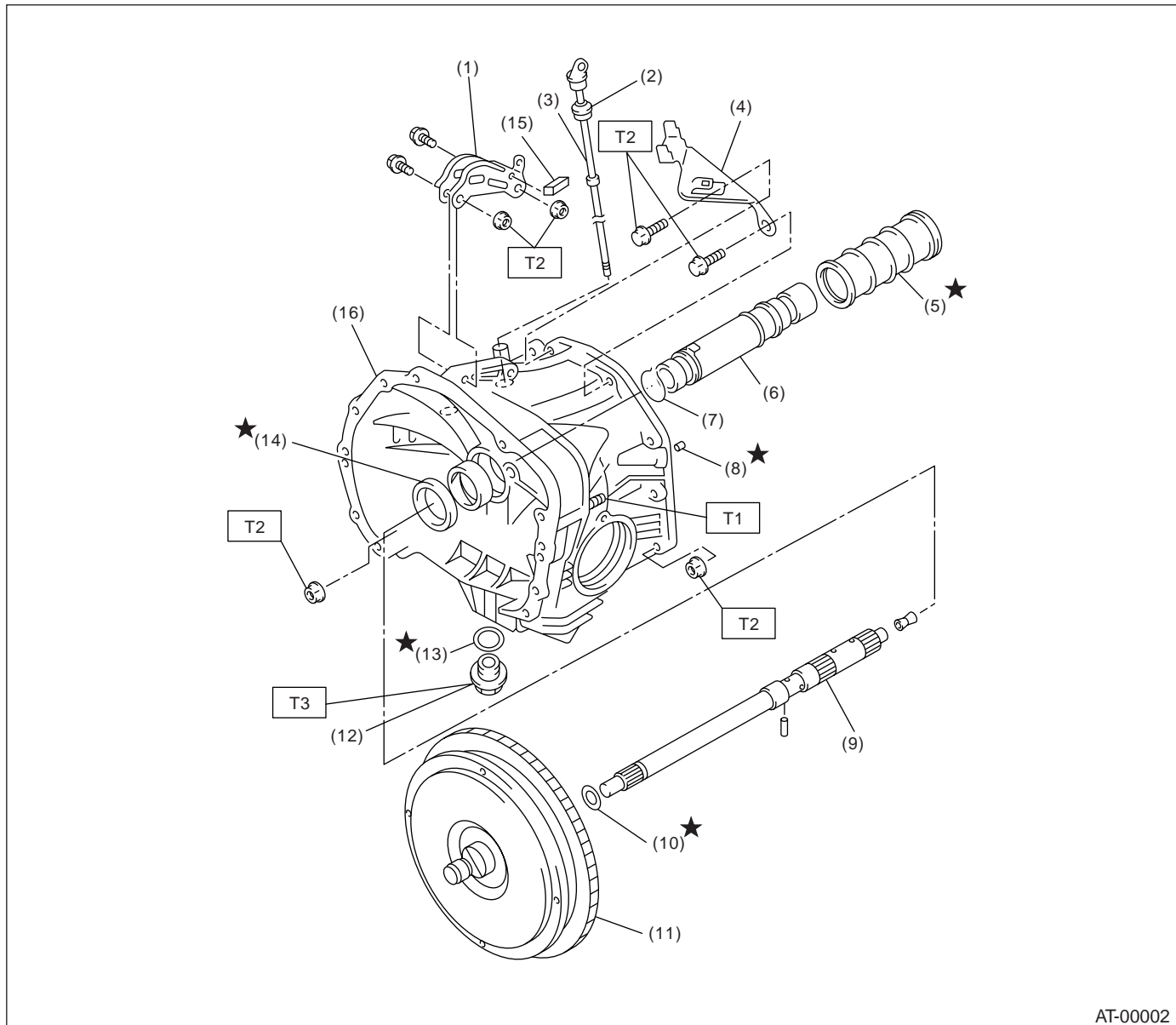
AT-3

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

B: COMPONENT

1. TORQUE CONVERTER CLUTCH AND CASE



AT-00002

- | | | |
|----------------------------------|-----------------------------------|-----------------------------------|
| (1) Pitching stopper bracket | (8) Oil drain pipe | (15) Clip |
| (2) O-ring | (9) Input shaft | (16) Torque converter clutch case |
| (3) Differential oil level gauge | (10) O-ring | |
| (4) Stay | (11) Torque converter clutch ASSY | |
| (5) Seal pipe | (12) Drain plug | |
| (6) Oil pump shaft | (13) Gasket | |
| (7) Clip | (14) Oil seal | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 18 (1.8, 13.0)

T2: 41 (4.2, 30.4)

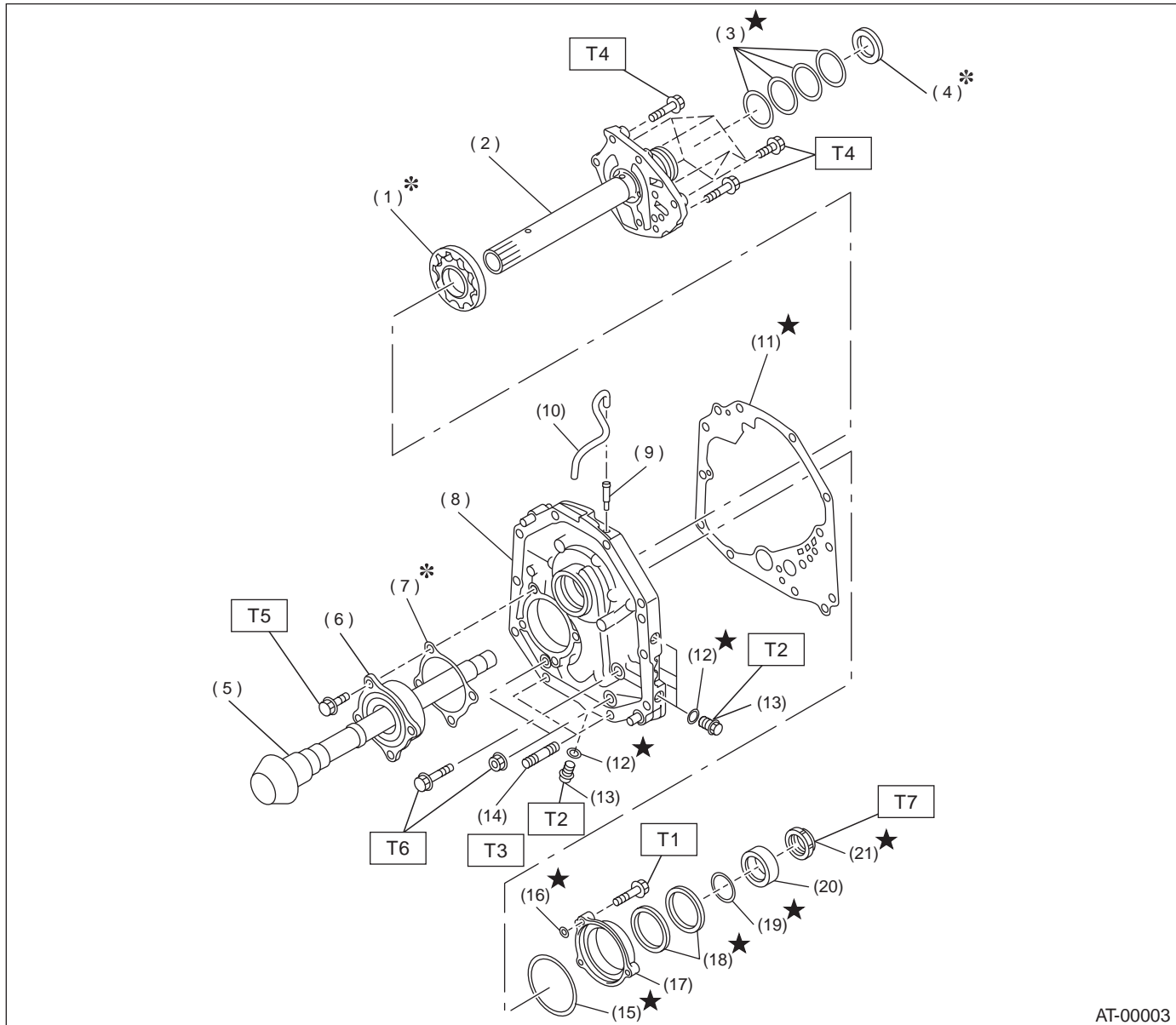
T3: 44 (4.5, 32.5)

AT-4

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

2. OIL PUMP



AT-00003

- | | |
|---------------------------|--------------------------|
| (1) Oil pump rotor | (12) O-ring |
| (2) Oil pump cover | (13) Test plug |
| (3) Seal ring | (14) Stud bolt |
| (4) Thrust needle bearing | (15) O-ring |
| (5) Drive pinion shaft | (16) O-ring |
| (6) Roller bearing | (17) Oil seal retainer |
| (7) Shim | (18) Oil seal |
| (8) Oil pump housing | (19) O-ring |
| (9) Nipple | (20) Drive pinion collar |
| (10) Air breather hose | (21) Lock nut |
| (11) Gasket | |

Tightening torque: N·m (kgf·m, ft·lb)

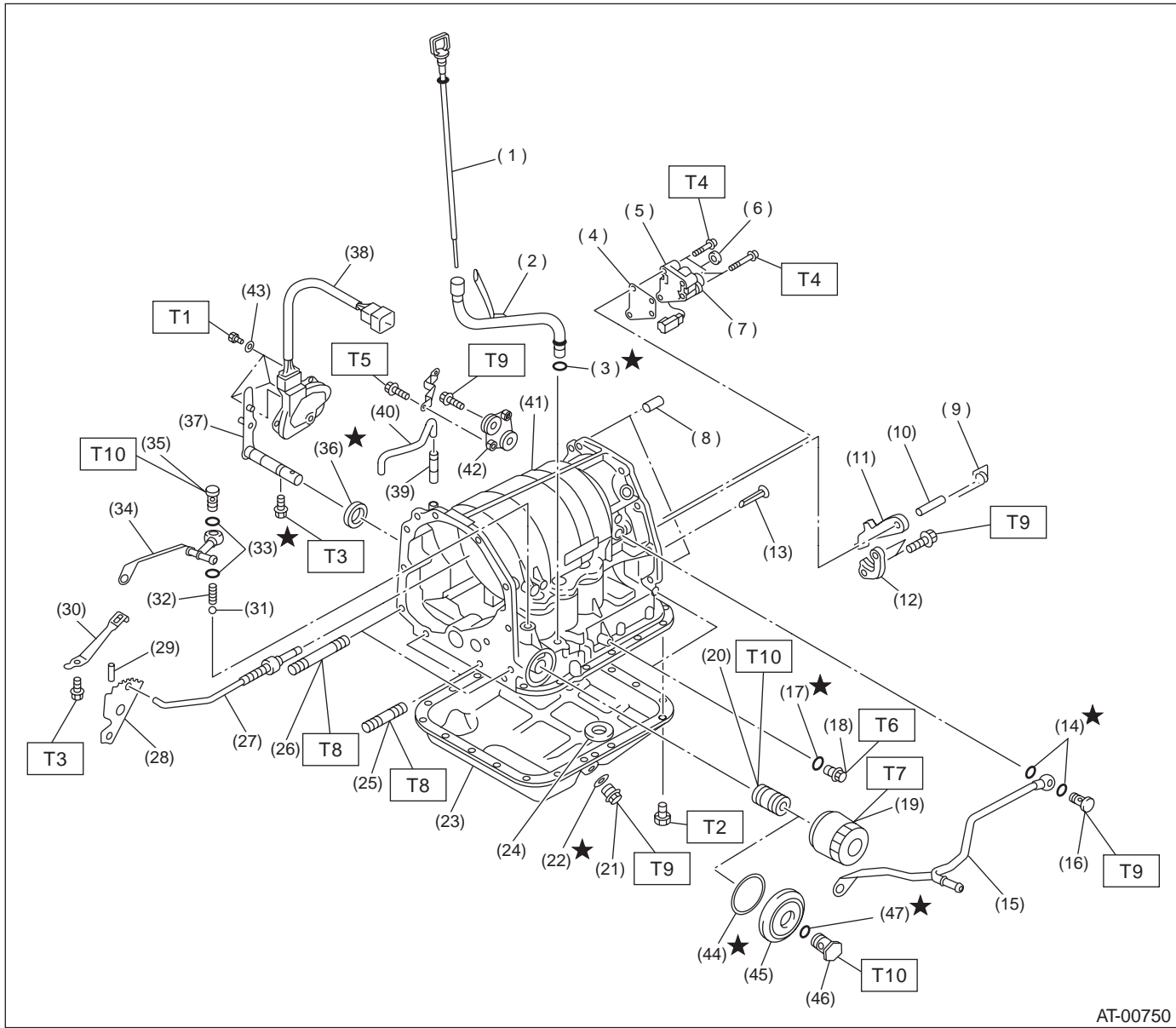
- T1: 7 (0.7, 5.1)**
T2: 13 (1.3, 9.4)
T3: 18 (1.8, 13.0)
T4: 25 (2.5, 18.1)
T5: 40 (4.1, 30)
T6: 42 (4.3, 31)
T7: 116 (11.8, 85)

AT-5

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

3. TRANSMISSION CASE AND CONTROL DEVICE



AT-6

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

(1) ATF level gauge	(21) Drain plug	(40) Air breather hose
(2) ATF charger pipe	(22) Gasket	(41) Transmission case
(3) O-ring	(23) Oil pan	(42) Plate ASSY
(4) Transfer valve plate	(24) Magnet	(43) Washer
(5) Transfer valve ASSY	(25) Stud bolt (Short)	(44) O-ring (3.0 L model)
(6) Transfer clutch seal	(26) Stud bolt (Long)	(45) Cover (3.0 L model)
(7) Transfer duty solenoid	(27) Parking rod	(46) Union screw
(8) Straight pin	(28) Manual plate	(47) Gasket
(9) Return spring	(29) Spring pin	
(10) Shaft	(30) Detention spring	
(11) Parking pawl	(31) Ball	
(12) Parking support	(32) Spring	
(13) Inlet filter	(33) Gasket	
(14) Gasket	(34) Outlet pipe	
(15) Inlet pipe	(35) Union screw	
(16) Union screw	(22) Gasket	
(17) O-ring	(36) Oil seal	
(18) Test plug	(37) Select lever	
(19) Oil filter (2.5 L model)	(38) Inhibitor switch ASSY	
(20) Oil filter stud bolt	(39) Nipple	

Tightening torque: N·m (kgf-m, ft-lb)

T1: 3.4 (0.35, 2.5)

T2: 5 (0.5, 3.6)

T3: 6 (0.6, 4)

T4: 8 (0.8, 6)

T5: 12 (1.2, 8.7)

T6: 13 (1.3, 10)

T7: 14 (1.4, 10)

T8: 18 (1.8, 13)

T9: 25 (2.6, 18)

T10: 44 (4.5, 32)

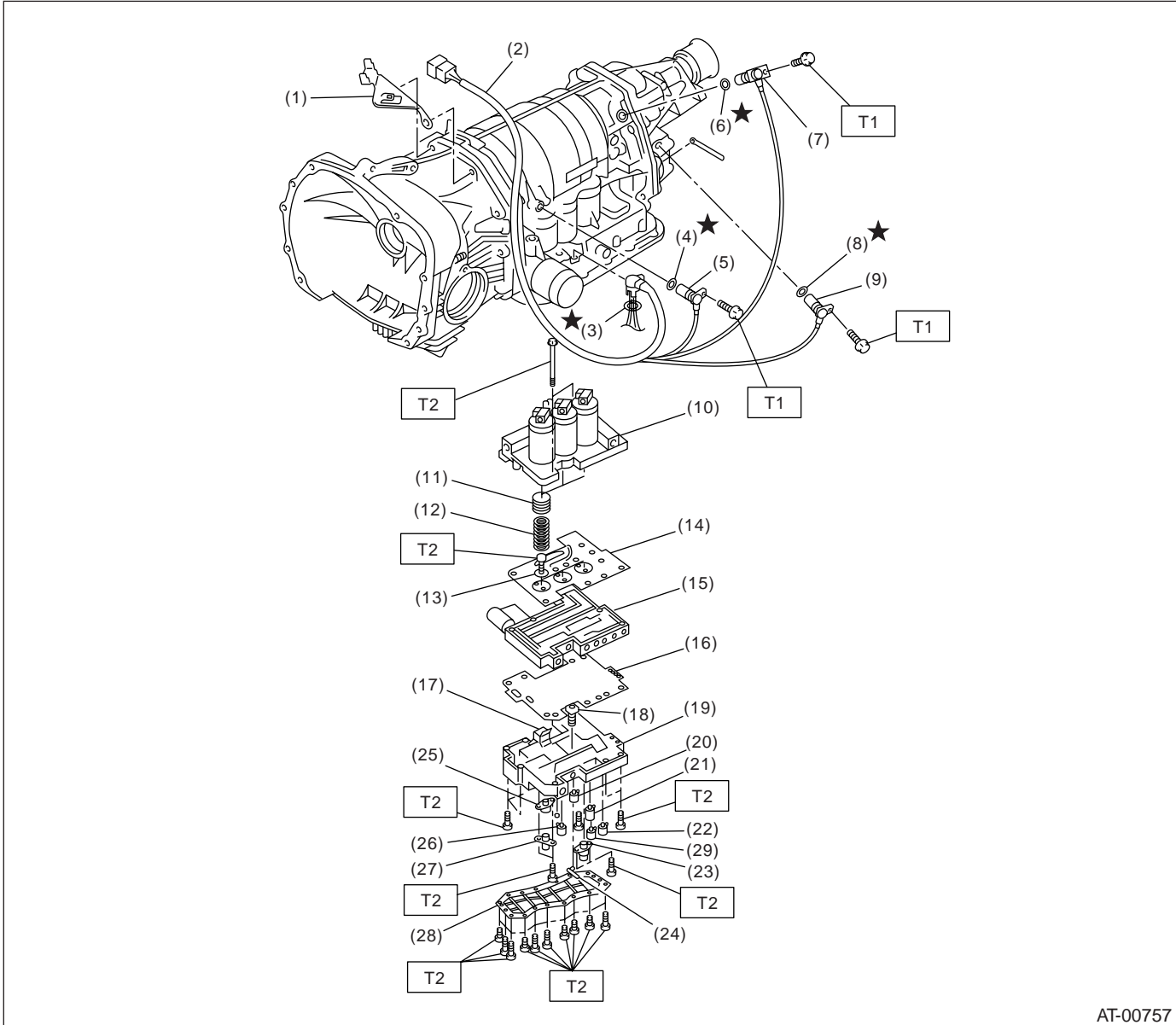
AT-7

Vehicle-id:
SIE-id::B:COMPONENT

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

4. CONTROL VALVE AND HARNESS ROUTING



- | | | |
|---|-------------------------|---|
| (1) Stay | (11) Accumulator piston | (22) 2-4 brake timing solenoid |
| (2) Transmission harness | (12) Accumulator spring | (23) 2-4 brake duty solenoid |
| (3) O-ring | (13) Side plate | (24) ATF temperature sensor |
| (4) O-ring | (14) Separate plate | (25) Line pressure duty solenoid |
| (5) Torque converter turbine speed sensor | (15) Middle valve body | (26) Low clutch timing solenoid |
| (6) O-ring | (16) Separate plate | (27) Lock-up duty solenoid |
| (7) Front vehicle speed sensor | (17) Fluid filter | (28) Oil strainer |
| (8) O-ring | (18) Fluid filter | (29) SPORT shift solenoid (if equipped) |
| (9) Rear vehicle speed sensor | (19) Lower valve body | |
| (10) Upper valve body | (20) Shift solenoid 2 | |
| | (21) Shift solenoid 1 | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7 (0.7, 5.1)

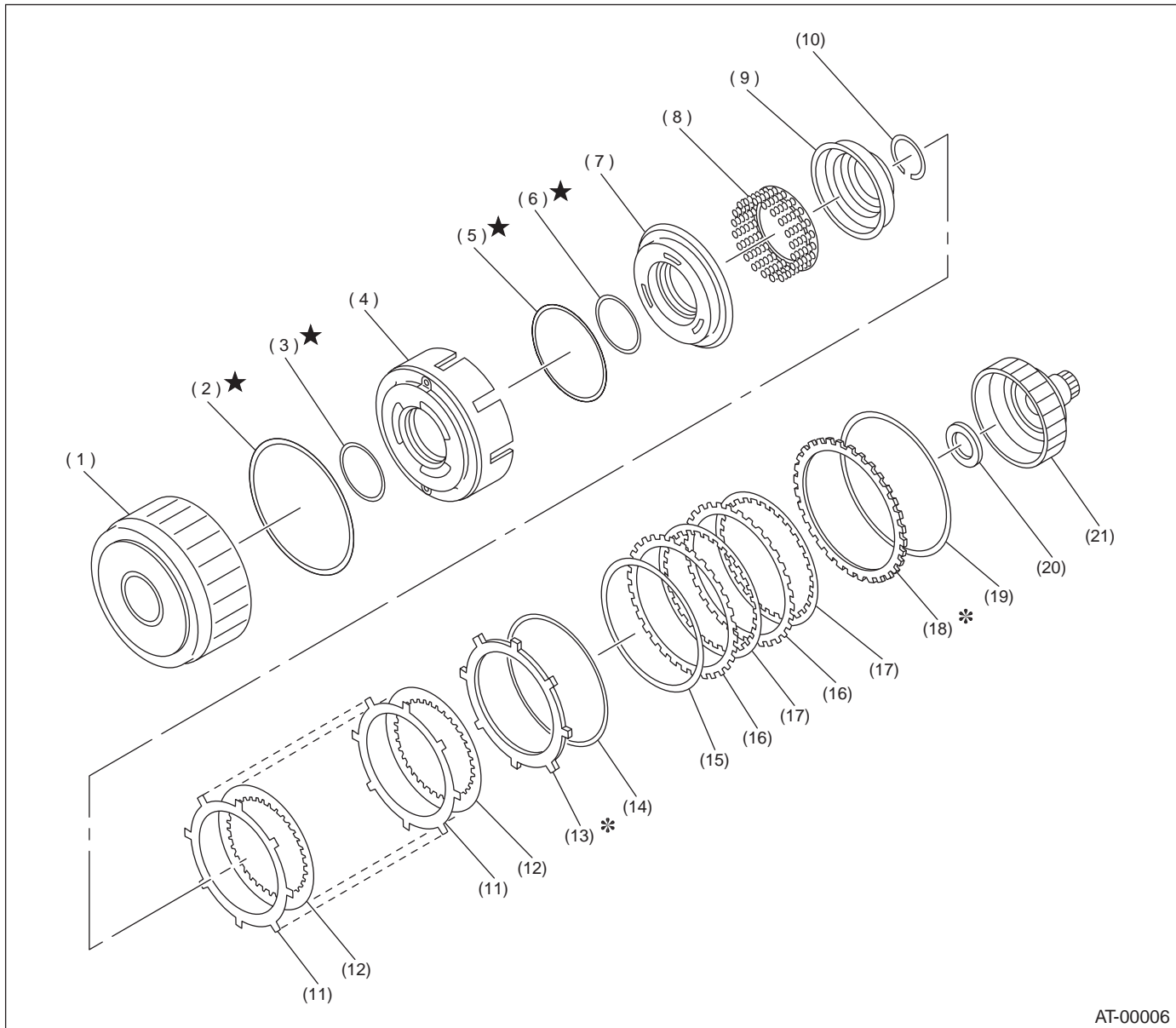
T2: 8 (0.8, 5.8)

AT-8

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

5. HIGH CLUTCH AND REVERSE CLUTCH



AT-00006

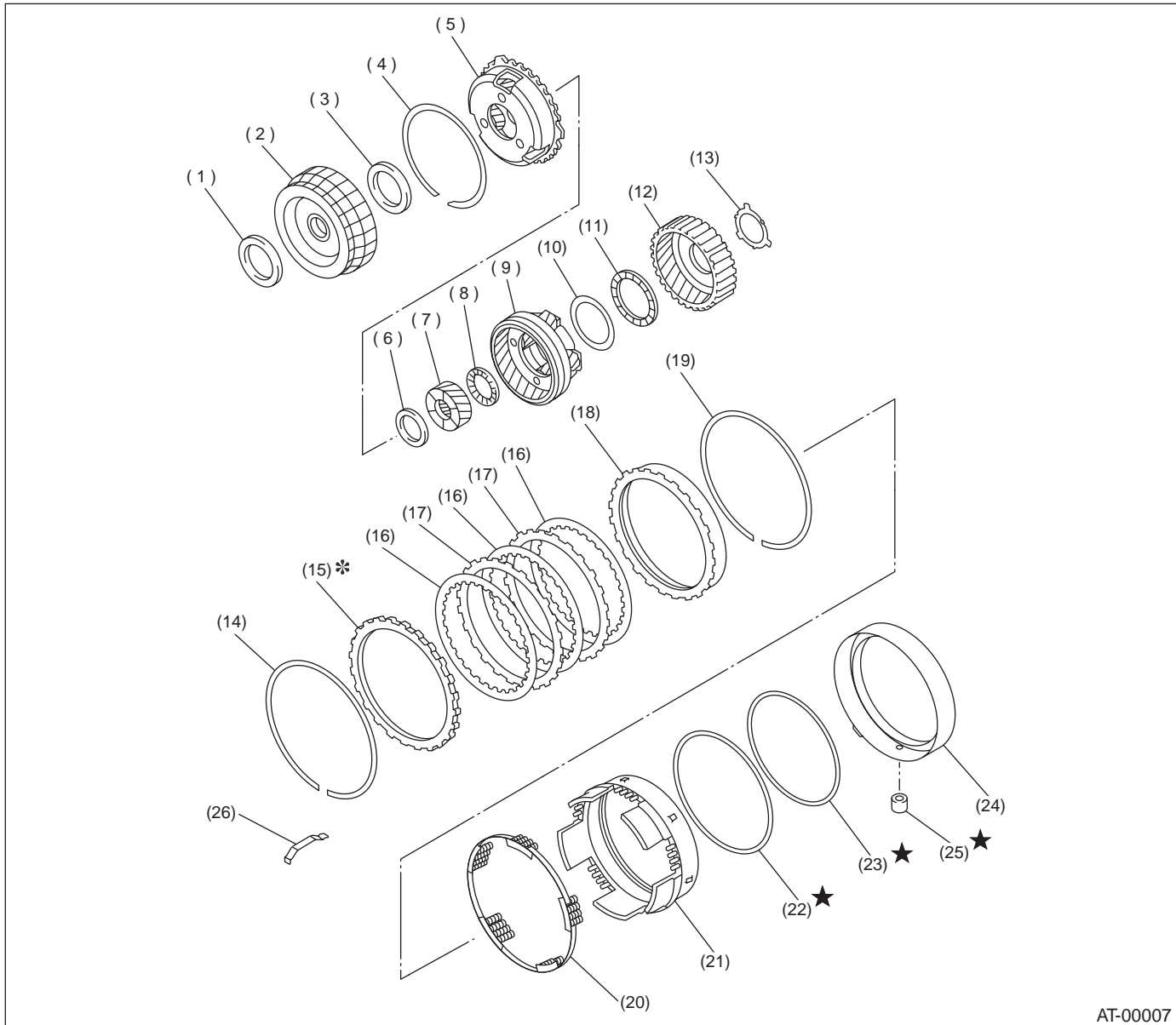
- | | | |
|---------------------------|----------------------|----------------------------|
| (1) High clutch drum | (8) Spring retainer | (15) Dish plate |
| (2) Lip seal | (9) Cover | (16) Driven plate |
| (3) Lathe cut seal ring | (10) Snap ring | (17) Drive plate |
| (4) Reverse clutch piston | (11) Driven plate | (18) Retaining plate |
| (5) Lathe cut seal ring | (12) Drive plate | (19) Snap ring |
| (6) Lathe cut seal ring | (13) Retaining plate | (20) Thrust needle bearing |
| (7) High clutch piston | (14) Snap ring | (21) High clutch hub |

AT-9

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

6. PLANETARY GEAR AND 2-4 BRAKE



AT-00007

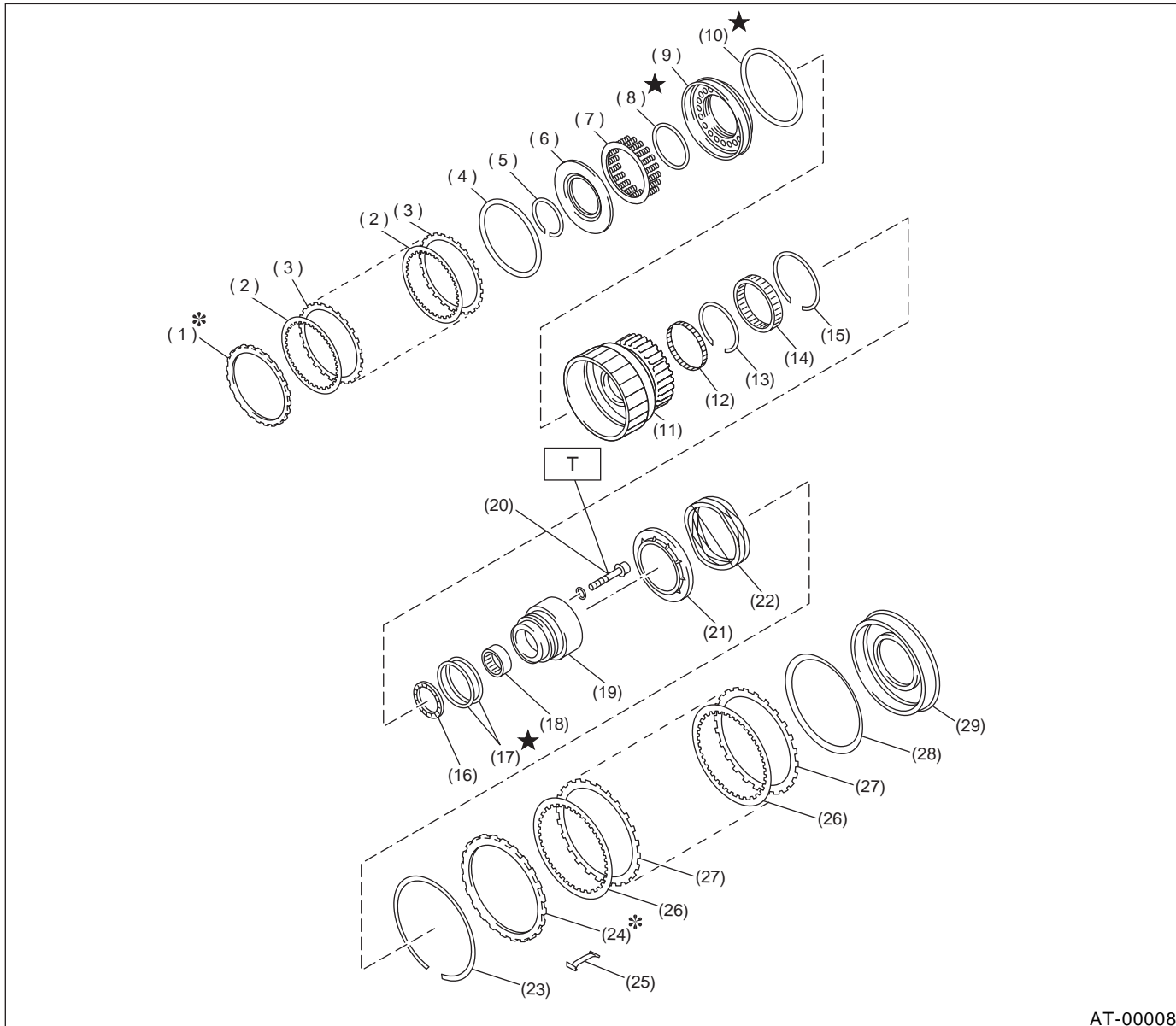
- | | | |
|-----------------------------|----------------------------|--------------------------------|
| (1) Thrust needle bearing | (10) Washer | (19) Snap ring |
| (2) Front sun gear | (11) Thrust needle bearing | (20) Spring retainer |
| (3) Thrust needle bearing | (12) Rear internal gear | (21) 2-4 brake piston |
| (4) Snap ring | (13) Washer | (22) Lathe cut seal ring |
| (5) Front planetary carrier | (14) Snap ring | (23) Lathe cut seal ring |
| (6) Thrust needle bearing | (15) Retaining plate | (24) 2-4 brake piston retainer |
| (7) Rear sun gear | (16) Drive plate | (25) 2-4 brake seal |
| (8) Thrust needle bearing | (17) Driven plate | (26) Leaf spring |
| (9) Rear planetary carrier | (18) Pressure rear plate | |

AT-10

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

7. LOW CLUTCH AND LOW & REVERSE BRAKE



AT-00008

- | | | |
|--------------------------|--------------------------------|-----------------------------------|
| (1) Retaining plate | (12) Needle bearing | (23) Snap ring |
| (2) Drive plate | (13) Inner snap ring | (24) Retaining plate |
| (3) Driven plate | (14) One-way clutch | (25) Leaf spring |
| (4) Dish plate | (15) Outer snap ring | (26) Drive plate |
| (5) Snap ring | (16) Thrust needle bearing | (27) Driven plate |
| (6) Cover | (17) Seal ring | (28) Dish plate |
| (7) Spring retainer | (18) Needle bearing | (29) Low and reverse brake piston |
| (8) Lathe cut seal ring | (19) One-way clutch inner race | |
| (9) Low clutch piston | (20) Socket bolt | |
| (10) Lathe cut seal ring | (21) Spring retainer | |
| (11) Low clutch drum | (22) Return spring | |

Tightening torque: N·m (kgf-m, ft-lb)

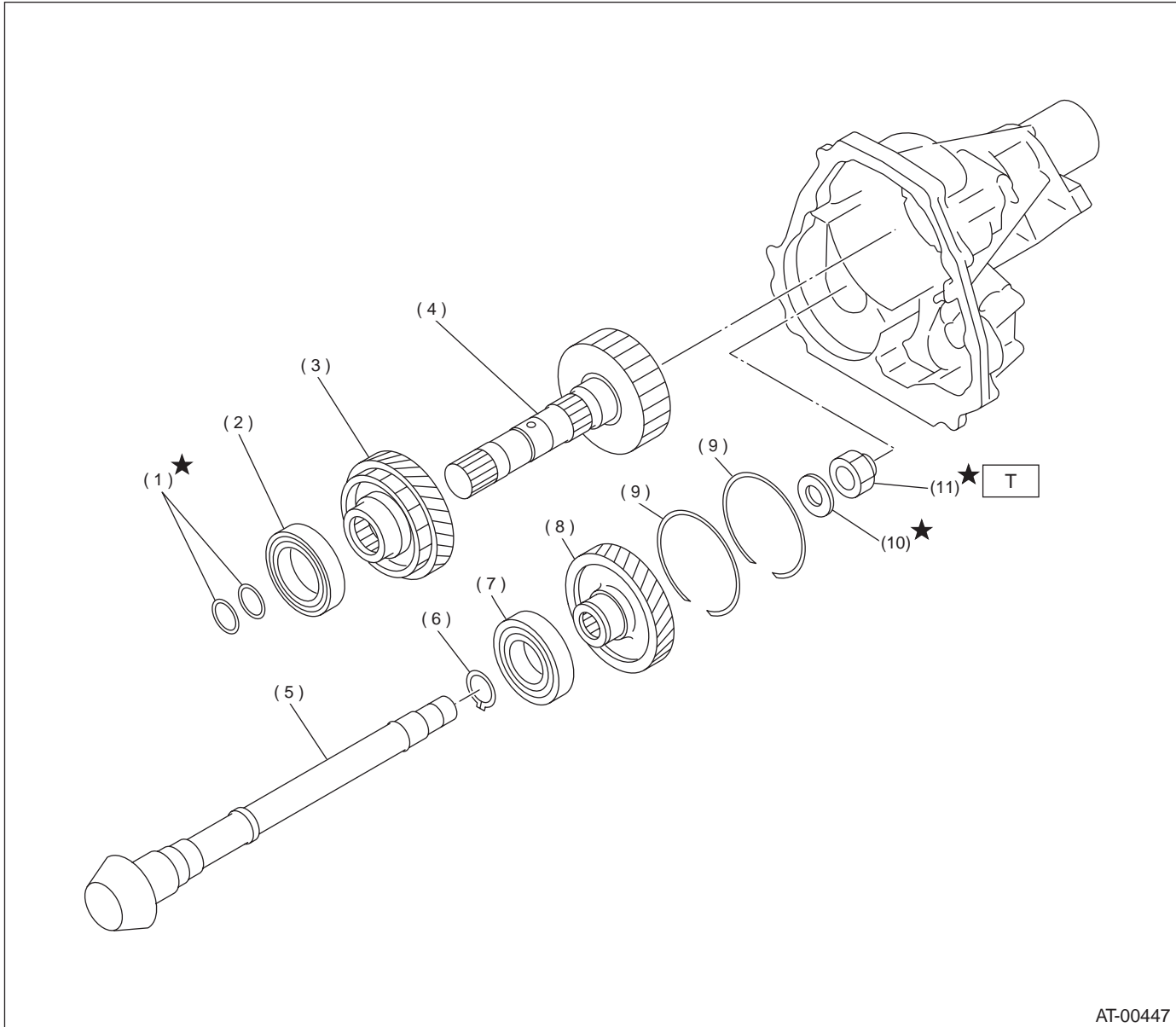
T: 25 (2.5, 18.1)

AT-11

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

8. REDUCTION GEAR (MPT)



AT-00447

- (1) Seal ring
- (2) Ball bearing
- (3) Reduction drive gear
- (4) Reduction drive shaft
- (5) Drive pinion shaft

- (6) Snap ring
- (7) Ball bearing
- (8) Reduction driven gear
- (9) Snap ring
- (10) Washer

- (11) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)

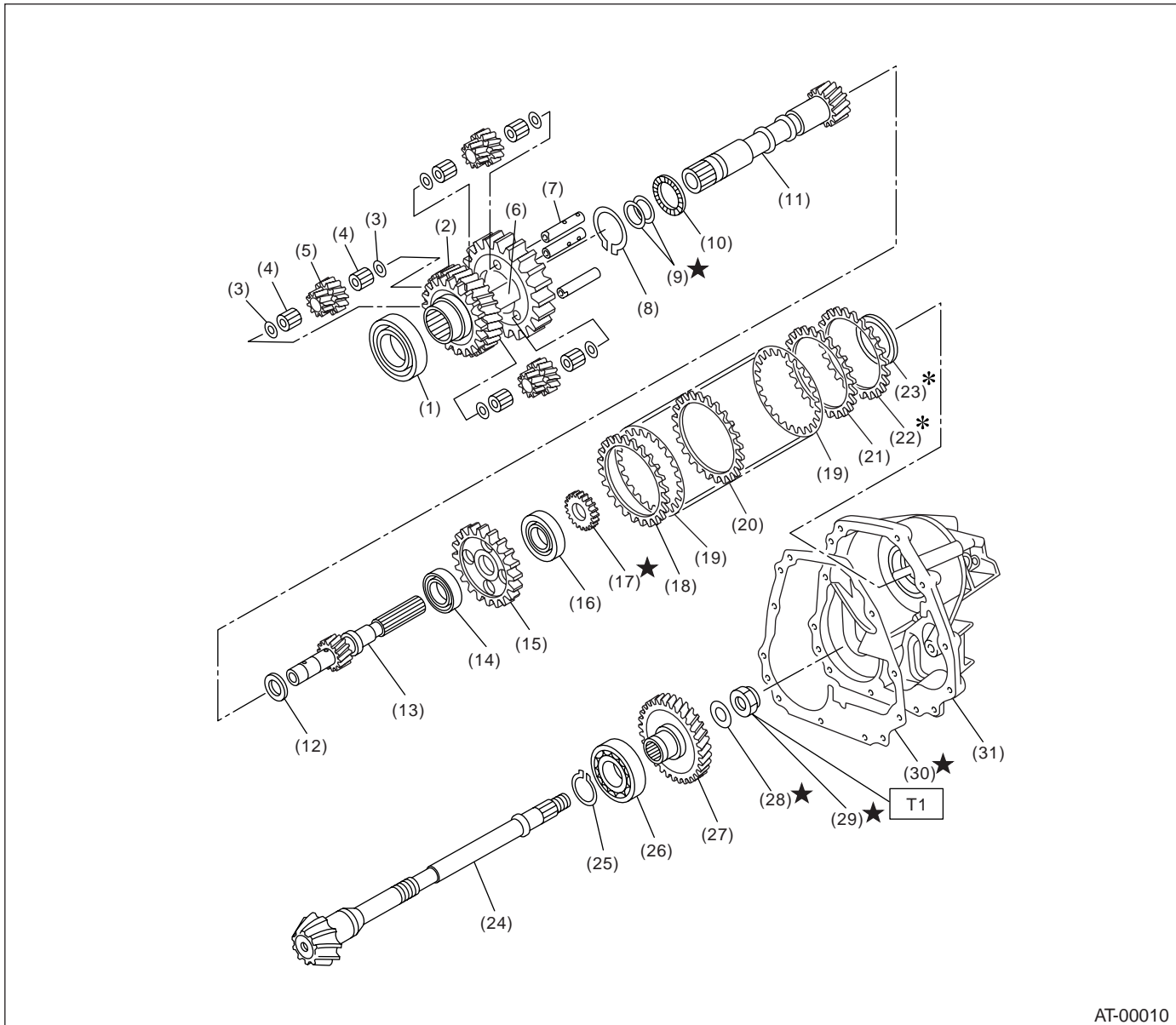
T: 100 (10.2, 73.8)

AT-12

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

9. REDUCTION GEAR (VTD)



AT-00010

- | | | |
|----------------------------|-----------------------------------|----------------------------|
| (1) Ball bearing | (13) Rear drive shaft | (25) Snap ring |
| (2) Reduction drive gear | (14) Ball bearing | (26) Ball bearing |
| (3) Washer | (15) Multi-plate clutch (LSD) hub | (27) Reduction driven gear |
| (4) Needle bearing | (16) Ball bearing | (28) Lock washer |
| (5) Pinion gear | (17) Revolution gear | (29) Lock nut |
| (6) Carrier | (18) Driven plate (Thick) | (30) Gasket |
| (7) Planetary pinion shaft | (19) Driven plate | (31) Extension case |
| (8) Snap ring | (20) Driven plate (Thin) | |
| (9) Seal ring | (21) Driven plate (Thick) | |
| (10) Thrust needle bearing | (22) Pressure plate | |
| (11) Intermediate shaft | (23) Rear drive shaft shim | |
| (12) Thrust washer | (24) Drive pinion shaft | |

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

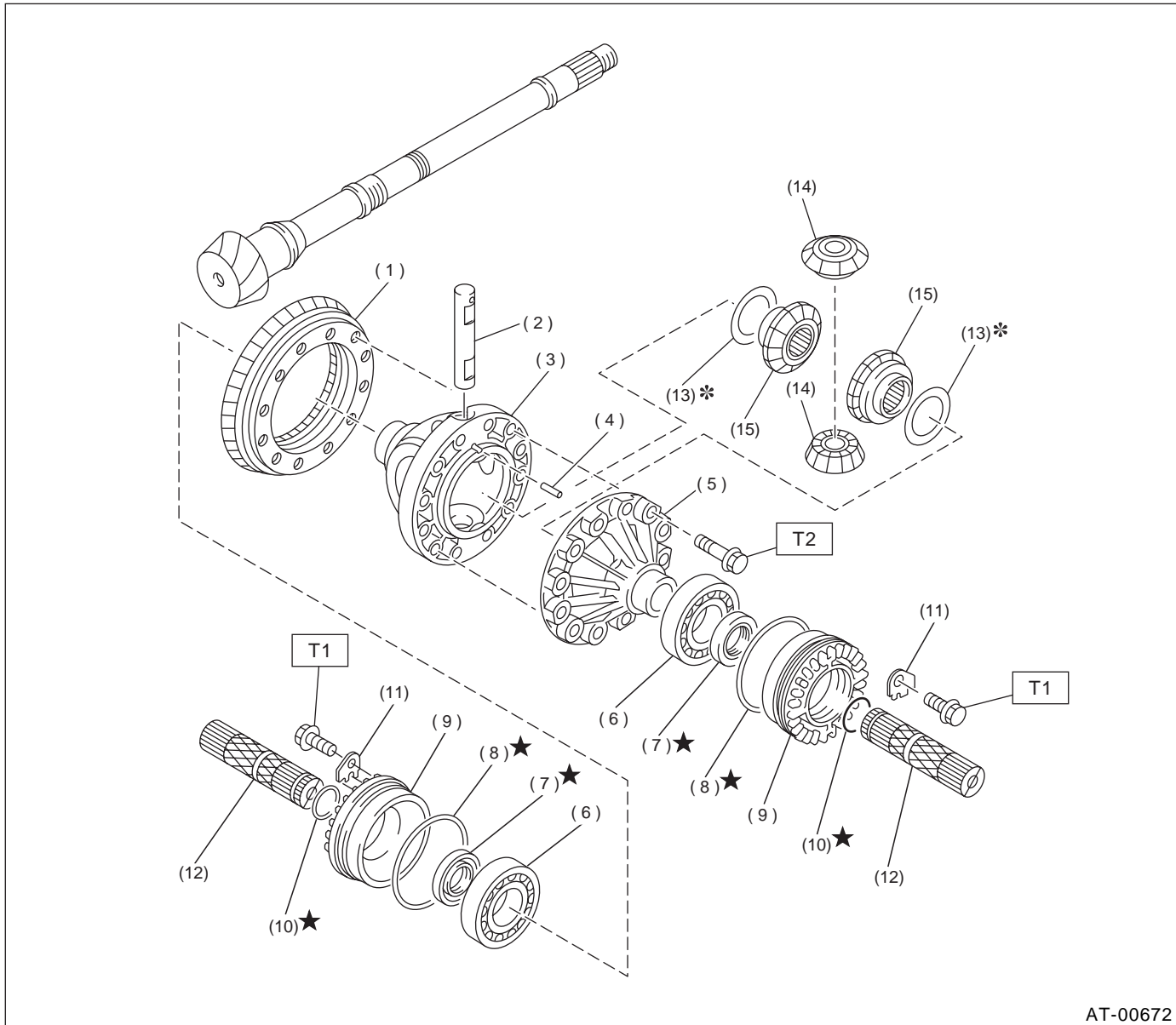
T: 100 (10.2, 73.8)

AT-13

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

10.DIFFERENTIAL GEAR



- (1) Crown gear
- (2) Pinion shaft
- (3) Differential case (RH)
- (4) Straight pin
- (5) Differential case (LH)
- (6) Taper roller bearing
- (7) Oil seal

- (8) O-ring
- (9) Differential side retainer
- (10) Circlip
- (11) Lock plate
- (12) Axle shaft
- (13) Washer
- (14) Differential bevel pinion

- (15) Differential bevel gear

Tightening torque: N·m (kgf·m, ft·lb)

T1: 25 (2.5, 18.1)

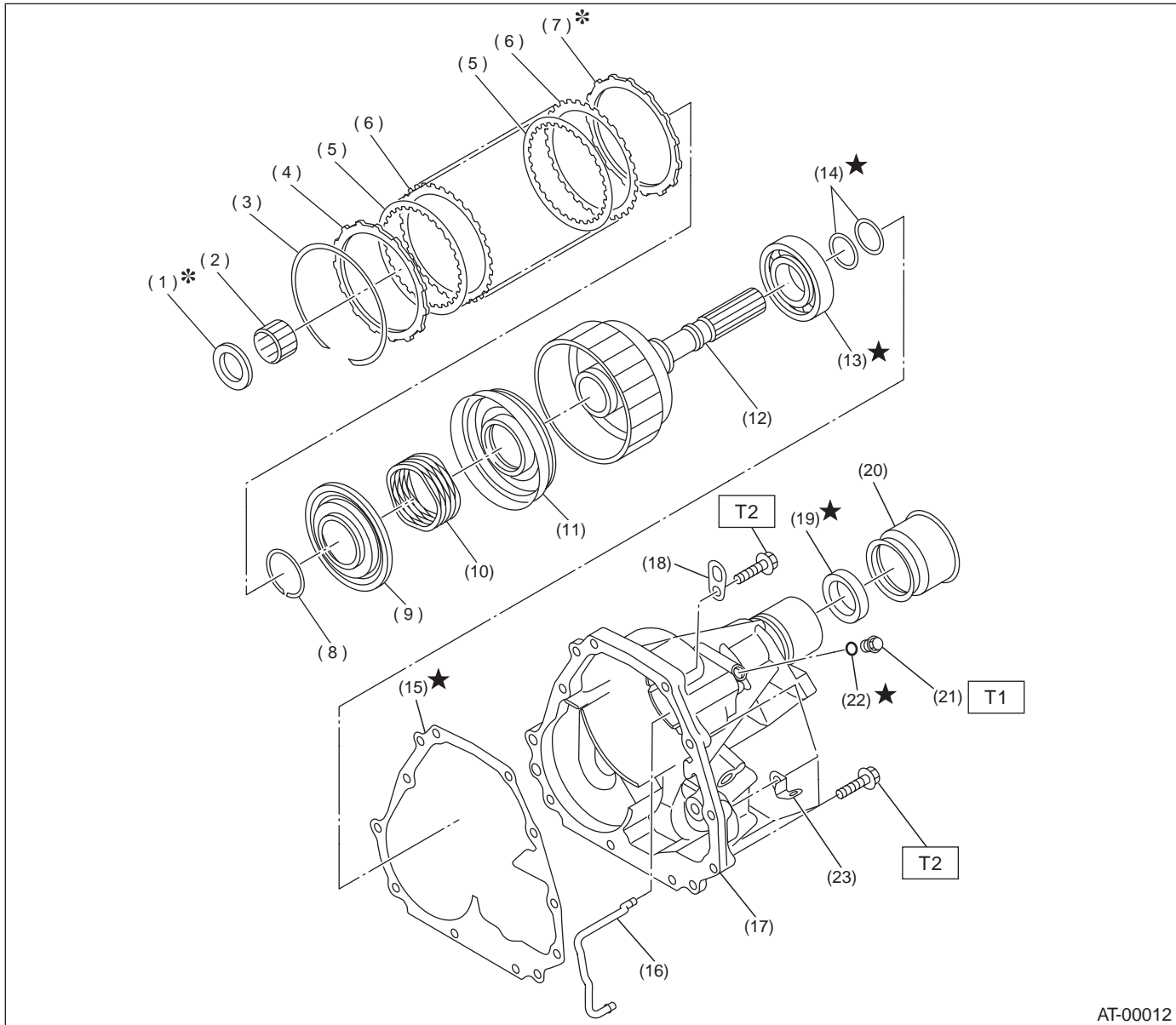
T2: 62 (6.3, 45.6)

AT-14

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

11.TRANSFER AND EXTENSION CASE (MPT)



AT-00012

- (1) Thrust needle bearing
- (2) Needle bearing
- (3) Snap ring
- (4) Pressure plate
- (5) Drive plate
- (6) Driven plate
- (7) Pressure plate
- (8) Snap ring
- (9) Transfer piston seal

- (10) Return spring
- (11) Transfer clutch piston
- (12) Rear drive shaft
- (13) Ball bearing
- (14) Seal ring
- (15) Gasket
- (16) Transfer clutch pipe
- (17) Extension case
- (18) Transmission hanger

- (19) Oil seal
- (20) Dust cover
- (21) Test plug
- (22) O-ring
- (23) Clip

Tightening torque: N·m (kgf·m, ft·lb)

T1: 13 (1.3, 9.4)

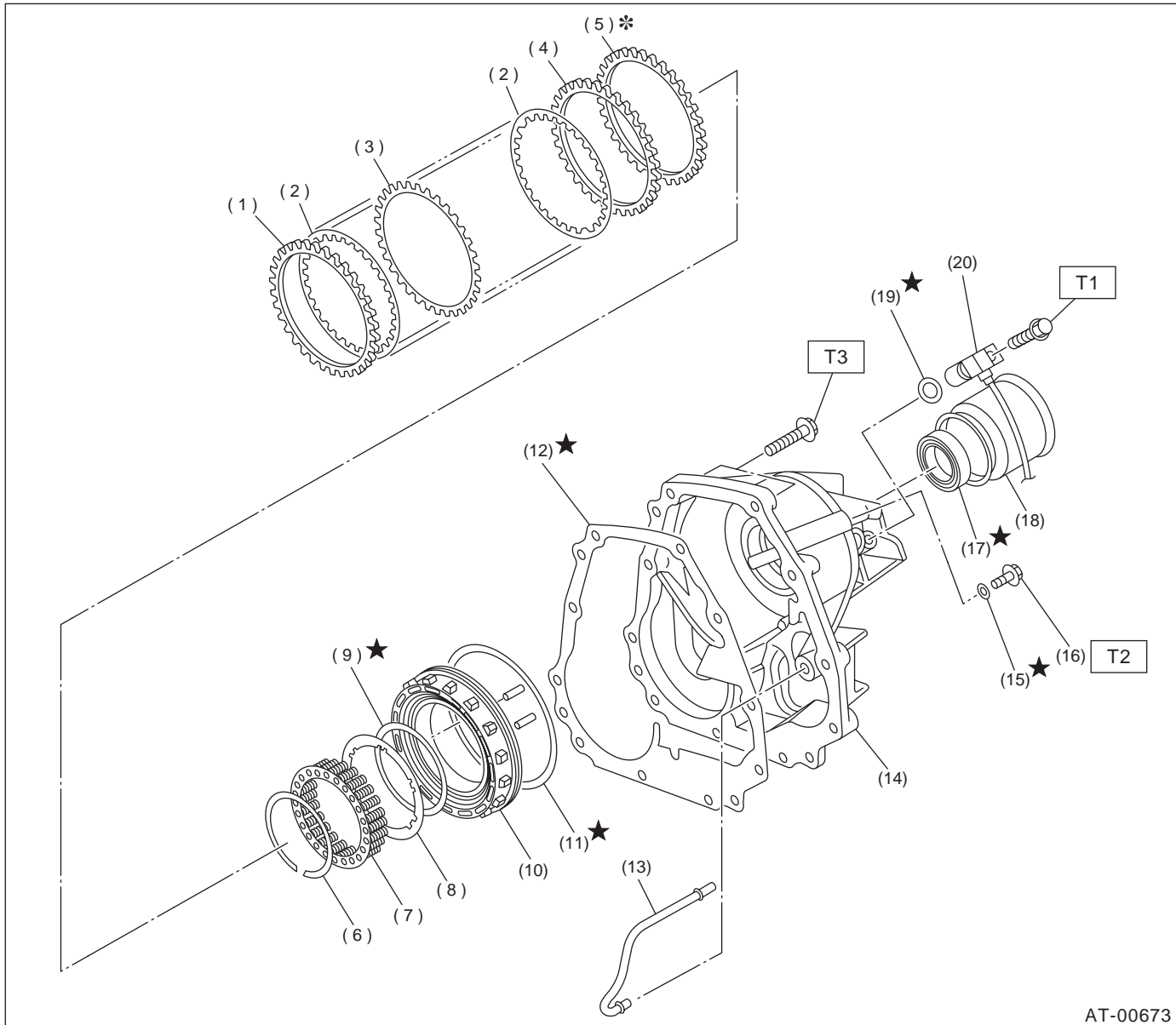
T2: 25 (2.5, 18.1)

AT-15

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

12.TRANSFER AND EXTENSION CASE (VTD)



- (1) Driven plate (Thick)
- (2) Driven plate
- (3) Driven plate (Thin)
- (4) Driven plate (Thick)
- (5) Adjust plate
- (6) Snap ring
- (7) Spring retainer
- (8) Plate
- (9) Raise cut seal ring

- (10) Multi-plate clutch (LSD) piston
- (11) Raise cut seal ring
- (12) Gasket
- (13) Multi-plate clutch (LSD) pipe
- (14) Extension case
- (15) O-ring
- (16) Test plug
- (17) Oil seal
- (18) Dust cover

- (19) O-ring
- (20) Rear wheel sensor

Tightening torque: N·m (kgf·m)

T1: 7 (0.7, 5.1)

T2: 13 (1.3, 9.4)

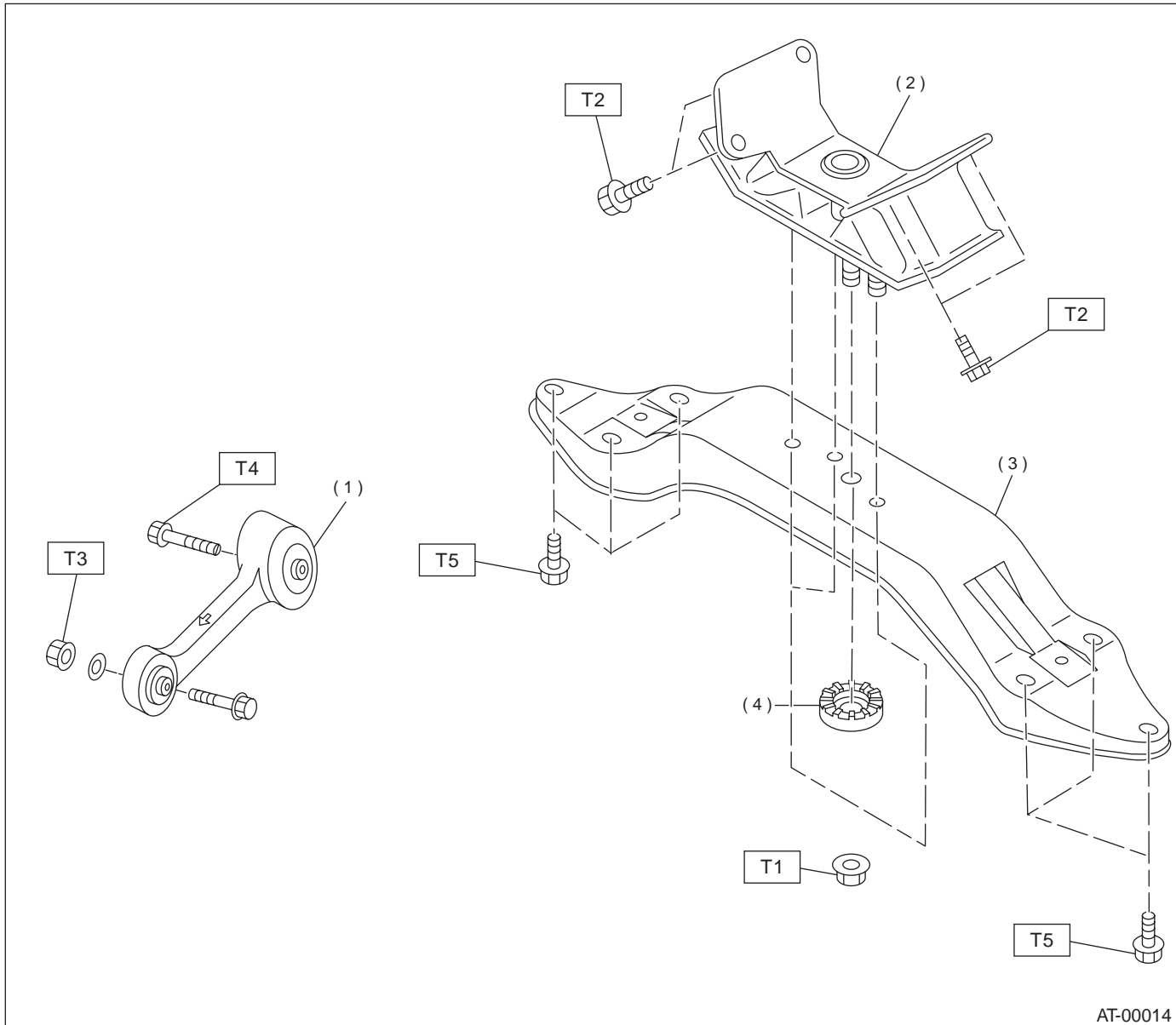
T3: 25 (2.5, 18.1)

AT-16

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

13.TRANSMISSION MOUNTING



AT-00014

- (1) Pitching stopper
- (2) Rear cushion rubber
- (3) Transmission rear crossmember
- (4) Stopper

Tightening torque: N·m (kgf·m, ft·lb)

T1: 35 (3.6, 26)

T2: 39 (4.0, 29)

T3: 50 (5.1, 37)

T4: 58 (5.9, 43)

T5: 75 (7.6, 55)

AT-17

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

C: CAUTION

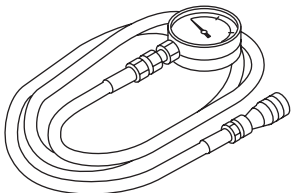
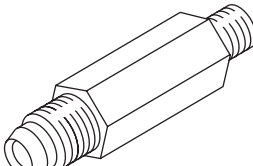
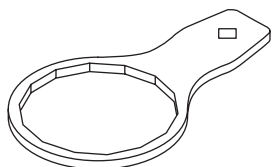
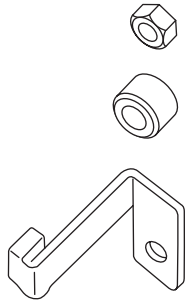
- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation, and disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Until the oil pan is removed, do not place with the oil pan side facing up to prevent foreign matter from entering the valve body.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use Subaru genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Replace deformed or otherwise damaged snap rings with new ones.
- Before installing O-rings or oil seals, apply sufficient amount of ATF fluid to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old seal.

AT-18

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

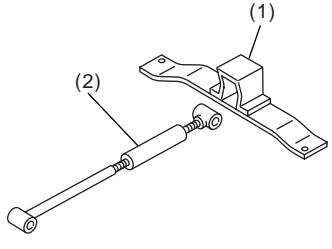
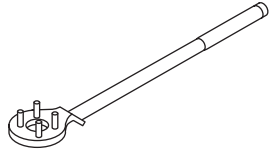
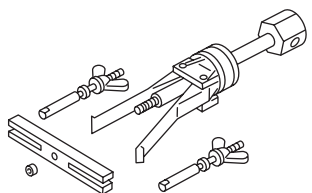
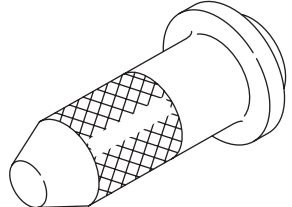
D: PREPARATION TOOL**1. SPECIAL TOOLS**

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498575400</p>	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 <p>ST-498897200</p>	498897200	ADAPTER	Used oil pump housing when measuring reverse clutch pressure and line pressure.
 <p>ST-498545400</p>	498545400	FILTER WRENCH	Used for removing and installing ATF filter.
 <p>ST-498277200</p>	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.

AT-19

GENERAL DESCRIPTION

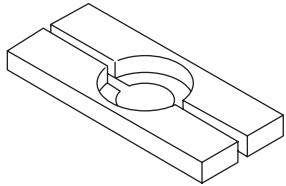
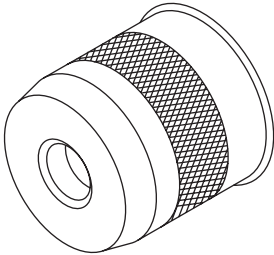
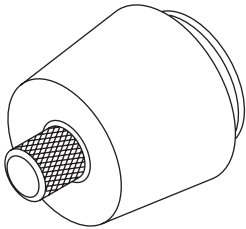
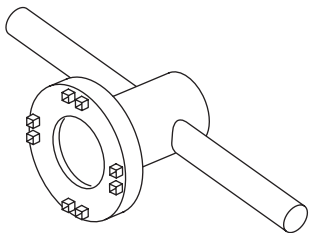
AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST41099AA000</p>	41099AA000	ENGINE SUPPORT ASSY	Used for supporting engine. (1) ENGINE SUPPORT BRACKET (41099AA010) (2) ENGINE SUPPORT (41099AA020)
 <p style="text-align: center;">ST-499977100</p>	49977100	CRANKSHAFT PULLEY WRENCH	Use for rotating crankshaft.
 <p style="text-align: center;">ST-398527700</p>	398527700	PULLER ASSY	<ul style="list-style-type: none"> • Used for removing extension case roller bearing. • Used for removing extension oil seal. • Used for removing front differential side retainer bearing outer race. • Used for removing front differential side retainer bearing outer ball race.
 <p style="text-align: center;">ST-498057300</p>	498057300	INSTALLER	Used for installing extension oil seal.

AT-20

GENERAL DESCRIPTION

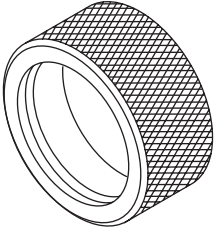
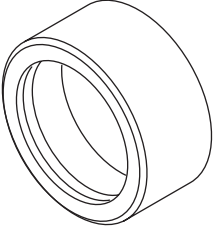
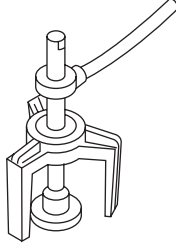
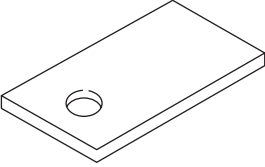
AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498077000</p>	498077000	REMOVER	Used for removing differential taper roller bearing.
 <p>ST-499247400</p>	499247400	INSTALLER	<ul style="list-style-type: none"> Used for installing transfer outer snap ring. Used with GUIDE (499257300).
 <p>ST-499257300</p>	499257300	SNAP RING OUTER GUIDE	<ul style="list-style-type: none"> Used for installing transfer outer snap ring. Used with INSTALLER (499247400).
 <p>ST-499787000</p>	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.

AT-21

GENERAL DESCRIPTION

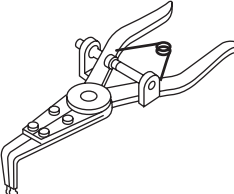
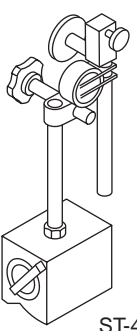
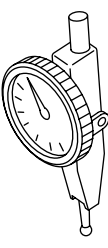
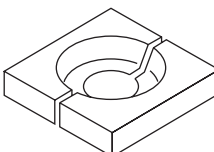
AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-398437700</p>	398437700	DRIFT	Used for installing converter case oil seal.
 <p style="text-align: center;">ST-398487700</p>	398487700	INSTALLER	Used for installing taper roller bearing of front differential.
 <p style="text-align: center;">ST-398673600</p>	398673600	COMPRESSOR	Used for removing and installing clutch spring.
 <p style="text-align: center;">ST-498255400</p>	498255400	PLATE	Used for measuring backlash of hypoid gear.

AT-22

GENERAL DESCRIPTION

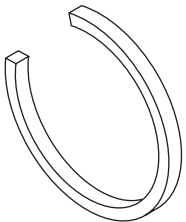
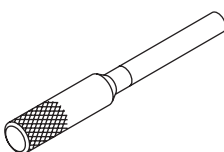
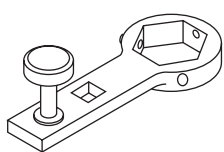
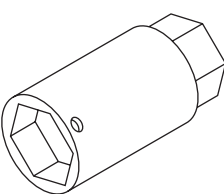
AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-399893600</p>	399893600	PLIERS	Used for removing and installing clutch spring.
 <p>ST-498247001</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> Used for measuring gear backlash. Used with DIAL GAUGE (498247100).
 <p>ST-498247100</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> Used for measuring gear backlash. Used with MAGNET BASE (498247001).
 <p>ST-498517000</p>	498517000	REPLACER	Used for removing front roller bearing.

AT-23

GENERAL DESCRIPTION

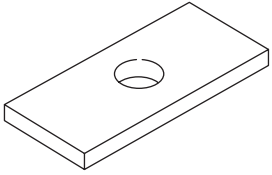
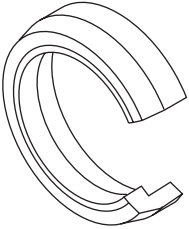
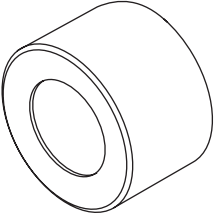
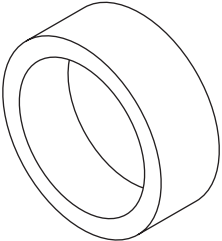
AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-398623600</p>	398623600	SEAT	Used for removing spring of transfer clutch piston.
 <p style="text-align: center;">ST-499267300</p>	499267300	STOPPER PIN	Used for installing inhibitor switch.
 <p style="text-align: center;">ST-499787700</p>	499787700	WRENCH	Used for removing and installing drive pinion lock nut.
 <p style="text-align: center;">ST-499787500</p>	499787500	ADAPTER	Used for removing and installing drive pinion lock nut.

AT-24

GENERAL DESCRIPTION

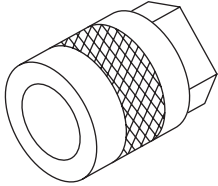
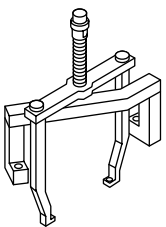
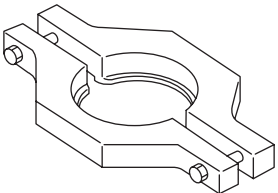
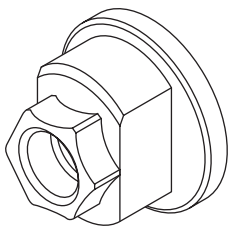
AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 ST-498627100	498627100	SEAT	Used for holding low clutch piston retainer spring when installing snap ring.
 ST-499577000	499577000	GAUGE	Used for measuring the transmission case mating surface to the reduction gear end surface.
 ST-398744300	398744300	GAUGE	<ul style="list-style-type: none"> • Use for measuring contact face between multi-plate clutch end and transmission. • VTD model

AT-25

GENERAL DESCRIPTION

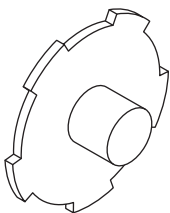
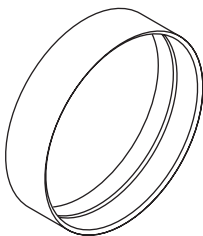
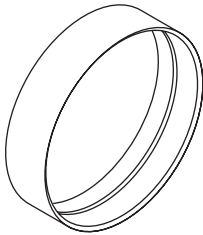
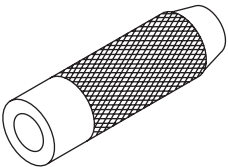
AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-499737000</p>	499737000	PULLER	Used for removing reduction driven gear assembly.
 <p style="text-align: center;">ST-499737100</p>	499737100	PULLER SET	Used for removing reduction drive gear assembly.
 <p style="text-align: center;">ST-498077600</p>	498077600	REMOVER	Used for removing ball bearing.
 <p style="text-align: center;">ST-498937110</p>	498937110	HOLDER	Used for removing and installing drive pinion lock nut.

AT-26

GENERAL DESCRIPTION

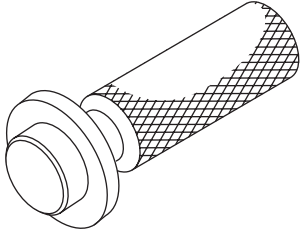
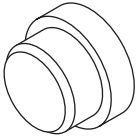
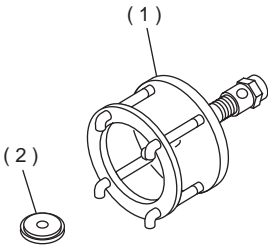
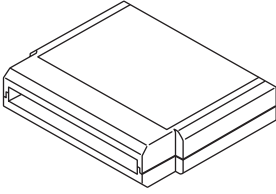
AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498677100</p>	498677100	COMPRESSOR	Used for installing 2-4 brake snap ring.
 <p>ST-498437000</p>	498437000	HIGH CLUTCH PISTON GUIDE	Used for installing high clutch piston.
 <p>ST-498437100</p>	498437100	LOW CLUTCH PISTON GUIDE	Used for installing low clutch piston.
 <p>ST-899580100</p>	899580100	INSTALLER	Used for press-fitting the ball bearing for transfer clutch.

AT-27

GENERAL DESCRIPTION


AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-499797000</p>	499797000	DIFFERENTIAL OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.
 <p style="text-align: center;">ST-398497701</p>	398497701	SEAT	Used for installing needle bearing.
 <p style="text-align: center;">ST-899524100</p>	899524100	PULLER SET	<ul style="list-style-type: none"> • Using the bolt only. (1) Bolt • Used with PULLER SET (499737100). • Used with PULLER (499737000). (1) Puller (2) Cap
 <p style="text-align: center;">ST24082AA210</p>	24082AA210 <Newly adopted tool>	CARTRIDGE	Troubleshooting for electrical systems.

AT-28

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST22771AA010</p>	22771AA010	SELECT MONITOR KIT	Troubleshooting for electrical systems.

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Depth gauge	Used for measuring transmission end play.
Thickness gauge	Used for measuring clearances of clutch, brake and oil pump.
Micro meter	Used for measuring thickness of drive pinion.
Spring balance	Used for measuring starting torque of drive pinion.
Circuit tester	Used for measuring resistance and voltage.

AT-29

AUTOMATIC TRANSMISSION FLUID

AUTOMATIC TRANSMISSION

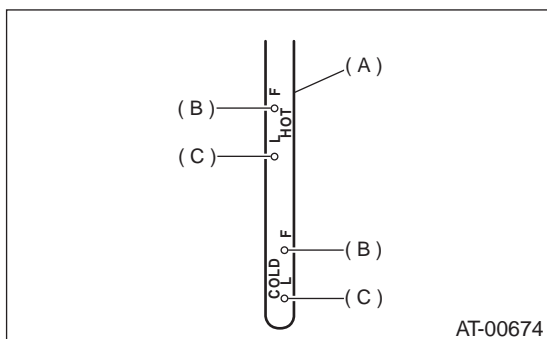
2. Automatic Transmission Fluid

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 AT-23, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
- 2) Make sure the vehicle is level.
- 3) After selecting all positions (P, R, N, D, 3, 2, 1), set the select lever in "P" range. Measure the ATF level with the engine idling for one or two minutes.



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

- 4) Make sure that ATF level is above the center of upper and lower marks.

NOTE:

When the transmission is hot, the level should be above the center of upper and lower marks, and when it is cold, the level should be found below the center of these two marks.

- 5) If the ATF level is below the center between upper and lower marks, add the recommended ATF until the ATF level is found above the center between upper and lower marks.

CAUTION:

- Use care not to exceed the upper limit level.
- Remember that the addition of ATF to the upper limit mark when the transmission is cold will result in 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) Lift-up the vehicle.
- 2) Drain the ATF completely.

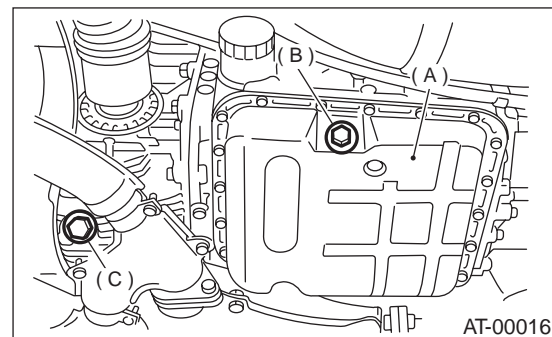
CAUTION:

Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.

- 3) Replace with a new gasket, and then tighten the ATF drain plug.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



- (A) Oil pan
(B) Drain plug (ATF)
(C) Differential oil drain plug

- 4) Lower the vehicle.
- 5) Pour ATF into the oil charge pipe.

Recommended fluid:

Dexron III type automatic transmission fluid

Capacity:

Fill the same amount of ATF drained from drain plug hole.

Capacity when transmission is overhauled:

9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

- 6) Check the level and leaks of ATF.

<Ref. to AT-30, INSPECTION, Automatic Transmission Fluid.>

AT-30

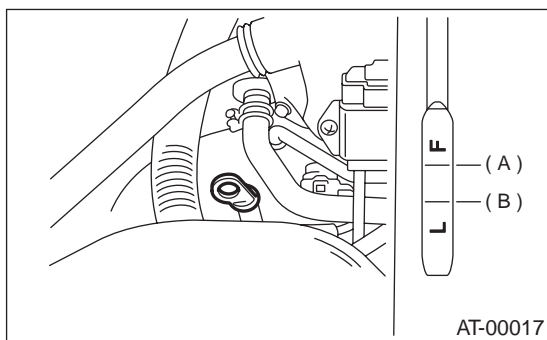
DIFFERENTIAL GEAR OIL

AUTOMATIC TRANSMISSION

3. Differential Gear 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 in the proper orientation.
- 4) Remove it again and note the reading. If the differential gear oil level is below the "L" line, add oil to bring the level up to the "F" line.
- 5) To prevent overfilling the differential gear oil, do not add oil above the "F" line.



- (A) Upper level
(B) Lower level

B: REPLACEMENT

- 1) Lift-up the vehicle.
- 2) Drain the differential gear oil completely.

CAUTION:

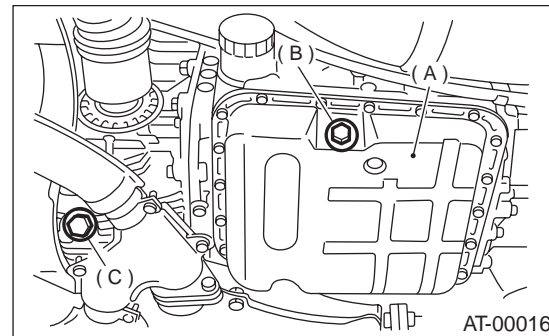
• **Directly after the engine has been running, the differential gear oil is hot. Be careful not to burn yourself.**

• **Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. When the differential gear oil is spilled on exhaust pipe, wipe it away completely.**

- 3) Replace the gasket with a new one, and then tighten the differential gear oil drain plug.

Tightening torque:

44 N·m (4.5 kgf·m, 32.5 ft·lb)



- (A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

- 4) Lower the vehicle.
- 5) Pour gear oil into the gauge hole.

Recommended fluid:

Use GL-5 (SAE: 80W — 90) or equivalent.

Gear oil capacity:

1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)

- 6) Check the level of differential gear oil.
<Ref. to AT-31, INSPECTION, Differential Gear Oil.>

AT-31

ROAD TEST

AUTOMATIC TRANSMISSION

4. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

Road tests should be conducted to properly diagnose the condition of the 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 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. Also check the kick-down shock level.

5. ENGINE BRAKE OPERATION

- Check the 3rd gear engine brake when shifting between D ⇔ 3rd range while driving in 4th gear of D range [50 to 60 km/h (31 to 37 MPH)].
- Check the 2nd gear engine brake when shifting between 3 ⇔ 2 range while driving in the 3 range 3rd gear [40 to 50 km/h (25 to 31 MPH)].
- Check the 1st gear engine brake when shifting between 2 ⇔ 1 range while driving in the 2 range 2nd gear [20 to 30 km/h (12 to 19 MPH)].

6. LOCK-UP FUNCTION

Check that rpm does not change sharply when the accelerator pedal is lightly depressed when driving on flat roads at normal speed in the lock-up range.

7. P RANGE OPERATION

Stop the vehicle on an uphill grade of 5% or more and shift to "P" range. Check that the vehicle does not move when the parking brake is released.

8. UNUSUAL SOUNDS AND VIBRATION

Check for unusual sounds and vibration while driving and during shifting.

9. CLIMBING CONTROL FUNCTION

- Check that the gear remains in 3rd when going up a grade.
- Check that the gear remains in 3rd when applying the brakes while going down a grade.

10. TRANSFER CLUTCH

Check if the tight corner braking occurs when the vehicle is started with steering wheel held at fully turned position.

11. OIL LEAKS

After the driving test, inspect for oil leaks.

AT-32

STALL TEST

AUTOMATIC TRANSMISSION

5. Stall Test

A: INSPECTION

1. GENERAL INFORMATION

The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in "R" and "2" ranges.

Purposes of the stall test:

- 1) To check the operation of the automatic transmission clutch.
- 2) To check the operation of the torque converter clutch.
- 3) To check engine performance.

2. TEST METHODS

- 1) Preparations before test:
 - (1) Check that throttle valve opens fully.
 - (2) Check that engine oil level is correct.
 - (3) Check that coolant level is correct.
 - (4) Check that ATF level is correct.
 - (5) Check that differential gear oil level is correct.
 - (6) Increase ATF temperature to 50 to 80°C (122 to 176°F) by idling the engine for approx. 30 minutes (with select lever set to "N" or "P").
- 2) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
- 3) Move the manual linkage to ensure it operates properly, and shift the select lever to the "2" range.
- 4) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.

- 8) Perform the stall tests with the select lever in "D" range.

NOTE:

- Do not continue the stall test for MORE THAN 5 SECONDS at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction causes the engine oil and ATF to deteriorate and the clutch and brake to be adversely affected.
- Be sure to cool down the engine for at least 1 minute after each stall test with the select lever set in the "P" or "N" range and with the idle speed lower than 1,200 rpm.
- If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the automatic transmission from sustaining damage.

Stall speed (at sea level):

Except OUTBACK (2.5 L model):

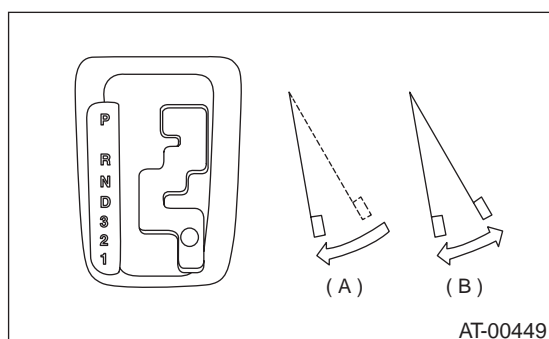
2,100 - 2,600 rpm

OUTBACK (2.5 L model):

2,200 - 2,700 rpm

3.0 L model:

2,000 - 2,500 rpm



- (A) Brake pedal
(B) Accelerator pedal

- 5) When the engine speed is stabilized, record that speed quickly and release the accelerator pedal.
- 6) Shift the select lever to "N" range, and cool down the engine by idling it for more than one minute.
- 7) If the stall speed in "2" range is higher than specifications, low clutch slipping and 2-4 brake slipping may occur. To identify it, conduct the same test as above in "R" range.

AT-33

STALL TEST

AUTOMATIC TRANSMISSION

3. EVALUATION

Stall speed (at sea level)	Position	Cause
Less than specifications	2 R	<ul style="list-style-type: none"> • Throttle valve not fully open • Erroneous engine operation • Torque converter clutch's one-way clutch slipping
Greater than specifications	D	<ul style="list-style-type: none"> • Line pressure too low • Low clutch slipping • One-way clutch malfunction
	R	<ul style="list-style-type: none"> • Line pressure too low • Reverse clutch slipping • Low & reverse brake slipping
	2	<ul style="list-style-type: none"> • Line pressure too low • Low clutch slipping • 2-4 brake slipping • One-way clutch malfunction

AT-34

TIME LAG TEST

AUTOMATIC TRANSMISSION

6. Time Lag Test

A: INSPECTION

1. GENERAL INFORMATION

If the select lever is shifted while the engine is idling, there will be a certain time elapse or lag before the shock can be felt. This is used for checking the condition of the low clutch, reverse clutch, low & reverse brake and one-way clutch.

NOTE:

- Perform the test at normal operating fluid temperature 60 to 80°C (140 to 176°F).
- Be sure to allow a 1 minute interval between tests.
- Make three measurements and take the average value.

2. TEST METHODS

- 1) Fully apply the parking brake.
- 2) Start the engine.
Check the idling speed (A/C OFF).
- 3) Shift the select lever from "N" to "D" range.
Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.
Time lag: Less than 1.2 seconds
- 4) In the same manner, measure the time lag for "N" → "R".
Time lag: Less than 1.5 seconds

3. EVALUATION

- 1) If "N" → "D" time lag is longer than specified:
 - Line pressure too low
 - Low clutch worn
 - One-way clutch not operating properly
- 2) If "N" → "R" time lag is longer than specified:
 - Line pressure too low
 - Reverse clutch worn
 - Low & reverse brake worn

AT-35

LINE PRESSURE TEST

AUTOMATIC TRANSMISSION

7. Line Pressure Test

A: MEASUREMENT

1. GENERAL INFORMATION

If the clutch or the brake shows a sign of slippage or shifting sensation is not correct, the line pressure should be checked.

- Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.

- Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.

1) Line pressure measurement (under no load)

NOTE:

- Before measuring the line pressure, jack-up all wheels.

- Maintain the temperature of ATF at approx. 50°C (122°F) during measurement.

(ATF will reach the above temperature after idling the engine for approx. 30 minutes with select lever in "N" or "P".)

2) Line pressure measurement (under heavy load)

NOTE:

- Before measuring the line pressure, apply both foot and parking brakes with all wheels chocked (Same as for "stall" test conditions).

- Measure the line pressure when select lever is in "R", "2" with engine under stall conditions.

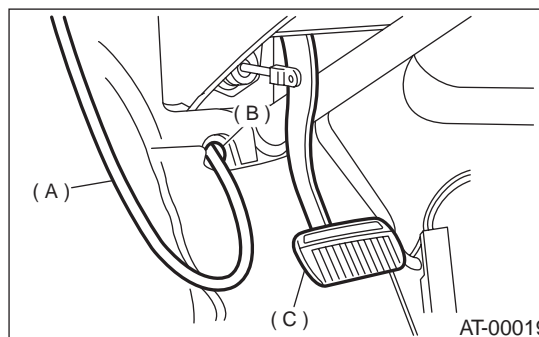
- Measure the line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle, and then stop it to cool down for at least one minute.)

- Maintain the temperature of ATF at approx. 50°C (122°F) during measurement (ATF will reach the above temperature after idling the engine for approx. 30 minutes with the select lever in "N" or "P".)

2. TEST METHODS

1) Temporarily attach the ST to a suitable place in the driver's compartment, remove the blind plug located in front of the toe board and pass the hose of the ST to engine compartment.

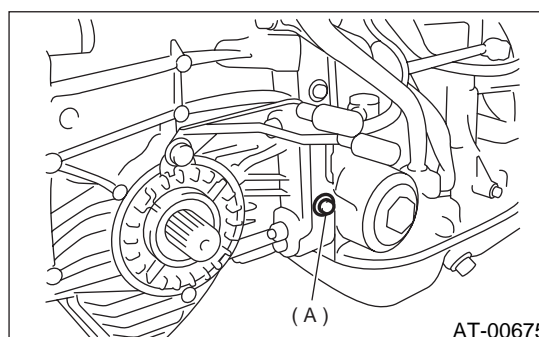
ST 498575400 OIL PRESSURE GAUGE ASSY



- (A) Pressure gauge hose
(B) Hole in toe board (blank cap hole)
(C) Brake pedal

2) Remove the test plug and install the ST instead.

ST 498897200 OIL PRESSURE GAUGE ADAPTER



- (A) Test plug

3) Connect the ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER

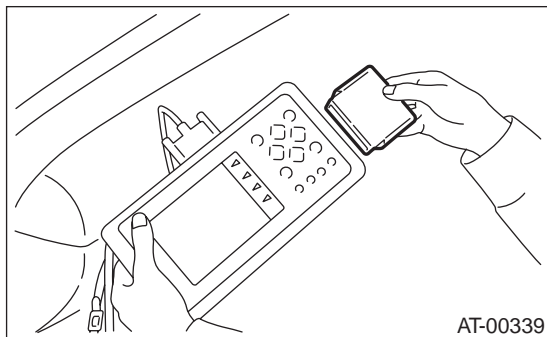
ST2 498575400 OIL PRESSURE GAUGE ASSY

LINE PRESSURE TEST

AUTOMATIC TRANSMISSION

4) Check for duty ratio changes by opening and closing the throttle valve using Subaru Select Monitor.

(1) Insert the cartridge to Subaru Select Monitor. <Ref. to AT-19, PREPARATION TOOL, General Description.>



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

5) Check the line pressure in accordance with the following chart.

3. EVALUATION

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle position	Line pressure kPa (kg/cm ² , psi)
2	5	Full open	1,128 — 1,304 (11.5 — 13.3, 164 — 189)
R	5	Full open	1,520 — 1,716 (15.5 — 17.5, 220 — 249)
D	95	Full closed	304 — 412 (3.1 — 4.2, 44 — 60)

AT-37

TRANSFER CLUTCH PRESSURE TEST

AUTOMATIC TRANSMISSION

8. Transfer Clutch Pressure Test

A: INSPECTION

1. TEST METHODS

- MPT model

Check the transfer clutch pressure in accordance with the following chart in the same manner as with line pressure. <Ref. to AT-36, Line Pressure Test.>

ST 498897700 OIL PRESSURE ADAPTER SET

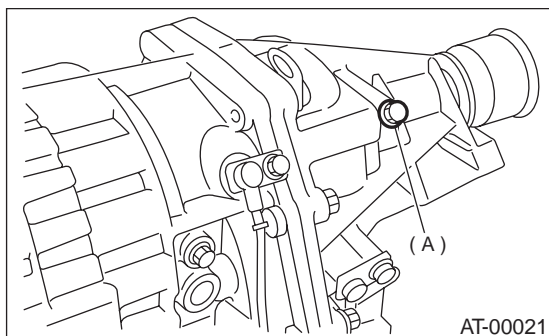
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: "D" range

FWD mode: "P" range, engine speed 2,000 rpm

NOTE:

Before setting in FWD mode, install the spare fuse on FWD mode switch.



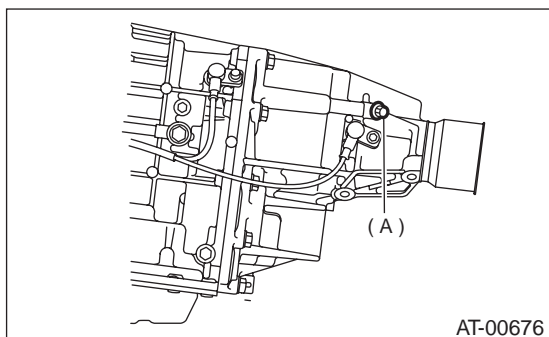
(A) Test plug

- VTD model

Check transfer clutch pressure using the following chart. <Ref. to AT-36, Line Pressure Test.>

ST 498897700 OIL PRESSURE ADAPTER SET

ST 498575400 OIL PRESSURE GAUGE ASSY



(A) Test plug

2. EVALUATION

- MPT model

NOTE:

If oil pressure is not produced or if it does not change in the AWD mode, the transfer duty solenoid or transfer valve assembly may be malfunctioning. If oil pressure is produced in the FWD mode, the problem is similar to that in the AWD mode.

Standard transfer clutch pressure kPa (kg/cm ² , psi)			
ON Duty ratio (%)	Throttle position	AWD mode	FWD mode
5	Full open	932 — 1,089 (9.5 — 11.1, 135 — 158)	—
60	2/3 throttle	216 — 294 (2.2 — 3.0, 31 — 43)	—
95	Full closed	—	0 (0, 0)

- VTD model

Duty ratio (%)	Throttle opening angle	Standard of transfer clutch pressure kPa (kg/cm ² , psi)
95	Fully open	932 — 1,089 (9.5 — 11.1, 135 — 158)
60	2/3 open	216 — 294 (2.2 — 3.0, 31 — 43)

AT-38

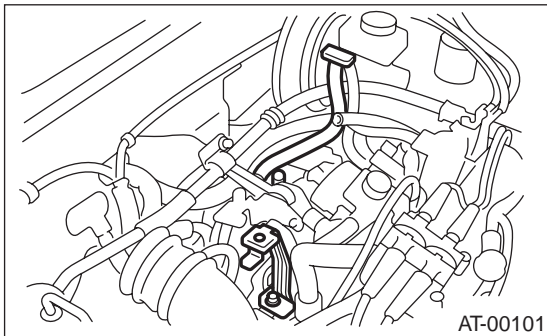
AUTOMATIC TRANSMISSION ASSEMBLY

AUTOMATIC TRANSMISSION

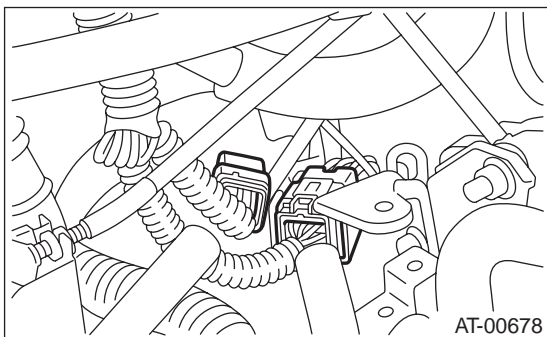
9. Automatic Transmission Assembly

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Open front hood fully, and support with stay.
- 3) Disconnect battery ground cable.
- 4) Remove air intake duct.
2.5 L model
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3.0 L model
<Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
- 5) Remove air cleaner case or air intake chamber.
2.5 L model
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
3.0 L model
<Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
- 6) Remove air cleaner case stay.

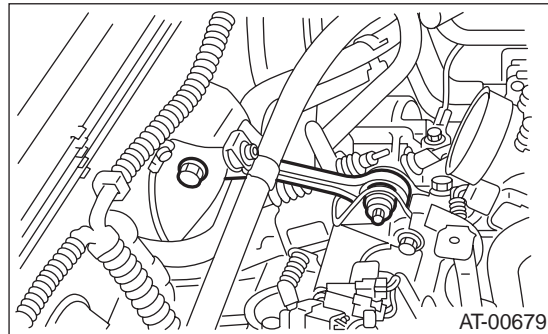


- 7) Disconnect the following connectors.
 - (1) Transmission harness connector



- (2) Transmission ground terminal
- 8) Remove starter.
Except 3.0 L model
<Ref. to SC(H4SO)-7, REMOVAL, Starter.>
3.0 L model
<Ref. to SC(H6DO)-6, REMOVAL, Starter.>

- 9) Remove pitching stopper.

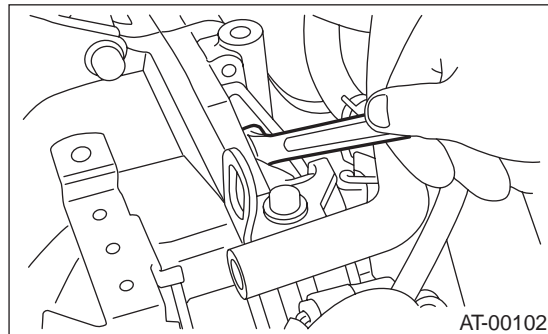


- 10) Separate torque converter clutch from drive plate.
 - (1) Remove service hole plug.
 - (2) Remove bolts which hold torque converter clutch to drive plate.
 - (3) While rotating the engine, remove other bolts using ST.

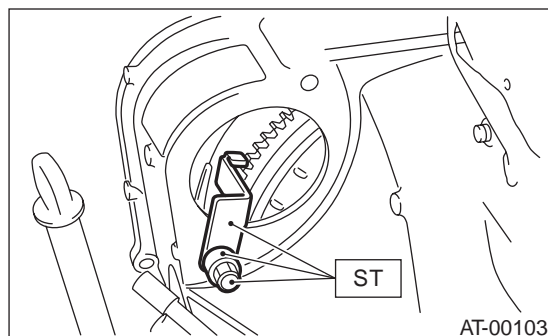
CAUTION:

Be careful not to drop bolts into torque converter clutch housing.

ST 499977100 CRANK PULLEY WRENCH



- 11) Install ST to torque converter clutch case.
ST 498277200 STOPPER SET



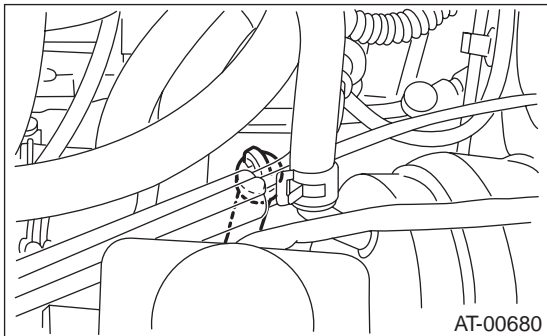
AUTOMATIC TRANSMISSION ASSEMBLY

AUTOMATIC TRANSMISSION

12) Remove ATF level gauge.

NOTE:

Plug opening to prevent entry of foreign particles into transmission fluid.

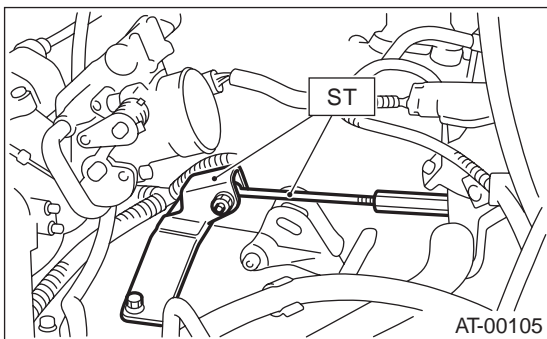


13) Set ST.

NOTE:

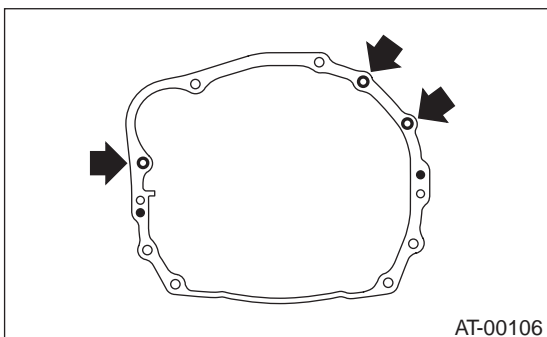
Also is available Part No. 41099AA010.

ST 41099AA020 ENGINE SUPPORT ASSY

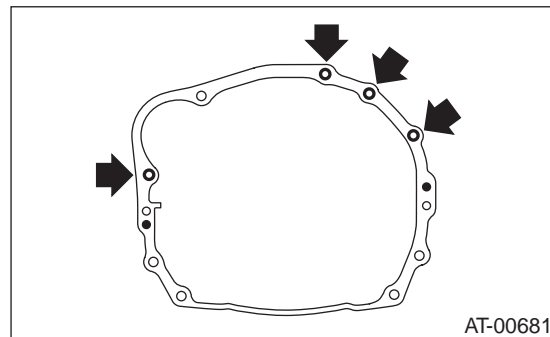


14) Remove bolt which holds right upper side of transmission to engine.

Except 3.0 L model



3.0 L model



15) Lift-up the vehicle.

16) Remove under cover.

17) Remove front, center, rear exhaust pipe and muffler.

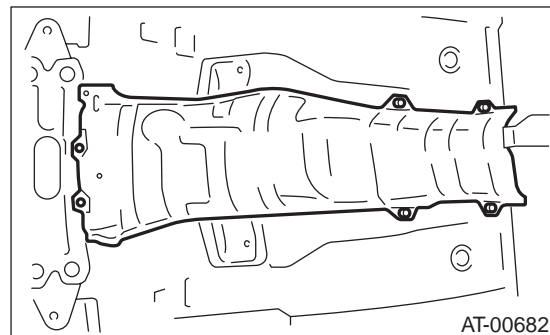
2.5 L model

<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>

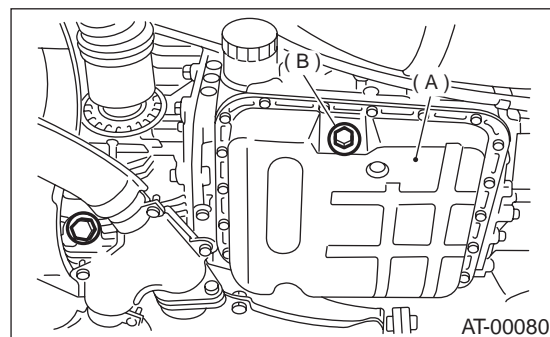
3.0 L model

<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>

18) Remove heat shield cover.



19) Drain ATF to remove ATF drain plug.



(A) Oil pan

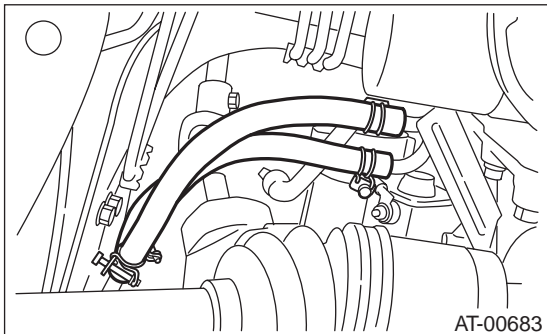
(B) Drain plug

AT-40

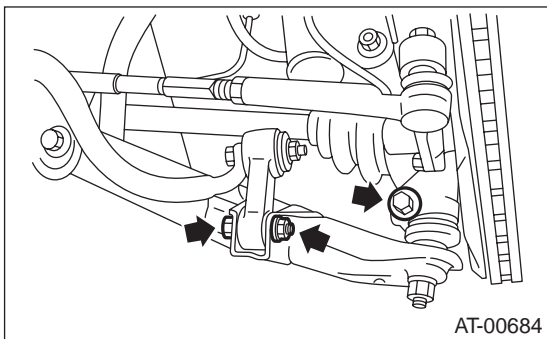
AUTOMATIC TRANSMISSION ASSEMBLY

AUTOMATIC TRANSMISSION

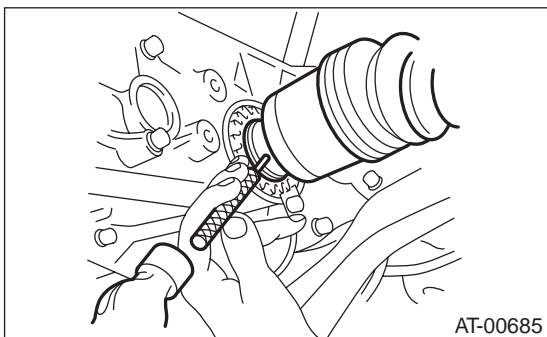
20) Disconnect ATF cooler hoses from pipes of transmission side, and remove ATF level gauge guide.



21) Remove propeller shaft.
 <Ref. to DS-14, REMOVAL, Propeller Shaft.>
 22) Remove shift select cable. <Ref. to CS-31, REMOVAL, Select Cable.>
 23) Disconnect stabilizer link from transverse link.
 24) Remove bolt securing ball joint of transverse link to housing.

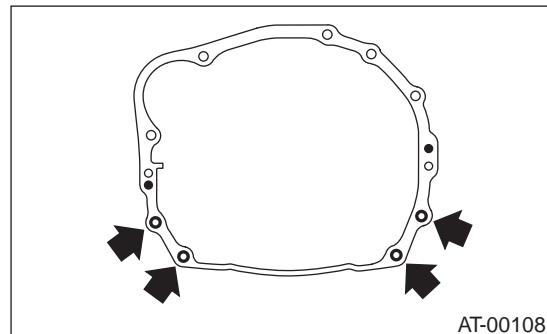


25) Remove spring pins and separate front drive shafts from each side of the transmission.

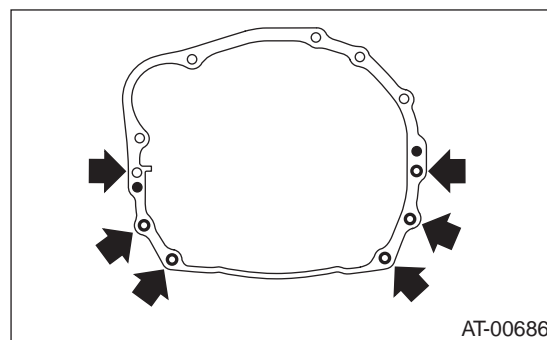


26) Remove nuts which hold lower side of transmission to engine.

Except 3.0 L model



3.0 L model

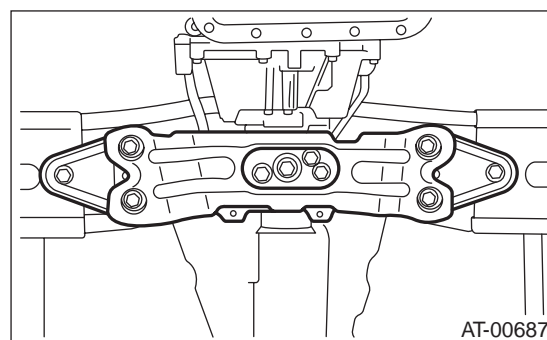


27) Place transmission jack under transmission.

NOTE:

Make sure that the support plates of transmission jack don't touch the oil pan.

28) Remove transmission rear crossmember from vehicle.



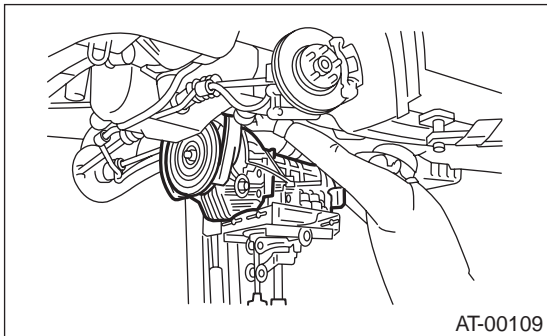
AUTOMATIC TRANSMISSION ASSEMBLY

AUTOMATIC TRANSMISSION

29) Remove transmission.

CAUTION:

Move transmission and torque converter as a unit away from engine.



30) Separate transmission assembly and rear cushion rubber.

B: INSTALLATION

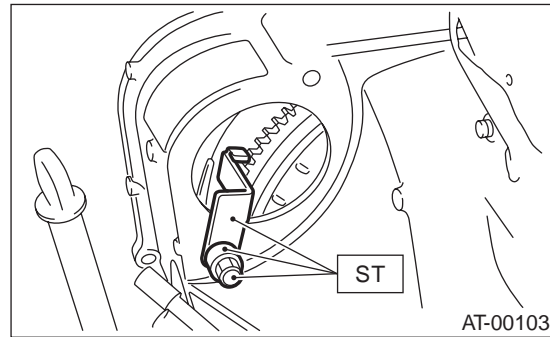
1) Install rear cushion rubber to transmission assembly.

Tightening torque:

39 N·m (4.0 kgf-m, 29 ft-lb)

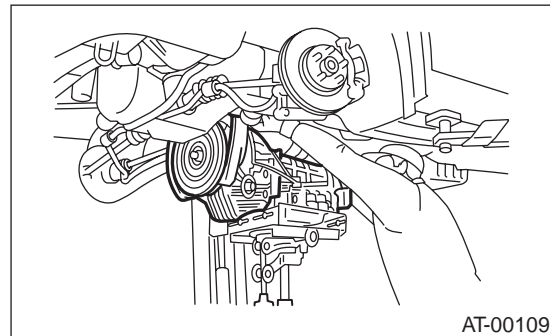
2) Install ST to torque converter clutch case.

ST 498277200 STOPPER SET



3) Install transmission onto engine.

(1) Gradually raise transmission with transmission jack.



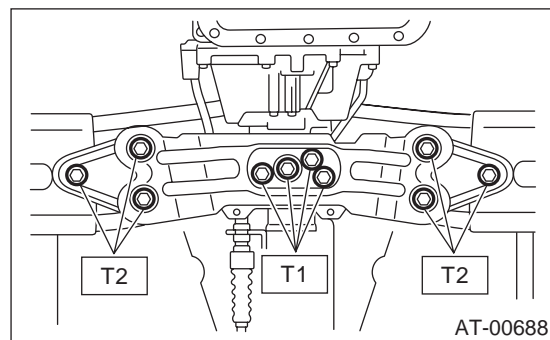
(2) Engage them at splines.

4) Install transmission rear crossmember.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 26 ft-lb)

T2: 75 N·m (7.6 kgf-m, 55 ft-lb)



5) Take off transmission jack.

AUTOMATIC TRANSMISSION ASSEMBLY

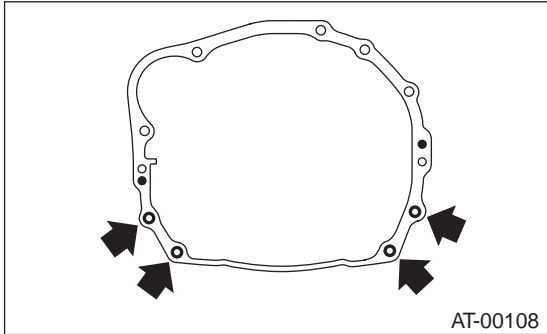
AUTOMATIC TRANSMISSION

6) Tighten nuts and bolts which hold lower side of transmission to engine.

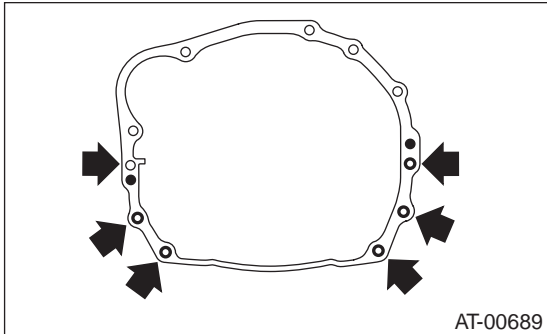
Tightening torque:

50 N·m (5.1 kgf·m, 36.9 ft·lb)

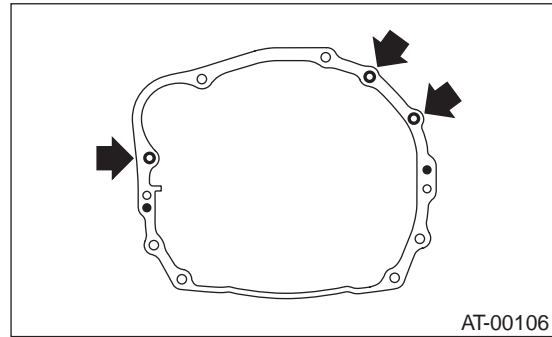
Except 3.0 L model



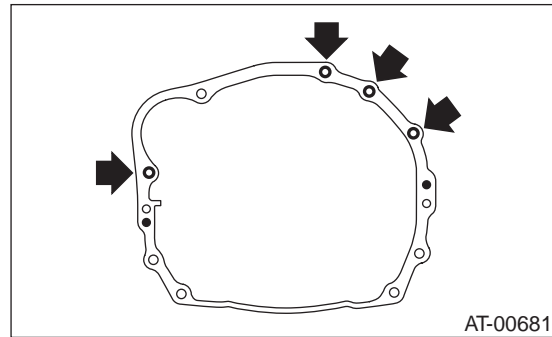
3.0 L model



Except 3.0 L model



3.0 L model



- 9) Install torque converter clutch to drive plate.
 (1) Tighten bolts which hold torque converter clutch to drive plate.
 (2) Tighten other bolts while rotating the engine by using ST.

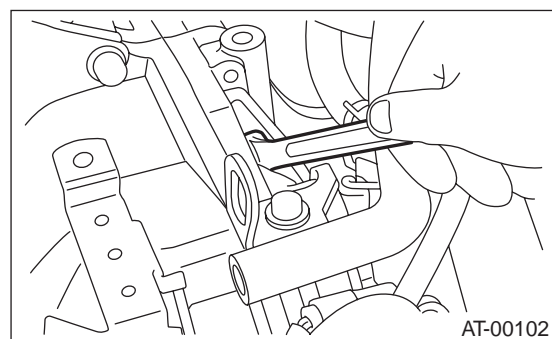
NOTE:

Be careful not to drop bolts into torque converter clutch housing.

ST 499977100 CRANK PULLEY WRENCH

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



- (3) Clog plug onto service hole.

7) Lower the vehicle.

8) Connect engine and transmission.

- (1) Remove ST from torque converter clutch case.

NOTE:

Be careful not to drop the ST into the torque converter clutch case when removing ST.

ST 498277200 STOPPER SET

- (2) Install starter.

Except 3.0 L model

<Ref. to SC(H4SO)-7, INSTALLATION, Starter.>

3.0 L model

<Ref. to SC(H6DO)-6, INSTALLATION, Starter.>

- (3) Tighten bolt which holds right upper side of transmission to engine.

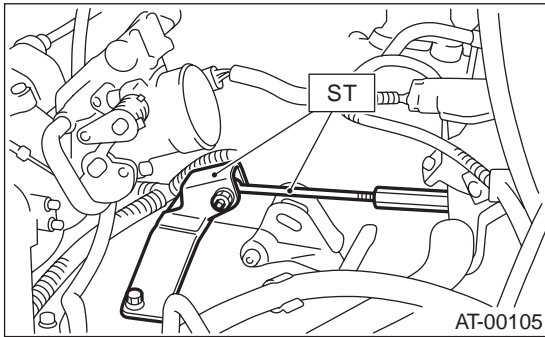
Tightening torque:

50 N·m (5.1 kgf·m, 36.9 ft·lb)

AUTOMATIC TRANSMISSION ASSEMBLY

AUTOMATIC TRANSMISSION

10) Remove ST.

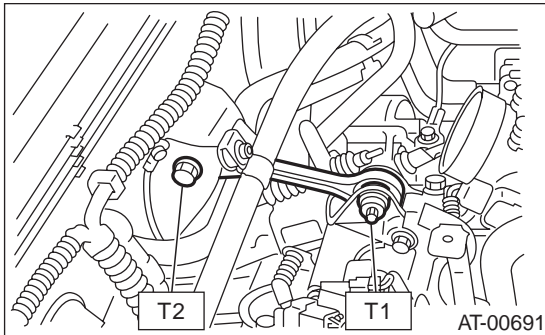


11) Install pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

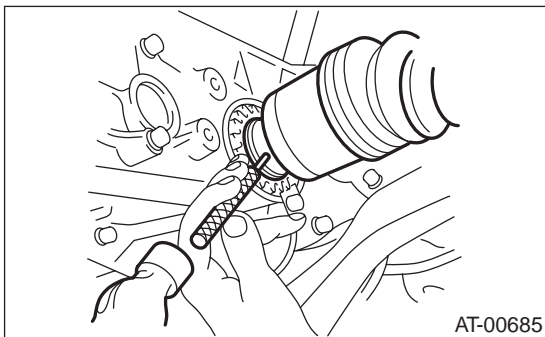
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



12) Lift-up the vehicle.

Install front drive shafts into transmission.

- (1) Lift-up the vehicle.
- (2) Install front drive shaft into transmission.
- (3) New drive spring pin into chamfered hole of drive shaft.



13) Install ball joint into housing.

14) Connect stabilizer link to transverse link, and temporarily tighten bolts.

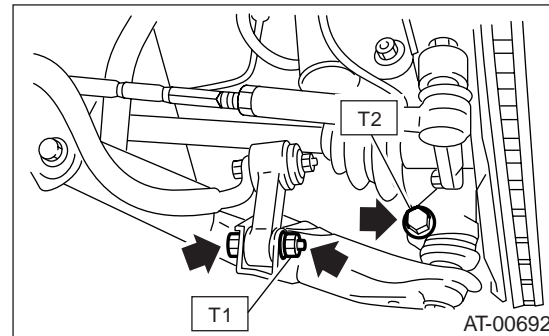
NOTE:

Discard loosened self-locking nut and replace with a new one.

Tightening torque:

T1: 30 N·m (3.1 kgf-m, 22.4 ft-lb)

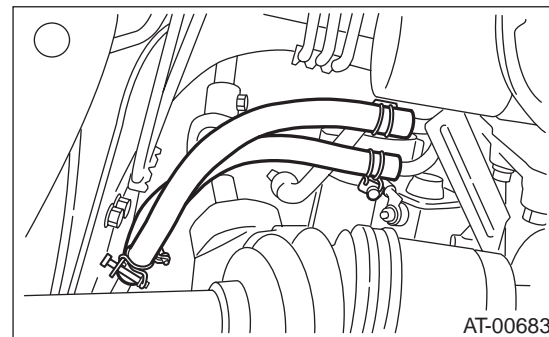
T2: 50 N·m (5.1 kgf-m, 37 ft-lb)



15) Install shift select cable onto select lever.

<Ref. to CS-31, INSTALLATION, Select Cable.>

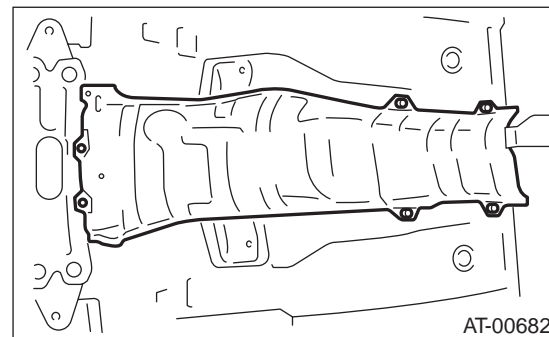
16) Install ATF level gauge guide, and connect ATF cooler hoses to pipe.



17) Install propeller shaft.

<Ref. to DS-15, INSTALLATION, Propeller Shaft.>

18) Install heat shield cover.



AUTOMATIC TRANSMISSION ASSEMBLY

AUTOMATIC TRANSMISSION

19) Install rear exhaust pipe and muffler assembly.

2.5 L model

<Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

3.0 L model

<Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>

20) Install front and center exhaust pipe.

2.5 L model

<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>

3.0 L model

<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>

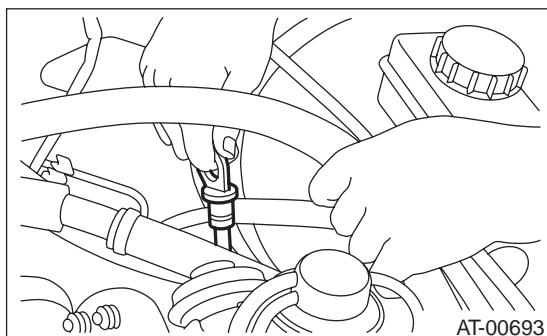
21) Install under cover.

22) Lower the vehicle.

23) Install ATF level gauge.

33) Check the vehicle on the road tester.

<Ref. to AT-32, Road Test.>



24) Connect the following connectors.

(1) Transmission harness connectors

(2) Transmission ground terminal

25) Connect the following cables.

(1) Cruise control cable (With cruise control vehicles)

26) Install air cleaner case stay.

Tightening torque:

16 N·m (1.6 kgf-m, 11.6 ft-lb)

27) Install air cleaner case or air intake chamber.

2.5 L model

<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>

3.0 L model

<Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

28) Connect battery ground cable.

29) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole. <Ref. to AT-30, Automatic Transmission Fluid.>

30) Take off vehicle from lift arms.

31) Check select lever operation.

<Ref. to AT-49, INSPECTION, Inhibitor Switch.>

32) Check the ATF level. <Ref. to AT-30, Automatic Transmission Fluid.>

AT-45

TRANSMISSION MOUNTING SYSTEM

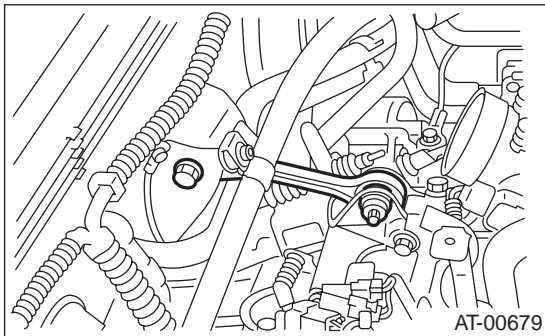
AUTOMATIC TRANSMISSION

10. Transmission Mounting System

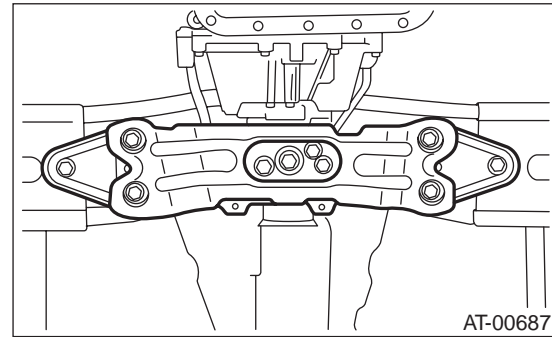
A: REMOVAL

1. PITCHING STOPPER

- 1) Disconnect the ground cable from battery.
- 2) Remove the air cleaner case. (2.5 L model)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 3) Remove air intake chamber. (3.0 L model)
<Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
- 4) Remove the pitching stopper.



- 6) Remove the transmission rear crossmember.



- 7) Remove the rear cushion rubber.

2. CROSSMEMBER AND CUSHION RUBBER

- 1) Disconnect the ground cable from battery.
- 2) Jack-up the vehicle and support it with sturdy racks.
- 3) Remove the front, center, rear exhaust pipes and muffler.
2.5 L model
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
3.0 L model
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
- 4) Remove the heat shield cover.
- 5) Set the transmission jack under the transmission. Make sure that the support plates of transmission jack don't touch the oil pan.

AT-46

TRANSMISSION MOUNTING SYSTEM

AUTOMATIC TRANSMISSION

B: INSTALLATION

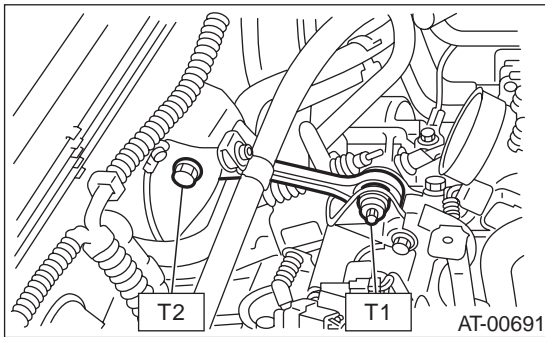
1. PITCHING STOPPER

1) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



2) Install the air cleaner case. (2.5 L model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>

3) Remove air intake chamber. (3.0 L model)
<Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

2. CROSSMEMBER AND CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:

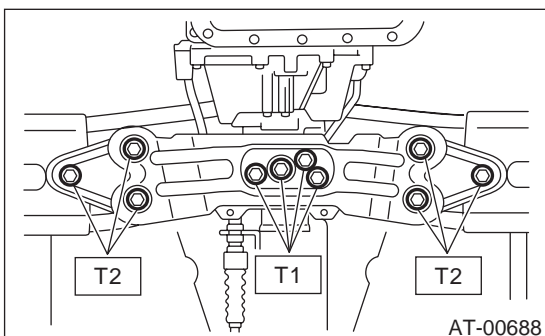
39 N·m (4.0 kgf-m, 29 ft-lb)

2) Install the crossmember.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 26 ft-lb)

T2: 75 N·m (7.6 kgf-m, 55 ft-lb)



3) Remove the transmission jack.

4) Install the heat shield cover.

5) Install the front, center, rear exhaust pipes and the muffler.

2.5 L model

<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

3.0 L model

<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>

C: INSPECTION

Repair or replace parts if the results of the inspection below are not satisfactory.

1. PITCHING STOPPER

Make sure that the pitching stopper is not bent or damaged. Make sure that the rubber is not stiff, cracked, or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

Make sure that the crossmember is not bent or damaged. Make sure that the cushion rubber is not stiff, cracked, or otherwise damaged.

AT-47

EXTENSION CASE OIL SEAL

AUTOMATIC TRANSMISSION

11.Extension Case Oil Seal

A: INSPECTION

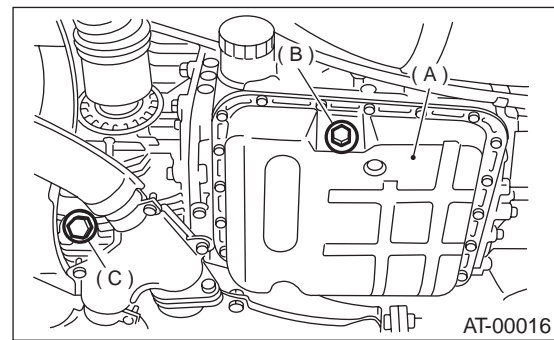
Make sure the ATF does not leak from the joint of transmission or propeller shaft. If so, replace the oil seal. <Ref. to AT-48, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT

- 1) Clean the transmission exterior.
- 2) Drain the ATF completely.
- 3) Replace the gasket with a new one, and then tighten the ATF drain plug.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 4) Remove the rear exhaust pipe and muffler.
 - 2.5 L model
<Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
 - 3.0 L model
<Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>
- 5) Remove the heat shield cover.
- 6) Remove the propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
- 7) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY
- 8) Using the ST, install the oil seal.
ST 498057300 INSTALLER
- 9) Install the propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>
- 10) Install the heat shield cover.
- 11) Install the rear exhaust pipe and muffler.
 - 2.5 L model
<Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
 - 3.0 L model
<Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>
- 12) Pour ATF and check the ATF level. <Ref. to AT-30, Automatic Transmission Fluid.>

AT-48

INHIBITOR SWITCH

AUTOMATIC TRANSMISSION

12. Inhibitor Switch

A: INSPECTION

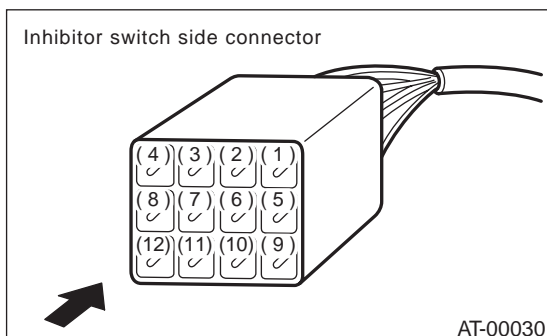
When the driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

- 1) Disconnect the inhibitor switch connector.
- 2) Check continuity in inhibitor switch circuits with the select lever moved to each position.

Also check that continuity in ignition circuit does not exist when the select lever is in "R", "D", "3", "2" and "1" ranges.

If the inhibitor switch is inoperative, check for poor contact of connector on transmission side.

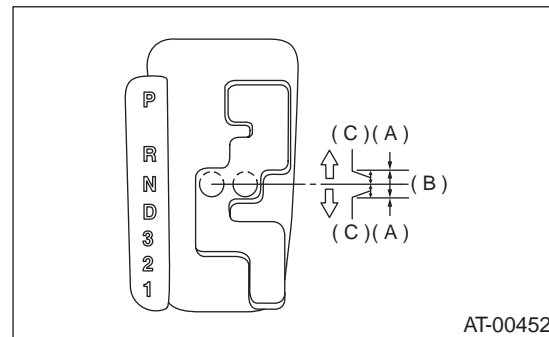
	Position	Pin No.	Value
Signal sent to TCM	P	4 - 3	Less than 1Ω
	R	4 - 2	
	N	4 - 1	
	D	4 - 8	
	3	4 - 7	
	2	4 - 6	
Ignition circuit	P/N	12 - 11	
Back-up light circuit	R	10 - 9	



- 3) Check if there is continuity at equal points when the select lever is turned 1.5° in both directions from "N" range.

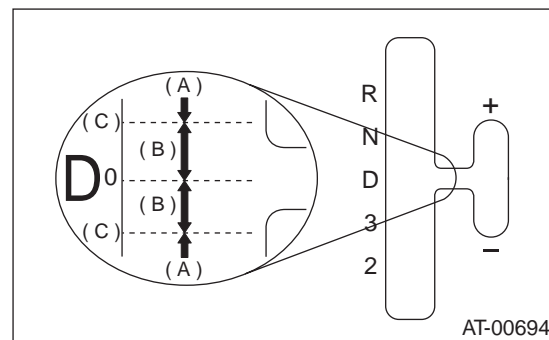
If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch. <Ref. to AT-50, ADJUSTMENT, Inhibitor Switch.>

- Except model with Sport shift



- (A) Continuity does not exist.
- (B) Continuity exists.
- (C) 1.5°

- Model with Sport shift



- (A) Continuity does not exist.
- (B) Continuity exists.
- (C) 1.5°

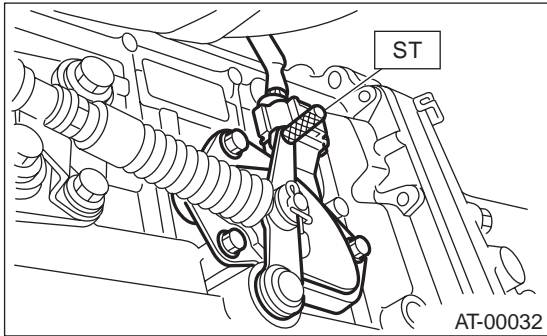
- 4) Repeat the above checks. If there are abnormalities, adjust the select cable. <Ref. to CS-32, ADJUSTMENT, Select Cable.>

INHIBITOR SWITCH

AUTOMATIC TRANSMISSION

B: ADJUSTMENT

- 1) Shift the select lever to "N" range.
 - 2) Loosen the three inhibitor switch securing bolts.
 - 3) Insert the ST as vertical as possible into the holes in inhibitor switch lever and switch body.
- ST 499267300 STOPPER PIN



- 4) Tighten the three inhibitor switch bolts.

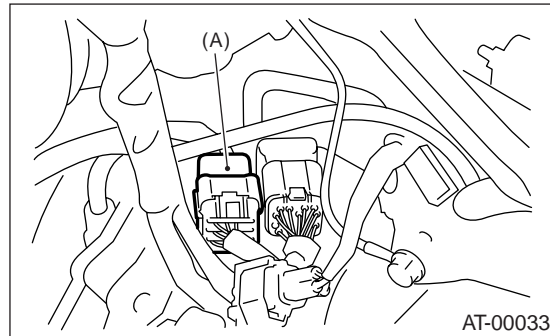
Tightening torque:

3.5 N·m (0.35 kgf·m, 2.5 ft·lb)

- 5) Repeat the above checks. If the inhibitor switch is determined to be "faulty", replace it.

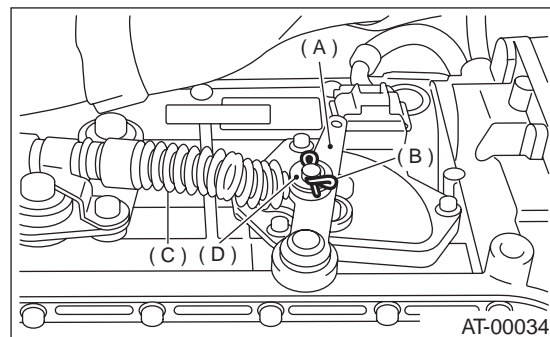
C: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Move the select lever to "N" range.
- 3) Remove the air cleaner case. (2.5 L model)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 4) Remove air intake chamber. (3.0 L model)
<Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
- 5) Disconnect the inhibitor switch connector.



(A) Inhibitor switch

- 6) Remove the inhibitor switch connector from stay.
- 7) Lift-up the vehicle.
- 8) Remove the front and center exhaust pipes.
2.5 L model
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>
3.0 L model
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
- 9) Remove the snap pin and washer from range select lever.



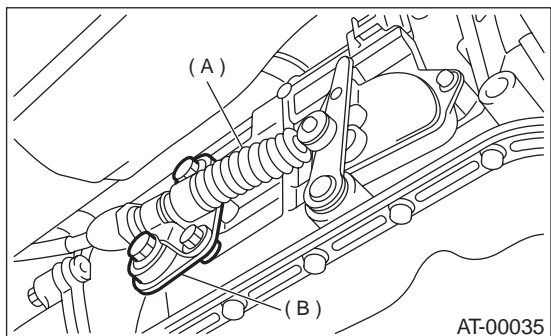
- (A) Range select lever
(B) Snap pin
(C) Select cable
(D) Washer

AT-50

INHIBITOR SWITCH

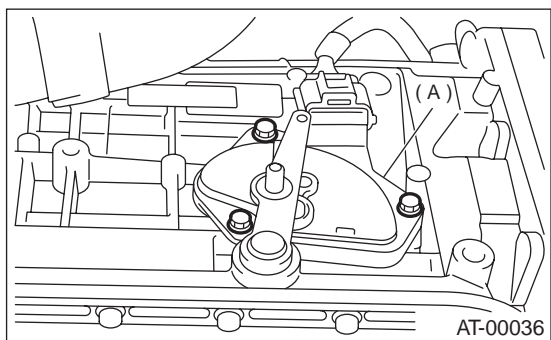
AUTOMATIC TRANSMISSION

10) Remove the plate assembly from transmission case.



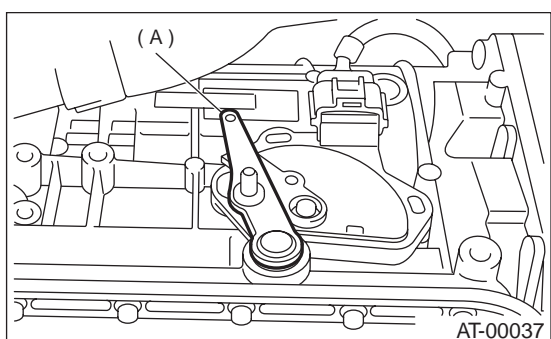
- (A) Select cable
- (B) Plate ASSY

11) Remove the bolts.



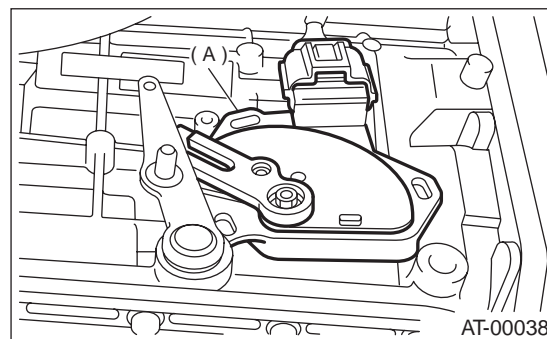
- (A) Inhibitor switch

12) Move the range select lever to parking position (left side).



- (A) Range select lever

13) Remove the inhibitor switch from transmission.



- (A) Inhibitor switch

14) Disconnect the inhibitor switch harness connector from inhibitor switch.

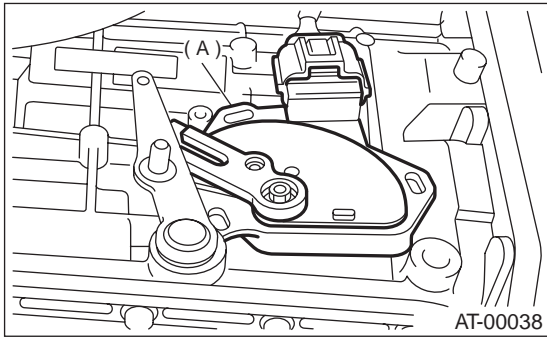
AT-51

INHIBITOR SWITCH

AUTOMATIC TRANSMISSION

D: INSTALLATION

- 1) Connect the inhibitor switch harness connector to inhibitor switch.
- 2) Install the inhibitor switch to transmission case.



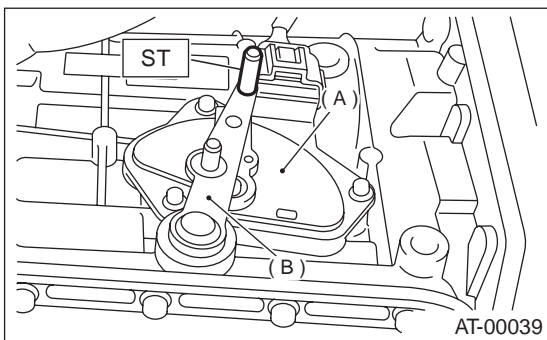
(A) Inhibitor switch

- 3) Move the range select lever to neutral position.
- 4) Place the inhibitor switch on specified position, and then tighten the bolts for inhibitor switch using ST.

ST 499267300 STOPPER PIN

Tightening torque:

3.5 N·m (0.36 kgf-m, 2.6 ft-lb)



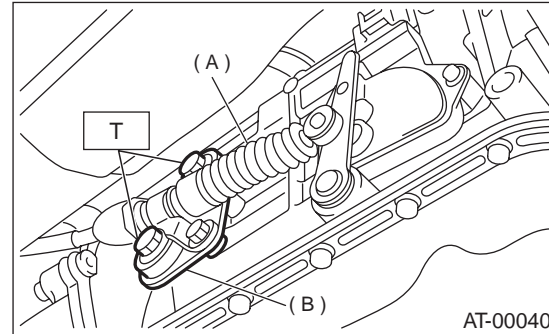
(A) Inhibitor switch
(B) Range select lever

- 5) Install the select cable to range select lever.

- 6) Install the plate assembly to transmission.

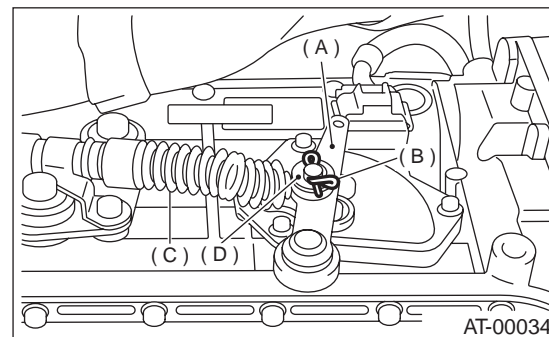
Tightening torque:

T: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Select cable
(B) Plate ASSY

- 7) Install the washer and snap pin to range select lever.



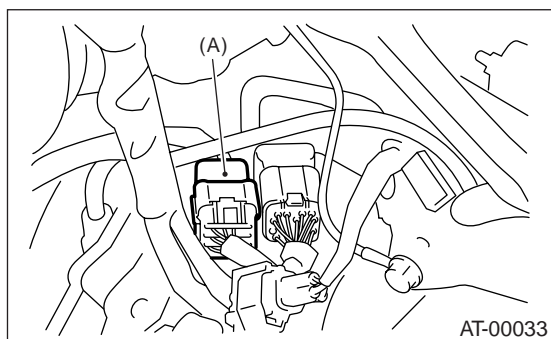
(A) Range select lever
(B) Snap ring
(C) Select cable
(D) Washer

- 8) Install the front and center exhaust pipes.
2.5 L model
<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>
3.0 L model
<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>
- 9) Lower the vehicle.
- 10) Install the inhibitor switch connector to stay.

INHIBITOR SWITCH

AUTOMATIC TRANSMISSION

11) Connect the inhibitor switch connector.



(A) Inhibitor switch

12) Install the air cleaner case. (2.5 L model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>

13) Install air intake chamber. (3.0 L model)
<Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

14) Inspect the inhibitor switch. <Ref. to AT-49, INSPECTION, Inhibitor Switch.>

AT-53

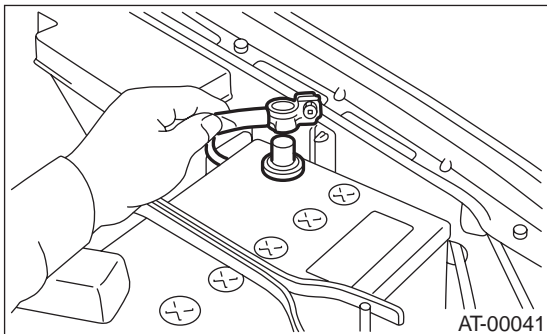
FRONT VEHICLE SPEED SENSOR

AUTOMATIC TRANSMISSION

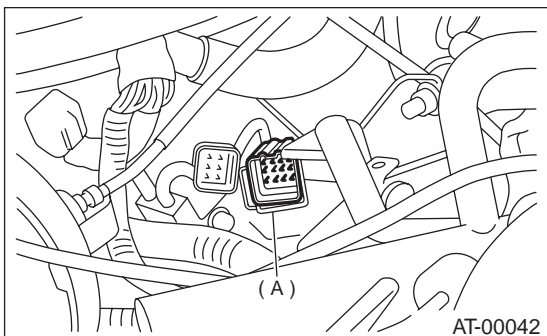
13. Front Vehicle Speed Sensor

A: REMOVAL

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



- 3) Remove the air cleaner case. (2.5 L model)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 4) Remove air intake chamber. (3.0 L model)
<Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
- 5) Disconnect the transmission connector.



(A) Transmission connector

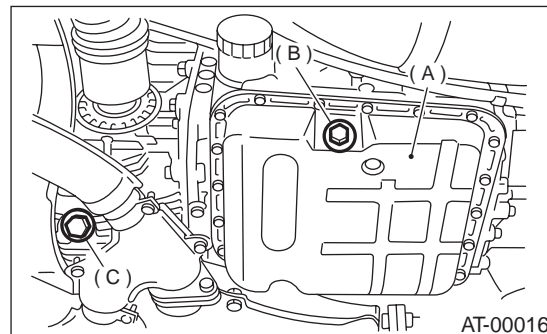
- 6) Remove the pitching stopper. <Ref. to AT-46, REMOVAL, Transmission Mounting System.>
- 7) Remove the transmission connector from stay.
- 8) Lift-up the vehicle.
- 9) Clean the transmission exterior.
- 10) Drain the ATF completely.

NOTE:

- Tighten the ATF drain plug after draining the ATF.
- Replace the gasket with a new one.

Tightening torque:

25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

- 11) Remove the front, center, rear exhaust pipes and muffler.

2.5 L model

- <Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>

3.0 L model

- <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>

- 12) Remove the shield cover.

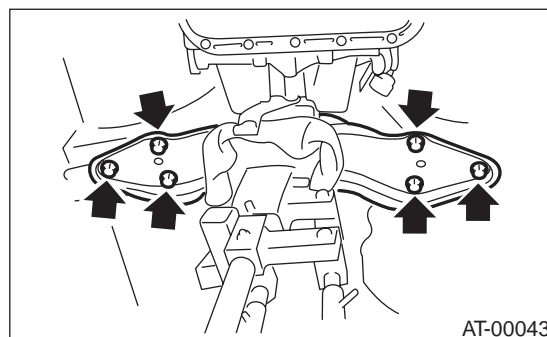
- 13) Remove the propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>

- 14) Place the transmission jack under transmission.

NOTE:

Make sure that the support plates of transmission jack don't touch the crossmember.

- 15) Remove the transmission rear crossmember bolts.



- 16) Lower the AT jack.

NOTE:

Do not separate the AT jack and transmission.

AT-54

FRONT VEHICLE SPEED SENSOR

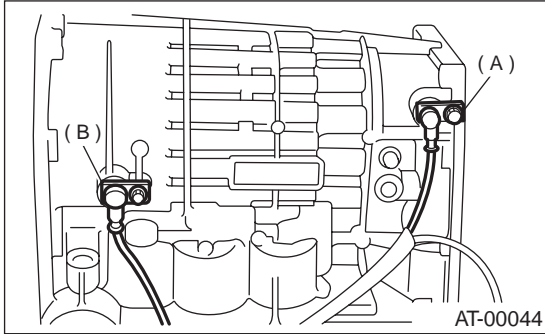
AUTOMATIC TRANSMISSION

17) Remove the oil cooler inlet and outlet pipe.

NOTE:

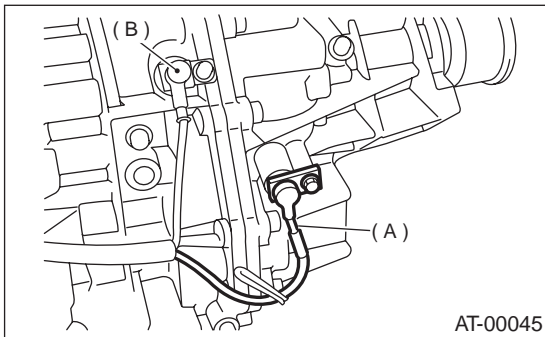
When removing the outlet pipe, be careful not to lose balls and springs used with retaining screws.

18) Remove the front torque converter turbine speed sensor.



- (A) Front vehicle speed sensor
- (B) Torque converter turbine speed sensor

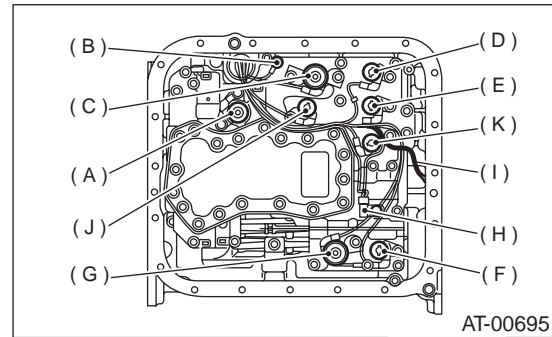
19) Remove the rear vehicle speed sensor.



- (A) Rear vehicle speed sensor
- (B) Front vehicle speed sensor

20) Remove the oil pan.

21) Disconnect the duty solenoid connector and ATF temperature sensor. Remove the connectors from clip and disconnect the connector.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty solenoid (Brown)
- (J) Transmission ground
- (K) Sport shift solenoid (Beige) (if equipped)

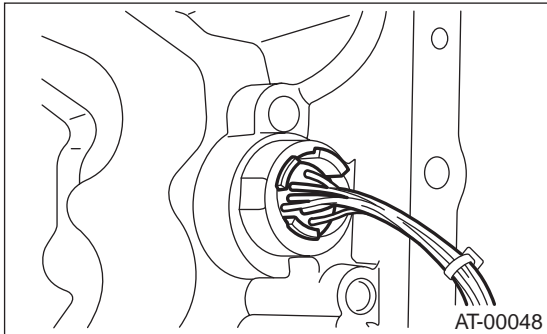
22) Remove the harness assembly.

FRONT VEHICLE SPEED SENSOR

AUTOMATIC TRANSMISSION

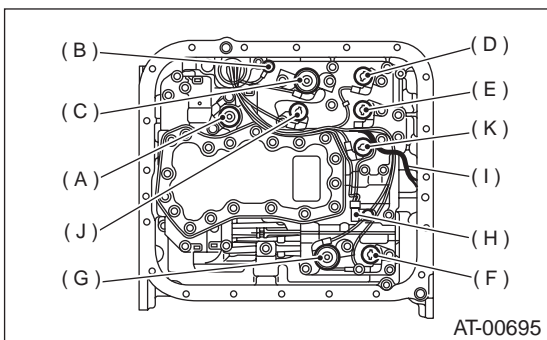
B: INSTALLATION

1) Pass the harness assembly through the hole in the transmission case.



2) Connect the harness connectors. Connect the connectors of same color, and secure the connectors to valve body using clips.

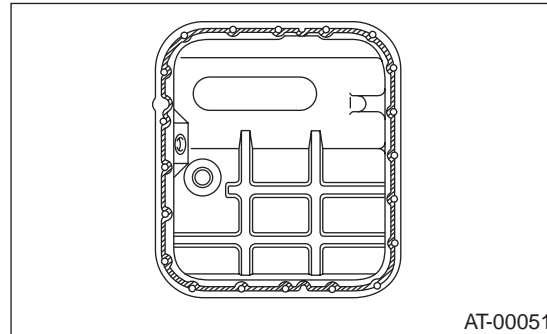
Tightening torque (Transmission ground cable and ATF temperature sensor)
8 N·m (0.8 kgf·m, 5.8 ft·lb)



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty solenoid (Brown)
- (J) Transmission ground
- (K) Sport shift solenoid (Beige) (if equipped)

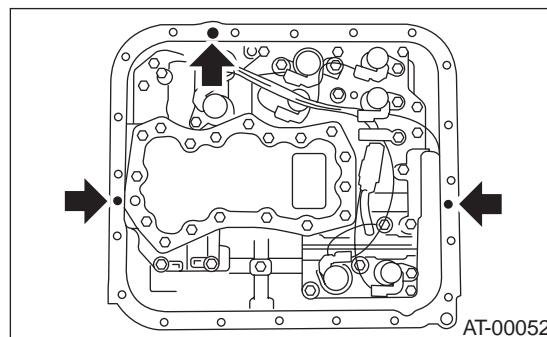
3) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Fluid packing:
THREE BOND 1217B (Part No. K0877YA020)



4) Apply liquid gasket fully to three holes other than screw holes on transmission case.

Fluid packing:
THREE BOND 1217B (Part No. K0877YA020)



5) Install the oil pan.

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

6) Install the front and rear vehicle speed sensor, and also the torque converter turbine speed sensor, and then fasten the harness.

Tightening torque:
7 N·m (0.7 kgf·m, 5.1 ft·lb)

FRONT VEHICLE SPEED SENSOR

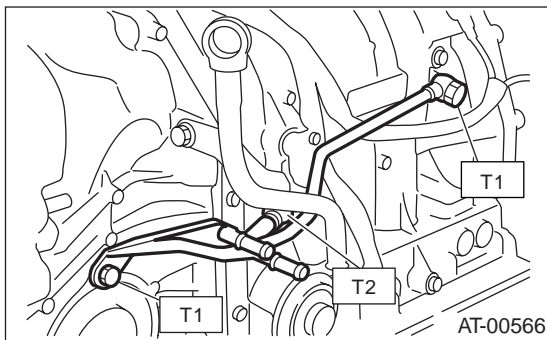
AUTOMATIC TRANSMISSION

7) Install a new aluminum washer and oil cooler pipes.

Tightening torque:

T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)

T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)



8) Install the transmission rear crossmember bolts.

Tightening torque:

75 N·m (7.6 kgf-m, 55 ft-lb)

9) Install the propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>

10) Install the shield cover.

11) Install the front, center, rear exhaust pipes and muffler.

2.5 L model

<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

3.0 L model

<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>

12) Lower the vehicle.

13) Install the transmission connector to the stay.

14) Install the pitching stopper. <Ref. to AT-47, INSTALLATION, Transmission Mounting System.>

15) Install the air cleaner case. (2.5 L model)

<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>

16) Install air intake chamber. (3.0 L model)

<Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

17) Fill ATF and check ATF level.

<Ref. to AT-30, Automatic Transmission Fluid.>

AT-57

REAR VEHICLE SPEED SENSOR

AUTOMATIC TRANSMISSION

14.Rear Vehicle Speed Sensor

A: REMOVAL

When removing the rear vehicle speed sensor, refer to "Front Vehicle Speed Sensor." <Ref. to AT-54, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

When installing the rear vehicle speed sensor, refer to "Front Vehicle Speed Sensor." <Ref. to AT-56, INSTALLATION, Front Vehicle Speed Sensor.>

AT-58

Vehicle-id:
SIE-id::A:REMOVAL

~

TORQUE CONVERTER TURBINE SPEED SENSOR

AUTOMATIC TRANSMISSION

15. Torque Converter Turbine Speed Sensor

A: REMOVAL

When removing the torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor."
<Ref. to AT-54, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

When installing the torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor."
<Ref. to AT-56, INSTALLATION, Front Vehicle Speed Sensor.>

AT-59

Vehicle-id:
SIE-id::A:REMOVAL

CONTROL VALVE BODY

AUTOMATIC TRANSMISSION

16. Control Valve Body

A: REMOVAL

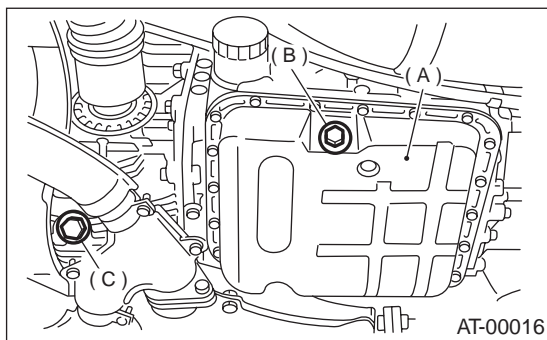
- 1) Lift-up the vehicle.
- 2) Clean the transmission exterior.
- 3) Drain the ATF completely.

NOTE:

- Tighten the ATF drain plug after draining the ATF.
- Replace the gasket with a new one.

Tightening torque:

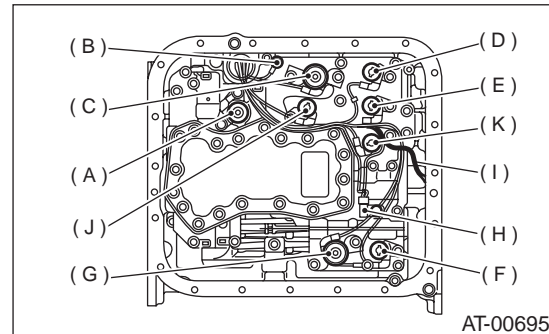
25 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

- 4) Remove the oil pan.
- 5) Remove and clean the magnet.
- 6) Remove the old gasket on the oil pan and transmission case completely.

- 7) Disconnect the duty solenoid connector and ATF temperature sensor. Remove the connector from clip and disconnect the connector.

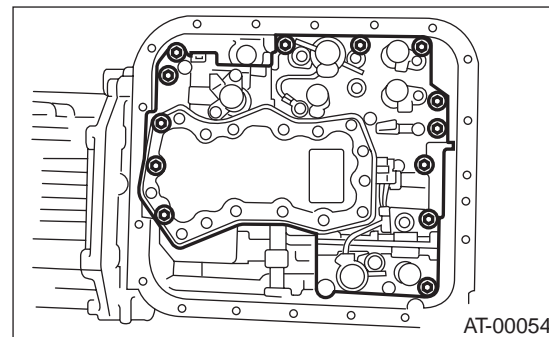


- (A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)
(J) Transmission ground
(K) Sport shift solenoid (Beige) (if equipped)

- 8) Remove the control valve.

NOTE:

When removing the control valve body, be careful not to interfere with transfer duty solenoid wiring.



AT-60

CONTROL VALVE BODY

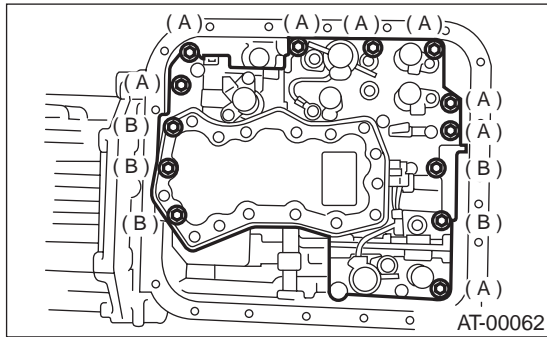
AUTOMATIC TRANSMISSION

B: INSTALLATION

- 1) Set the range select lever in "N" range.
- 2) Install the control valve, ATF temperature sensor and ground connectors.

Tightening torque:

8 N·m (0.8 kgf·m, 5.8 ft·lb)

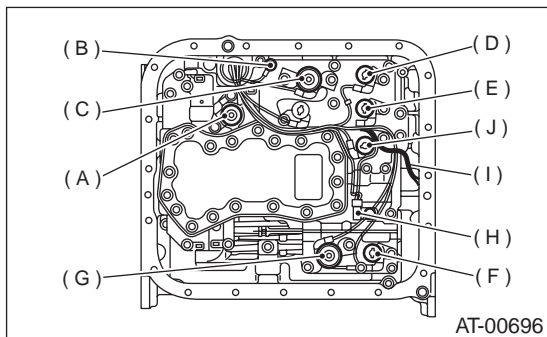


Bolt length mm (in)

(A) 30 (1.18)

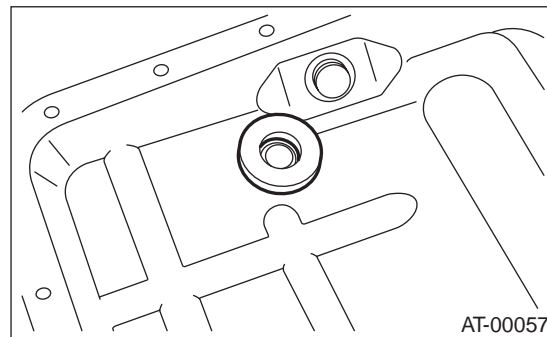
(B) 55 (2.17)

- 3) Connect all connectors.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty solenoid (Brown)
- (J) Sport shift solenoid (Beige) (if equipped)

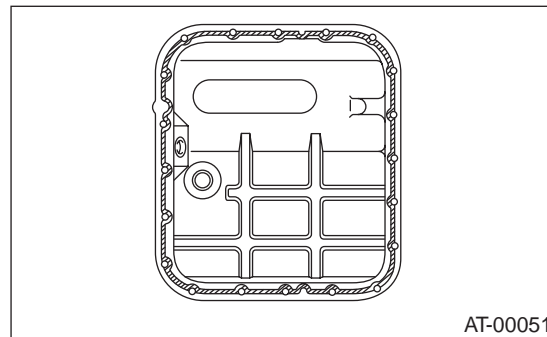
- 4) Attach the magnet at specified position.



- 5) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Liquid gasket:

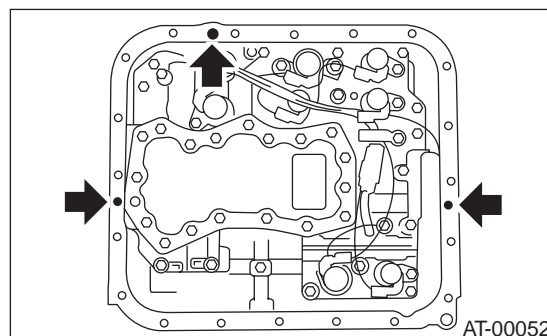
THREE BOND 1217B (Part No. K0877YA020)



- 6) Apply liquid gasket fully to three holes other than screw holes on transmission case.

Liquid gasket:

THREE BOND 1217B (Part No. K0877YA020)



- 7) Install the oil pan.

Tightening torque:

5 N·m (0.5 kgf·m, 3.6 ft·lb)

AT-61

CONTROL VALVE BODY

AUTOMATIC TRANSMISSION

8) Pour ATF into the oil charge pipe.

Recommended fluid:

Dexron III type automatic transmission fluid

Fluid capacity:

Fill the same amount of fluid drained from drain plug hole.

9) Check the level of ATF.

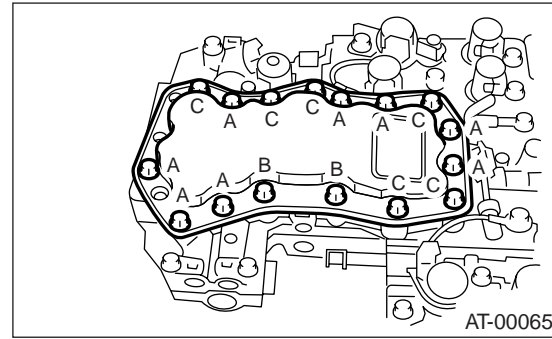
<Ref. to AT-30, Automatic Transmission Fluid.>

C: DISASSEMBLY

1) Remove oil strainer from lower control valve body.

NOTE:

Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.

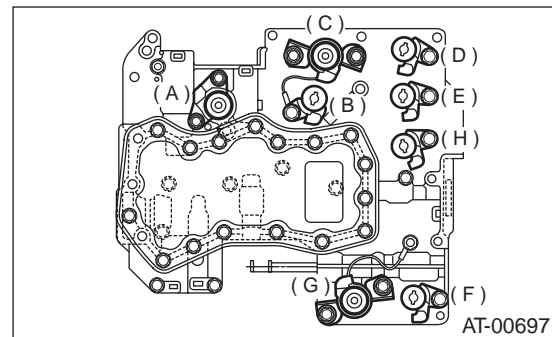


- (A) Short bolt
- (B) Middle bolt
- (C) Long bolt

2) Remove the duty solenoids, solenoids and sensor from the lower valve body.

NOTE:

Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 1 (Yellow)
- (E) Shift solenoid 2 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) Sport shift solenoid (Beige) (if equipped)

AT-62

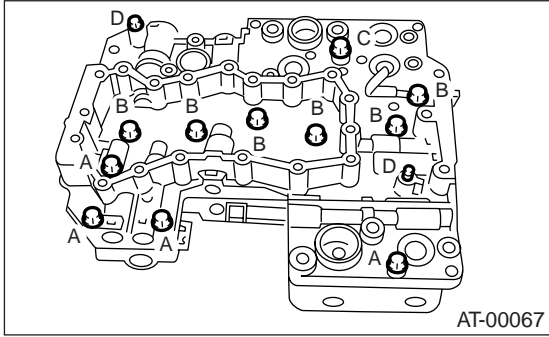
CONTROL VALVE BODY

AUTOMATIC TRANSMISSION

3) Remove the upper-lower valve body tightening bolts.

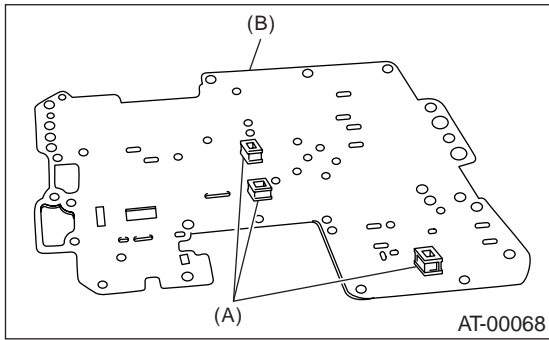
NOTE:

Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.



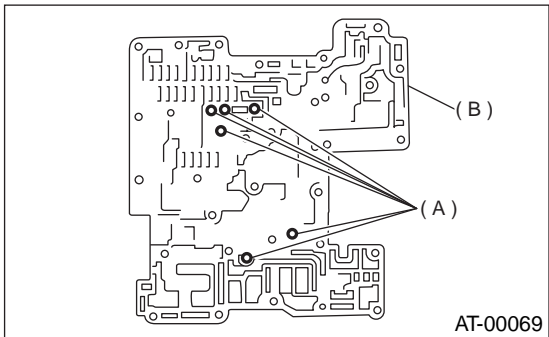
4) Remove the lower valve body.

5) Remove the oil filter and plate.



- (A) Oil filter
- (B) Plate

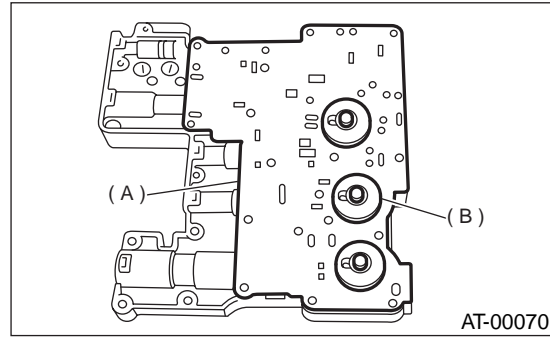
6) Remove six steel balls from middle valve body.



- (A) Steel ball
- (B) Middle valve body

7) Remove the middle valve body.

8) Remove upper separator plate from middle valve body.

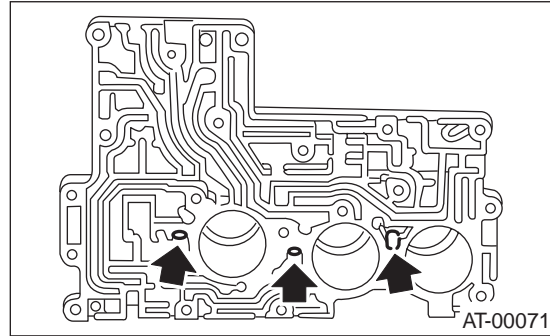


- (A) Upper separator plate
- (B) Side plate

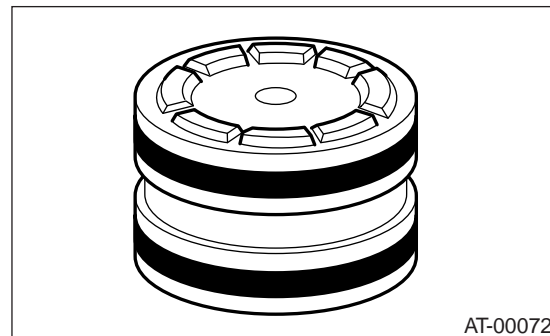
9) Remove valve springs and four steel balls from upper valve body.

10) Place a shop cloth to the piston removal hole.

11) Using an air compressor, apply air slowly to each piston hole and remove the pistons.



12) Remove the seal ring from piston.



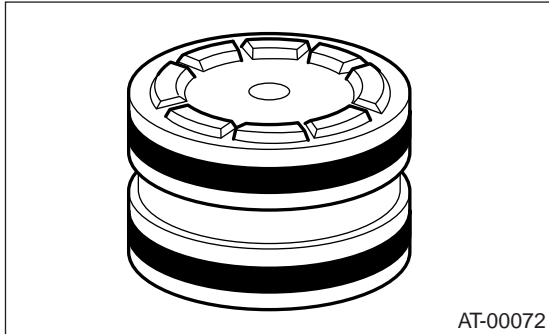
AT-63

CONTROL VALVE BODY

AUTOMATIC TRANSMISSION

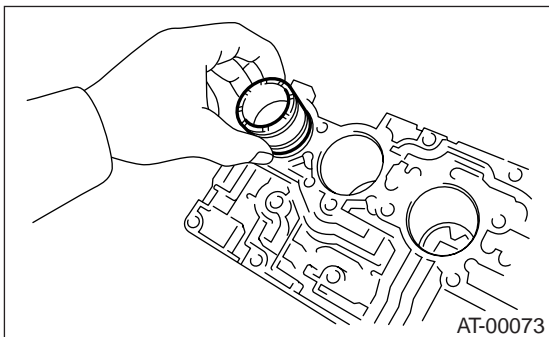
D: ASSEMBLY

1) Install a new seal ring to piston.

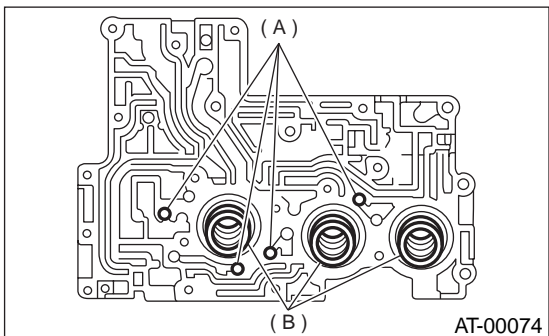


2) Apply ATF to the seal ring.

3) Insert the piston fully into upper valve body.



4) Install the spring and four steel balls to specified positions of upper valve body.

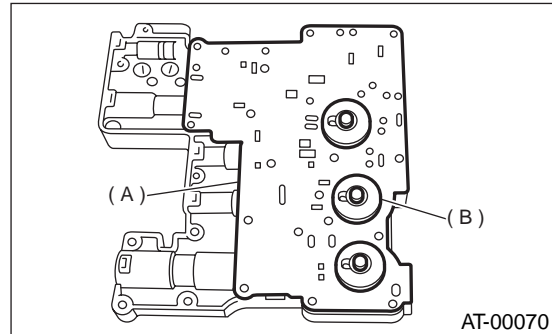


- (A) Steel ball
- (B) Spring

5) Align the hole in side plate with the hole in separator plate, and then install support plate and upper separator plate to middle valve body.

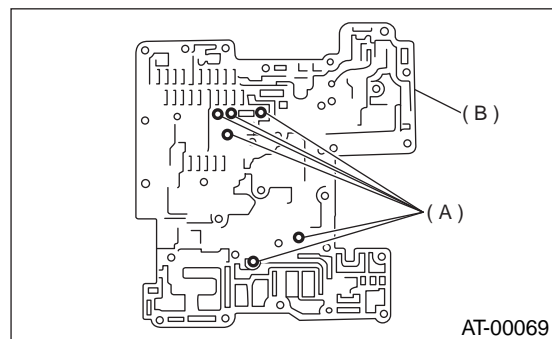
Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)



- (A) Upper separator plate
- (B) Side plate

6) Insert six steel balls in their proper positions to middle valve body.

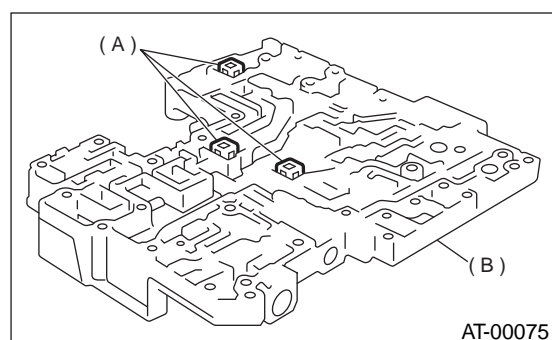


- (A) Steel ball
- (B) Middle valve body

7) Install three filters to lower valve body.

NOTE:

Pay attention to the location of filters.

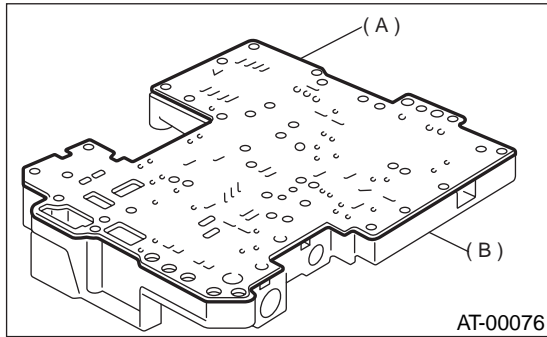


- (A) Strainer
- (B) Lower valve body

CONTROL VALVE BODY

AUTOMATIC TRANSMISSION

8) Install lower separate plate to lower valve body.

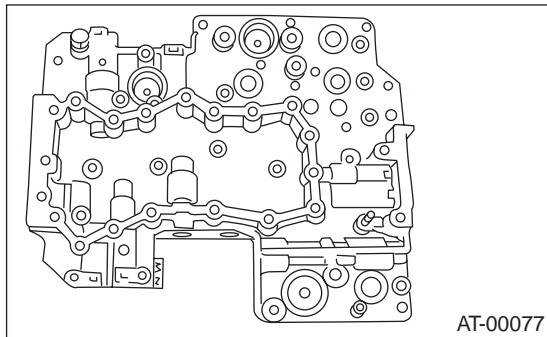


- (A) Lower separator plate
- (B) Lower valve body

9) Temporarily assemble valve body.

NOTE:

Be careful not to drop the middle valve body and upper body interior steel ball, or the lower body filter.



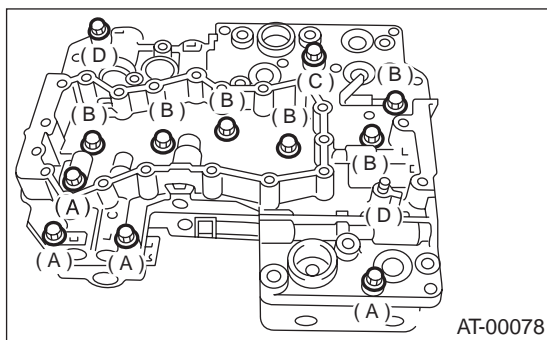
10) Tighten bolts.

NOTE:

Install the bolts (D) from upper valve body side.

Tightening torque:

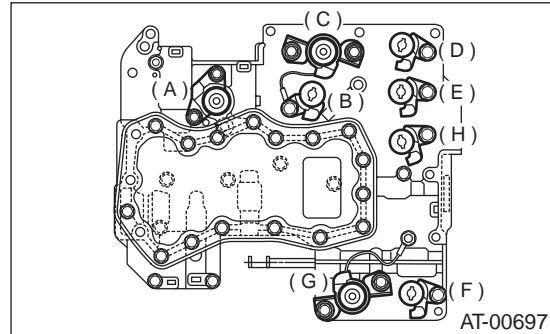
8 N·m (0.8 kgf·m, 5.8 ft·lb)



Bolt length mm (in)

- (A) 40 (1.57)
- (B) 62 (2.44)
- (C) 73 (2.87)
- (D) 79 (3.11)

11) Install the sensor, solenoids and duty solenoids to specified positions.

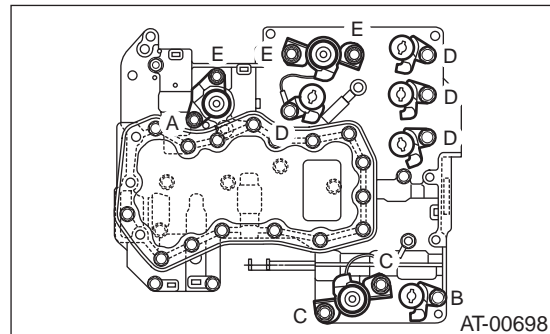


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 1 (Yellow)
- (E) Shift solenoid 2 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) SPORT shift solenoid (Beige) (if equipped)

12) Tighten the bolts and nuts.

Tightening torque:

8 N·m (0.8 kgf·m, 5.8 ft·lb)



Bolt length mm (in)

- (A) 12 (0.47)
- (B) 40 (1.57)
- (C) 45 (1.77)
- (D) 62 (2.44)
- (E) 73 (2.87)

AT-65

CONTROL VALVE BODY

AUTOMATIC TRANSMISSION

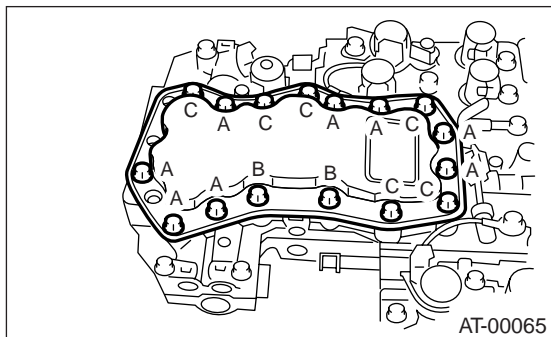
13) Install oil strainer to lower valve body.

Tightening torque:

8 N·m (0.8 kgf-m, 5.8 ft-lb)

E: INSPECTION

Make sure that each component is free of harmful gouges, cuts, or dust.



Bolt length mm (in)

(A) 12 (0.47)

(B) 62 (2.44)

(C) 81 (3.19)

AT-66

SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

AUTOMATIC TRANSMISSION

17. Shift Solenoids, Duty Solenoids and ATF Temperature Sensor

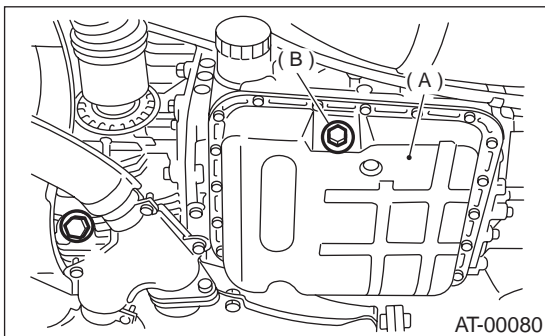
A: REMOVAL

1. SHIFT SOLENOIDS AND DUTY SOLENOIDS

- 1) Lift-up the vehicle.
- 2) Clean the transmission exterior.
- 3) Replace the gasket with a new one, and tighten the drain plug.
- 4) Drain the ATF completely.

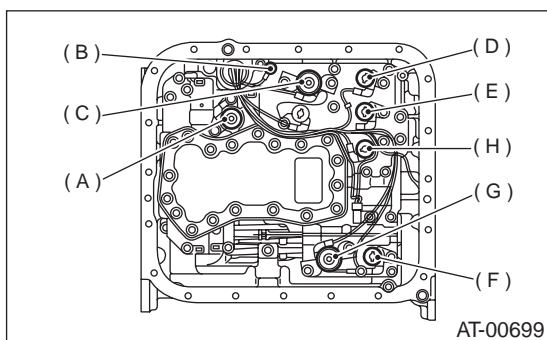
Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



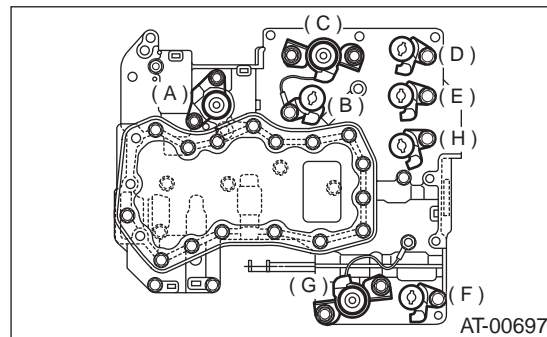
- (A) Oil pan
- (B) Drain plug

- 5) Remove the oil pan.
- 6) Disconnect the solenoid and sensor connectors. Remove the connectors from clip and disconnect the connectors.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) Sport shift solenoid (Beige) (if equipped)

- 7) Remove the solenoids and duty solenoids.



- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) Sport shift solenoid (Beige) (if equipped)

2. ATF TEMPERATURE SENSOR

For removal of ATF temperature sensor, refer to "Front Vehicle Speed Sensor." <Ref. to AT-54, REMOVAL, Front Vehicle Speed Sensor.>

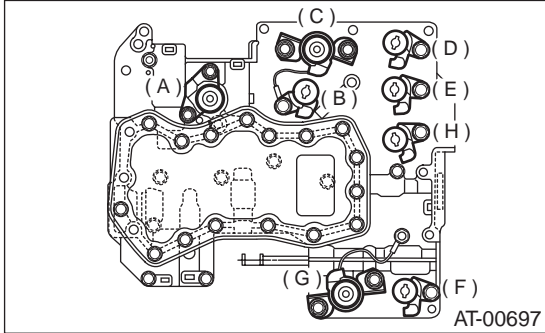
AT-67

SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR AUTOMATIC TRANSMISSION

B: INSTALLATION

1. SHIFT SOLENOIDS AND DUTY SOLENOIDS

1) Insert solenoid and duty solenoid to specified position.

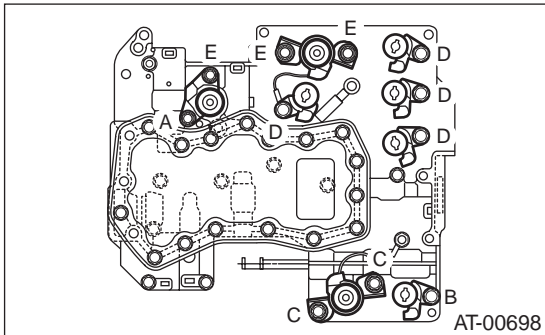


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) Sport shift solenoid (Beige) (if equipped)

2) Tighten the bolts and nuts.

Tightening torque:

8 N·m (0.8 kgf·m, 5.8 ft·lb)

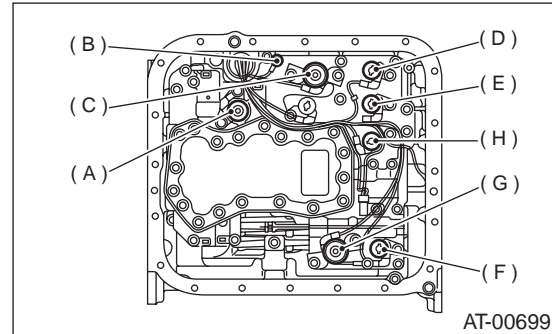


Bolt length mm (in)

- (A) 12 (0.47)
- (B) 40 (1.57)
- (C) 45 (1.77)
- (D) 62 (2.44)
- (E) 73 (2.87)

3) Connect the harness connectors.

Connect the connectors of same color, and secure the connectors to valve body using clips.

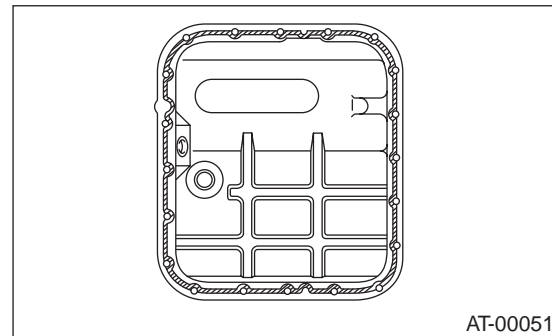


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) Sport shift solenoid (Beige) (if equipped)

4) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Fluid packing:

THREE BOND 1217B (Part No. K0877YA020)



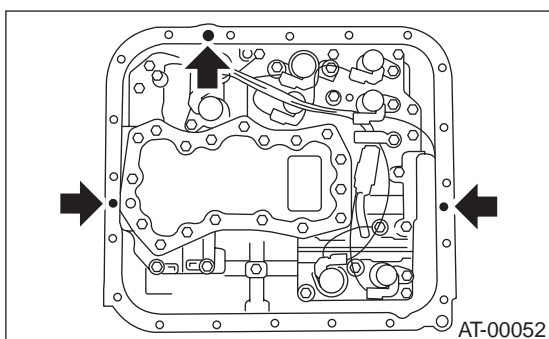
SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

AUTOMATIC TRANSMISSION

5) Apply liquid gasket fully to three holes other than screw holes on transmission case.

Fluid packing:

THREE BOND 1217B (Part No. K0877YA020)



6) Install the oil pan.

Tightening torque:

5 N·m (0.5 kgf·m, 3.6 ft·lb)

7) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole. <Ref. to AT-30, Automatic Transmission Fluid.>

8) Check the ATF level. <Ref. to AT-30, Automatic Transmission Fluid.>

2. ATF TEMPERATURE SENSOR

For installation of ATF temperature sensor, refer to "Front Vehicle Speed Sensor." <Ref. to AT-56, INSTALLATION, Front Vehicle Speed Sensor.>

AT-69

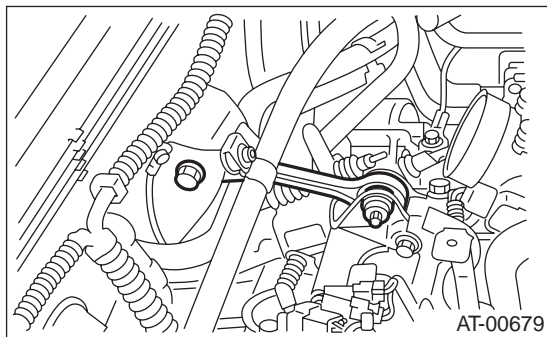
TRANSFER DUTY SOLENOID AND VALVE BODY

AUTOMATIC TRANSMISSION

18. Transfer Duty Solenoid and Valve Body

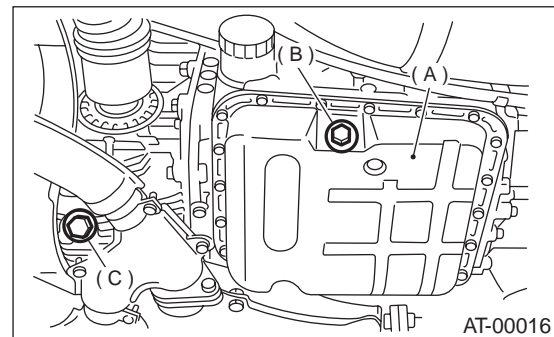
A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Remove the air cleaner case. (2.5 L model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
- 4) Remove air intake chamber. (3.0 L model)
<Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
- 5) Remove the pitching stopper.



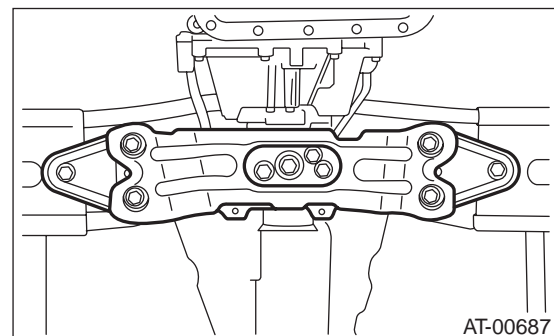
- 6) Remove the front exhaust pipe with center exhaust pipe.
2.5 L model
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>
3.0 L model
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
- 7) Remove the rear exhaust pipe and muffler.
2.5 L model
<Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
3.0 L model
<Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H6DO)-9, REMOVAL, Muffler.>

- 8) Raise the vehicle and drain the ATF.

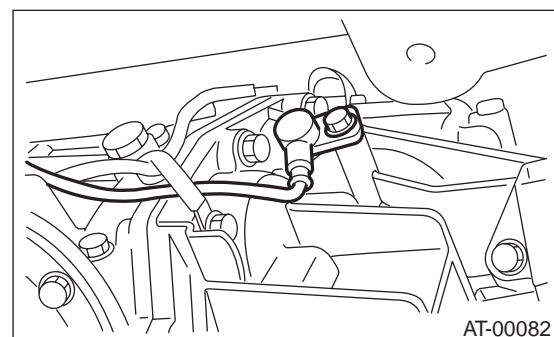


- (A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

- 9) Remove the heat shield cover.
- 10) Remove the propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
- 11) Remove the transmission rear crossmember.
 - (1) Support the transmission using a transmission jack and raise slightly.
 - (2) Remove the bolts and nuts as shown in the figure.



- 12) Remove the rear vehicle speed sensor.

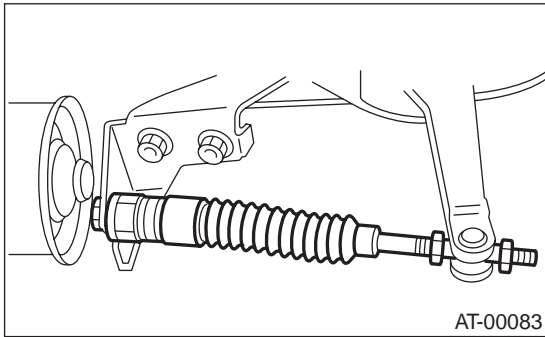


AT-70

TRANSFER DUTY SOLENOID AND VALVE BODY

AUTOMATIC TRANSMISSION

13) Remove the select cable nut.



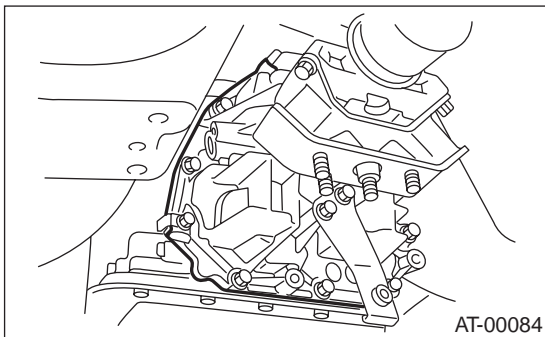
14) Move the gear select cable so that extension bolts can be removed.

15) Remove the bolts.

16) Remove the extension case.

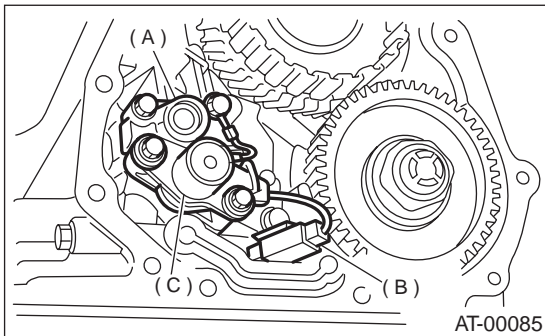
NOTE:

Use a container to catch oil flowing from extension.



17) Disconnect the transfer duty solenoid connector.

18) Remove the transfer duty solenoid and transfer valve body.



- (A) Transfer valve body
- (B) Transfer duty solenoid connector
- (C) Transfer duty solenoid

B: INSTALLATION

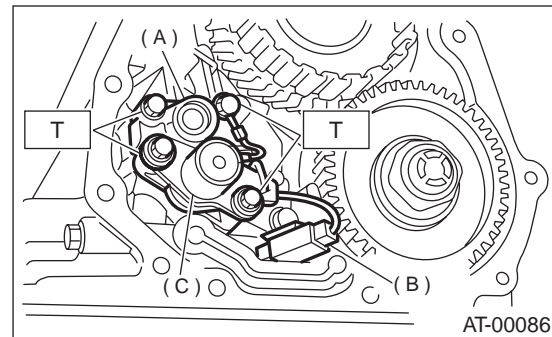
1) Install the transfer duty solenoid and transfer valve body.

(1) Install the transfer duty solenoid and transfer valve body.

Tightening torque:

T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

(2) Connect the transfer duty solenoid connector.



- (A) Transfer valve body
- (B) Transfer duty solenoid connector
- (C) Transfer duty solenoid

2) Install a new gasket and the extension case to transmission case.

(1) Tighten eleven bolts.

Tightening torque:

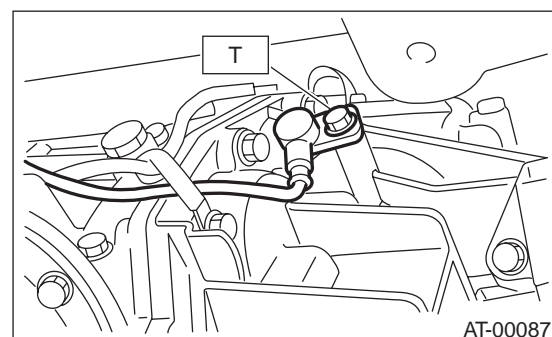
25 N·m (2.5 kgf-m, 18.1 ft-lb)

(2) Adjust the select cable. <Ref. to CS-32, ADJUSTMENT, Select Cable.>

3) Install the rear vehicle speed sensor.

Tightening torque:

T: 7 N·m (0.7 kgf-m, 5.1 ft-lb)



TRANSFER DUTY SOLENOID AND VALVE BODY

AUTOMATIC TRANSMISSION

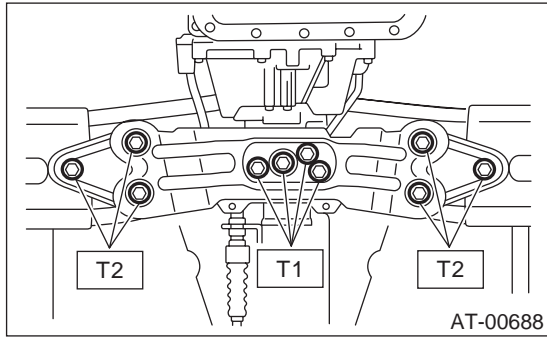
4) Install the transmission rear crossmember.

(1) Tighten the bolts.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 26 ft-lb)

T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



(2) Remove the transmission jack.

5) Install the propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>

6) Install the front, center rear exhaust pipe and muffler.

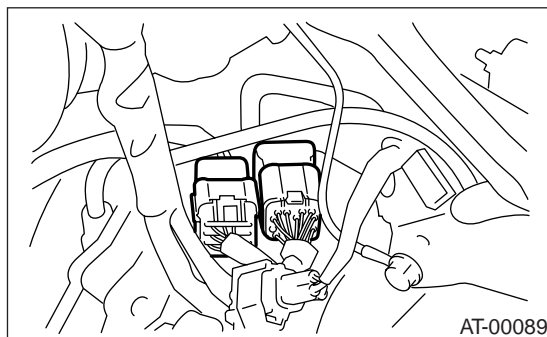
2.5 L model

<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

3.0 L model

<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H6DO)-9, INSTALLATION, Muffler.>

7) Connect the transmission harness connector.

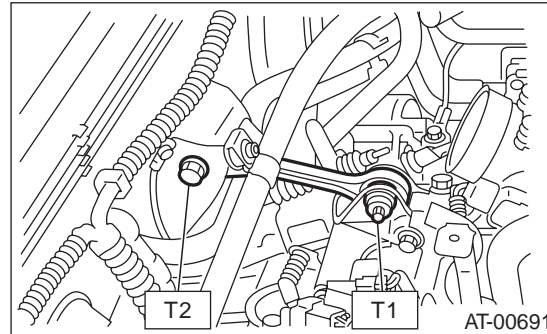


8) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



9) Install the air cleaner case. (2.5 L model)

<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>

10) Install air intake chamber. (3.0 L model)

<Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

11) Fill ATF up to the middle of the "COLD" side on level gauge by using the gauge hole. <Ref. to AT-30, Automatic Transmission Fluid.>

12) Check the ATF level. <Ref. to AT-30, Automatic Transmission Fluid.>

ATF FILTER

AUTOMATIC TRANSMISSION

19.ATF Filter

A: REMOVAL

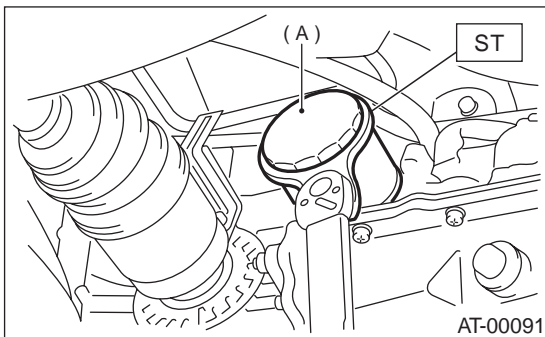
1. EXCEPT 3.0 L MODEL

NOTE:

The ATF filter is maintenance free.

- 1) Lift-up the vehicle.
- 2) Using ST, remove ATF filter.

ST 498545400 OIL FILTER WRENCH



(A) ATF filter

2. 3.0 L MODEL

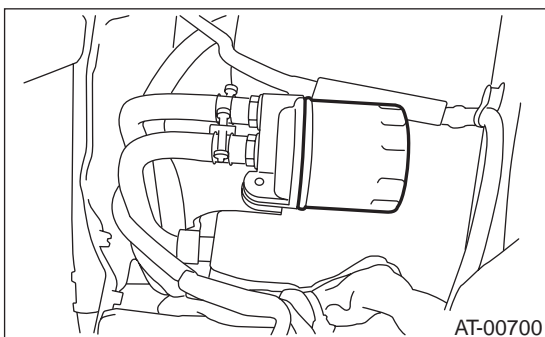
• ATF Filter

NOTE:

The ATF filter is maintenance free.

- 1) Lift-up the vehicle.
- 2) Remove front left mud guard.
<Ref. to EI-23, REMOVAL, Mud Guard.>
- 3) Using ST, remove ATF filter.

ST 498548500 OIL FILTER WRENCH



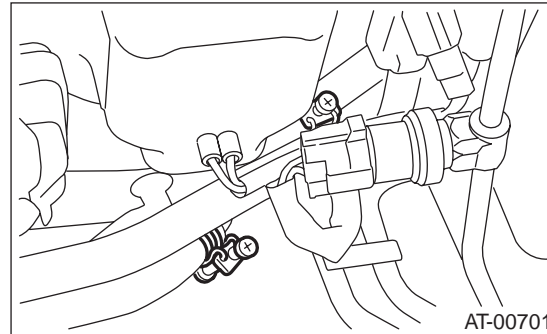
- 4) Get new ATF filter and apply a thin coat of ATF to the oil seal

• ATF Filter Assembly

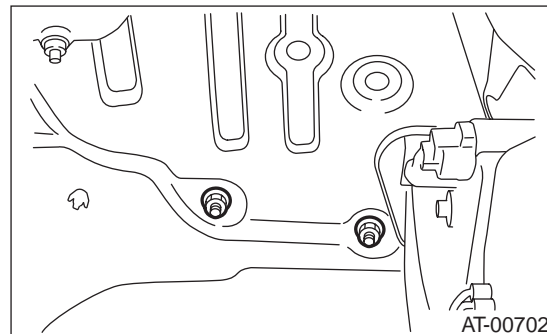
- 1) Remove battery.
- 2) Lift-up the vehicle.
- 3) Remove front left mud guard.
<Ref. to EI-23, REMOVAL, Mud Guard.>
- 4) Lower the vehicle.
- 5) Release clamp of IN, OUT of oil filter hose, and remove hose from pipe.

NOTE:

- Plug the pipe.
- Put a mark etc., to distinguish IN, OUT on pipe and hose.



- 6) Remove oil filter bracket installation nut.



- 7) Remove ATF filter assembly.
- 8) Remove ATF filter with attachment to bracket.
- 9) Get new ATF filter and apply a thin coat of ATF to the oil seal.

AT-73

ATF FILTER

AUTOMATIC TRANSMISSION

B: INSTALLATION

1. EXCEPT 3.0 L MODEL

- 1) Get new ATF filter and apply a thin coat of ATF to the oil seal.
- 2) Install ATF filter. Turn it by hand, being careful not to damage oil seal.
- 3) Using ST, tighten ATF filter to transmission case.

Calculate ATF filter torque specifications using the following formula.

$$T2 = L2 / (L1 + L2) \times T1$$

T1: 14 N·m (1.4 kgf·m, 10.1 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST length 0.078 m (3.07 in)

L2: Torque wrench length

Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf·m, ft·lb)
100 (3.94)	7.7 (0.79, 5.7)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	10 (1.0, 7.2)

NOTE:

Align ST with torque wrench while tightening ATF filter.

ST 498545400 OIL FILTER WRENCH

4) Add ATF.

5) Inspect level of ATF. <Ref. to AT-30, Automatic Transmission Fluid.>

2. 3.0 L MODEL

• ATF Filter

- 1) Get new ATF filter and apply a thin coat of ATF to the oil seal.
- 2) Install AT oil filter. Turn it by hand, being careful not to damage oil seal.
- 3) Using ST, tighten AT oil filter to attachment.

Calculate AT filter torque specifications using the following formula.

$$T2 = L2 / (L1 + L2) \times T1$$

T1: 14 N·m (1.4 kgf·m, 10.1 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST length 0.078 m (3.07 in)

L2: Torque wrench length

Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf·m, ft·lb)
100 (3.94)	7.7 (0.79, 5.7)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	10 (1.0, 7.2)

NOTE:

Align ST with torque wrench while tightening AT oil filter.

ST 498545400 OIL FILTER WRENCH

4) Install front left mud guard. <Ref. to EI-23, INSTALLATION, Mud Guard.>

5) Add ATF.

6) Inspect level of ATF. <Ref. to AT-30, Automatic Transmission Fluid.>

• ATF Filter Assembly

- 1) Install ATF filter with attachment to bracket.

Tightening torque:

14 N·m (1.4 kgf·m, 10 ft·lb)

- 2) Install ATF filter assembly to vehicle.

Tightening torque:

16 N·m (1.6 kgf·m, 12 ft·lb)

- 3) Install AT oil filter. Turn it by hand, being careful not to damage oil seal.

4) Using ST, tighten AT oil filter to transmission case.

Calculate AT filter torque specifications using the following formula.

$$T2 = L1 / (L1 + L2) \times T1$$

T1: 14 N·m (1.4 kgf·m, 10.1 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST length 0.078 m (3.07 in)

L2: Torque wrench length

Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf·m, ft·lb)
100 (3.94)	7.7 (0.79, 5.7)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	10 (1.0, 7.2)

NOTE:

Align ST with torque wrench while tightening AT oil filter.

ST 498545400 OIL FILTER WRENCH

5) Install hoses to pipe.

NOTE:

Install hoses to pipe aligning marks on them.

6) Install front left mud guard.

<Ref. to EI-23, INSTALLATION, Mud Guard.>

7) Add ATF.

8) Inspect level of ATF. <Ref. to AT-30, Automatic Transmission Fluid.>

C: INSPECTION

Replace the part if any defect is found from the inspection.

Check for rust, hole, ATF leaks, and other damage.

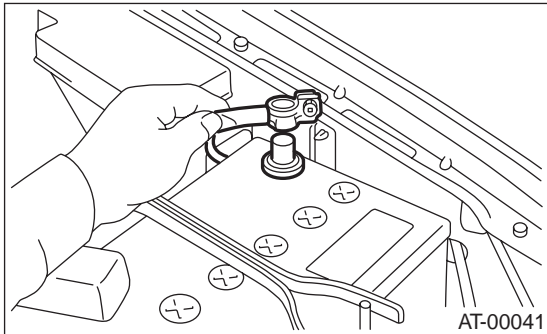
TRANSMISSION CONTROL MODULE (TCM)

AUTOMATIC TRANSMISSION

20. Transmission Control Module (TCM)

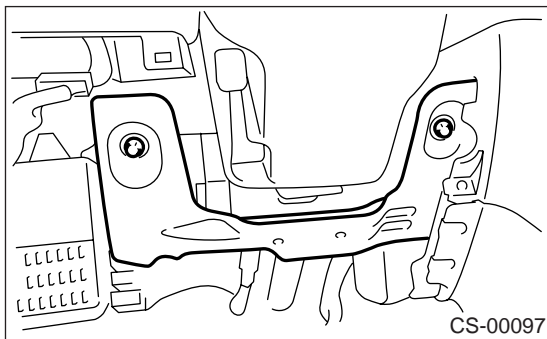
A: REMOVAL

1) Disconnect the ground cable from battery.

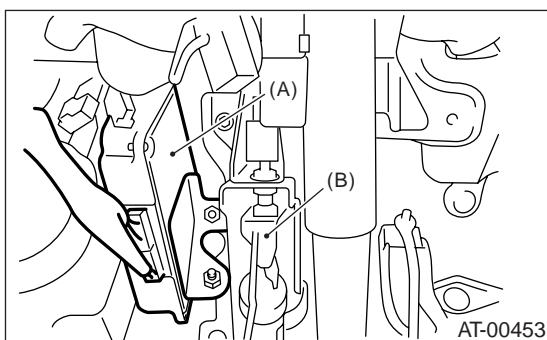


2) Remove the lower cover and then disconnect the connector.

3) Remove the knee bolster.

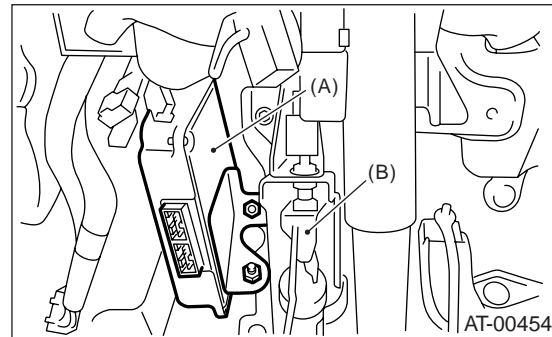


4) Disconnect the connectors from transmission control module.



- (A) Transmission control module
- (B) Brake pedal

5) Remove the transmission control module.



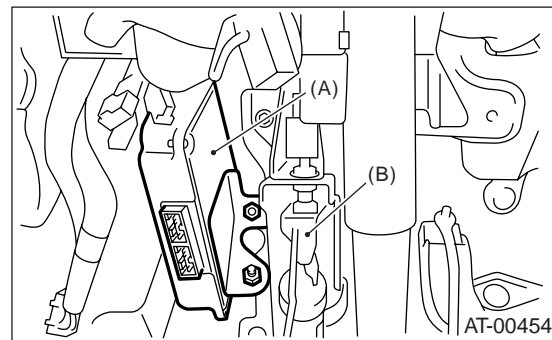
- (A) Transmission control module
- (B) Brake pedal

B: INSTALLATION

1) Install the transmission control module.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



- (A) Transmission control module
- (B) Brake pedal

2) Connect the connectors to transmission control module.
3) Install in the reverse order of removal.

AT-75

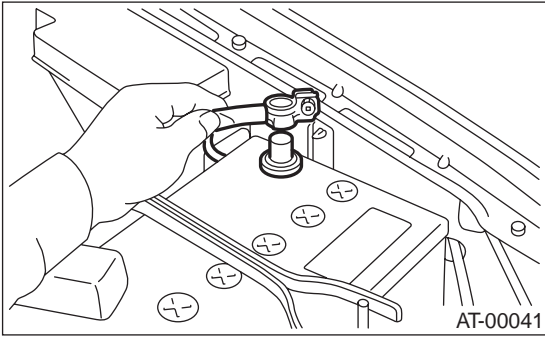
DROPPING RESISTOR

AUTOMATIC TRANSMISSION

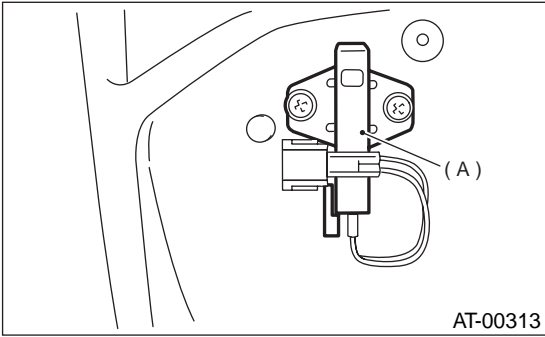
21. Dropping Resistor

A: REMOVAL

- 1) Disconnect the ground terminal from battery.



- 2) Disconnect the connector from dropping resistor.
- 3) Remove the dropping resistor.



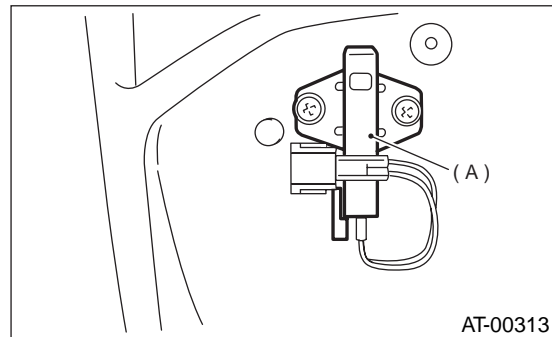
(A) Dropping resistor

B: INSTALLATION

- 1) Install in the reverse order of removal.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



(A) Dropping resistor

C: INSPECTION

Step	Value	Yes	No
1 CHECK RESISTOR. 1) Turn the ignition switch to OFF. 2) Disconnect the connector from dropping resistor. 3) Measure the resistance between dropping resistor terminal. Terminals No. 1 — No. 2: Is the measured value within specified value?	9 — 15 Ω	Go to step 2.	Replace the dropping resistor. <Ref. to AT-76, Dropping Resistor.>
2 CHECK RESISTOR. Measure the resistance between dropping resistor terminal. Terminals No. 3 — No. 4: Is the measured value within specified value?	9 — 15 Ω	Dropping resistor is normal.	Replace the dropping resistor. <Ref. to AT-76, Dropping Resistor.>

AT-76

ATF COOLER PIPE AND HOSE

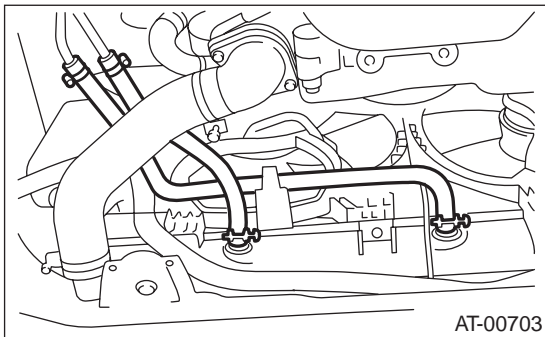
AUTOMATIC TRANSMISSION

22.ATF Cooler Pipe and Hose**A: REMOVAL****1. EXCEPT 3.0 L MODEL**

- 1) Set the vehicle on a lift.
- 2) Remove battery and washer tank.
- 3) Lift-up the vehicle.
- 4) Remove the under cover.
- 5) Disconnect ATF cooler hose from radiator.

NOTE:

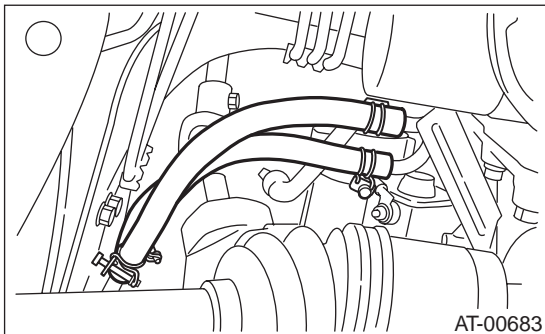
- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



- 6) Disconnect ATF cooler hoses from pipes.

NOTE:

- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.

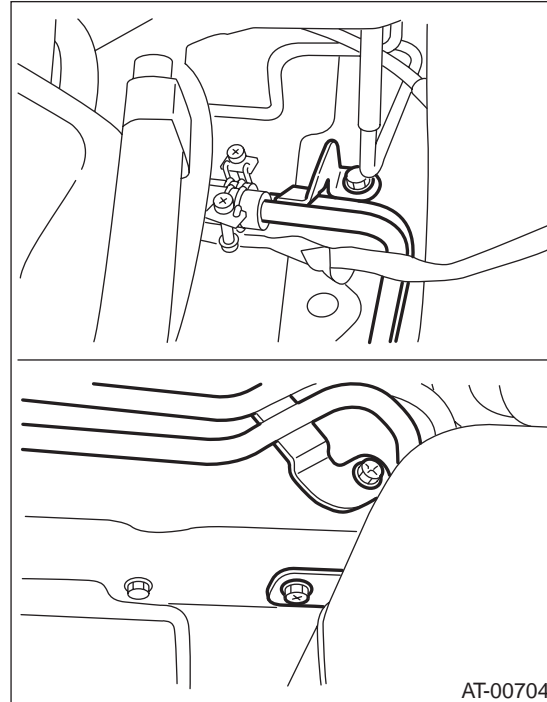
**2. 3.0 L MODEL**

- 1) Set the vehicle on a lift.
- 2) Remove battery and washer tank.
- 3) Lift-up the vehicle.
- 4) Remove the under cover.
- 5) Disconnect ATF cooler hose from radiator.

NOTE:

- Do not remove with a screwdriver or other pointed tools.

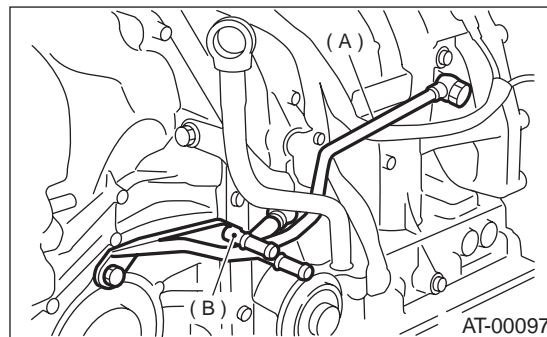
- 7) Remove ATF cooler pipe from frame.



- 8) Remove the oil cooler inlet and outlet pipes.

NOTE:

When removing outlet pipe, be careful not to lose ball and spring used with retaining screw.

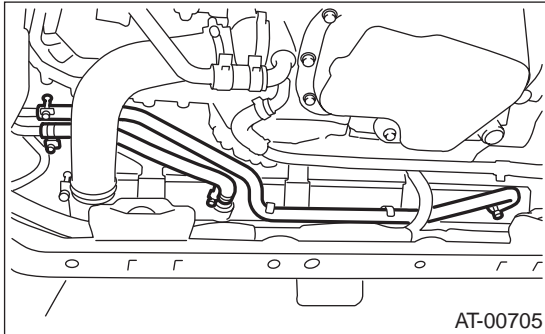


- (A) Inlet pipe
(B) Outlet pipe

ATF COOLER PIPE AND HOSE

AUTOMATIC TRANSMISSION

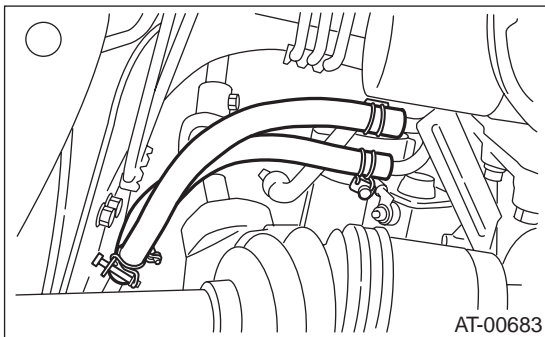
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



6) Disconnect ATF cooler hoses from transmission.

NOTE:

- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



7) Remove front left mud guard.

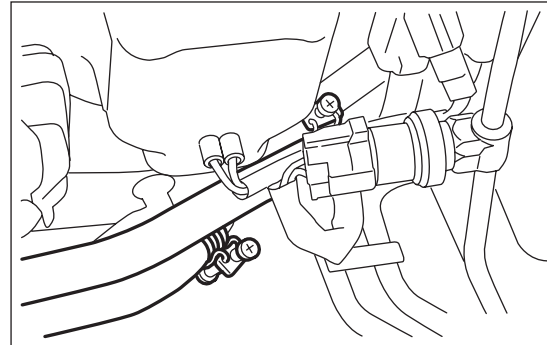
<Ref. to EI-23, REMOVAL, Mud Guard.>

8) Disconnect ATF cooler hoses from ATF filter.

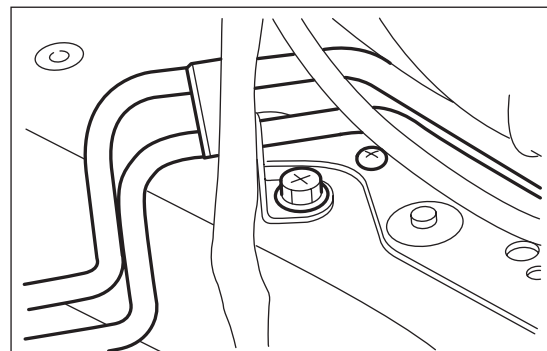
NOTE:

- Do not remove with a screwdriver or other pointed tools.

- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



9) Remove AT cooler pipe from frame.



AT-78

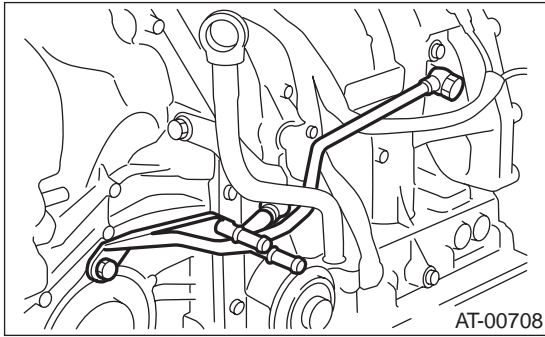
ATF COOLER PIPE AND HOSE

AUTOMATIC TRANSMISSION

10) Remove the oil cooler inlet and outlet pipes.

NOTE:

When removing outlet pipe, be careful not to lose ball and spring used with retaining screw.



B: INSTALLATION

1. EXCEPT 3.0 L MODEL

1) Install the oil cooler outlet and inlet pipes.

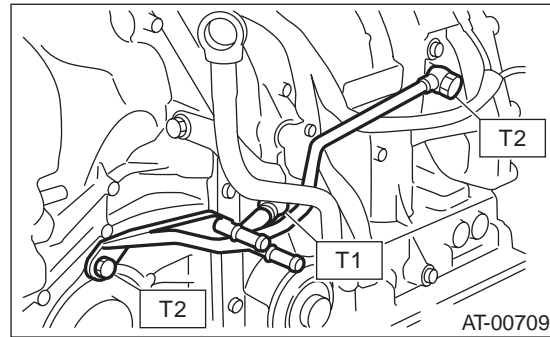
NOTE:

Be sure to use a new aluminum washer.

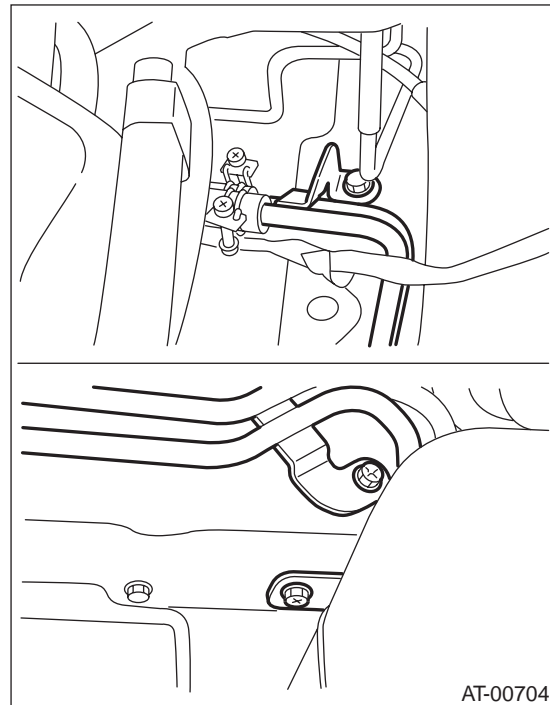
Tightening torque:

T1: 44 N·m (4.5 kgf·m, 32.5 ft·lb)

T2: 25 N·m (2.5 kgf·m, 18.1 ft·lb)



2) Install ATF cooler pipe to frame.



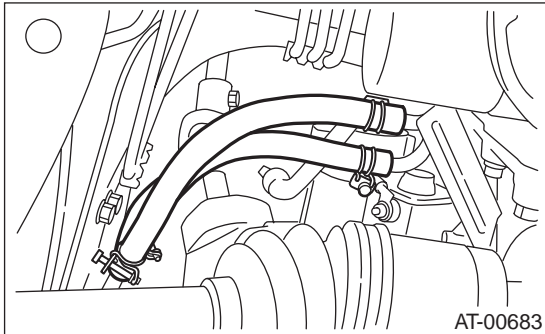
ATF COOLER PIPE AND HOSE

AUTOMATIC TRANSMISSION

3) Connect ATF cooler hose to pipe transmission side.

NOTE:

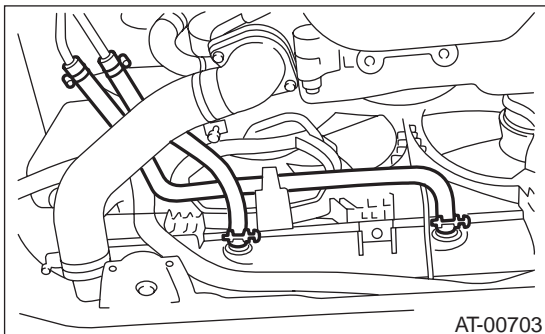
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



4) Connect ATF cooler hose to pipe of radiator side.

NOTE:

- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



5) Install the under cover.

6) Install battery and washer tank.

7) Fill ATF. <Ref. to AT-30, Automatic Transmission Fluid.>

NOTE:

Make sure there are no ATF leaks in joints between the transmission, radiator, pipes, and hoses.

2. 3.0 L MODEL

1) Install the oil cooler outlet and inlet pipes.

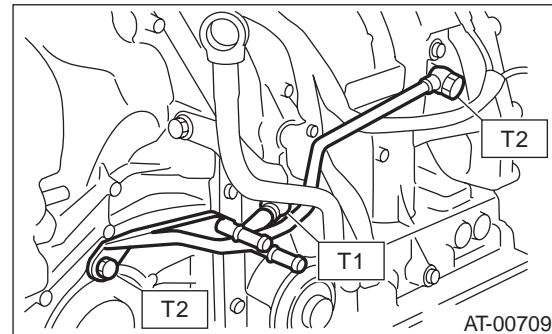
NOTE:

Be sure to use a new aluminum washer.

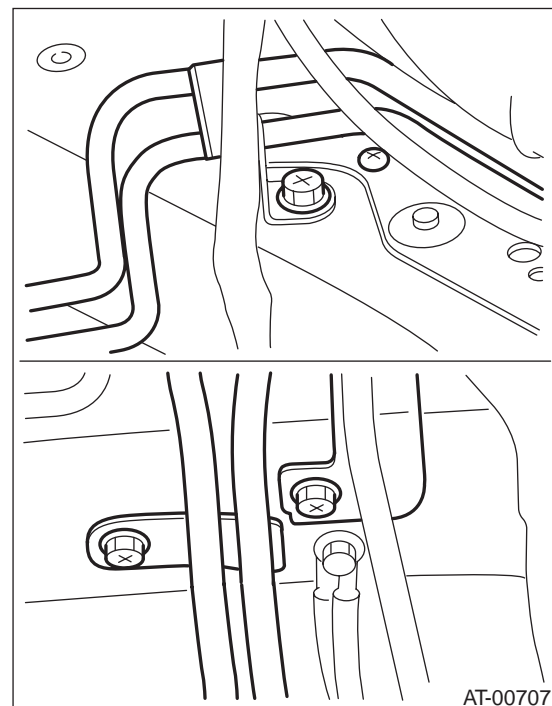
Tightening torque:

T1: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

T2: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



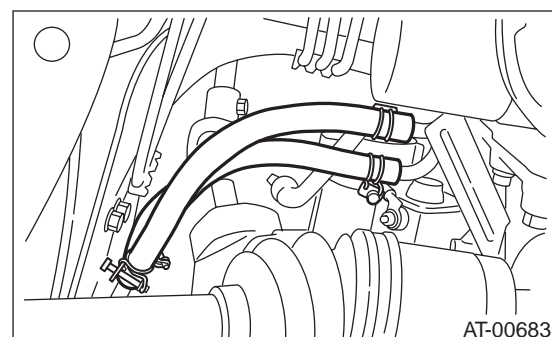
2) Install ATF cooler pipe to frame.



3) Connect ATF cooler hose to transmission.

NOTE:

- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



AT-80

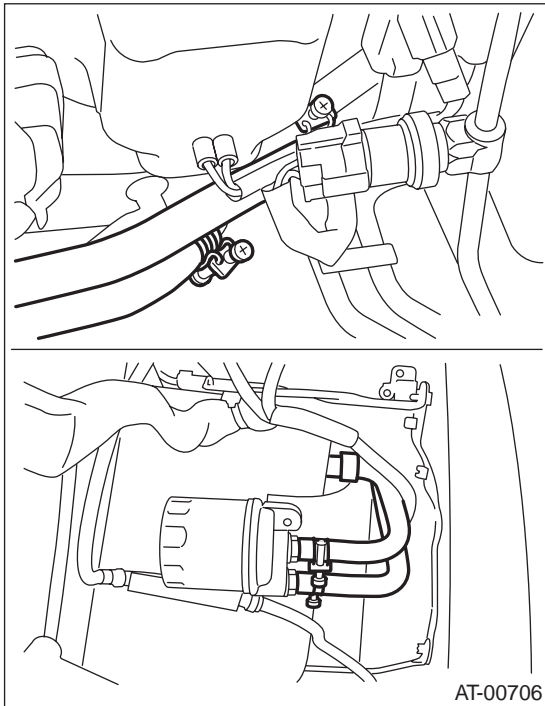
ATF COOLER PIPE AND HOSE

AUTOMATIC TRANSMISSION

4) Connect ATF cooler hoses from ATF filter.

NOTE:

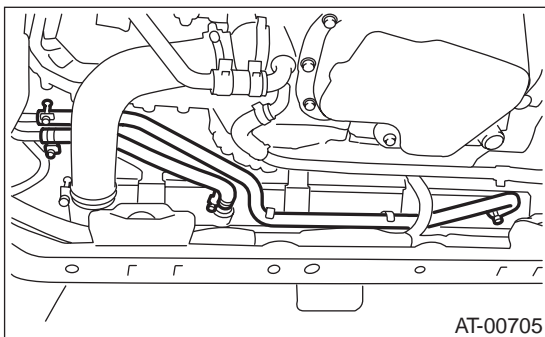
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



5) Connect ATF cooler hoses from radiator.

NOTE:

- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



6) Install front left mud guard. <Ref. to EI-23, INSTALLATION, Mud Guard.>

7) Install the under cover.

8) Install battery and washer tank.

9) Fill ATF. <Ref. to AT-30, 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 defective hoses, pipes, clamps, and washers found from the inspection below.

- 1) Check for ATF leaks in joints between the transmission, radiator, pipes, and hoses.
- 2) Check for deformed clamps.
- 3) Lightly bend the hose and check for cracks in the surface and other damage.
- 4) Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was by pressing with your fingernail.
- 5) Check for peeling, cracks, and deformation at the tip of the hose.

AT-81

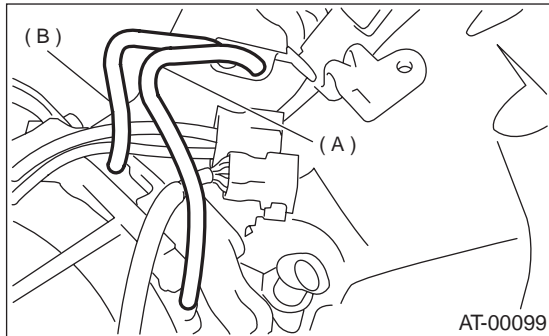
AIR BREATHER HOSE

AUTOMATIC TRANSMISSION

23. Air Breather Hose

A: REMOVAL

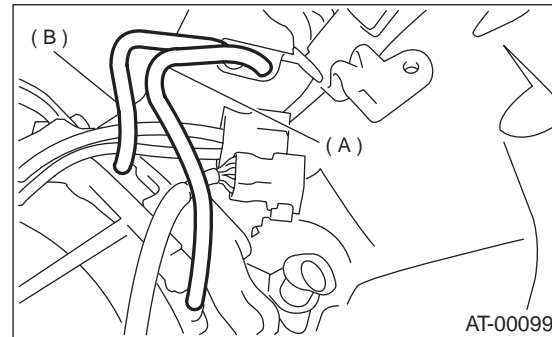
- 1) Remove the air cleaner case. (2.5 L model)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 2) Remove air intake chamber. (3.0 L model)
<Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
- 3) Disconnect the air breather hoses.



- (A) Air breather hose (Transmission case)
- (B) Air breather hose (Oil pump housing)

B: INSTALLATION

- 1) Install air breather hoses.



- (A) Air breather hose (Transmission case)
- (B) Air breather hose (Oil pump housing)

- 2) Install the air cleaner case. (2.5 L model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
- 3) Install air intake chamber. (3.0 L model)
<Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

C: INSPECTION

Make sure the hose is not cracked or clogged.

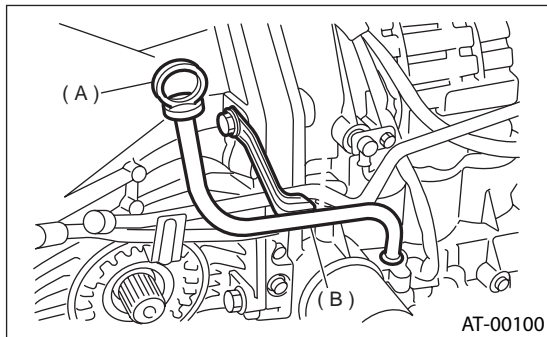
OIL CHARGER PIPE

AUTOMATIC TRANSMISSION

24.Oil Charger Pipe

A: REMOVAL

- 1) Remove the air cleaner case. (2.5 L model)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 2) Remove air intake chamber. (3.0 L model)
<Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.>
- 3) Remove the oil charger pipe, and remove the O-ring from the flange face.



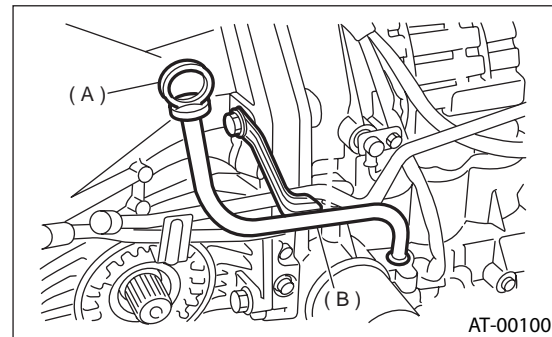
- (A) Oil level gauge
(B) Oil charger pipe

B: INSTALLATION

- 1) Install the oil charger pipe with new O-ring.

Tightening torque:

41 N·m (4.2 kgf-m, 30.4 ft-lb)



- (A) Oil level gauge
(B) Oil charger pipe

- 2) Install the air cleaner case. (2.5 L model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
- 3) Install air intake chamber. (3.0 L model)
<Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.>

C: INSPECTION

Make sure the oil charger pipe is not deformed or otherwise damaged.

TORQUE CONVERTER CLUTCH ASSEMBLY

AUTOMATIC TRANSMISSION

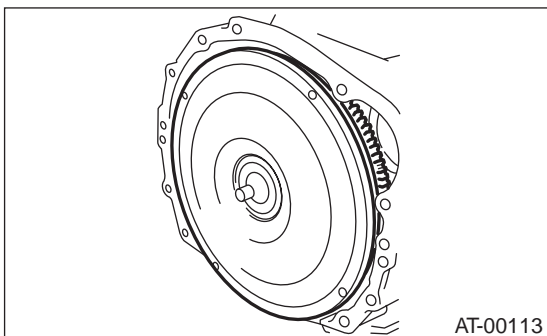
25. Torque Converter Clutch Assembly

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch horizontally.

NOTE:

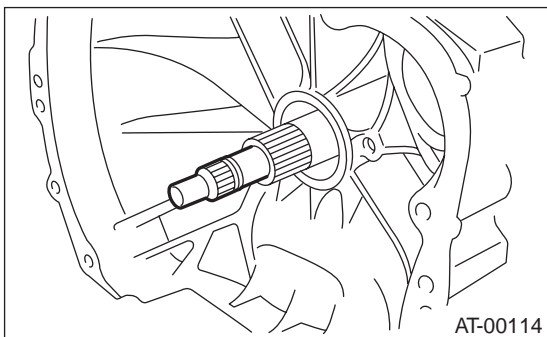
- Be careful not to scratch the bushing inside the oil pump shaft.
- Note that oil pump shaft also comes out.



- 3) Remove the input shaft.

NOTE:

When the torque converter clutch assembly is removed, the input shaft will come out.



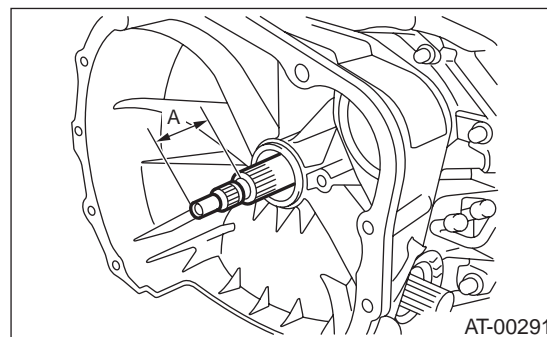
- 4) Extract the oil pump shaft from torque converter clutch.
- 5) Remove the clip from torque converter clutch.

B: INSTALLATION

- 1) Install the clip to torque converter clutch.
- 2) Install the oil pump shaft to the torque converter clutch, and then check the clip fits securely in its groove.
- 3) Insert the input shaft while turning lightly by hand.

Normal protrusion A:

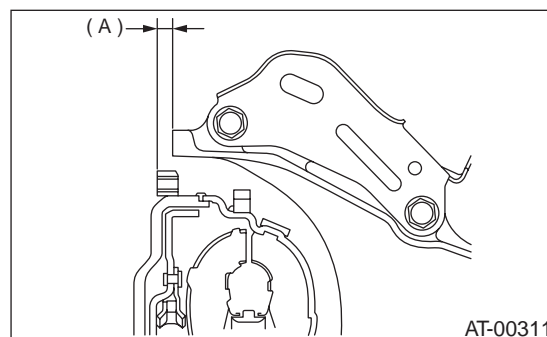
50 — 55 mm (1.97 — 2.17 in)



- 4) Holding the torque converter clutch assembly by hand, carefully install it to the torque converter clutch case. Be careful not to damage the bushing. Also avoid undue contact between the oil pump shaft bushing and stator shaft portion of the oil pump cover.
- 5) Rotate the shaft lightly by hand to engage the splines securely.

Dimension A:

2.7 to 2.9 mm (0.106 to 0.114 in)



(A) Dimension A

- 6) Install the transmission assembly to vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Make sure the ring gear is not damaged and that the protrusion on the edge of the torque converter clutch is not deformed or otherwise damaged.

EXTENSION CASE

AUTOMATIC TRANSMISSION

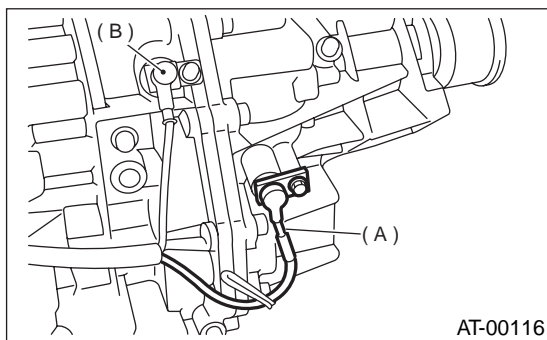
26.Extension Case

A: REMOVAL

1) Remove the transmission assembly. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>

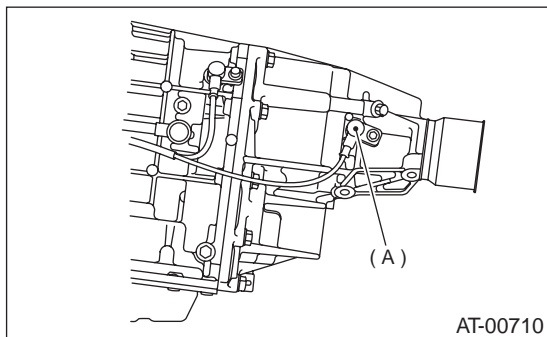
2) Remove rear vehicle speed sensor.

- MPT model



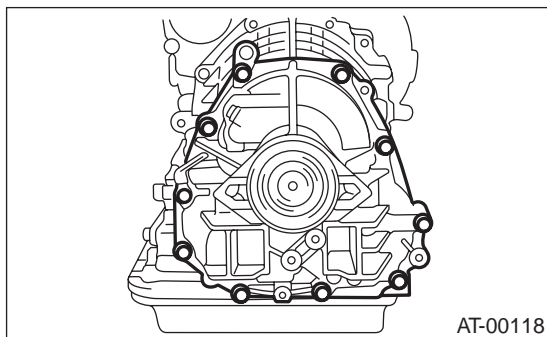
- (A) Rear vehicle speed sensor
- (B) Front vehicle speed sensor

- VTD model



- (A) Rear vehicle speed sensor

3) Separate transmission case and extension case sections.



B: INSTALLATION

1) Attach the selected thrust needle bearing to the end surface of reduction drive gear with vaseline.

NOTE:

Install thrust needle bearing in the correct direction.

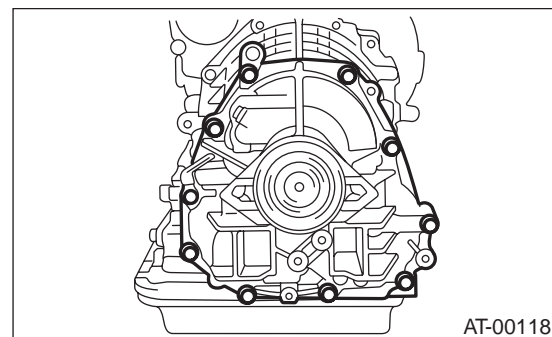
2) Install new gasket.

3) Install the extension case to the transmission case.

4) Tighten bolts to secure the case.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)

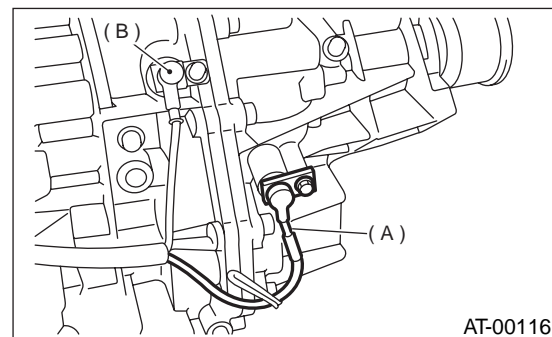


5) Install the rear vehicle speed sensor.

Tightening torque:

7 N·m (0.7 kgf·m, 5.1 ft·lb)

- MPT model



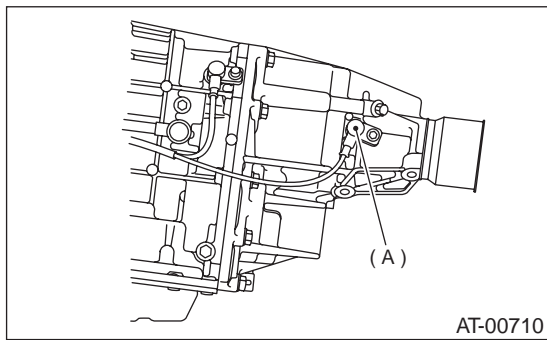
- (A) Rear vehicle speed sensor
- (B) Front vehicle speed sensor

AT-85

EXTENSION CASE

AUTOMATIC TRANSMISSION

- VTD model



(A) Rear vehicle speed sensor

6) Install the transmission assembly. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

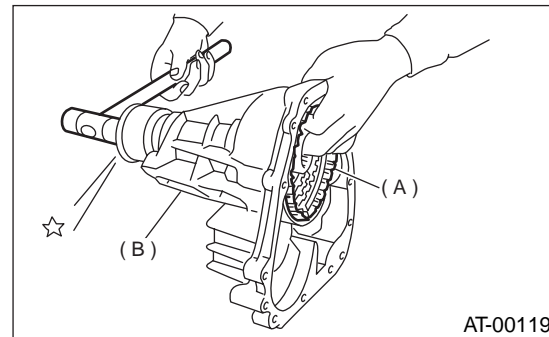
C: DISASSEMBLY

1. MPT MODEL

1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

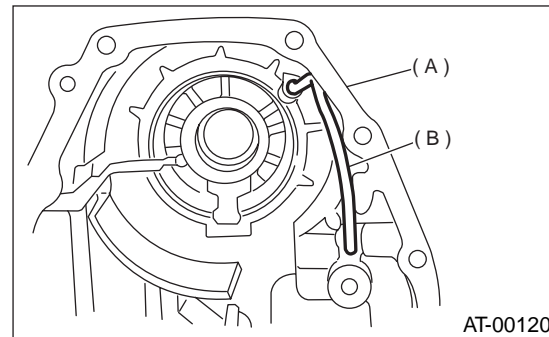
NOTE:

Be careful not to damage the oil seal in the extension.



(A) Extension case
(B) Transfer clutch

2) Remove the transmission clutch pipe without bending pipe.



(A) Extension case
(B) Transfer clutch pipe

2. VTD MODEL

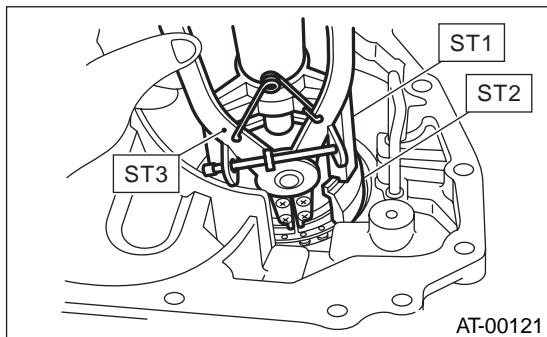
1) Remove snap ring using ST1, ST2, ST3 and a press.

ST1 398673600 COMPRESSOR
ST2 498627100 SHEAT

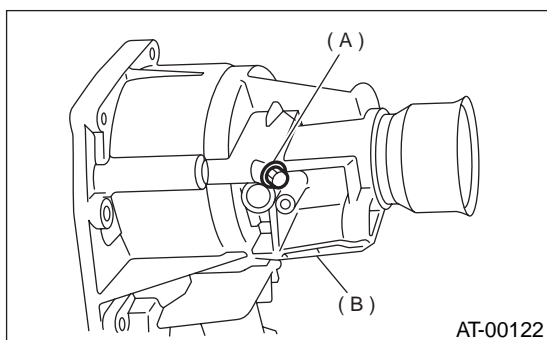
EXTENSION CASE

AUTOMATIC TRANSMISSION

ST3 398663600 PLYER

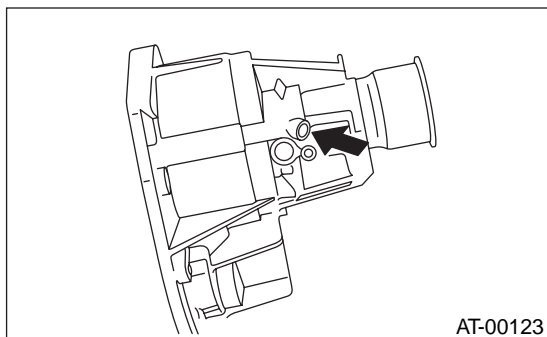


2) Remove test plug.

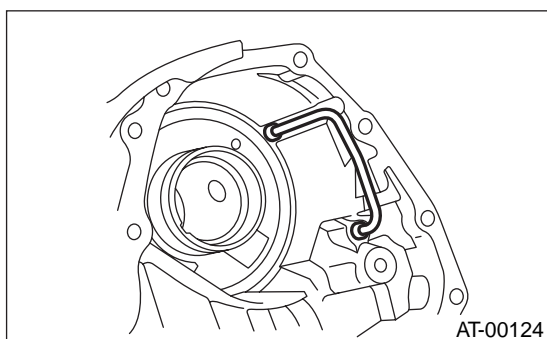


(A) Extension case
(B) Test plug

3) Remove clutch piston using compressed air.



4) Pay attention, not to bend pipe, and remove transfer clutch pipe.



5) Remove the dust cover from the extension case.
6) Remove the oil seal from the extension case.

D: ASSEMBLY

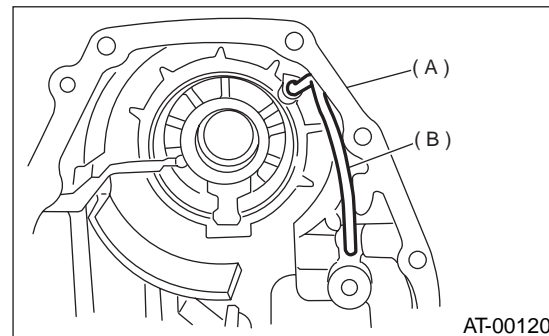
1. MPT MODEL

1) Using the ST and a press, press in a new oil seal.

ST 498057300 INSTALLER

2) Press in the dust cover.

3) Install the transfer clutch pipe to extension case without bending pipe.

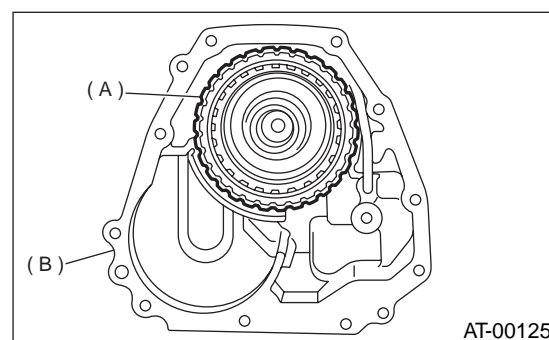


(A) Extension case
(B) Transfer clutch pipe

4) Install the transfer clutch assembly to the case.

NOTE:

- Be careful not to damage the seal rings.
- Insert the clutch assembly fully into position until the bearing shoulder bottoms.



(A) Transfer clutch
(B) Extension case

2. VTD MODEL

1) Press new oil seal using ST and a press.

ST 498057300 INSTALLER

2) Press dust cover.

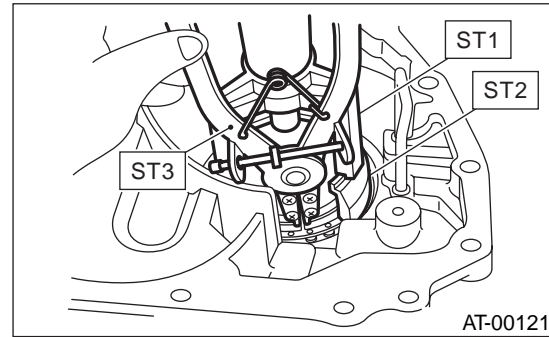
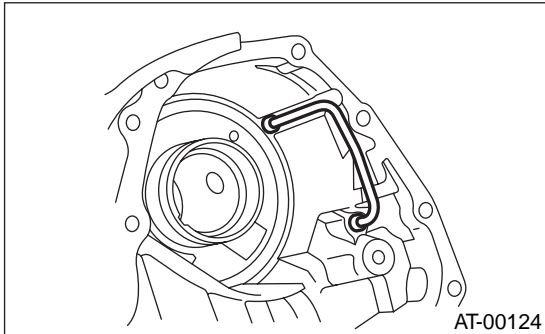
AT-87

EXTENSION CASE

AUTOMATIC TRANSMISSION

3) Install the transfer clutch pipe onto the extension case, taking care not to bend the pipe.

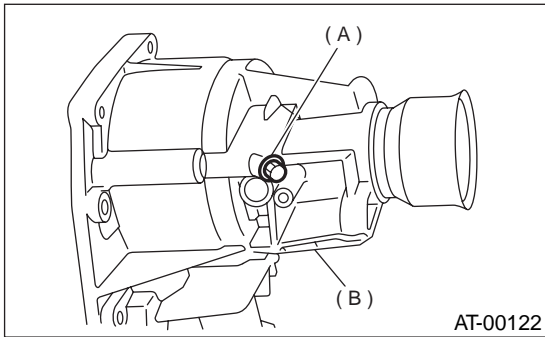
ST3 398663600 Pliers



4) Install the test plug.

Tightening torque:

13 N·m (1.3 kgf·m, 9.4 ft·lb)



- (A) Test plug
- (B) Extension case

E: INSPECTION

- Use forced air to make sure the transfer pipe and extension case routes are not clogged and do not leak.

- Measure the extension end play and adjust it to within specifications.

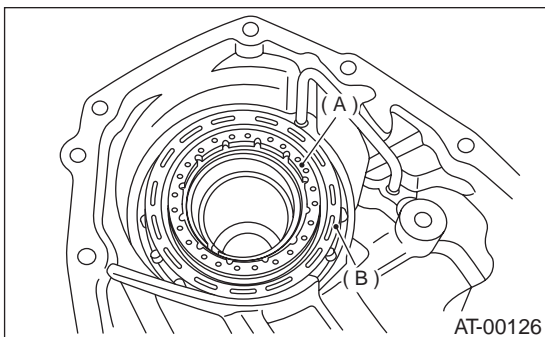
MPT model

<Ref. to AT-93, MPT MODEL, ADJUSTMENT, Transfer Clutch.>

VTD model

<Ref. to AT-94, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

5) Insert the multi-plate clutch, drive plates, driven plates, and spring retainer.



- (A) Spring retainer
- (B) Multi-plate clutch (LSD) piston assembly

6) Install the snap ring using special tools 1, 2, and 3.

ST1 398673600 Compressor

ST2 498627100 Seat

AT-88

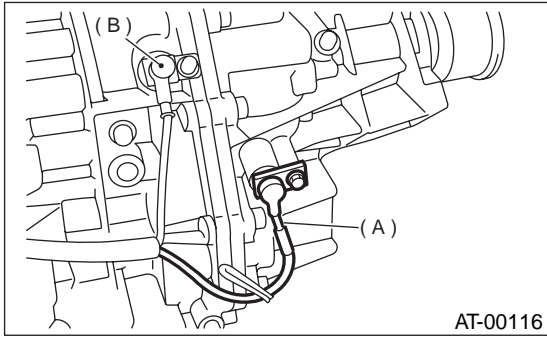
TRANSFER CLUTCH

AUTOMATIC TRANSMISSION

27. Transfer Clutch

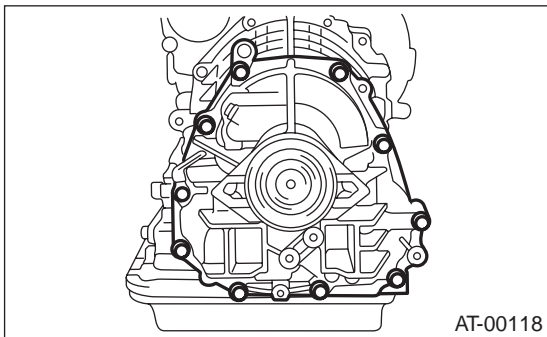
A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor.

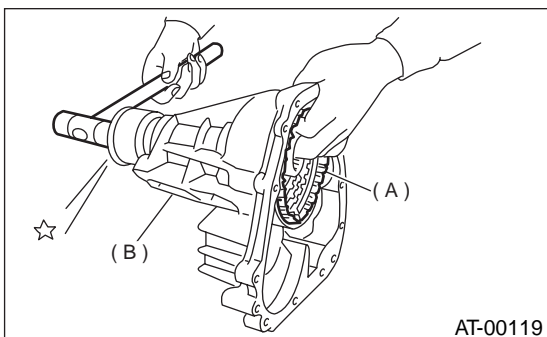


- (A) Rear vehicle speed sensor
- (B) Front vehicle speed sensor

- 3) Separate transmission case and extension case sections.



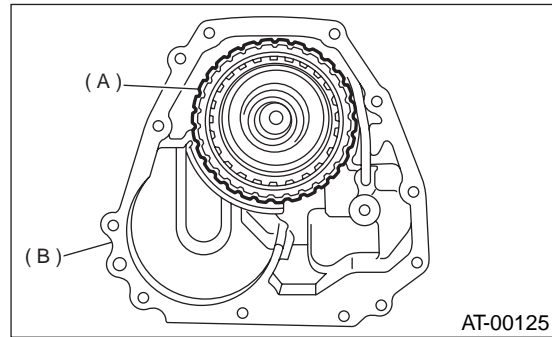
- 4) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.



- (A) Transfer clutch
- (B) Extension case

B: INSTALLATION

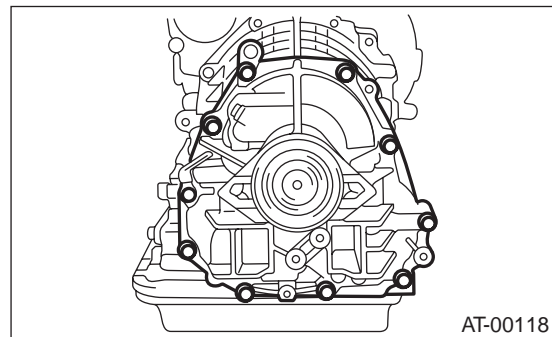
- 1) Select the thrust needle bearing.
- 2) Install the transfer clutch assembly to the case.



- (A) Transfer clutch
- (B) Extension case

- 3) Tighten bolts to secure the case.

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



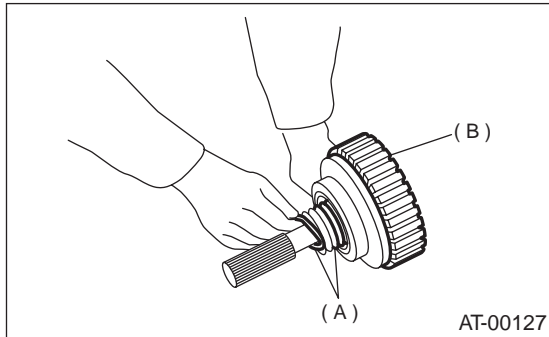
- 4) Install the transmission assembly to vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

TRANSFER CLUTCH

AUTOMATIC TRANSMISSION

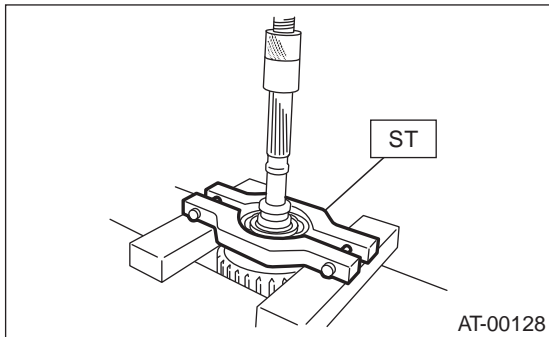
C: DISASSEMBLY

1) Remove the seal ring.

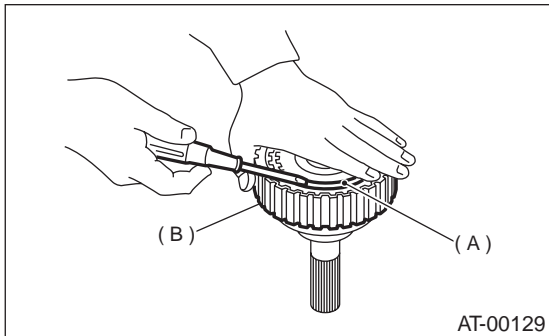


- (A) Seal ring
- (B) Transfer clutch

2) Using a press and ST, remove the ball bearing.
ST 498077600 REMOVER



3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.

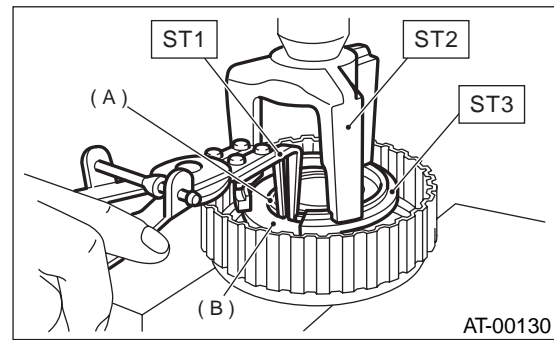


- (A) Snap ring
- (B) Transfer clutch

4) Remove the snap ring with ST1, ST2 and ST3, and take out the return spring and transfer clutch piston seal.

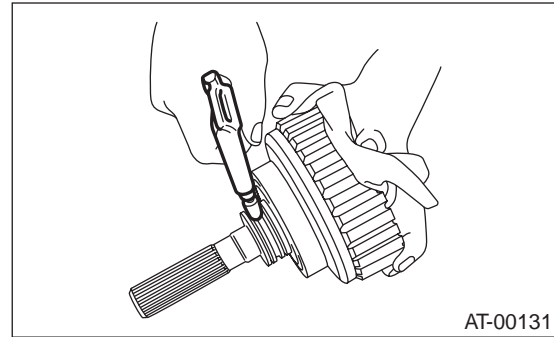
ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR

ST3 398623600 SEAT



- (A) Snap ring
- (B) Transfer piston seal

5) Apply compressed air to the rear drive shaft to remove the piston.



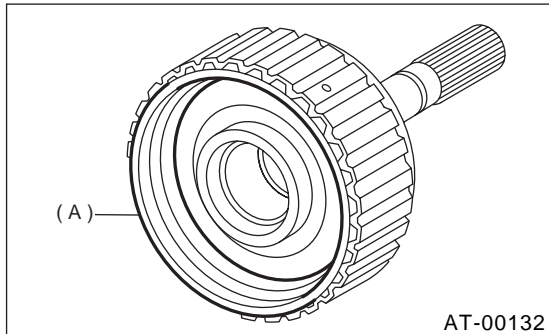
AT-90

TRANSFER CLUTCH

AUTOMATIC TRANSMISSION

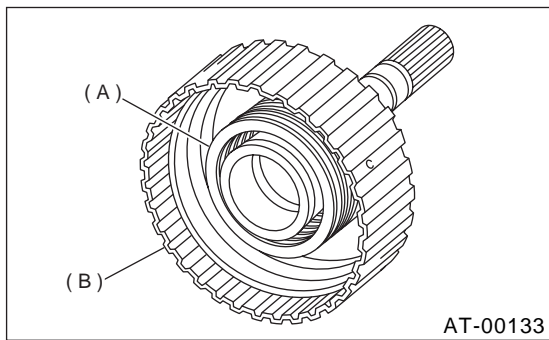
D: ASSEMBLY

1) Install the transfer clutch piston.



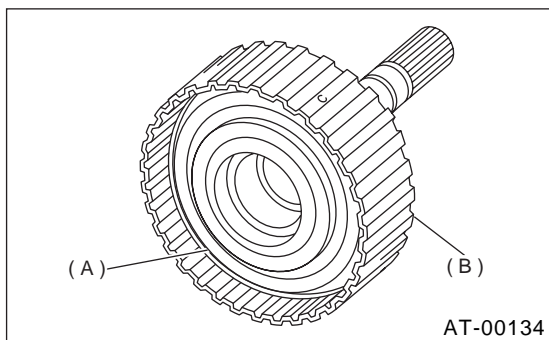
- (A) Transfer clutch piston
- (B) Rear drive shaft

2) Install return spring to transfer piston.



- (A) Return spring
- (B) Rear drive shaft

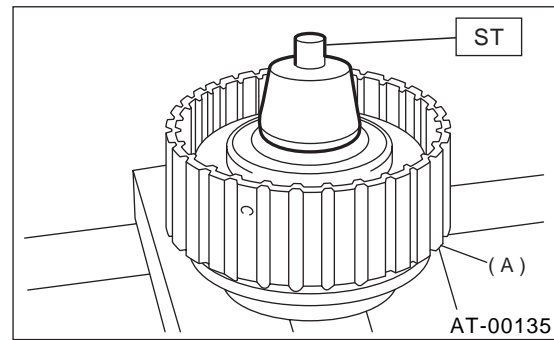
3) Install transfer clutch piston seal.



- (A) Transfer clutch piston seal
- (B) Rear drive shaft

4) Install ST to rear drive shaft.

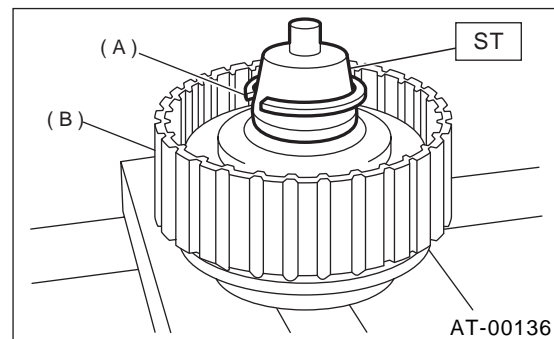
ST 499257300 SNAP RING OUTER GUIDE



- (A) Transfer clutch

5) Install snap ring to ST.

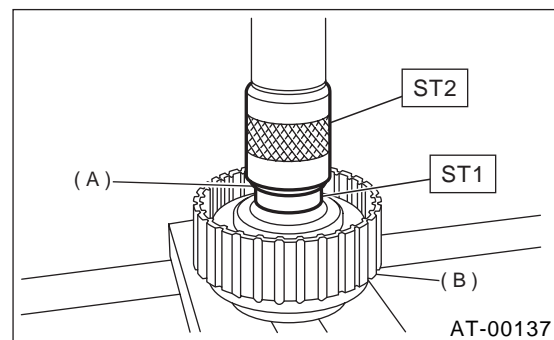
ST 499257300 SNAP RING OUTER GUIDE



- (A) Snap ring
- (B) Transfer clutch

6) Using ST1 and ST2, install snap ring to rear drive shaft.

ST1 499257300 SNAP RING OUTER GUIDE
ST2 499247400 INSTALLER



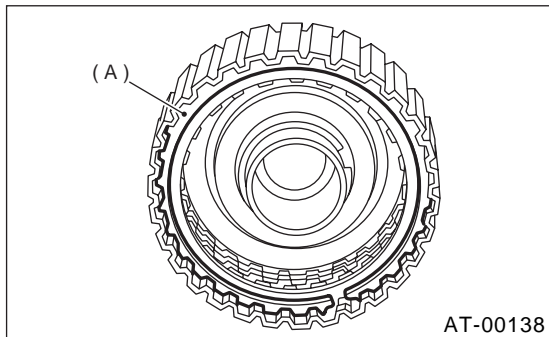
- (A) Snap ring
- (B) Transfer clutch

AT-91

TRANSFER CLUTCH

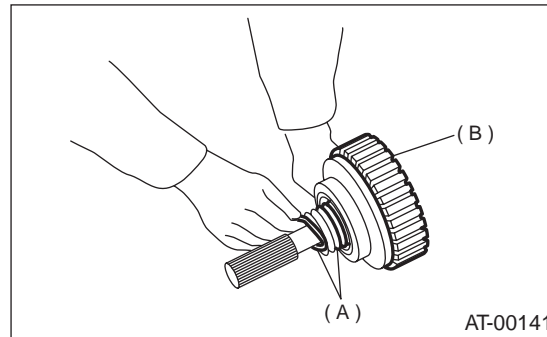
AUTOMATIC TRANSMISSION

7) Install the driven plates, drive plates, pressure plate and snap ring.



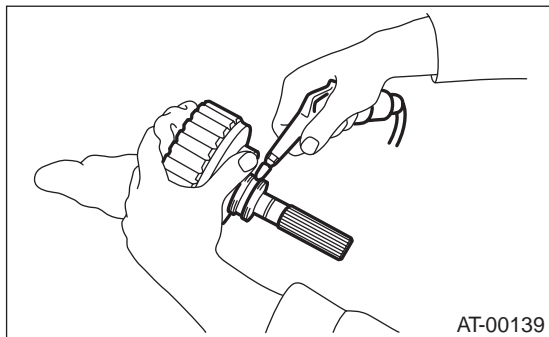
(A) Snap ring

NOTE:
Do not expand the seal ring excessively when installing.

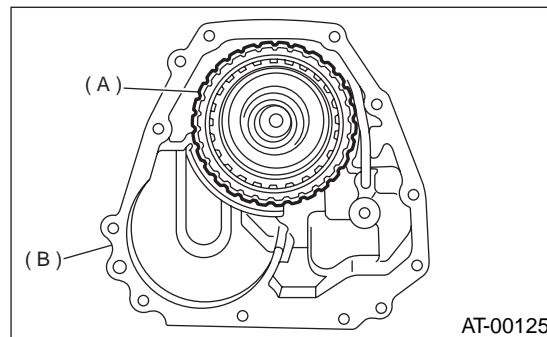


(A) Snap ring
(B) Transfer clutch

8) Apply compressed air to see if the assembled parts move smoothly.



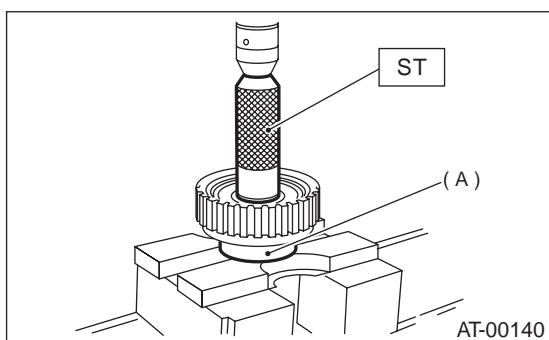
12) Install the transfer clutch assembly without damaging seal ring.



(A) Transfer clutch
(B) Extension case

9) Check clearance between snap ring and pressure plate. <Ref. to AT-93, INSPECTION, Transfer Clutch.>

10) Press-fit a new ball bearing with ST.
ST 899580100 INSTALLER



(A) Ball bearing

11) Coat a new seal ring with vaseline, and install it in the seal ring groove of the shaft.

AT-92

TRANSFER CLUTCH

AUTOMATIC TRANSMISSION

E: INSPECTION

- Check the drive plate facing for wear and damage.
- Check the snap ring for wear, return spring for permanent set and breakage, and return spring for deformation.
- Check the lathe cut ring for damage.
- Measure the extension end play and adjust it to within specifications.

<Ref. to AT-93, ADJUSTMENT, Transfer Clutch.>

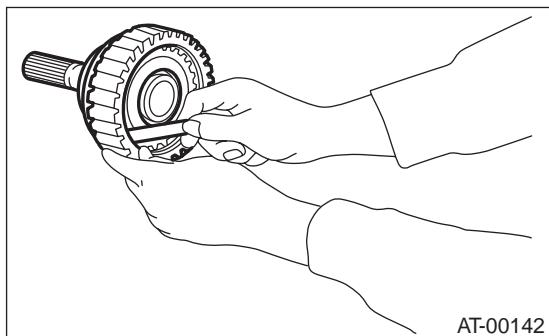
- 1) Inspect clearance between snap ring and pressure plate.
- 2) Before measuring clearance, place the same thickness of shim on both sides to prevent pressure plate from tilting.
- 3) If the clearance is not within specification, adjust it by selecting a suitable pressure plate on the transfer clutch piston side.

Standard value:

0.7 — 1.1 mm (0.028 — 0.043 in)

Allowable limit:

1.6 mm (0.063 in)



Available pressure plates	
Part No.	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

- 4) Check if the tight corner braking does not occur when the vehicle is started with steering wheel held at fully turned position. If tight corner braking occurs, perform the following procedures.

(1) With the steering wheel held at fully turned position, drive the vehicle in "D" range and with vehicle speed at approx. 5 km/h (3 mph) in both clockwise and counterclockwise directions for approx. ten times each, while repeating acceleration and braking intermittently.

(2) If the tight corner braking still persists, drive the vehicle again in a circle for several laps.

F: ADJUSTMENT

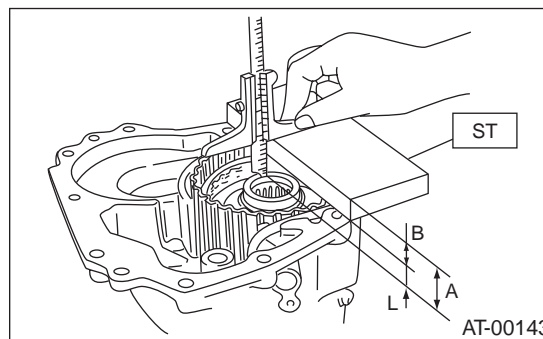
1. MPT MODEL

- 1) Measure distance "L" from end of extension case and rear drive shaft with ST.

ST 398643600 GAUGE

L = Measured value – 15 mm

(L = Measured value – 0.59 in)



A: Measured value

B: ST thickness [15 mm (0.59 in)]

L: Distance from end of extension case to end of rear drive shaft

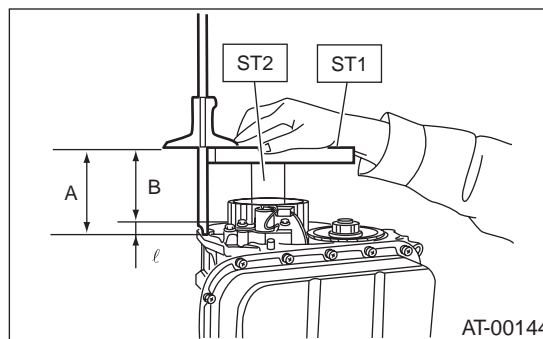
- 2) Measure the distance "Q" from the transmission case mating surface to the reduction drive gear end surface with ST1 and ST2.

Q = Measured value – 50 mm

(Q = Measured value – 1.97 in)

ST1 398643600 GAUGE

ST2 499577000 GAUGE



A: Measured value

B: ST thickness [50 mm (1.97 in)]

Q: Distance from end of transmission case to end of reduction drive gear

- 3) Calculation equation:

NOTE:

Calculate "H":

When clearance is at 0.05 mm (0.0020 in) and 0.25 mm (0.0098 in), then select a suitable thrust needle bearing from the table.

$H = (L + 0.45 \text{ mm}) - Q - T$

[$H = (L + 0.0177 \text{ in}) - Q - T$]

T: Thrust needle bearing thickness

AT-93

TRANSFER CLUTCH

AUTOMATIC TRANSMISSION

L: Distance from end of extension case to end of rear drive shaft

0.45 mm (0.0177 in): Gasket thickness

\varnothing : Distance from end of transmission case to end of reduction drive gear

H: Shim clearance

0.05 — 0.25 mm (0.0020 — 0.0098 in)

Example:

When, L = 18.60 mm (0.7323 in), \varnothing = 15.05 mm (0.5925 in)

Calculation when clearance is 0.05 mm (0.0020 in)

$$H = (18.60 + 0.45) - 15.05 - 0.05 = 3.95$$

$$[H = (0.7323 + 0.0177) - 0.5925 - 0.0020 = 0.1555]$$

Calculation when clearance is 0.25 mm (0.0098 in)

$$H = (18.60 + 0.45) - 15.05 - 0.25 = 3.75$$

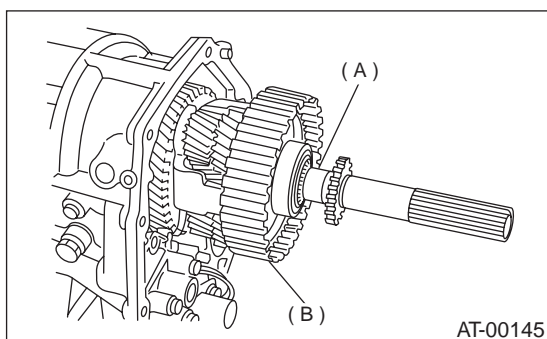
$$[H = (0.7323 + 0.0177) - 0.5925 - 0.0098 = 0.1476]$$

After calculation, the value of "H" becomes between 3.75 and 3.95, therefore select bearing thickness of 3.8.

Thrust needle bearing	
Part No.	Thickness mm (in)
806536020	3.8 (0.150)
806535030	4.0 (0.157)
806535040	4.2 (0.165)
806535050	4.4 (0.173)
806535060	4.6 (0.181)
806535070	4.8 (0.189)
806535090	5.0 (0.197)

2. VTD MODEL

1) Insert the rear driveshaft into the reduction drive gear and center differential assembly.



(A) Rear drive plate

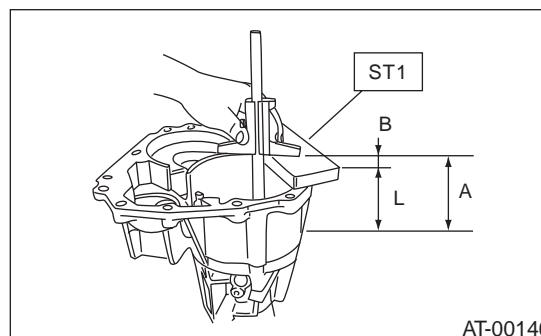
(B) Center differential carrier

2) Using the special tool, measure the distance "L" between the mating surface of extension case and multi-plate clutch (LSD) piston.

ST 398643600 Gauge

L = Measured value - 15 mm

(L = Measured value - 0.59 in)



A: Measured value

B: Thickness of special tool [15 mm (0.59 in)]

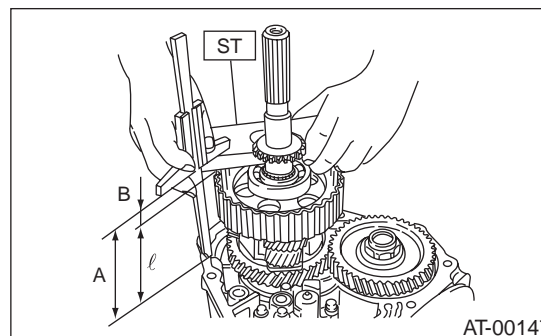
L: Distance between extension case edge and rear driveshaft edge

3) Using the special tool, measure the distance " \varnothing " between the mating surface of transmission case and reduction drive gear edge.

\varnothing = Measured value - 15 mm

(\varnothing = Measured value - 0.59 in)

ST 398643600 Gauge



A: Measured value

B: Thickness of special tool [15 mm (0.59 in)]

\varnothing : Distance between extension case edge and reduction drive gear edge

4) Formula:

NOTE:

Calculation of "H":

When clearances are 0.05 mm (0.0020 in) and 0.25 mm (0.0098 in), select up to four adjusting shims from the table, suitable for clearance value.

$$H = (L + 0.45 \text{ mm}) - \varnothing - T$$

$$[H = (L + 0.0177 \text{ in}) - \varnothing - T]$$

T: Shim clearance

L: Distance between extension case edge and rear driveshaft edge

0.45 mm (0.0177 in): Gasket thickness

\varnothing : Distance between transmission case edge and reduction drive gear edge

T: Shim thickness

0.05 — 0.25 mm (0.0020 — 0.0098 in)

Example:

AT-94

TRANSFER CLUTCH

AUTOMATIC TRANSMISSION

When, $L = 90.50 \text{ mm}$ (3.5630 in), $\varnothing = 90.35 \text{ mm}$ (3.5571 in)

Calculation for 0.05 mm of clearance (0.0020 in)

$$H = (90.50 + 0.45) - 90.35 - 0.05 = 0.55$$

$$[H = (3.5630 + 0.0177) - 3.5571 - 0.0020 = 0.0217]$$

Calculation when clearance is 0.25 mm

(0.0098 in)

$$H = (90.50 + 0.45) - 90.35 - 0.25 = 0.35$$

$$[H = (3.5630 + 0.0177) - 3.5571 - 0.0098 = 0.0138]$$

After calculation, the value of "H" becomes between 0.35 mm (0.0138 in) and 0.55 mm (0.0216 in), therefore select two shims with thickness of 0.2 mm (0.010 in) or one shim with thickness of 0.5 mm (0.020 in).

Adjusting shim	
Part No.	Thickness mm (in)
33281AA001	0.2 (0.008)
33281AA011	0.5 (0.020)

AT-95

MULTI-PLATE CLUTCH

AUTOMATIC TRANSMISSION

28.Multi-plate Clutch

A: REMOVAL

Remove multi-plate clutch following the same instructions as for the extension case. <Ref. to AT-85, REMOVAL, Extension Case.>

B: INSTALLATION

Install multi-plate clutch following the same instructions as for the extension case. <Ref. to AT-85, INSTALLATION, Extension Case.>

C: INSPECTION

- Inspect drive plate facing for wear and damage.
- Make sure snap ring is not worn and return spring has no permanent distortion, damage, or deformation.
- Inspect raised cut ring for damage.
- Measure multi-plate clutch clearance and adjust it to within the specification range. <Ref. to AT-96, ADJUSTMENT, Multi-plate Clutch.>

D: ADJUSTMENT

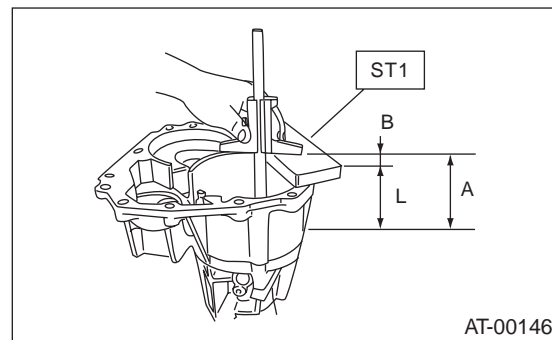
1) Remove drive plate and driven plate from center differential carrier.

2) Using the special tool, measure distance "L" from extension case joining surface to multi-plate clutch (LSD) piston.

ST 398643600 Gauge

L = Measured value – 15 mm

(L = Measured value – 0.59 in)



A: Measured value

B: Special tool thickness [15 mm (0.59 in)]

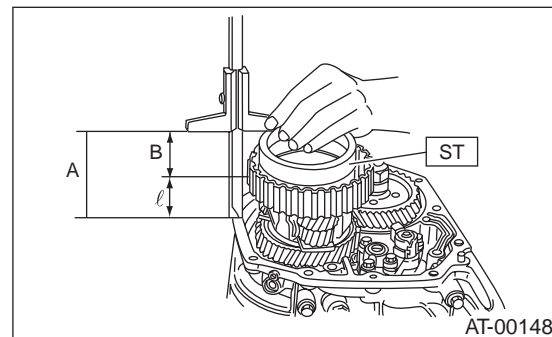
L: Distance from the extension case edge to the rear driveshaft edge.

3) Using ST, measure height "ℓ" from transmission case joining edge to center differential clutch drum edge.

ST 398744300 Gauge

ℓ = Measurement value – 50 mm

(ℓ = Measurement value – 1.97 in)



A: Measurement value

B: Special tool thickness [50 mm (1.97 in)]

ℓ: Measure distance from transmission case joining surface to multi-plate clutch (LSD) piston.

4) Calculation formula

$$T = (L + 0.45 \text{ mm}) - \ell$$

$$[T = (L + 0.0177 \text{ in}) - \ell]$$

T: Measurement value between clutch drum and multi-plate clutch (LSD) piston

L: Distance from extension case joining surface to multi-plate clutch (LSD) piston

0.45: Gasket thickness

ℓ: Distance from transmission case joining surface to center differential clutch drum edge

AT-96

MULTI-PLATE CLUTCH

AUTOMATIC TRANSMISSION

NOTE:

Measure multi-plate clutch (LSD) driven and drive plate thickness to find the clearance between measurement value and "T".

Standard value:

0.2 - 0.6 mm (0.008 - 0.024 in)

Limit value:

1.6 mm (0.063 in)

If outside the standard value, replace the plate set (drive and driven plate). Select a multi-plate clutch (LSD) piston side adjustment plate that will bring clearance within the standard value.

Obtainable driven plates	
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)

AT-97

Vehicle-id:
SIE-id::D:ADJUSTMENT

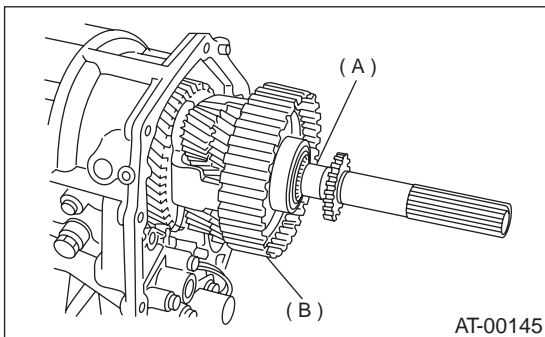
REAR DRIVE SHAFT

AUTOMATIC TRANSMISSION

29.Rear Drive Shaft

A: REMOVAL

- 1) Remove transmission assembly. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear wheel speed sensor and separate extension case from transmission case. <Ref. to AT-85, REMOVAL, Extension Case.>
- 3) Pull out the rear driveshaft from the center differential assembly.



- (A) Rear driveshaft
(B) Center differential carrier

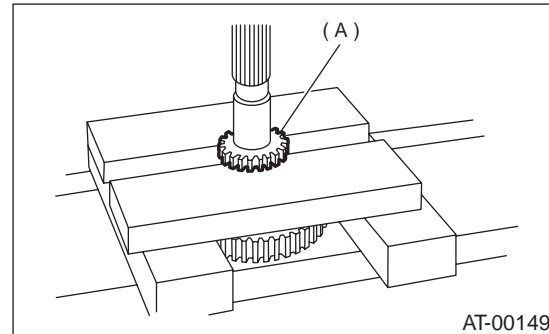
- 4) Remove drive plate and driven plate.

B: INSTALLATION

- 1) Select the appropriate shim. <Ref. to AT-94, VTD MODEL, ADJUSTMENT, Transfer Clutch.>
- 2) Install drive plate and driven plate.
- 3) Insert rear driveshaft into the center differential assembly.
- 4) Join transmission case and extension case. Install rear wheel speed sensor. <Ref. to AT-85, INSTALLATION, Extension Case.>
- 5) Install transmission assembly. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

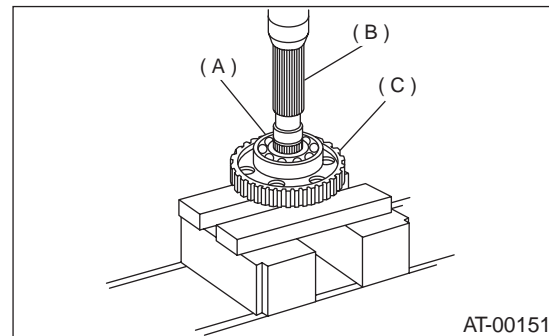
C: DISASSEMBLY

- 1) Using a press, remove 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 driveshaft
(C) Clutch hub

AT-98

REAR DRIVE SHAFT

AUTOMATIC TRANSMISSION

D: ASSEMBLY

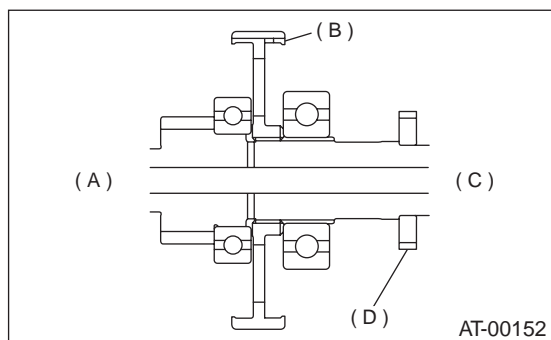
Assemble in the reverse order of disassembly.

NOTE:

- Use a new revolution gear and ball bearings.
- Make sure the clutch hub is oriented in the correct direction.

E: INSPECTION

- Inspect parts to make sure there are no holes, cuts, and that they are not dusty.
- Inspect extension end play and adjust it to within the standard value. <Ref. to AT-94, VTD MODEL, ADJUSTMENT, Transfer Clutch.>



- (A) Front side
- (B) Clutch hub
- (C) Rear side
- (D) Revolution gear

AT-99

REDUCTION DRIVEN GEAR

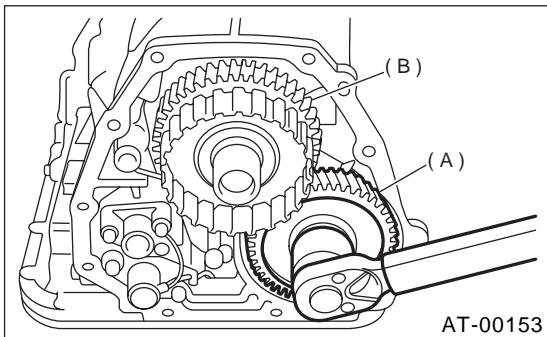
AUTOMATIC TRANSMISSION

30.Reduction Driven Gear

A: REMOVAL

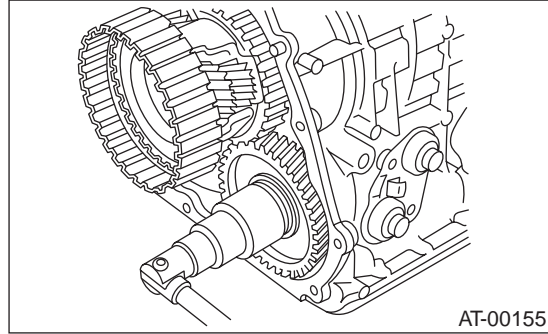
1. MPT MODEL

- 1) Remove the transmission assembly from the vehicle. <<Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to AT-85, REMOVAL, Extension Case.>
- 3) Set the range select lever to "P".
- 4) Straighten the staked portion, and remove the lock nut.



- (A) Reduction driven gear
- (B) Reduction drive gear

- 4) Set the range select lever to "P".
- 5) Straighten the staked portion, and remove the lock nut.



- (A) Reduction driven gear
- (B) Reduction drive gear

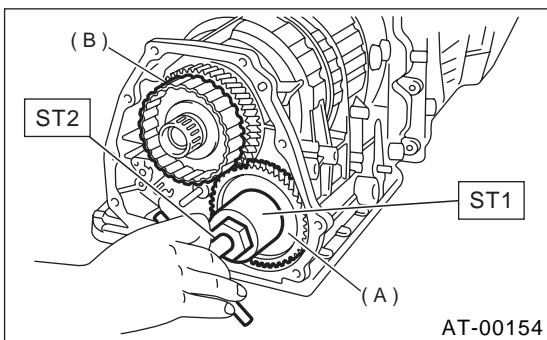
- 6) Using the ST1 and ST2, extract the reduction driven gear.

ST1 499737000 PULLER
ST2 899524100 PULLER SET

- 7) Pull out the center differential assembly. <Ref. to AT-105, REMOVAL, Center Differential Carrier.>

- 5) Using the ST1 and ST2, extract the reduction driven gear.

ST1 499737000 PULLER
ST2 899524100 PULLER SET



- (A) Reduction driven gear
- (B) Reduction drive gear

2. VTD MODEL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to AT-85, REMOVAL, Extension Case.>
- 3) Remove the rear drive shaft. <Ref. to AT-98, REMOVAL, Rear Drive Shaft.>

AT-100

REDUCTION DRIVEN GEAR

AUTOMATIC TRANSMISSION

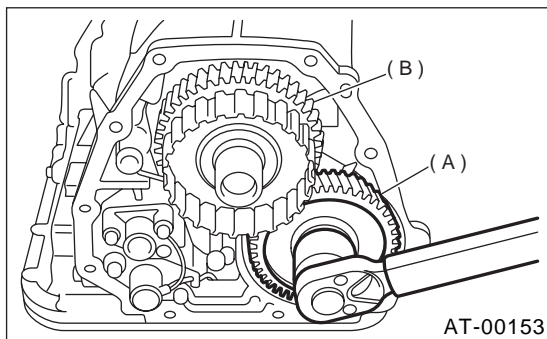
B: INSTALLATION

1. MPT MODEL

- 1) Set the select lever to "P" range.
- 2) Using a plastic hammer, install reduction driven gear assembly and new washer, and tighten new drive pinion lock nut.

Tightening torque:

100 N·m (10.2 kgf·m, 73.8 ft·lb)



- (A) Reduction driven gear
(B) Reduction drive gear

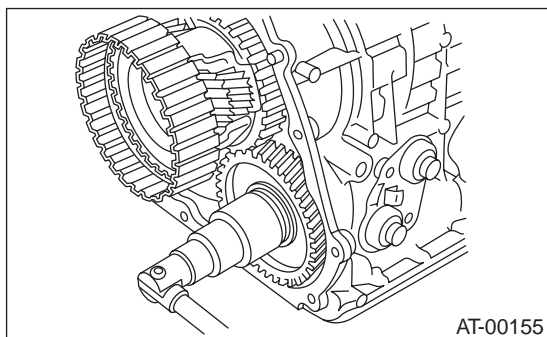
- 3) After tightening, stake the lock nut securely.
- 4) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to AT-85, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly to vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

2. VTD MODEL

- 1) Set the select lever to "P" range.
- 2) Using a plastic hammer, install reduction driven gear assembly.
- 3) Using a plastic hammer, install the center differential assembly.
- 4) Install a new self-lock nut and a washer.

Tightening torque:

100 N·m (10.2 kgf·m, 73.8 ft·lb)



- (A) Reduction driven gear
(B) Reduction drive gear

- 5) After tightening, stake the lock nut securely.
- 6) Insert the rear drive shaft assembly. <Ref. to AT-98, INSTALLATION, Rear Drive Shaft.>
- 7) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to AT-85, INSTALLATION, Extension Case.>
- 8) Install the transmission assembly to vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

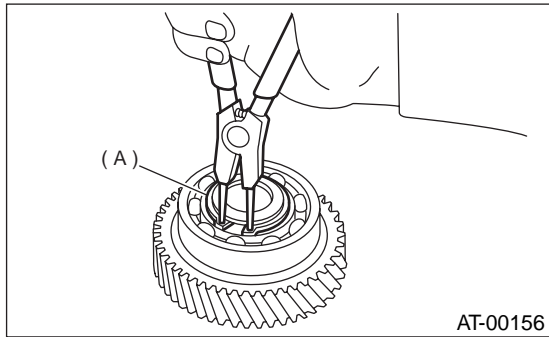
AT-101

REDUCTION DRIVEN GEAR

AUTOMATIC TRANSMISSION

C: DISASSEMBLY

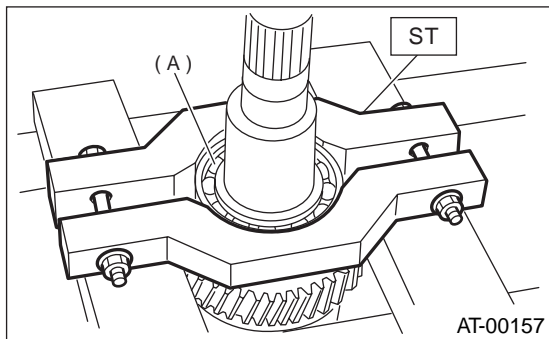
1) Remove snap ring from reduction driven gear.



(A) Snap ring

2) Using ST, remove ball bearing from reduction driven gear.

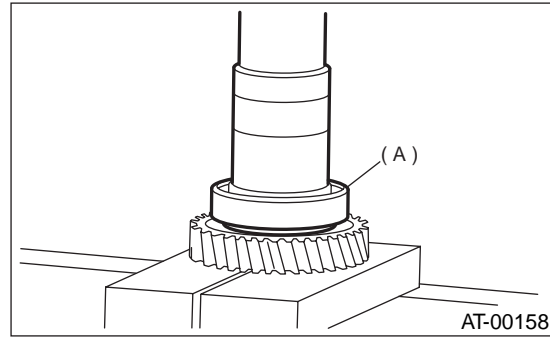
ST 498077600 REMOVER



(A) Ball bearing

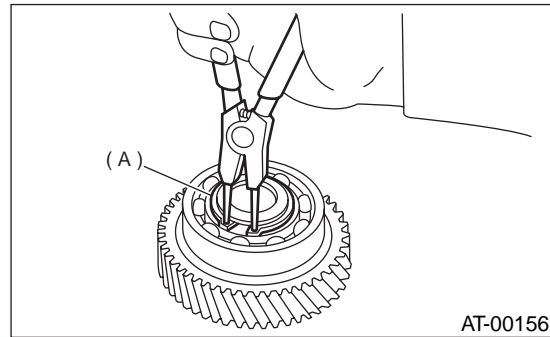
D: ASSEMBLY

1) Using a press, install a new ball bearing to reduction driven gear.



(A) Ball bearing

2) Install snap ring to reduction driven gear.



(A) Snap ring

E: INSPECTION

Check ball bearing and gear for dents or damage.

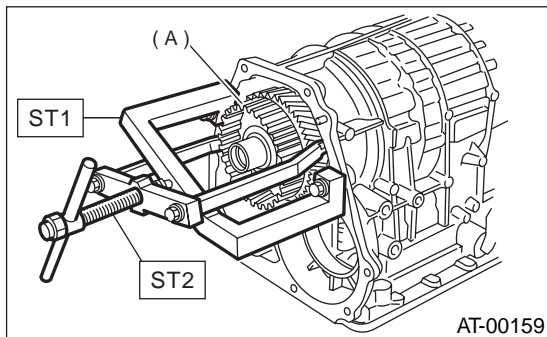
REDUCTION DRIVE GEAR

AUTOMATIC TRANSMISSION

31.Reduction Drive Gear**A: REMOVAL**

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to AT-85, REMOVAL, Extension Case.>
- 3) Remove the reduction driven gear. <Ref. to AT-100, REMOVAL, Reduction Driven Gear.>
- 4) Using ST, extract the reduction drive gear.

ST1 499737100 PULLER
ST2 899524100 PULLER SET



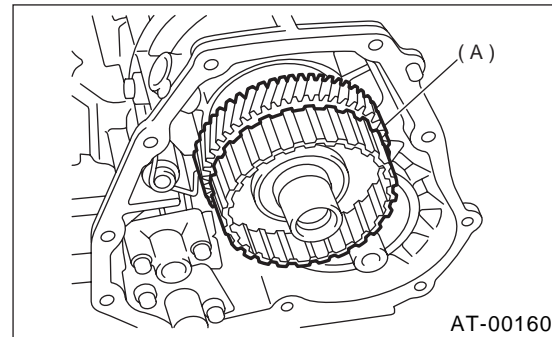
(A) Reduction drive gear

B: INSTALLATION

- 1) Install the reduction drive gear assembly.

NOTE:

Insert it fully into position until the bearing shoulder bottoms.



(A) Reduction drive gear

- 2) Install the reduction driven gear. <Ref. to AT-101, INSTALLATION, Reduction Driven Gear.>
- 3) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to AT-85, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

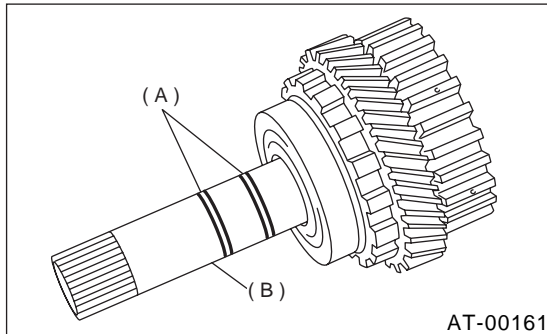
AT-103

REDUCTION DRIVE GEAR

AUTOMATIC TRANSMISSION

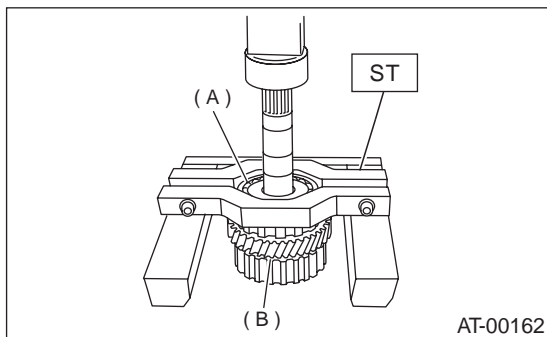
C: DISASSEMBLY

1) Take out the seal rings.



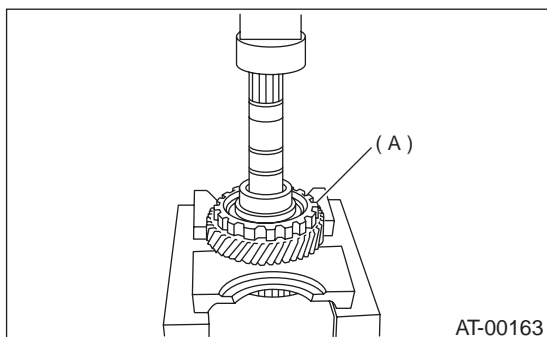
- (A) Seal rings
(B) Reduction drive shaft

2) Using ST, remove the ball bearing.
ST 498077600 REMOVER



- (A) Ball bearing
(B) Reduction drive gear

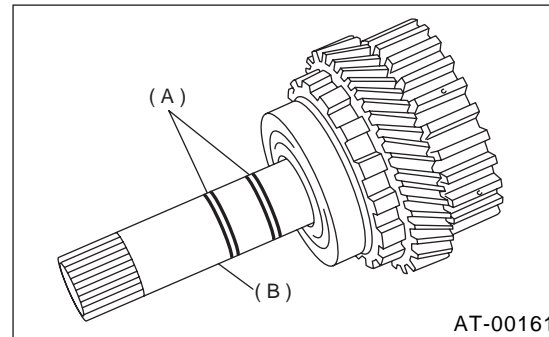
3) Using a press, remove the reduction drive gear.



- (A) Reduction drive gear

D: ASSEMBLY

- 1) Press-fit the reduction drive gear to the shaft.
- 2) Press-fit the a new ball bearing to the reduction drive gear.
- 3) Apply vaseline to outer surface of seal ring and shaft groove.
- 4) Attach new seal rings.



- (A) Seal rings
(B) Reduction drive shaft

E: INSPECTION

- Rotate bearing by hand, make sure it rotates smoothly.
- Make sure that each component is free of harmful gouges, cuts, or dust.
- Measure the extension end play and adjust it to within specifications.<Ref. to AT-93, ADJUSTMENT, Transfer Clutch.>

CENTER DIFFERENTIAL CARRIER

AUTOMATIC TRANSMISSION

32.Center Differential Carrier**A: REMOVAL**

1) Remove the transmission assembly from vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>

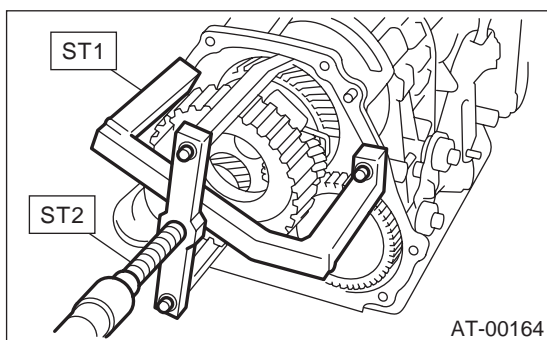
2) Remove the rear wheel speed sensor, and separate the extension case from the transmission case. <Ref. to AT-85, REMOVAL, Extension Case.>

3) Pull out the rear driveshaft. <Ref. to AT-98, REMOVAL, Rear Drive Shaft.>

4) Using the special tools, pull out the center differential carrier assembly.

ST1 499737100 Puller

ST2 899524100 Puller set



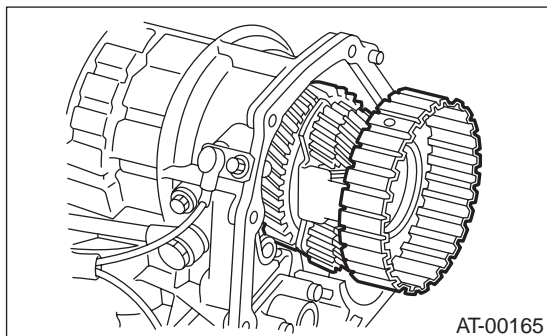
5) Pull out the shim(s) from transmission case.

B: INSTALLATION

1) Install the center differential assembly with the shim(s).

NOTE:

Insert the center differential assembly and shim(s) completely into the bearing shoulder bottom.



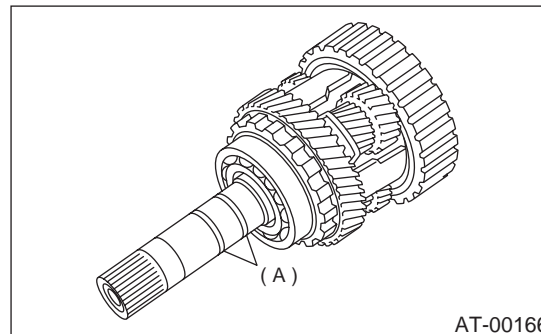
2) Insert the rear driveshaft. <Ref. to AT-98, INSTALLATION, Rear Drive Shaft.>

3) Connect the transmission case and extension case, and install the rear wheel speed sensor. <Ref. to AT-85, INSTALLATION, Extension Case.>

4) Install the transmission assembly onto vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

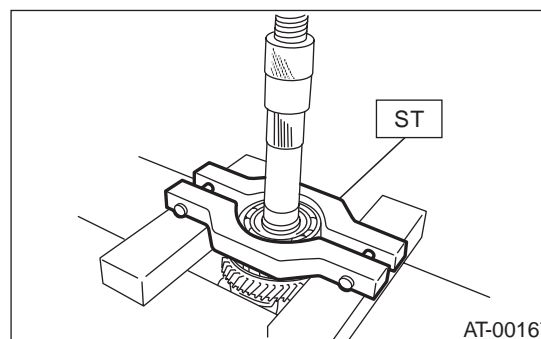
1) Remove the seal rings.



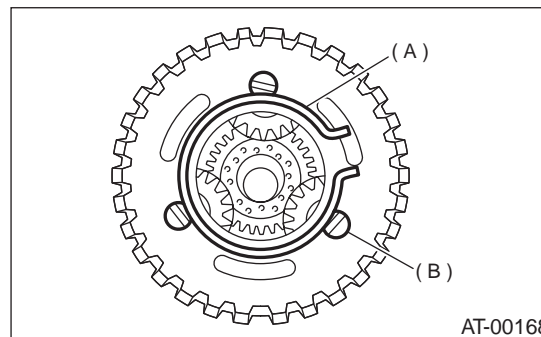
(A) Seal ring

2) Using a press and the special tool, remove the ball bearing.

ST 498077600 Remover



3) Remove the snap ring, and pull out the shaft from the center differential assembly.



(A) Snap ring

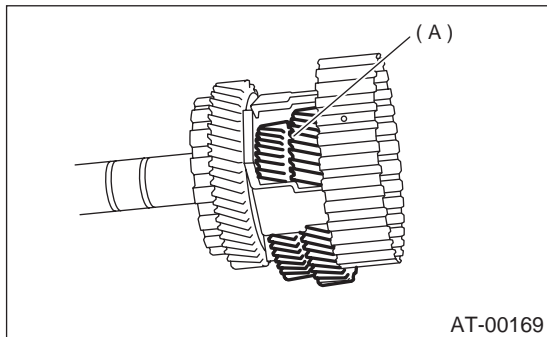
(B) Shaft

AT-105

CENTER DIFFERENTIAL CARRIER

AUTOMATIC TRANSMISSION

4) Remove the thrust washers, pinion gears, and washers from the center differential assembly.



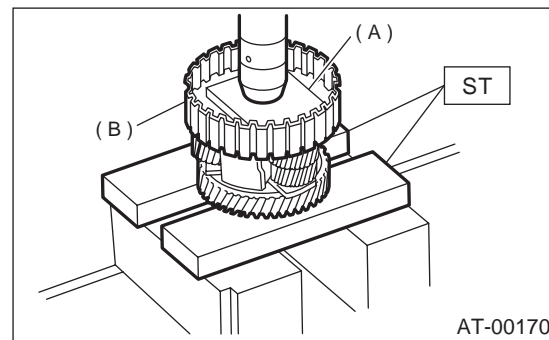
(A) Pinion gear

5) Pull out the intermediate shaft and thrust bearing.

D: ASSEMBLY

- 1) Install the thrust washer onto the intermediate shaft.
- 2) Install thrust bearing onto the 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 new seal rings.

E: INSPECTION

- Check all parts for hole, score, or dirt.
- Check the play of the extension end, and if necessary, adjust it. <Ref. to AT-94, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

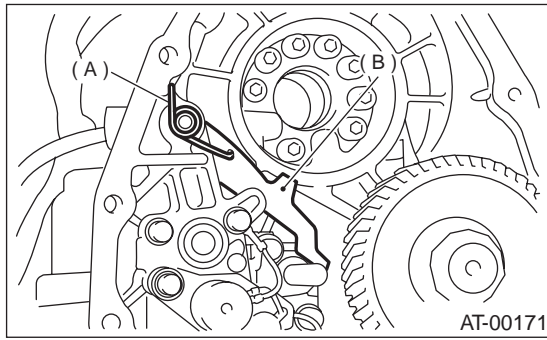
PARKING PAWL

AUTOMATIC TRANSMISSION

33.Parking Pawl

A: REMOVAL

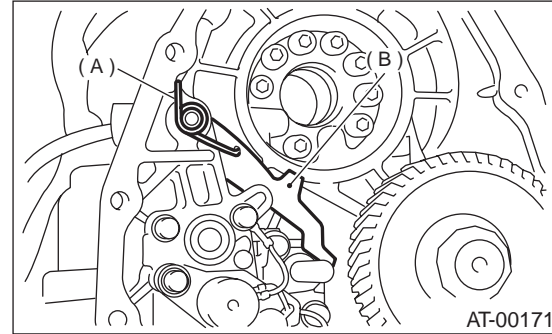
- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor and separate transmission case and extension case sections. <Ref. to AT-85, REMOVAL, Extension Case.>
- 3) Remove the reduction drive gear. (MPT model) <Ref. to AT-103, REMOVAL, Reduction Drive Gear.>
- 4) Remove the center differential carrier. (VTD model) <Ref. to AT-105, REMOVAL, Center Differential Carrier.>
- 5) Remove the parking pawl, return spring and shaft.



- (A) Return spring
(B) Parking pawl

B: INSTALLATION

- 1) Install the parking pawl, shaft and return spring.



- (A) Return spring
(B) Parking pawl

- 2) Install the reduction drive gear. <Ref. to AT-103, INSTALLATION, Reduction Drive Gear.>
- 3) Install the center differential carrier. (VTD model) <Ref. to AT-105, INSTALLATION, Center Differential Carrier.>
- 4) Install the rear vehicle speed sensor and extension case. <Ref. to AT-85, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Make sure that the tab of the parking pole on the reduction gear is not worn or otherwise damaged.

AT-107

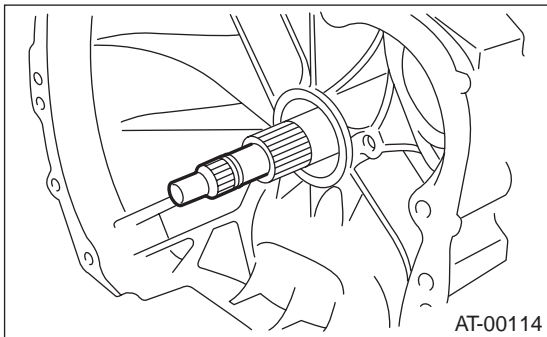
TORQUE CONVERTER CLUTCH CASE

AUTOMATIC TRANSMISSION

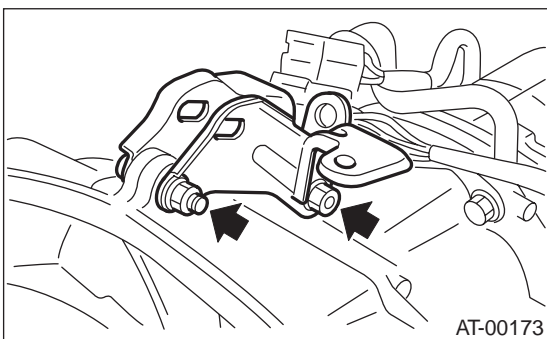
34. Torque Converter Clutch Case

A: REMOVAL

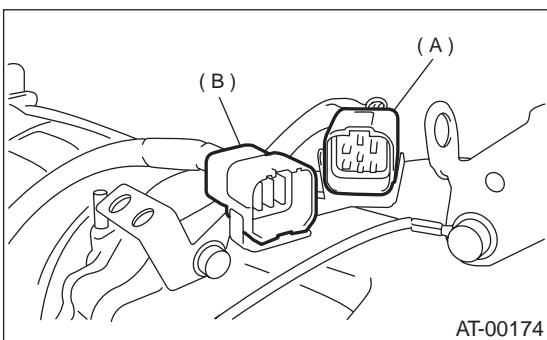
- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-84, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Remove air breather hose. <Ref. to AT-82, REMOVAL, Air Breather Hose.>
- 5) Remove pitching stopper bracket.



- 6) Lift-up lever behind the connector and disconnect it from stay.
- 7) Disconnect inhibitor switch connector from stay.



- (A) Transmission harness
(B) Inhibitor switch harness

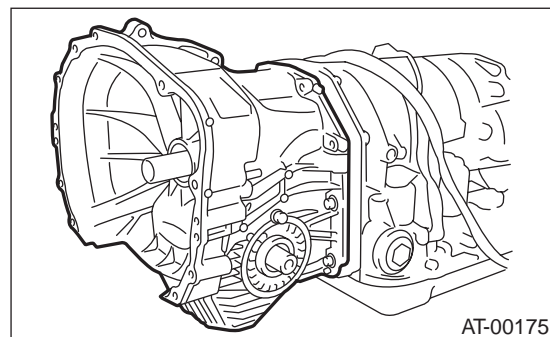
- 8) Remove the oil charger pipe. <Ref. to AT-83, REMOVAL, Oil Charger Pipe.>

- 9) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-77, REMOVAL, ATF Cooler Pipe and Hose.>

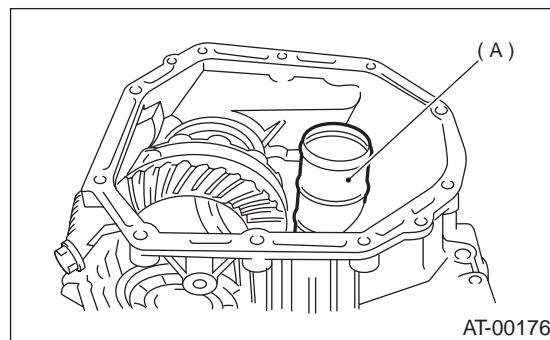
- 10) Lightly tapping the torque converter clutch case with plastic hammer, separate the transmission case and torque converter clutch case.

NOTE:

- Be careful not to damage the oil seal and bushing inside the torque converter clutch case by the oil pump cover.
- Be careful not to lose the rubber seal.



- 11) Remove the seal pipe if it is attached. (Reusing is not allowed.)



- (A) Seal pipe

- 12) Remove the differential assembly. <Ref. to AT-123, REMOVAL, Front Differential.>
- 13) Remove the oil seal from torque converter clutch case.

AT-108

TORQUE CONVERTER CLUTCH CASE

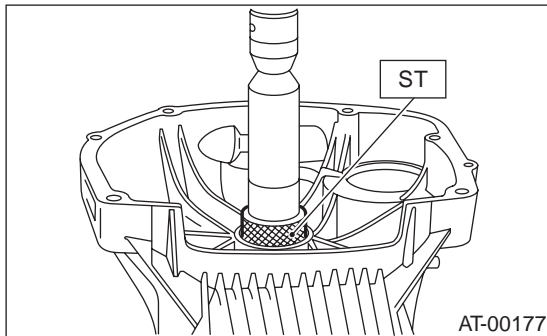
AUTOMATIC TRANSMISSION

B: INSTALLATION

1) Check the appearance of each component and clean.

2) Force-fit the oil seal to the torque converter clutch case with ST.

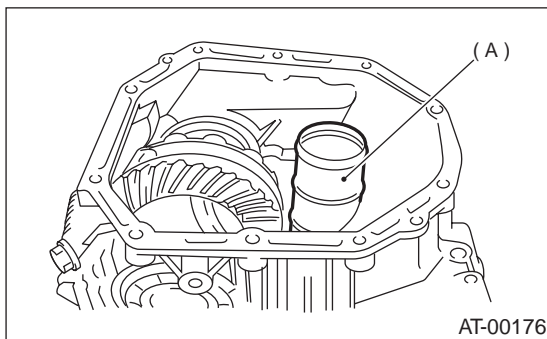
ST 398437700 DRIFT



3) Install the differential assembly to the case. <Ref. to AT-123, INSTALLATION, Front Differential.>

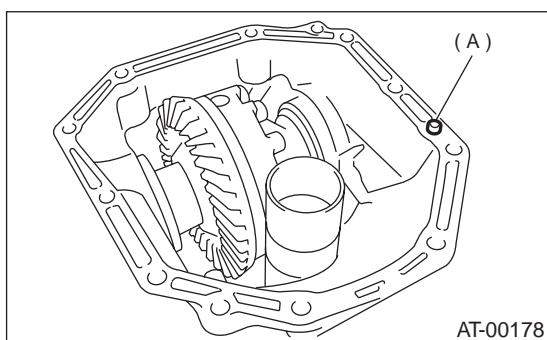
4) Install the left and right side retainers. <Ref. to AT-127, ADJUSTMENT, Front Differential.>

5) Install the new seal pipe to the torque converter clutch case.



(A) Seal pipe

6) Install the rubber seal to the torque converter clutch case.

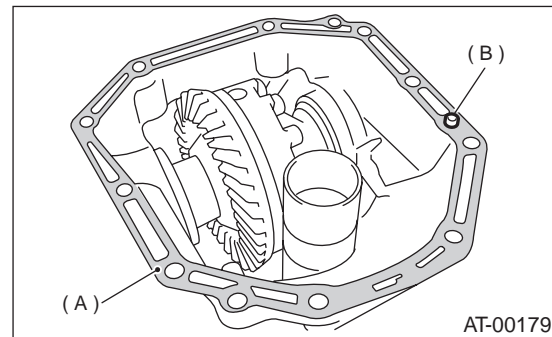


(A) Rubber seal

7) Apply proper amount of liquid gasket to the entire torque converter clutch case mating surface.

Liquid gasket:

THREE BOND 1215 (Part No. 004403007)

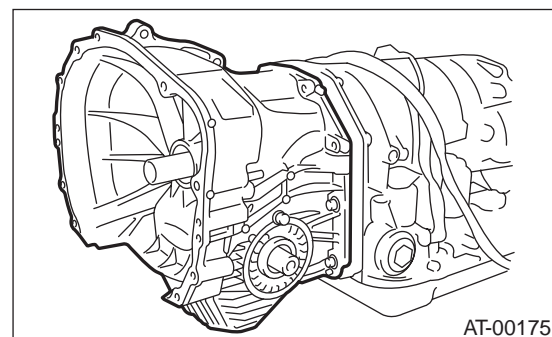


(A) THREE BOND 1215
(B) Rubber seal

8) Install the torque converter clutch case assembly without damaging bush and oil seal and secure with six bolts and four nuts.

Tightening torque:

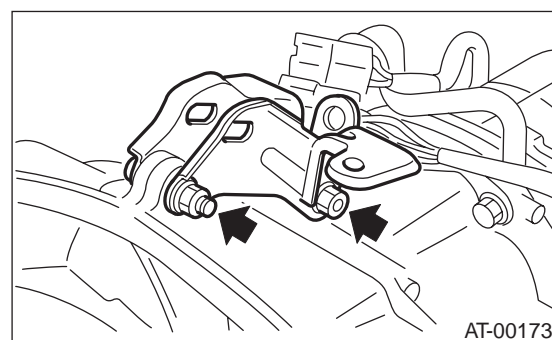
41 N·m (4.2 kgf·m, 30.4 ft·lb)



9) Install the pitching stopper bracket and transmission ground cable.

Tightening torque:

41 N·m (4.2 kgf·m, 30.4 ft·lb)



10) Insert inhibitor switch and transmission connector into stay.

11) Install air breather hose. <Ref. to AT-82, INSTALLATION, Air Breather Hose.>

12) Install the oil cooler pipes. <Ref. to AT-79, INSTALLATION, ATF Cooler Pipe and Hose.>

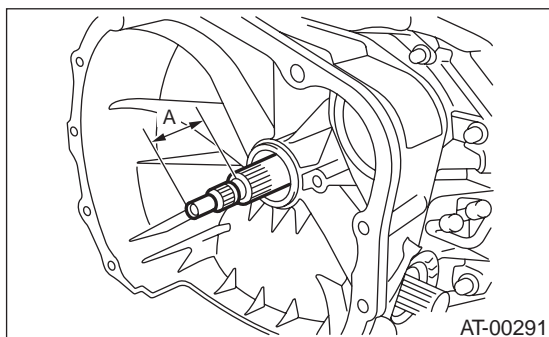
AT-109

TORQUE CONVERTER CLUTCH CASE

AUTOMATIC TRANSMISSION

- 13) Install the oil charger pipe with O-ring. <Ref. to AT-83, INSTALLATION, Oil Charger Pipe.>
- 14) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



- 15) Install the torque converter clutch assembly. <Ref. to AT-84, INSTALLATION, Torque Converter Clutch Assembly.>
- 16) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Measure the backlash and adjust to within specifications. <Ref. to AT-120, ADJUSTMENT, Drive Pinion Shaft.>

AT-110

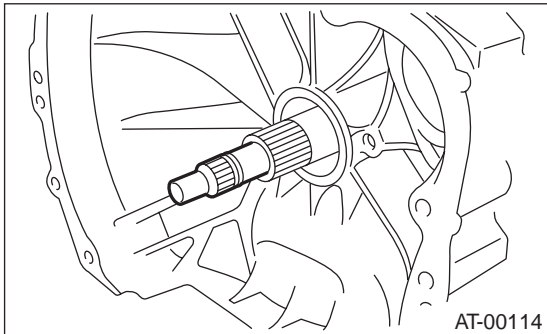
OIL PUMP

AUTOMATIC TRANSMISSION

35.Oil Pump

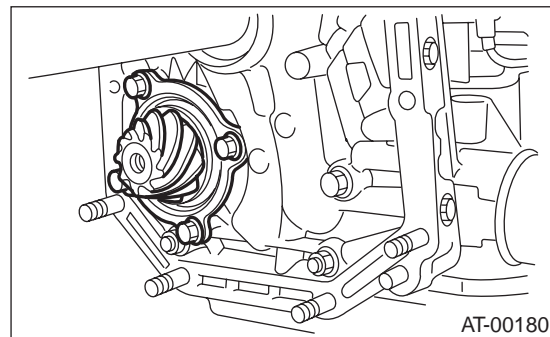
A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-84, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose. <Ref. to AT-82, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charger pipe. <Ref. to AT-83, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case sections <Ref. to AT-108, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-85, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. (MPT model) <Ref. to AT-103, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to AT-105, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to AT-100, REMOVAL, REMOVAL, Reduction Driven Gear.>

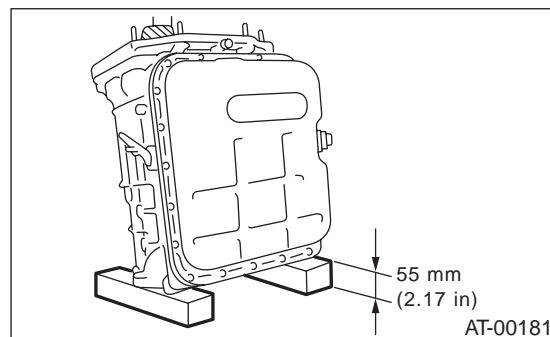
- 14) Loosen the taper roller bearing mounting bolts.



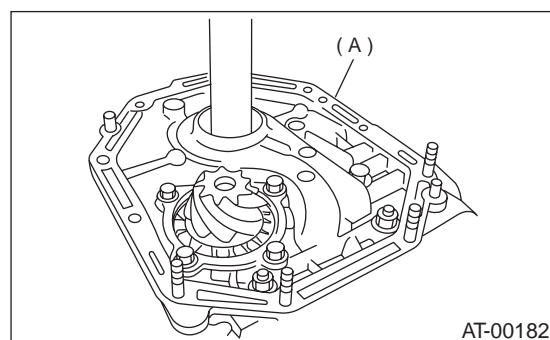
- 15) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

NOTE:

- Be careful not to scratch the rear mating surface of the transmission case.
- Note that the parking rod and drive pinion protrude from the mating surface.



- 16) Remove the oil pump housing and adjusting thrust washer.



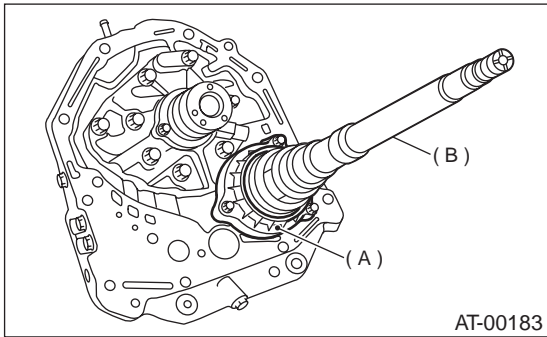
(A) Oil pump housing

AT-111

OIL PUMP

AUTOMATIC TRANSMISSION

- 17) Remove the oil seal retainer.
Also remove the O-ring and oil seal (air breather).



- (A) Oil seal retainer
(B) Drive pinion shaft

- 18) Remove O-rings from oil pump housing.
19) Remove the drive pinion assembly.

B: INSTALLATION

- 1) Assemble the drive pinion assembly to the oil pump housing.

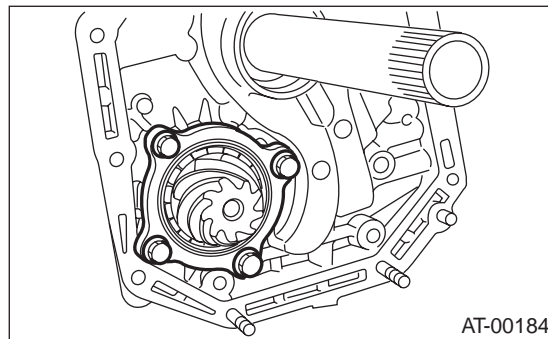
NOTE:

- Be careful not to bend the shims.
- Be careful not to force the pinion against the housing bore.

- 2) Tighten four bolts to secure the roller bearing.

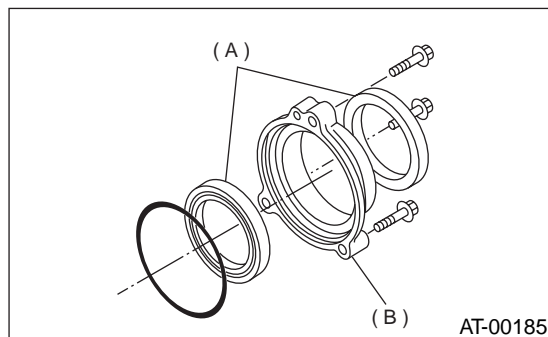
Tightening torque:

40 N·m (4.1 kgf-m, 30 ft-lb)



- 3) With pay attention to the orientation of the oil seals, install two new oil seals to the oil seal retainer using ST.

ST 499247300 INSTALLER



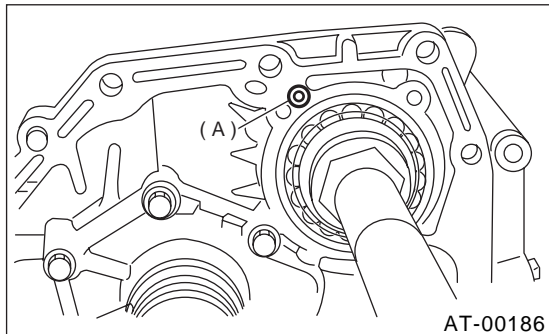
- (A) Oil seal
(B) Oil seal retainer

AT-112

OIL PUMP

AUTOMATIC TRANSMISSION

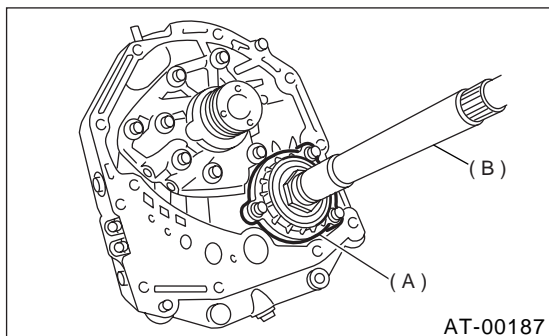
4) Attach the new O-ring to the oil seal retainer with vaseline. Install the seal to the oil pump housing bore.



(A) O-ring

5) Install the oil seal retainer taking care not to damage the oil seal lips. Then secure with three bolts.

Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)

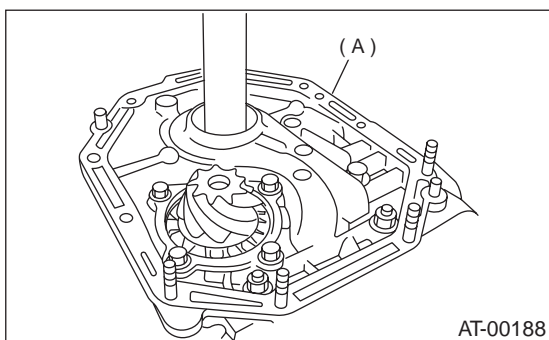


(A) Oil seal retainer
(B) Drive pinion shaft

6) Make sure the O-ring is fitted correctly in position.

7) Secure the housing with two nuts and the bolt.

Tightening torque:
42 N·m (4.3 kgf-m, 31 ft-lb)



(A) Oil pump housing

8) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-84, INSTALLATION, Torque Converter Clutch Assembly.>

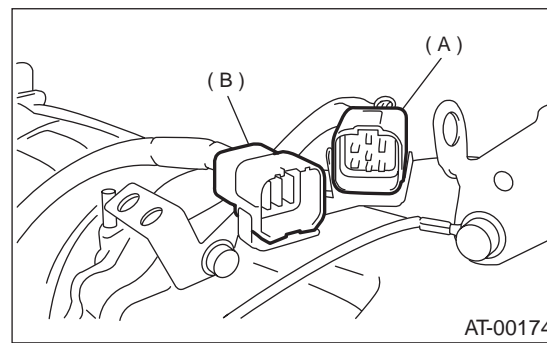
9) Install reduction driven gear. <Ref. to AT-101, INSTALLATION, Reduction Driven Gear.>

10) Install the reduction drive gear. (MPT model) <Ref. to AT-103, INSTALLATION, Reduction Drive Gear.>

11) Install the center differential carrier. (VTD model) <Ref. to AT-105, INSTALLATION, Center Differential Carrier.>

12) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to AT-85, INSTALLATION, Extension Case.>

13) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness
(B) Inhibitor switch harness

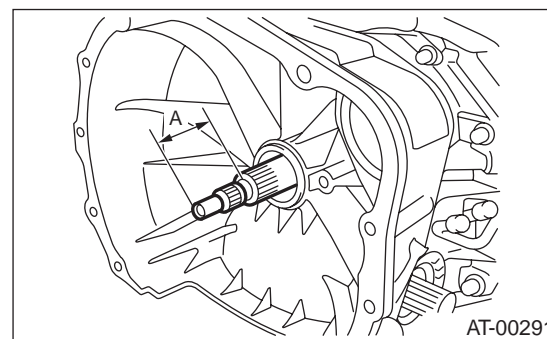
14) Install air breather hose. <Ref. to AT-82, INSTALLATION, Air Breather Hose.>

15) Install the oil cooler pipe. <Ref. to AT-79, INSTALLATION, ATF Cooler Pipe and Hose.>

16) Install the oil charger pipe with O-ring. <Ref. to AT-83, INSTALLATION, Oil Charger Pipe.>

17) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



18) Install the torque converter clutch assembly. <Ref. to AT-84, INSTALLATION, Torque Converter Clutch Assembly.>

AT-113

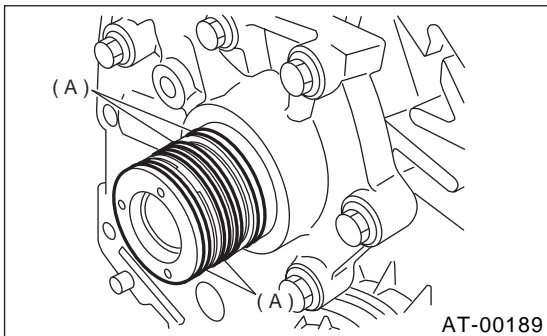
OIL PUMP

AUTOMATIC TRANSMISSION

19) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

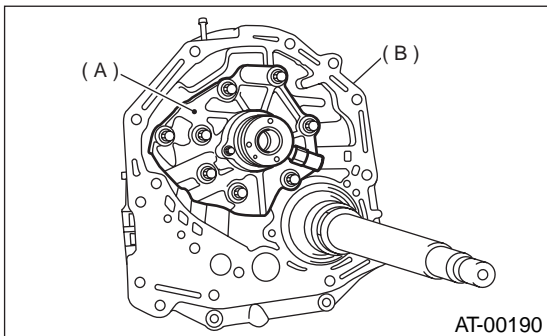
C: DISASSEMBLY

1) Remove four seal rings.



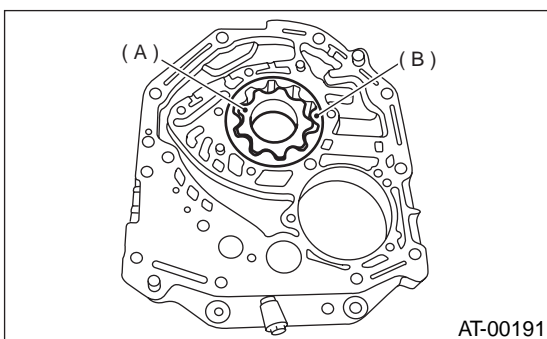
(A) Seal rings

2) Lightly tap the end of the stator shaft to remove the cover.



(A) Oil pump cover
(B) Oil pump housing

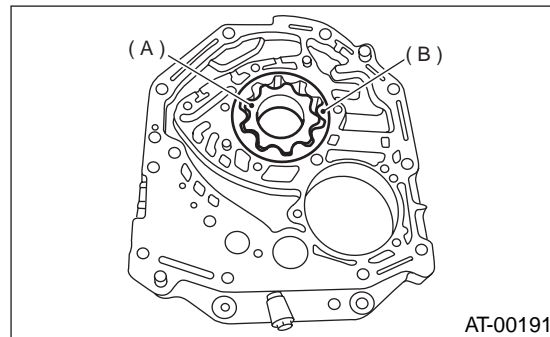
3) Remove the inner and outer rotor.



(A) Inner rotor
(B) Outer rotor

D: ASSEMBLY

1) Install oil pump rotor assembly to oil pump housing.

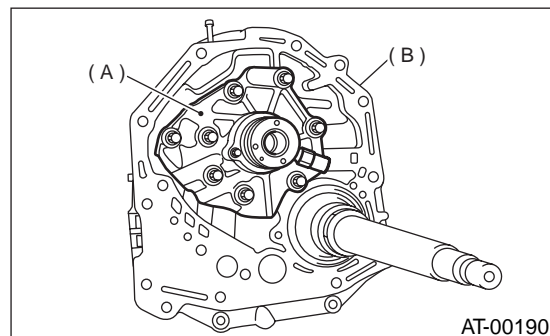


(A) Inner rotor
(B) Outer rotor

2) Align both pivots with the pivot holes of the cover, and install the oil pump cover being careful not to apply undue force to the pivots.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



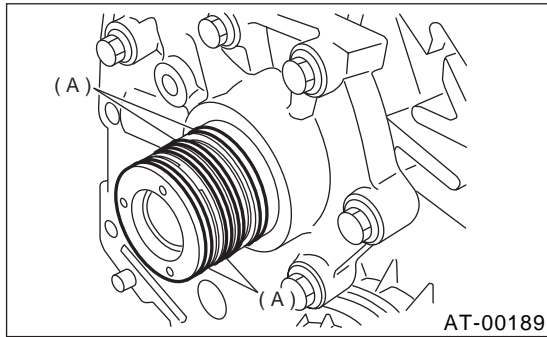
(A) Oil pump cover
(B) Oil pump housing

3) After assembling, turn the oil pump shaft to check for smooth rotation of the rotor.

OIL PUMP

AUTOMATIC TRANSMISSION

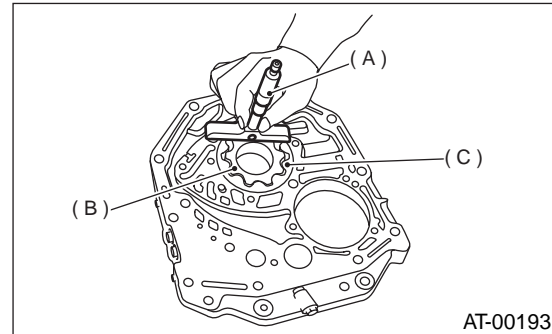
4) Install the oil seal retainer and new seal rings. After adjusting the drive pinion backlash and tooth contact. <Ref. to AT-116, ADJUSTMENT, Oil Pump.>



(A) Seal rings

Side clearance:

0.02 — 0.04 mm (0.0008 — 0.0016 in)



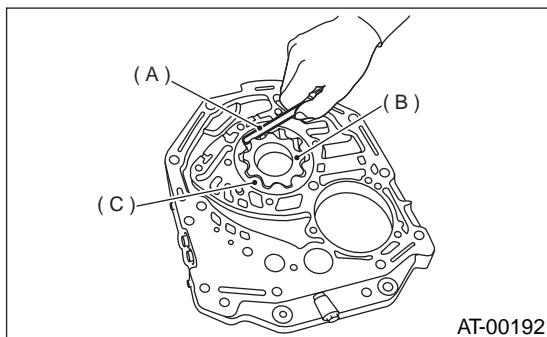
(A) Depth gauge
(B) Inner rotor
(C) Outer rotor

E: INSPECTION

- 1) Check seal ring and O-ring oil seal for breaks or damage.
- 2) Check other parts for dents or abnormalities.
- 3) Selection of oil pump rotor assembly
 - (1) Tip clearance
Install inner rotor and outer rotor to oil pump. With rotor gears facing each other, measure 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 oil pump housing-to-rotor clearances.

- (3) If depth and/or side clearances are outside specifications, replace rotor assembly.

Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

- Measure the total end play and adjust to within specifications. <Ref. to AT-116, ADJUSTMENT, Oil Pump.>

AT-115

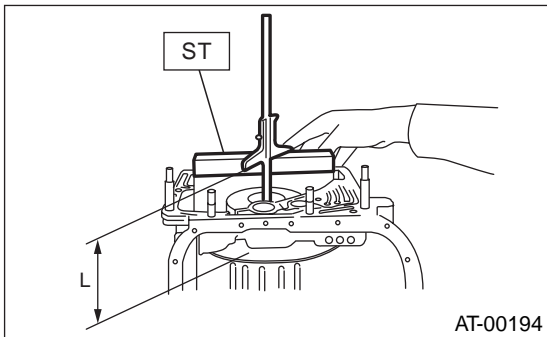
OIL PUMP

AUTOMATIC TRANSMISSION

F: ADJUSTMENT

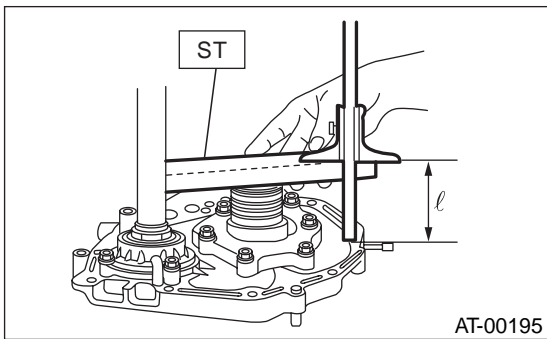
1) Using ST, measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum "L".

ST 398643600 GAUGE



2) Using ST, measure the distance from the oil pump housing mating surface to the top surface of the oil pump cover with thrust needle bearing.

ST 398643600 GAUGE

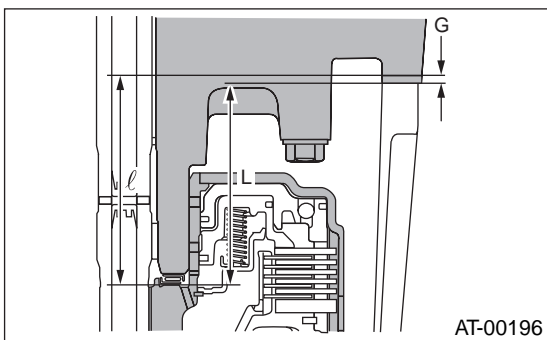


3) Calculation of total end play

Select suitable bearing race from among those listed in this table so that clearance C is in the 0.25 to 0.55 mm (0.0098 to 0.0217 in) range.

$$C = (L + G) - \varnothing$$

C	Clearance between concave portion of high clutch and end of clutch drum support
L	Length from case mating surface to concave portion of high clutch
G	Gasket thickness [0.28 mm (0.0110 in)]
\varnothing	Height from housing mating surface to upper surface of clutch drum support



Thrust needle bearing	
Part No.	Thickness mm (in)
806528050	4.1 (0.161)
806528060	4.3 (0.169)
806528070	4.5 (0.177)
806528080	4.7 (0.185)
806528090	4.9 (0.193)
806528100	5.1 (0.201)

4) After completing end play adjustment, insert the bearing race in the recess of the high clutch. Attach the thrust needle bearing to the oil pump cover with vaseline.

5) After correctly installing the new gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of the case.

6) Install both parts with dowel pins aligned. Make sure no clearance exists at the mating surface.

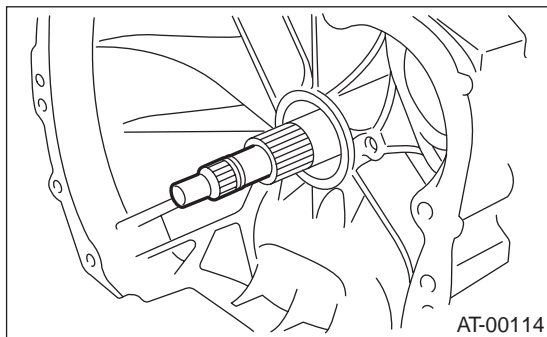
AT-116

DRIVE PINION SHAFT

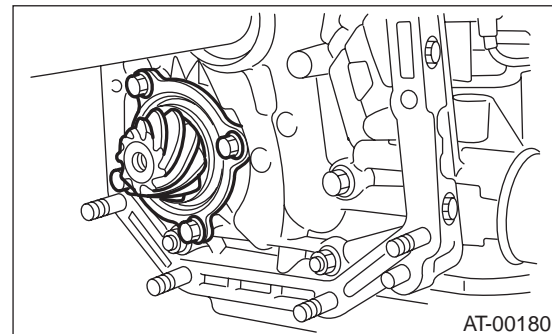
AUTOMATIC TRANSMISSION

36. Drive Pinion Shaft**A: REMOVAL**

- 1) Remove the transmission assembly from vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-84, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 14) Separation of drive pinion shaft and oil pump housing. <Ref. to AT-111, REMOVAL, Oil Pump.>



- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose. <Ref. to AT-82, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charger pipe. <Ref. to AT-83, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case sections <Ref. to AT-108, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-85, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. (MPT model) <Ref. to AT-103, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to AT-105, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to AT-100, REMOVAL, Reduction Driven Gear.>

AT-117

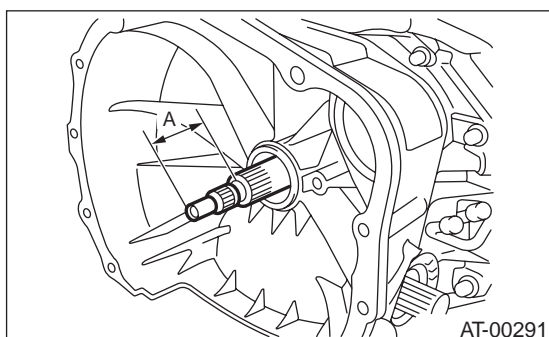
DRIVE PINION SHAFT

AUTOMATIC TRANSMISSION

B: INSTALLATION

- 1) Assemble the drive pinion assembly to the oil pump housing. <Ref. to AT-112, INSTALLATION, Oil Pump.>
- 2) Install oil pump housing to transmission case. <Ref. to AT-112, INSTALLATION, Oil Pump.>
- 3) Combine the torque converter case with the transmission case. <Ref. to AT-109, INSTALLATION, Torque Converter Clutch Case.>
- 4) Install the reduction driven gear. <Ref. to AT-101, INSTALLATION, Reduction Driven Gear.>
- 5) Install the reduction drive gear. (MPT model) <Ref. to AT-103, INSTALLATION, Reduction Drive Gear.>
- 6) Install the center differential carrier. (VTD model) <Ref. to AT-105, INSTALLATION, Center Differential Carrier.>
- 7) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to AT-85, INSTALLATION, Extension Case.>
- 8) Insert inhibitor switch and transmission connector into stay.
- 9) Install air breather hose. <Ref. to AT-82, INSTALLATION, Air Breather Hose.>
- 10) Install the oil cooler inlet and outlet pipes. <Ref. to AT-79, INSTALLATION, ATF Cooler Pipe and Hose.>
- 11) Install the oil charger pipe with O-ring.
- 12) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)

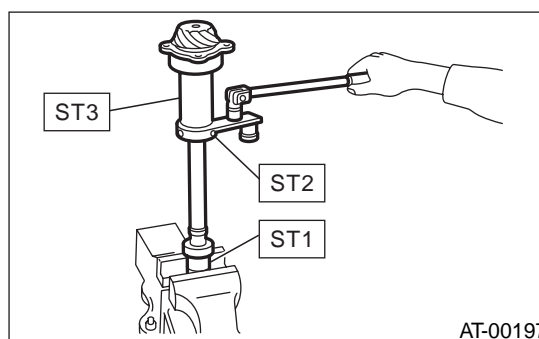


- 13) Install the torque converter clutch assembly. <Ref. to AT-84, INSTALLATION, Torque Converter Clutch Assembly.>
- 14) Install the transmission assembly to vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

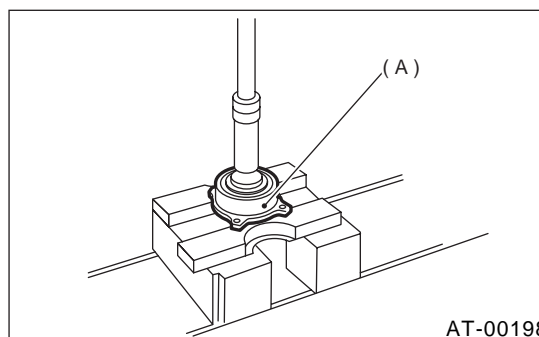
C: DISASSEMBLY

- 1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1 and ST2. Then pull off the drive pinion collar.

ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER



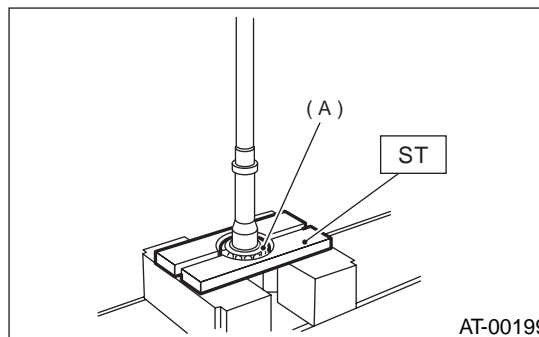
- 2) Remove the O-ring.
- 3) Using a press, separate the rear roller bearing and outer race from the shaft.



(A) Outer race

- 4) Using a press and ST, separate the front roller bearing from the shaft.

ST 498517000 REPLACER



(A) Front roller bearing

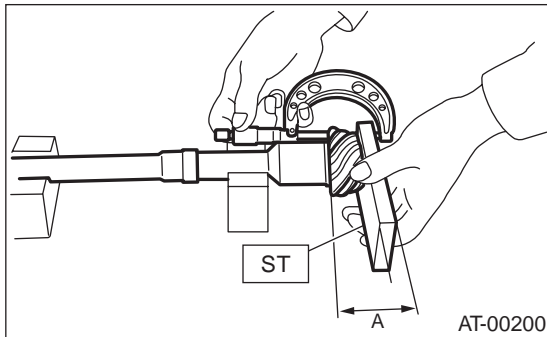
AT-118

DRIVE PINION SHAFT

AUTOMATIC TRANSMISSION

D: ASSEMBLY

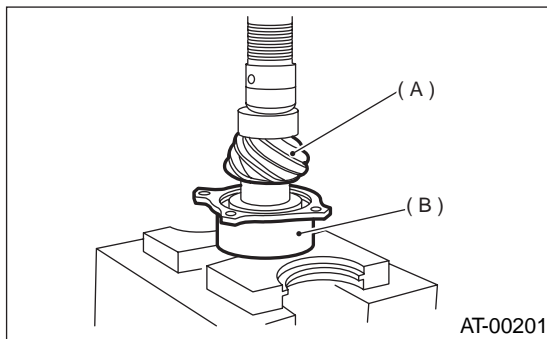
- 1) Measure dimension "A" of the drive pinion shaft.
ST 398643600 GAUGE



- 2) Using a press, force-fit a new roller bearing in position.

NOTE:

If too much pressure is applied, 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) Install the lock washer to drive pinion shaft in proper direction.

- 5) Tighten a new lock nut with ST1, ST2 and ST3. Calculate lock washer and lock nut specifications using the following formula.

$$T2 = L2 / (L1 + L2) \times T1$$

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

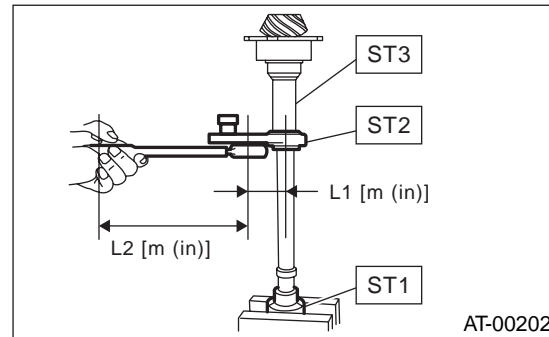
Example:

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 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

NOTE:

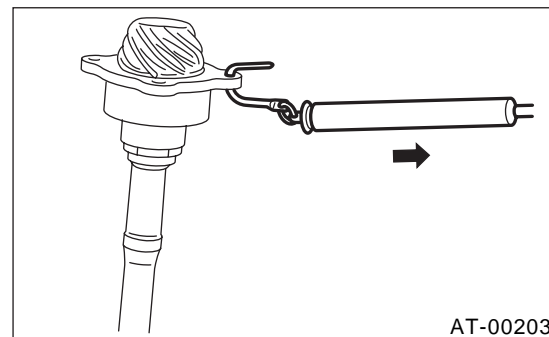
Install ST2 to torque wrench as straight as possible.



- 6) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If out of the allowable range, replace the roller bearing.

Starting torque:

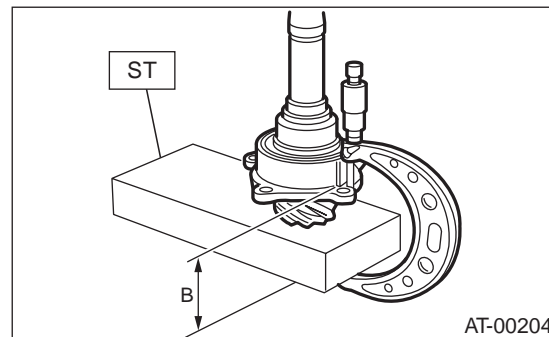
7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 8.6 lb)



- 7) Stake the lock nut securely at two places.

- 8) Measure dimension "B" of the drive pinion shaft.

ST 398643600 GAUGE



- 9) The thickness "t" (mm) of the drive pinion shim.

$$t = 6.5 \pm 0.0625 - (B - A)$$

- 10) Select three or less shims from following table.

AT-119

DRIVE PINION SHAFT

AUTOMATIC TRANSMISSION

Available drive pinion shims	
Part No.	Thickness mm (in)
31451AA050	0.150 (0.0059)
31451AA060	0.175 (0.0069)
31451AA070	0.200 (0.0079)
31451AA080	0.225 (0.0089)
31451AA090	0.250 (0.0098)
31451AA100	0.275 (0.0108)

E: INSPECTION

- Make sure that all component parts are free of harmful cuts, gouges, and other faults.
- Adjust the teeth alignment. <Ref. to AT-120, ADJUSTMENT, Drive Pinion Shaft.>

F: ADJUSTMENT

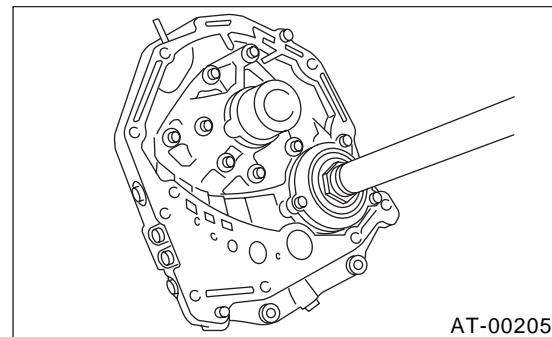
- 1) Thoroughly remove the liquid gasket from the case mating surface beforehand.
- 2) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening four bolts.

NOTE:

Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.

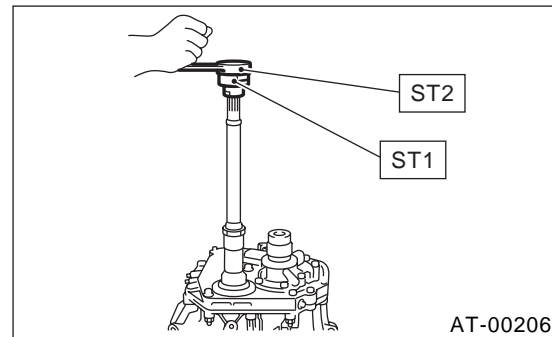
Tightening torque:

41 N·m (4.2 kgf·m, 30.4 ft·lb)



- 3) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937110 HOLDER
ST2 499787700 WRENCH



- 4) Adjust the backlash between drive pinion and crown gear. <Ref. to AT-127, ADJUSTMENT, Front Differential.>

- 5) Apply red lead evenly to the surfaces of three or four teeth of the crown gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern.

If tooth contact is improper, readjust the backlash or shim thickness. <Ref. to AT-127, ADJUSTMENT, Front Differential.>

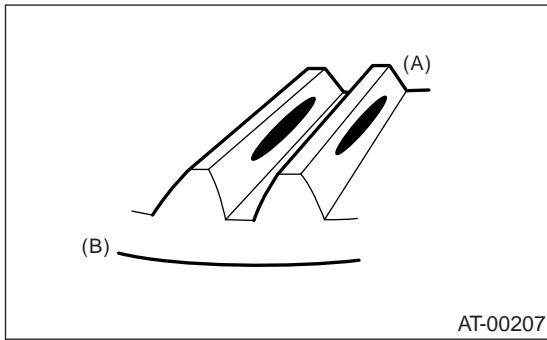
AT-120

DRIVE PINION SHAFT

AUTOMATIC TRANSMISSION

- Tooth contact

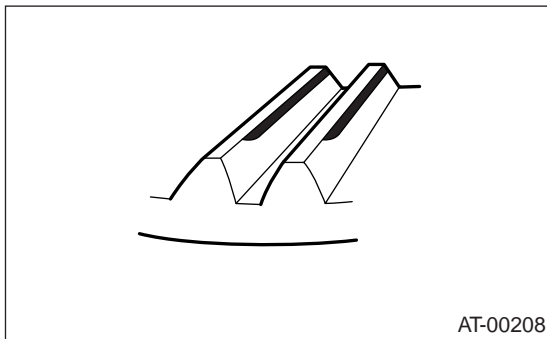
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]



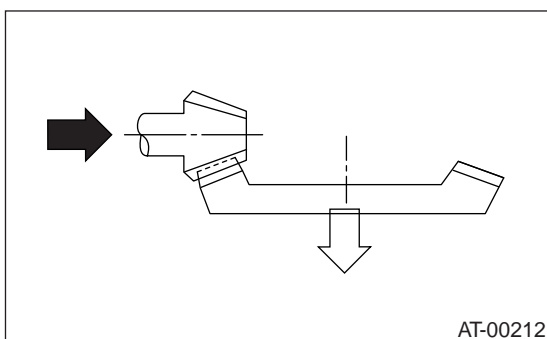
(A) Toe side
(B) Heel side

- Face contact

Checking item: Backlash is too large.
Contact pattern

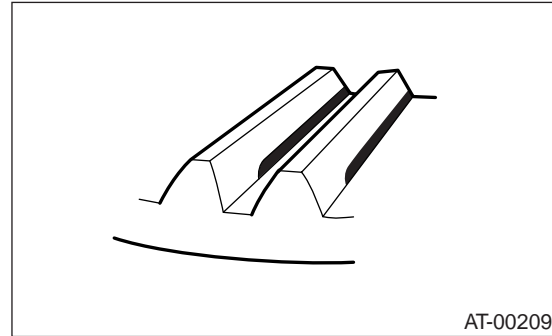


Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.

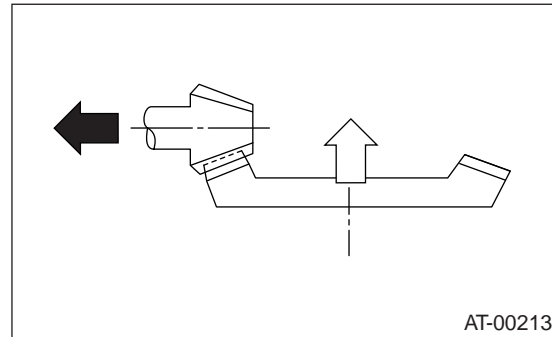


- Flank contact

Checking item: Backlash is too small.
Contact pattern

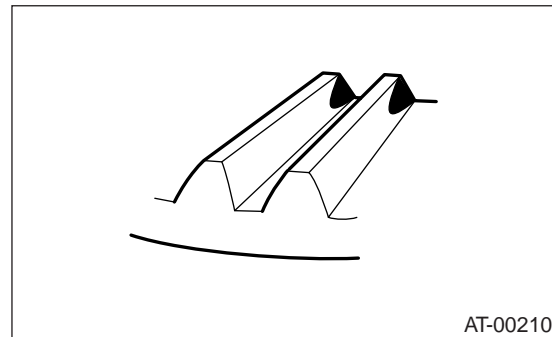


Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



- Toe contact (Inside end contact)

Checking item: Contact areas is small.
Contact pattern

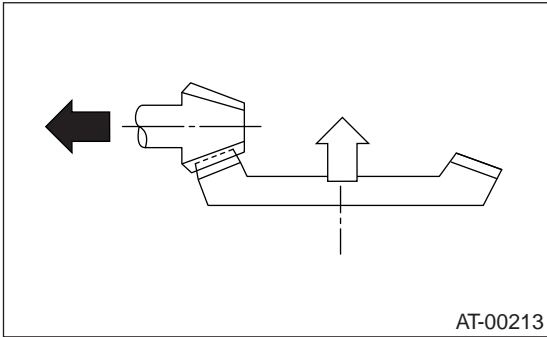


AT-121

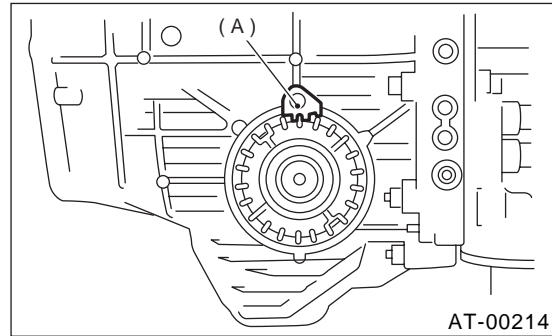
DRIVE PINION SHAFT

AUTOMATIC TRANSMISSION

Corrective action: Decrease thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.

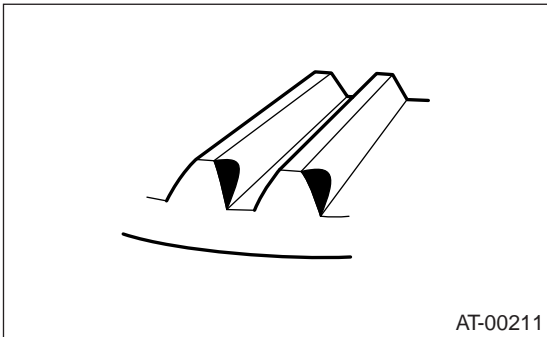


Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

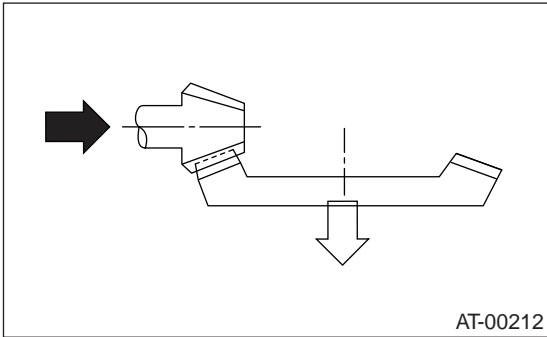


(A) Lock plate

- Heel contact (Outside end contact)
- Checking item: Contact areas is small.**
 Contact pattern



Corrective action: Increase thickness of drive pinion height adjusting shim in order to move drive pinion close to crown 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. Then tighten the lock plate to the specified torque.

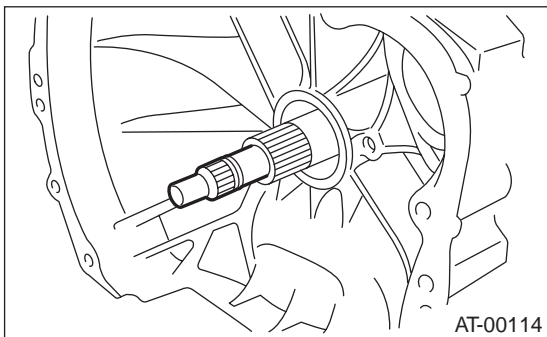
FRONT DIFFERENTIAL

AUTOMATIC TRANSMISSION

37.Front Differential

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-84, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Disconnect the air breather hose. <Ref. to AT-82, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-83, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case. <Ref. to AT-108, REMOVAL, Torque Converter Clutch Case.>
- 10) Remove the seal pipe if it is attached.
- 11) Remove the differential side retainer with ST.

NOTE:

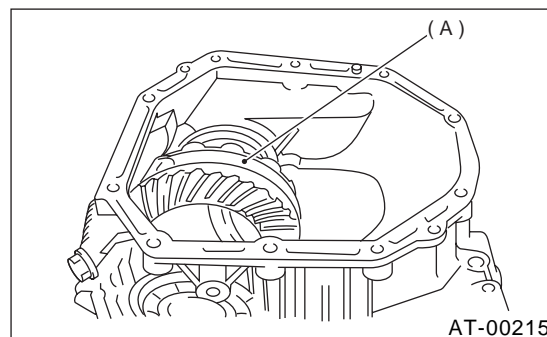
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the torque converter clutch case.

ST 499787000 WRENCH ASSY

- 12) Remove the differential assembly without damaging installation part of retainer.

B: INSTALLATION

- 1) Install the differential assembly to the case, paying special attention not to damage the inside of the case (particularly, the differential side retainer contact surface).

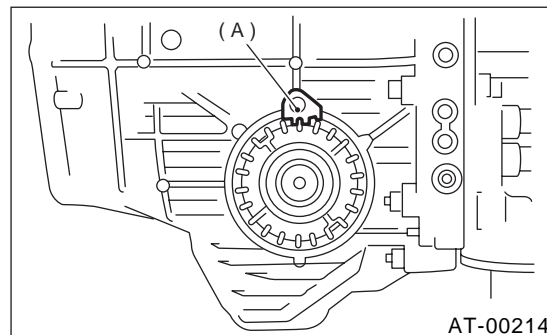


(A) Differential assembly

- 2) Remove the O-rings from left and right side retainer.
- 3) Using ST, install the side retainers. <Ref. to AT-123, REMOVAL, Front Differential.>
ST 499787000 WRENCH ASSY
- 4) Install the lock plate.

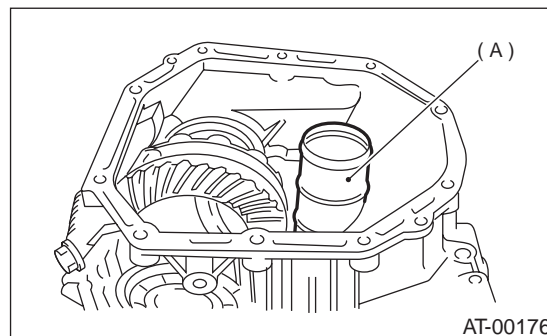
Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



(A) Lock plate

- 5) Install the new seal pipe to the torque converter clutch case.



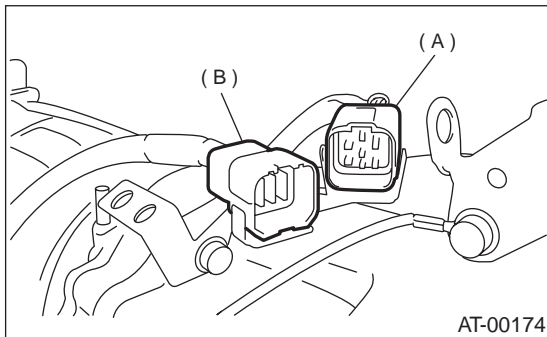
(A) Seal pipe

AT-123

FRONT DIFFERENTIAL

AUTOMATIC TRANSMISSION

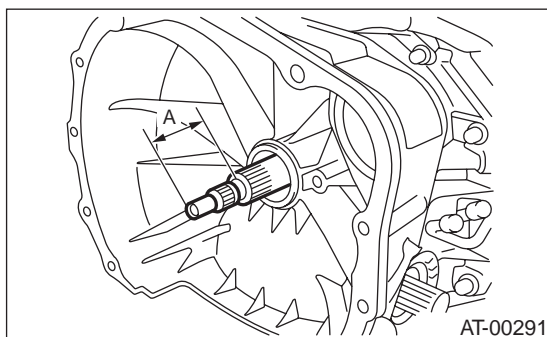
- 6) Install the torque converter clutch case to transmission case. <Ref. to AT-109, INSTALLATION, Torque Converter Clutch Case.>
- 7) Install air breather hose.
- 8) Insert inhibitor switch and transmission connector into stay.



- (A) Transmission harness
(B) Inhibitor switch harness

- 9) Install oil cooler pipes. <Ref. to AT-79, INSTALLATION, ATF Cooler Pipe and Hose.>
- 10) Install the oil charger pipe with O-ring <Ref. to AT-83, INSTALLATION, Oil Charger Pipe.>
- 11) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



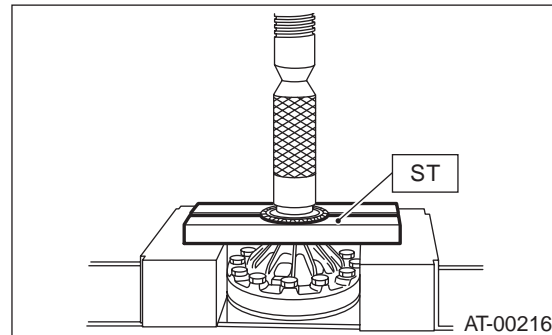
- 12) Install the torque converter clutch assembly. <Ref. to AT-84, INSTALLATION, Torque Converter Clutch Assembly.>
- 13) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

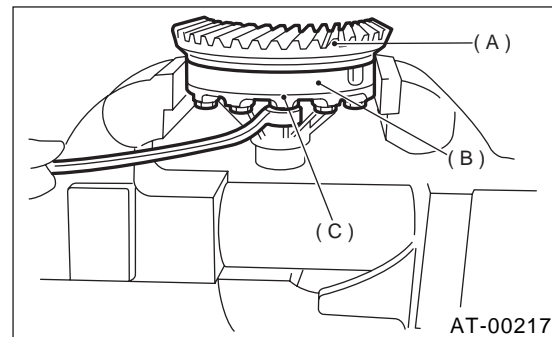
1. DIFFERENTIAL CASE ASSEMBLY

- 1) Using a press and ST, remove the taper roller bearing.

ST 498077000 REMOVER

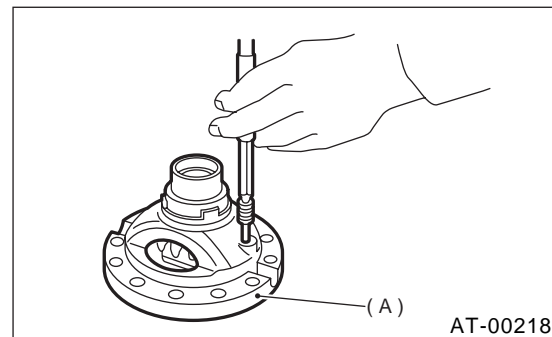


- 2) Secure the case in a vise and remove the crown gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



- (A) Crown gear
(B) Differential case (RH)
(C) Differential case (LH)

- 3) Pull out the straight pin and shaft, and remove the differential bevel gear, washer, and differential bevel pinion.



- (A) Differential case (RH)

AT-124

FRONT DIFFERENTIAL

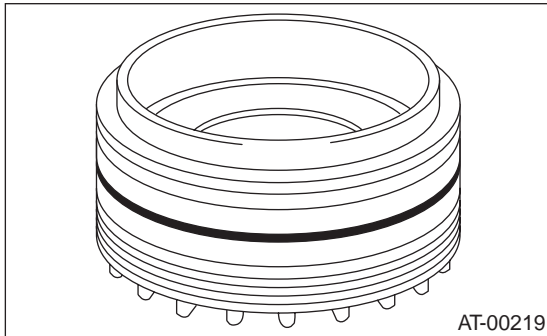
AUTOMATIC TRANSMISSION

2. SIDE RETAINER

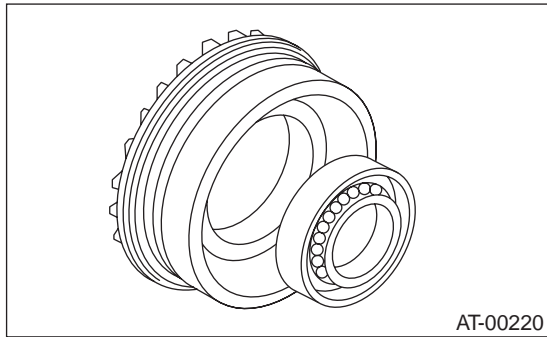
NOTE:

After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.

1) Remove O-ring.

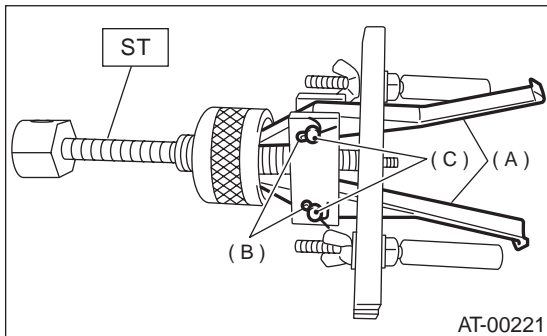


2) Remove oil seal.



3) Take out either split pin, remove claw.

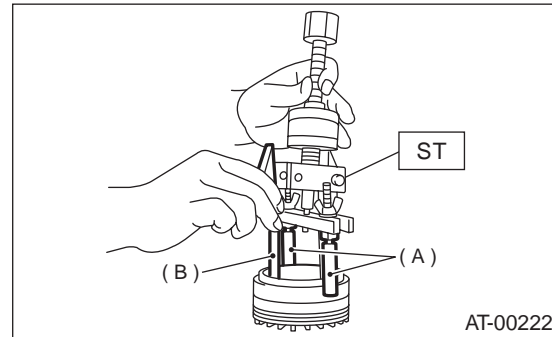
ST 398527700 PULLER ASSY



- (A) Claw
- (B) Split pin
- (C) Pin

4) Securely attach two claws to outer race, set ST to side retainer.

ST 398527700 PULLER ASSY



- (A) Shaft
- (B) Claw

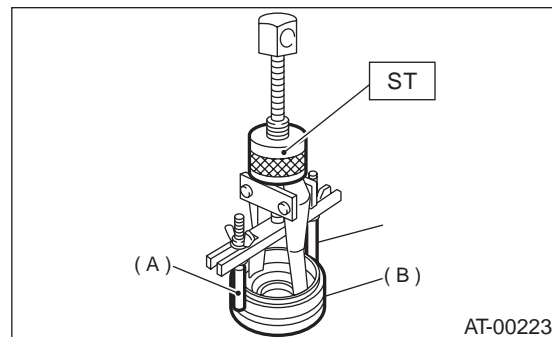
5) Return removed claw to the original position, and install pin and split pin.

6) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.

ST 398527700 PULLER ASSY

NOTE:

Replace bearing inner and outer races as a single unit.



- (A) Shaft
- (B) Side retainer

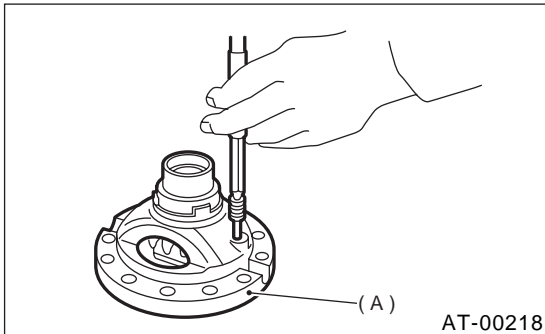
FRONT DIFFERENTIAL

AUTOMATIC TRANSMISSION

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

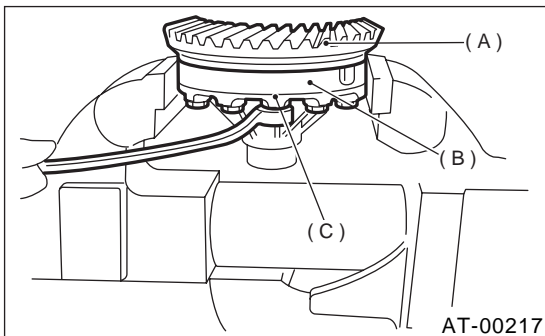
- 1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft.
- 2) Install straight pin from reverse direction.



(A) Differential case (RH)

- 3) Install the washer and differential bevel gear to the differential case (LH). Then put the case over the differential case (RH), and connect both cases.
- 4) Install the crown gear and secure by tightening the bolt.

Standard tightening torque:
62 N·m (6.3 kgf·m, 45.6 ft·lb)



- (A) Crown gear
 (B) Differential case (RH)
 (C) Differential case (LH)

5) Measurement of backlash (Selection of washer)

- (1) Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of the case.

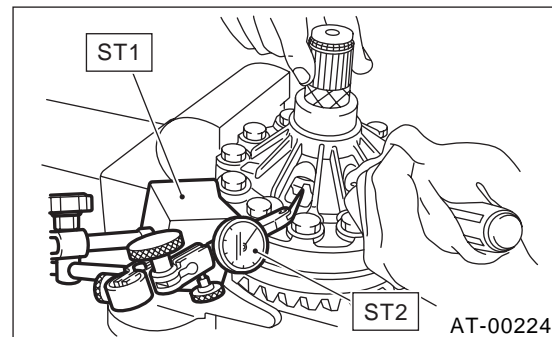
ST1 498247001 MAGNET BASE
 ST2 498247100 DIAL GAUGE

NOTE:

- Measure the backlash by applying a pinion tooth between two bevel gear teeth.
- Fix bevel pinion gear in place with a screwdriver or similar tool when measuring.

Standard value:

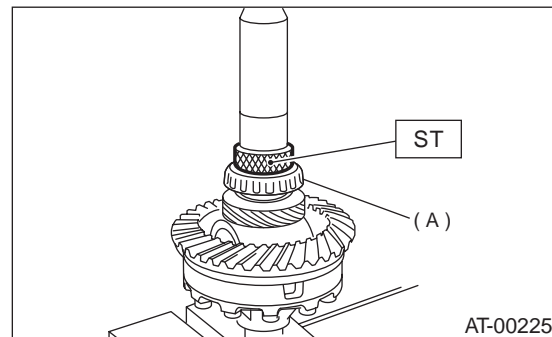
0.13 — 0.18 mm (0.0051 — 0.0071 in)



- (2) If backlash is not as specified, 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)

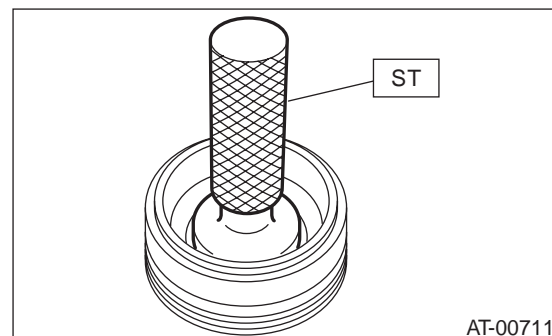
- 6) Using ST, install taper roller bearing.
 ST 398437700 DRIFT



(A) Taper roller bearing

2. SIDE RETAINER

- 1) Install bearing outer race to side retainer.
- 2) Install a new oil seal using the ST and hammer.
 ST 499797000 INSTALLER

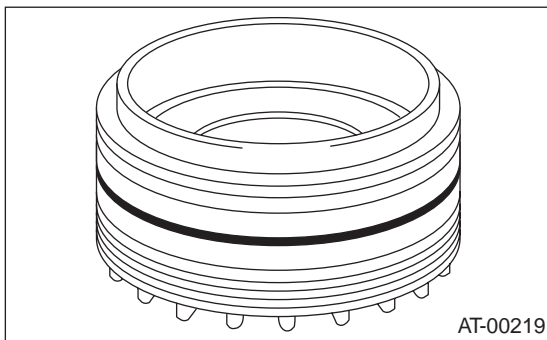


AT-126

FRONT DIFFERENTIAL

AUTOMATIC TRANSMISSION

3) Install new O-ring.



E: INSPECTION

- Check each component for harmful cuts, damage and other faults.
- Measure the backlash and adjust to within specifications.

<Ref. to AT-127, ADJUSTMENT, Front Differential.>

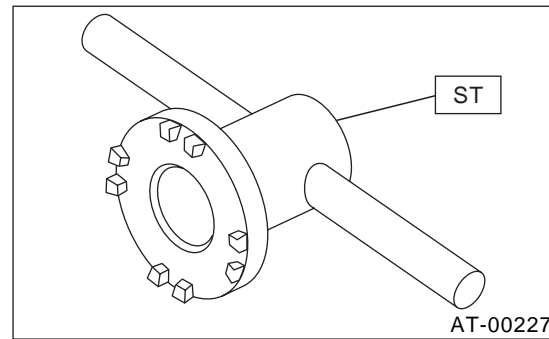
F: ADJUSTMENT

1) Using ST, screw in the retainer until light contact is felt.

NOTE:

Screw in the RH side slightly deeper than the LH side.

ST 499787000 WRENCH ASSY



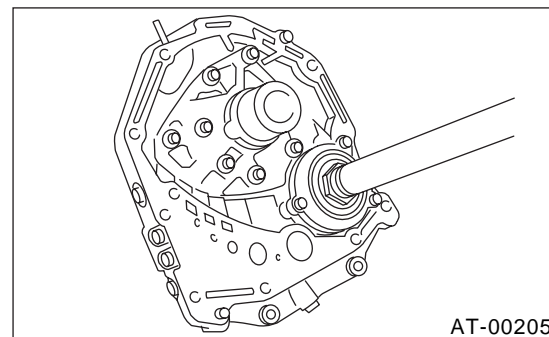
- 2) Remove the oil pump housing.
- 3) Thoroughly remove the liquid gasket from the case mating surface beforehand.
- 4) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening four bolts.

NOTE:

Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.

Tightening torque:

41 N·m (4.2 kgf-m, 30.4 ft-lb)



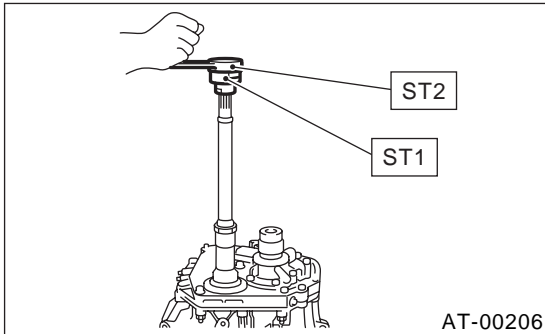
AT-127

FRONT DIFFERENTIAL

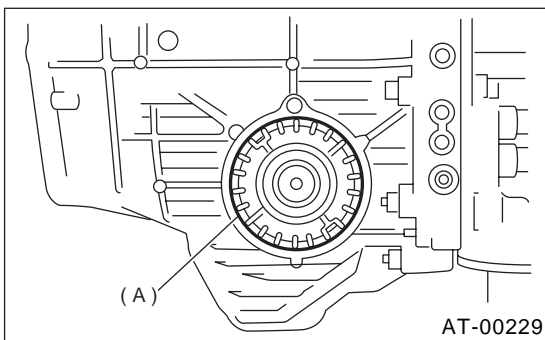
AUTOMATIC TRANSMISSION

5) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937110 HOLDER
ST2 499787700 WRENCH

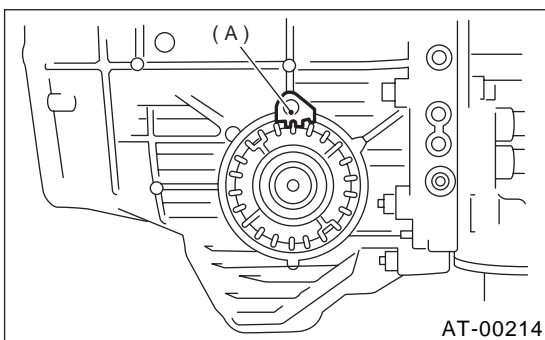


6) Tighten the LH retainer until contact is felt while rotating the shaft. Then loosen the RH retainer. Keep tightening the LH retainer and loosening the RH retainer until the pinion shaft can no longer be turned. This is the "zero" state.



(A) Retainer

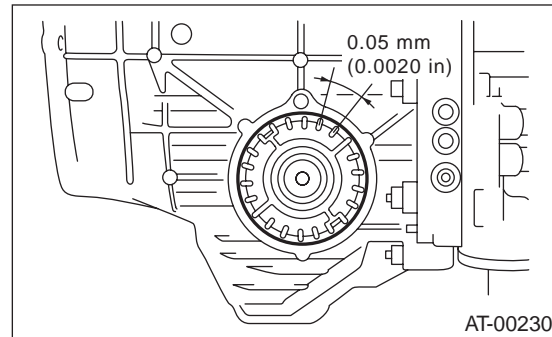
7) After the "zero" state is established, back off the LH retainer 3 notches and secure it with the lock plate. Then back off the RH retainer and retighten until it stops. Rotate drive pinion a few times. Tighten the RH retainer 1-3/4 notches further. This sets the preload. Finally, secure the retainer with its lock plate.



(A) Lock plate

NOTE:

Turning the retainer by one tooth changes the backlash about 0.05 mm (0.0020 in).

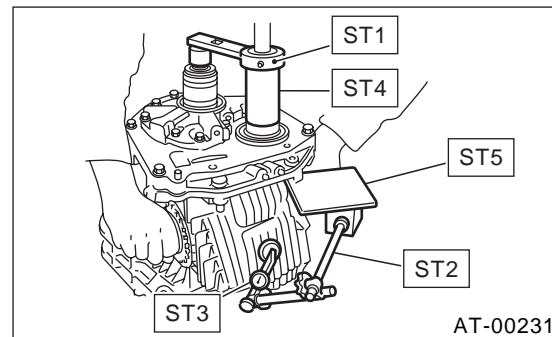


8) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3, ST4 and ST5.

ST1 499787700 WRENCH
ST2 498247001 MAGNET BASE
ST3 498247100 DIAL GAUGE
ST4 499787500 ADAPTER
ST5 498255400 PLATE

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



9) Adjust the tooth contact between front differential and drive shaft. <Ref. to AT-120, ADJUSTMENT, Drive Pinion Shaft.>

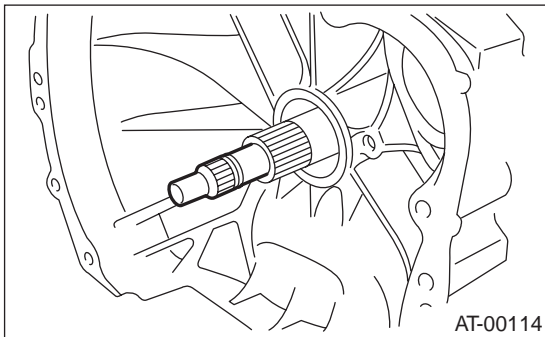
AT-128

HIGH CLUTCH AND REVERSE CLUTCH

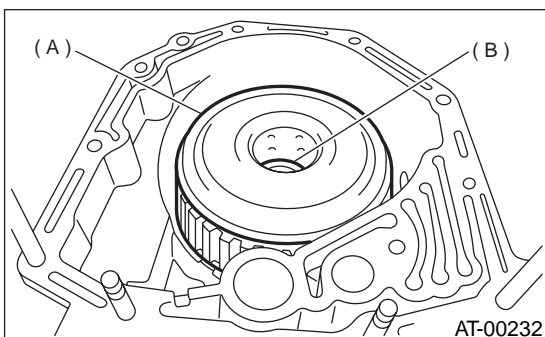
AUTOMATIC TRANSMISSION

38.High Clutch and Reverse Clutch**A: REMOVAL**

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-84, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.

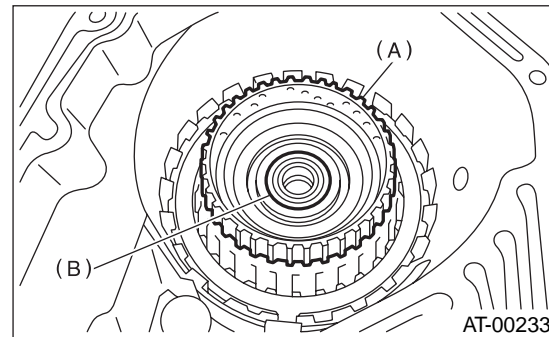


- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose.
- 7) Remove the oil charger pipe. <Ref. to AT-83, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case. <Ref. to AT-108, REMOVAL, Torque Converter Clutch Case.>
- 10) Remove the oil pump housing. <Ref. to AT-111, REMOVAL, Oil Pump.>
- 11) Take out the high clutch, thrust needle bearing and reverse clutch assembly.



- (A) High clutch and reverse clutch assembly
 (B) Thrust needle bearing

- 12) Take out the high clutch hub and the thrust bearing.



- (A) High clutch hub
 (B) Thrust needle bearing

AT-129

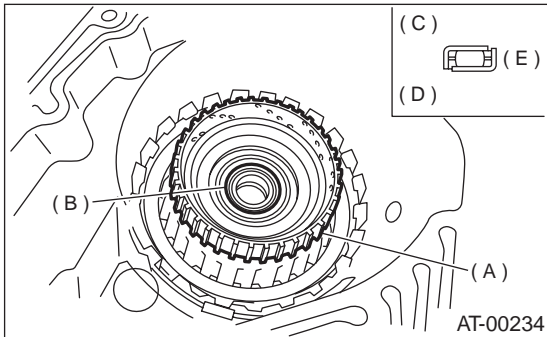
HIGH CLUTCH AND REVERSE CLUTCH

AUTOMATIC TRANSMISSION

B: INSTALLATION

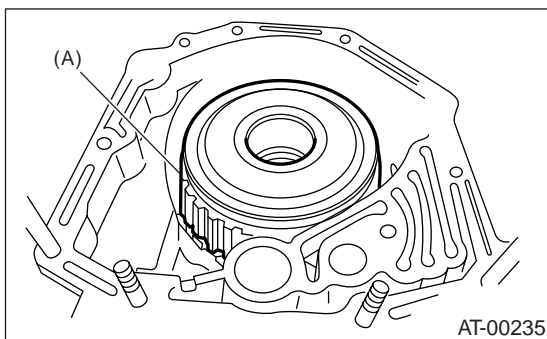
- 1) Apply vaseline to thrust needle bearing.
- 2) Install the high clutch hub and thrust needle bearing.

Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.



- (A) High clutch hub
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

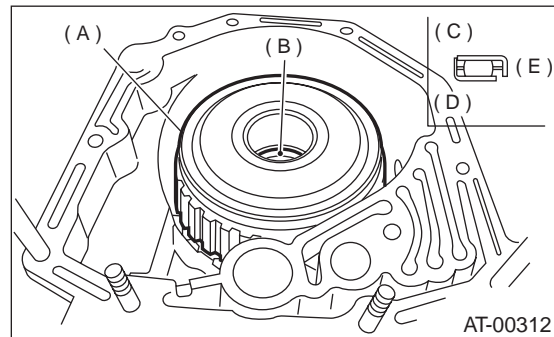
- 3) Install the high clutch assembly.



- (A) High clutch and reverse clutch assembly

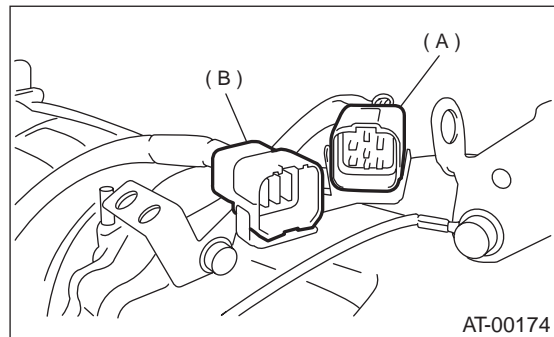
- 4) Adjust total end play. <Ref. to AT-116, ADJUSTMENT, Oil Pump.>

- 5) Install the thrust needle bearing in proper direction.



- (A) High clutch and reverse clutch ASSY
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

- 6) Install the oil pump housing assembly.
- 7) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-109, INSTALLATION, Torque Converter Clutch Case.>
- 8) Insert inhibitor switch and transmission connector into stay.
- 9) Install air breather hose. <Ref. to AT-82, INSTALLATION, Air Breather Hose.>



- (A) Transmission harness
- (B) Inhibitor switch harness

- 10) Install oil cooler pipes. <Ref. to AT-79, INSTALLATION, ATF Cooler Pipe and Hose.>
- 11) Install the oil charger pipe with O-ring. <Ref. to AT-83, INSTALLATION, Oil Charger Pipe.>

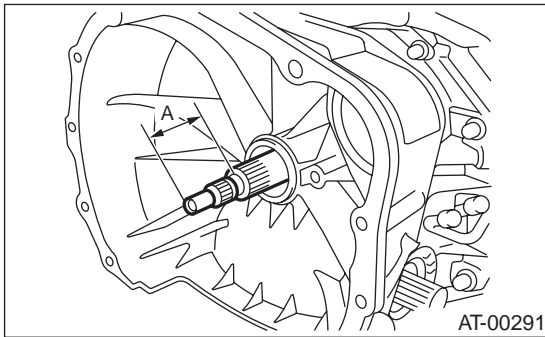
AT-130

HIGH CLUTCH AND REVERSE CLUTCH

AUTOMATIC TRANSMISSION

12) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)

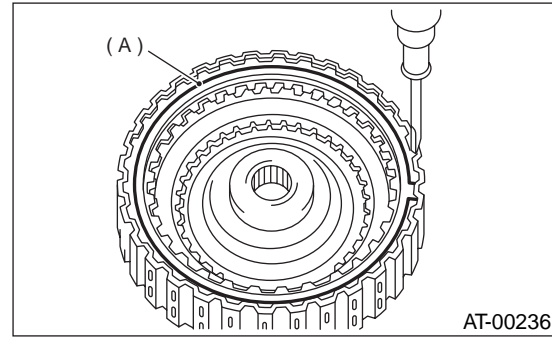


13) Install the torque converter clutch assembly.
<Ref. to AT-84, INSTALLATION, Torque Converter Clutch Assembly.>

14) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

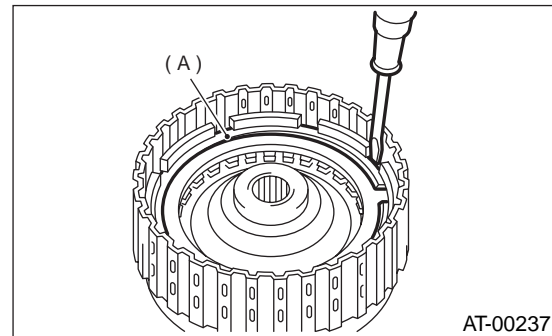
C: DISASSEMBLY

1) Remove the snap ring, and take out the retaining plate, drive plates, driven plates.



(A) Snap ring

2) Remove snap ring, and take out the retaining plate, drive plates and driven plates.

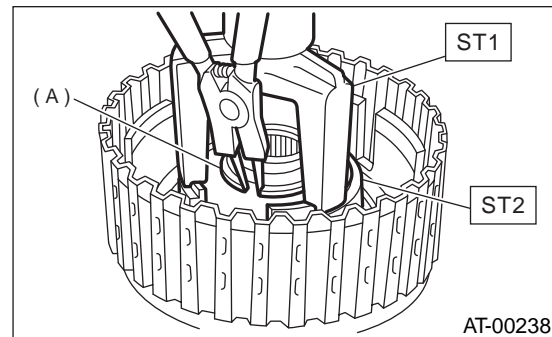


(A) Snap ring

3) Using ST1 and ST2, remove snap ring.

ST1 398673600 COMPRESSOR

ST2 498627100 SEAT



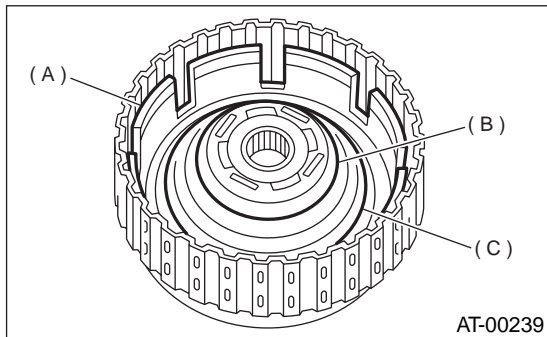
(A) Snap ring

AT-131

HIGH CLUTCH AND REVERSE CLUTCH

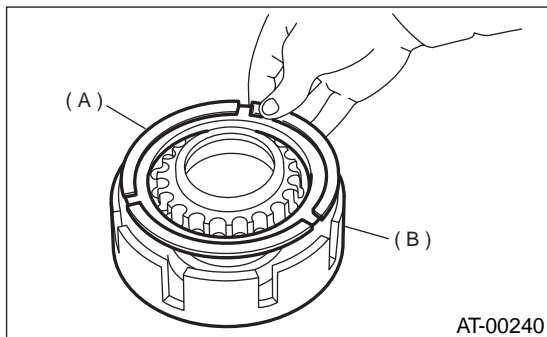
AUTOMATIC TRANSMISSION

4) Take out clutch cover, spring retainer, high clutch piston and reverse clutch piston.



- (A) Reverse clutch piston
- (B) Cover
- (C) Return spring

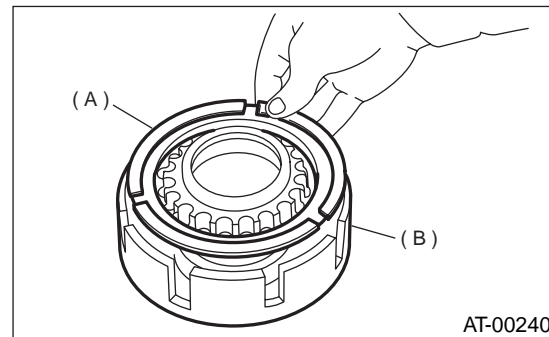
5) Remove seal rings and lip seal from high clutch piston and reverse clutch piston.



- (A) High clutch piston
- (B) Reverse clutch piston

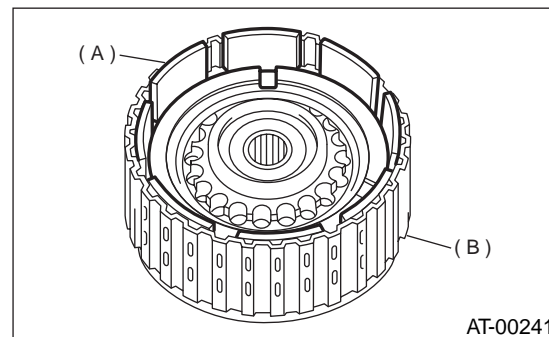
D: ASSEMBLY

- 1) Install seal rings and lip seal to high clutch piston and reverse clutch piston.
- 2) Install high clutch piston to reverse clutch piston.



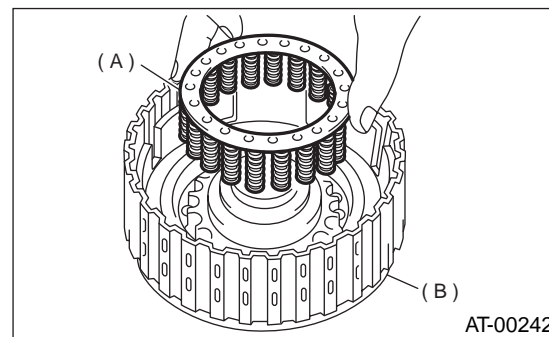
- (A) High clutch piston
- (B) Reverse clutch piston

- 3) Install reverse clutch to high clutch drum. Align the groove on the reverse clutch piston with the groove on the high clutch drum during installation.



- (A) Reverse clutch piston
- (B) High clutch drum

- 4) Install spring retainer to high clutch piston.



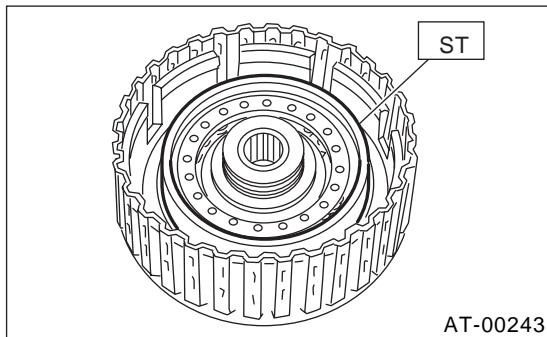
- (A) Return spring
- (B) High clutch drum

AT-132

HIGH CLUTCH AND REVERSE CLUTCH

AUTOMATIC TRANSMISSION

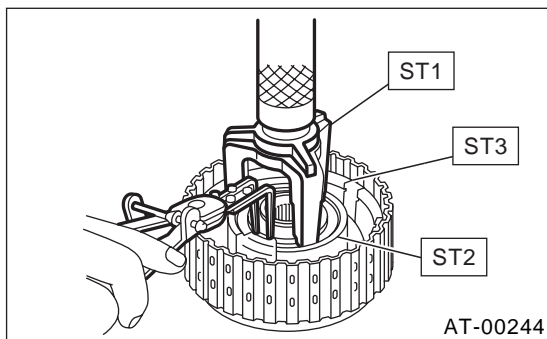
- 5) Install ST to high clutch piston.
 ST 498437000 HIGH CLUTCH PISTON GAUGE



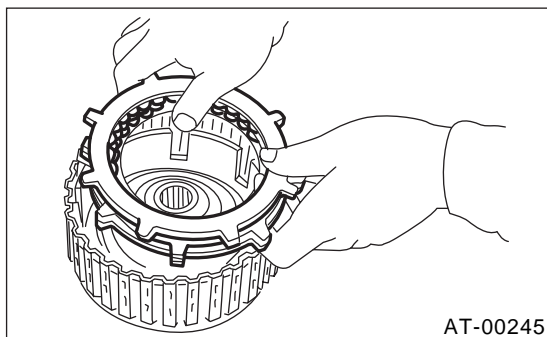
- 6) Avoid folding the high clutch piston seal, when installing the cover to high clutch piston.

- 7) Using ST1 and ST2, install snap ring.

- ST1 398673600 COMPRESSOR
 ST2 498627100 SEAT
 ST3 498437000 HIGH CLUTCH PISTON GAUGE

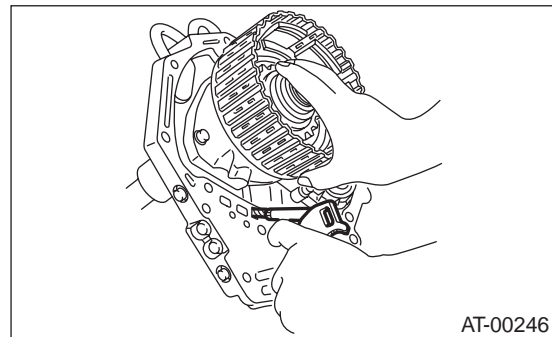


- 8) Install the thickest driven plate to piston side, and then install the driven plate, drive plate, retaining plate to high clutch drum.



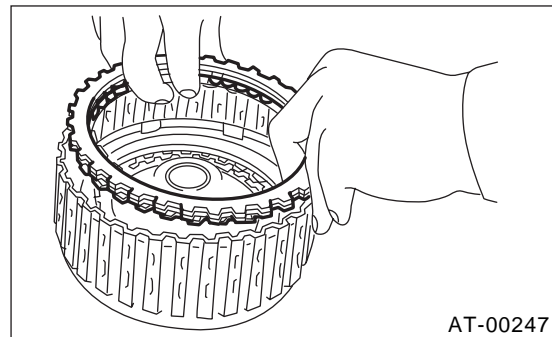
- 9) Install snap ring to high clutch drum.

- 10) Apply compressed air intermittently to check for operation.

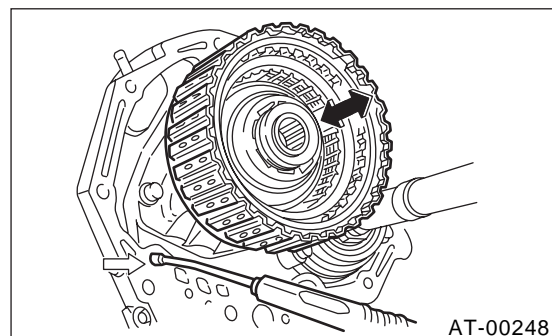


- 11) Measure the clearance between the retaining plate and snap ring.<Ref. to AT-134, INSPECTION, High Clutch and Reverse Clutch.>

- 12) Install driven plate, drive plate, retaining plate and snap ring.



- 13) Apply compressed air intermittently to check for operation.



- 14) Measure the clearance between the retaining plate and snap ring.<Ref. to AT-134, INSPECTION, High Clutch and Reverse Clutch.>

AT-133

HIGH CLUTCH AND REVERSE CLUTCH

AUTOMATIC TRANSMISSION

E: INSPECTION

1) Inspect the following items.

- Drive plate facing for wear and damage
- Snap ring for wear, return spring for setting and breakage, and snap ring retainer for deformation
- Lip seal and lathe cut ring for damage
- Piston and drum check ball for operation
- Adjust total end play. <Ref. to AT-116, ADJUSTMENT, Oil Pump.>

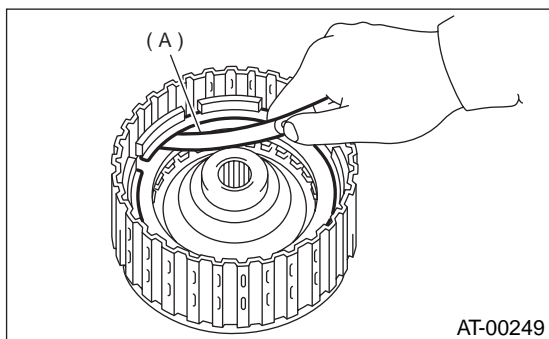
2) Inspect clearance between the retaining plate and snap ring. (High clutch) At this time, do not press down retaining plate.

Standard value:

0.8 — 1.1 mm (0.031 — 0.043 in)

Allowable limit:

1.5 mm (0.059 in)



(A) Thickness gauge

3) If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

High clutch retaining plate	
Part No.	Thickness mm (in)
31567AA710	4.7 (0.185)
31567AA720	4.8 (0.189)
31567AA730	4.9 (0.193)
31567AA740	5.0 (0.197)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)

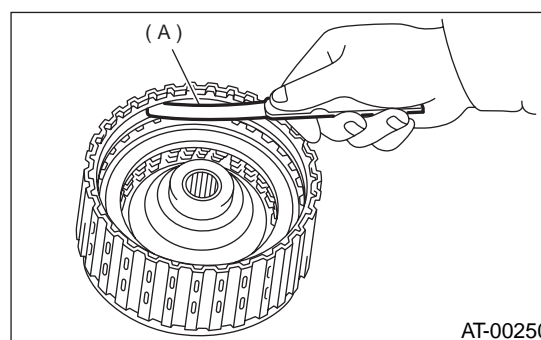
4) Inspect clearance between retaining plate and snap ring. (Reverse clutch) At this time, do not press down retaining plate.

Standard value:

0.5 — 0.8 mm (0.020 — 0.031 in)

Allowable limit:

1.2 mm (0.047 in)



(A) Thickness gauge

5) If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

Reverse clutch retaining plates	
Part No.	Thickness mm (in)
31567AA910	4.0 (0.157)
31567AA920	4.2 (0.165)
31567AA930	4.4 (0.173)
31567AA940	4.6 (0.181)
31567AA950	4.8 (0.189)
31567AA960	5.0 (0.197)
31567AA970	5.2 (0.205)
31567AA980	5.4 (0.213)

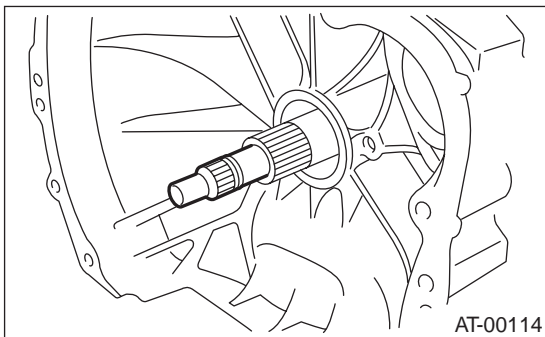
PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

39. Planetary Gear and Low Clutch

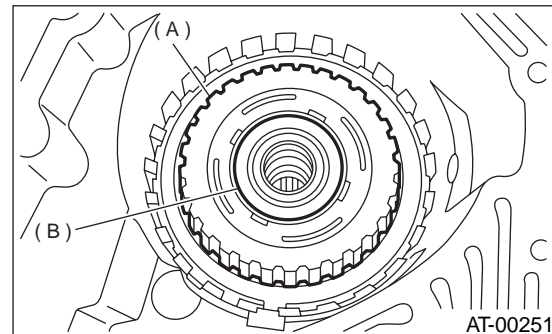
A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-84, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Disconnect the air breather hose. <Ref. to AT-82, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe, and remove the O-ring from the flange face. Attach the O-ring to the pipe. <Ref. to AT-83, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to AT-85, REMOVAL, Extension Case.>
- 10) Remove reduction driven gear. <Ref. to AT-100, REMOVAL, Reduction Driven Gear.>
- 11) Separation of torque converter clutch case and transmission case. <Ref. to AT-108, REMOVAL, Torque Converter Clutch Case.>
- 12) Remove the oil pump housing. <Ref. to AT-111, REMOVAL, Oil Pump.>
- 13) Take out the high clutch and reverse clutch assembly. <Ref. to AT-129, REMOVAL, High Clutch and Reverse Clutch.>

- 14) Take out the front sun gear and the thrust bearing.

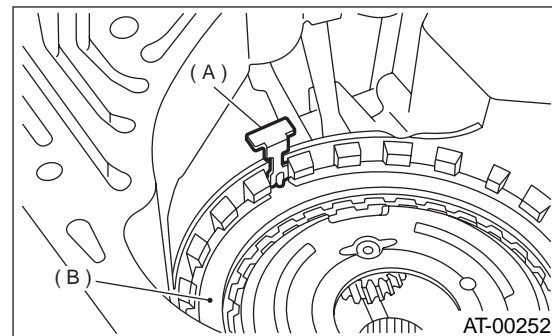


- (A) Front sun gear
(B) Thrust needle bearing

- 15) Pull out leaf spring without folding.

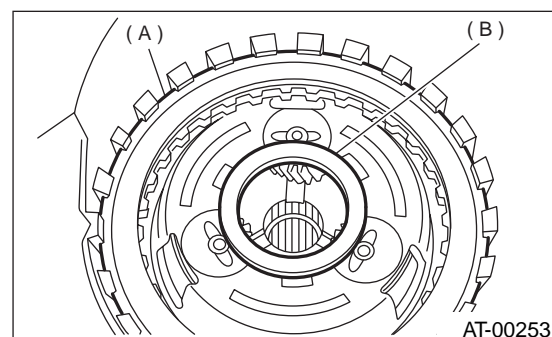
NOTE:

Remove it while pressing down on lower leaf spring.



- (A) Leaf spring
(B) Retaining plate

- 16) Remove snap ring and thrust needle bearing.



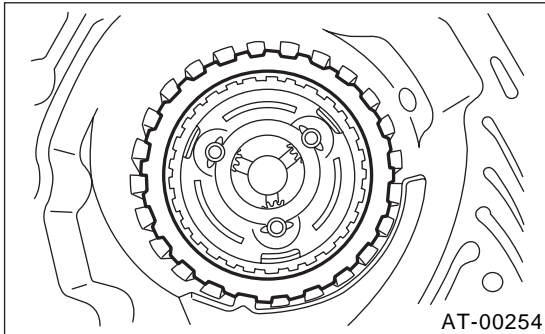
- (A) Snap ring
(B) Thrust needle bearing

AT-135

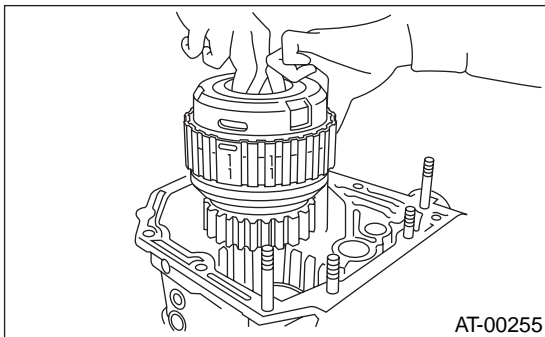
PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

17) Take out retaining plate, drive plate and driven plate of 2-4 brake.



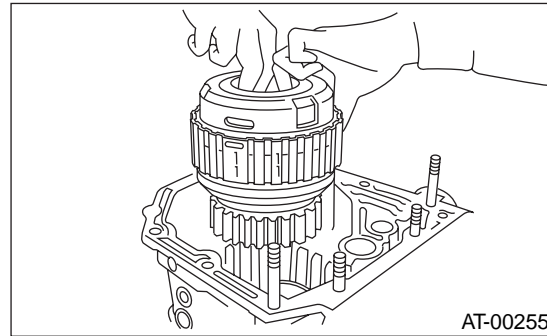
18) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly.



B: INSTALLATION

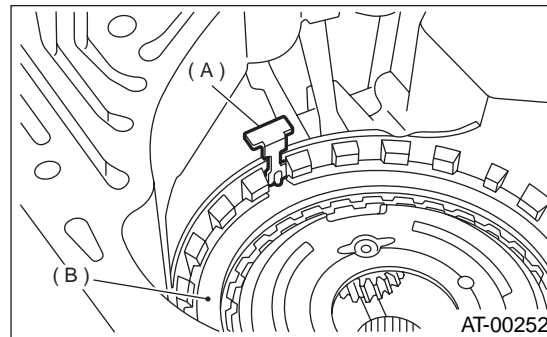
1) Install planetary gear and low clutch assembly to transmission case.

Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring.



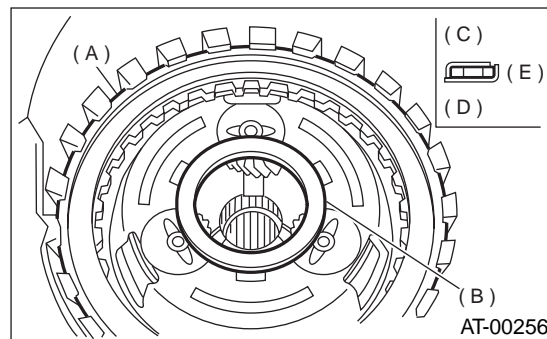
2) Install the pressure plate, driven plate, drive plate, retaining plate and snap ring.

3) Be careful not to mistake the location of the leaf spring to be inserted.



- (A) Leaf spring
- (B) Retaining plate

4) Install thrust needle bearing in the correct direction.

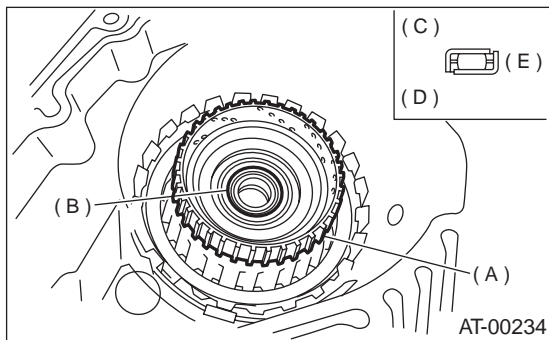


- (A) Snap ring
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

PLANETARY GEAR AND LOW CLUTCH

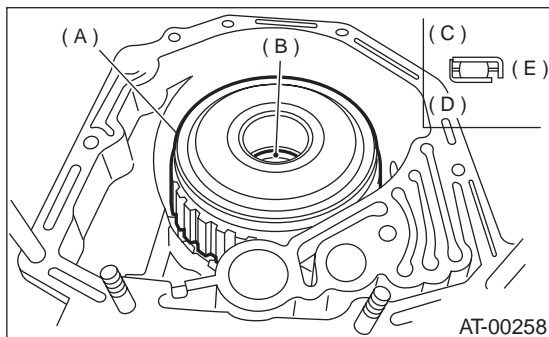
AUTOMATIC TRANSMISSION

- 5) Install front sun gear and thrust needle bearing.
 6) Install the high clutch hub.
 Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.
 7) Install the thrust needle bearing in proper direction.



- (A) High clutch hub
 (B) Thrust needle bearing
 (C) Upside
 (D) Downside
 (E) Outside

- 8) Install the high clutch assembly.
 9) Install the thrust needle bearing in proper direction.

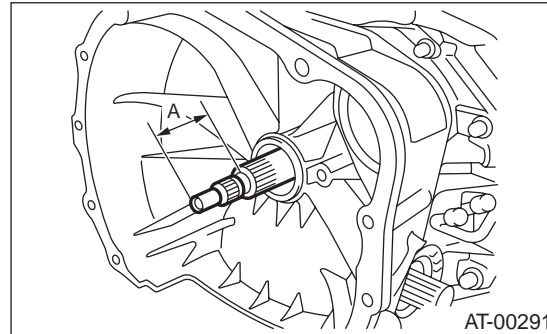


- (A) High clutch and reverse clutch assembly
 (B) Thrust needle bearing
 (C) Upside
 (D) Downside
 (E) Outside

- 10) Install oil pump housing assembly with new gasket.
 11) Install torque converter clutch case. <Ref. to AT-109, INSTALLATION, Torque Converter Clutch Case.>
 12) Insert inhibitor switch and transmission connector into stay.
 13) Install air breather hose. <Ref. to AT-82, INSTALLATION, Air Breather Hose.>
 14) Install oil cooler pipes. <Ref. to AT-79, INSTALLATION, ATF Cooler Pipe and Hose.>

- 15) Install the oil charger pipe with O-ring. <Ref. to AT-83, INSTALLATION, Oil Charger Pipe.>
 16) Insert the input shaft while turning lightly by hand.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



- 17) Install the torque converter clutch assembly. <Ref. to AT-84, INSTALLATION, Torque Converter Clutch Assembly.>
 18) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

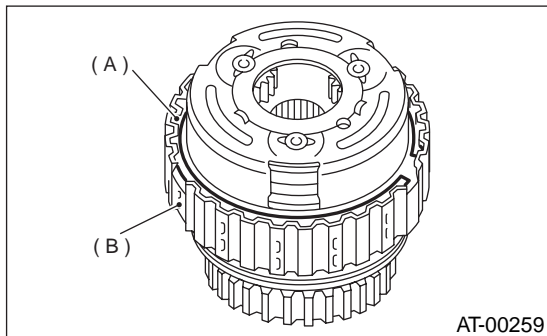
AT-137

PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

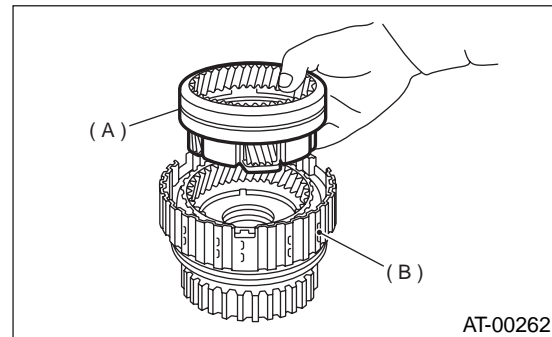
C: DISASSEMBLY

1) Remove snap ring from the low clutch drum.



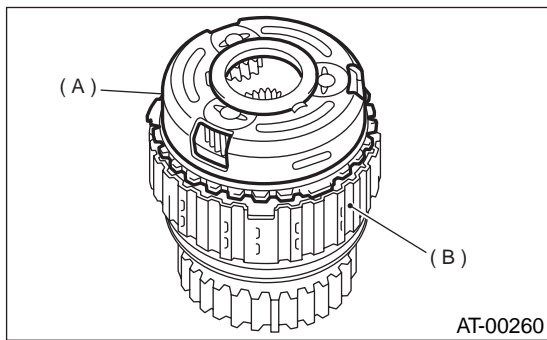
(A) Snap ring
(B) Low clutch drum

4) Take out rear planetary carrier, washer and thrust needle bearing.



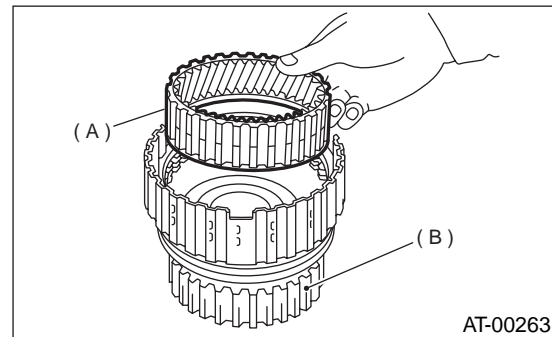
(A) Rear planetary carrier
(B) Low clutch drum

2) Take out front planetary carrier.



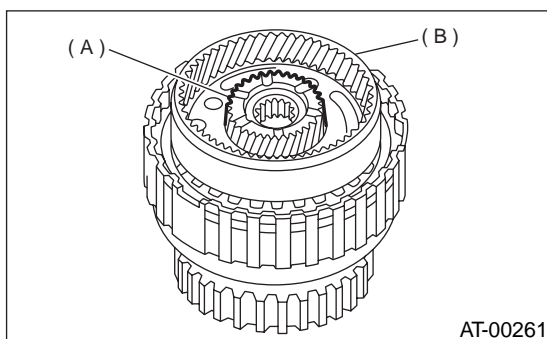
(A) Front planetary carrier
(B) Low clutch drum

5) Take out rear internal gear.



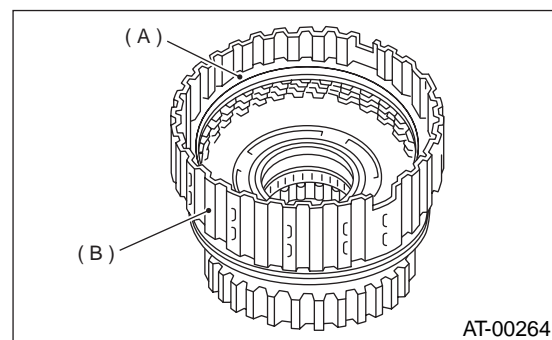
(A) Rear internal gear
(B) Low clutch drum

3) Take out rear sun gear.



(A) Rear sun gear
(B) Rear planetary carrier

6) Remove the snap ring from the low clutch drum.



(A) Snap ring
(B) Low clutch drum

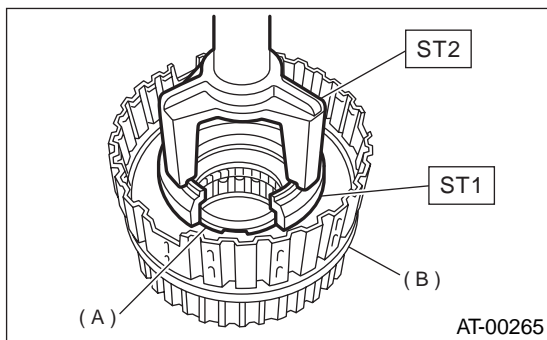
AT-138

PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

7) Compress the spring retainer, and remove the snap ring from the low clutch drum, by using ST1 and ST2.

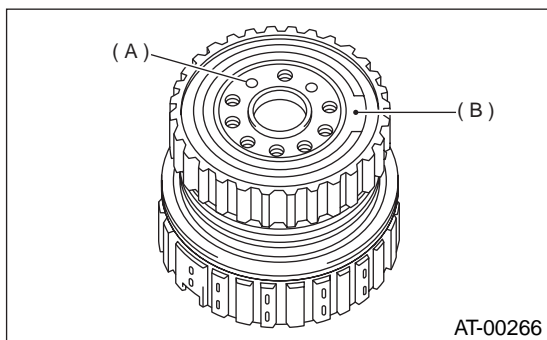
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



- (A) Snap ring
- (B) Low clutch drum

8) Remove one-way clutch. <Ref. to AT-149, REMOVAL, One-way Clutch.>

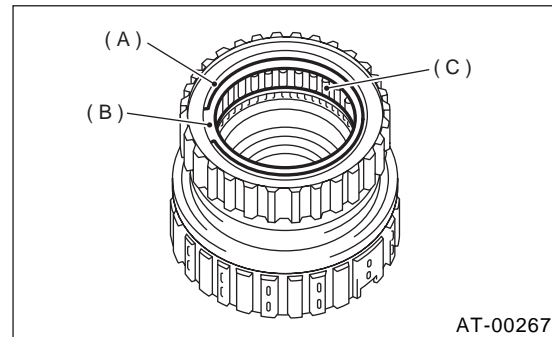
9) Install the one-way clutch inner race to the low clutch drum, and apply compressed air to remove the low clutch piston.



- (A) Apply compressed air
- (B) One-way clutch inner race

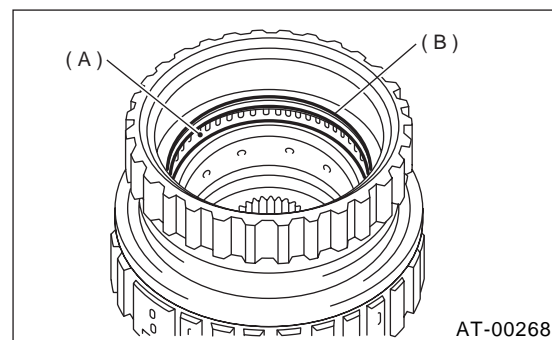
10) Remove the one-way clutch inner race.

11) Remove the one-way clutch after taking out the snap ring.



- (A) Snap ring
- (B) Plate
- (C) One-way clutch

12) Remove the needle bearing after taking out the snap ring.



- (A) Needle bearing
- (B) Snap ring

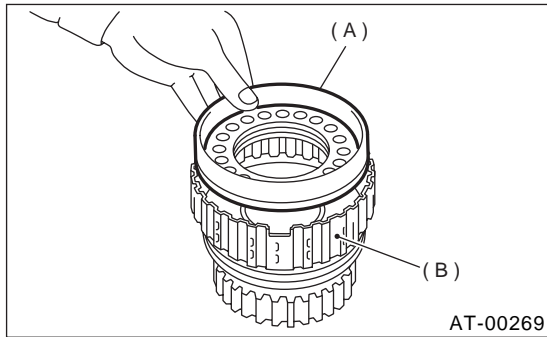
AT-139

PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

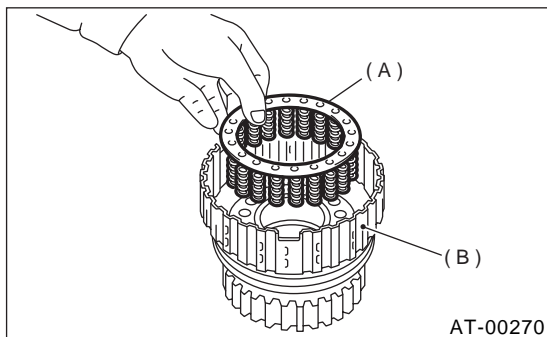
D: ASSEMBLY

- 1) Install lathe cut seal ring to low clutch piston.
- 2) Fit the low clutch piston to the low clutch drum.



- (A) Low clutch piston
- (B) Low clutch drum

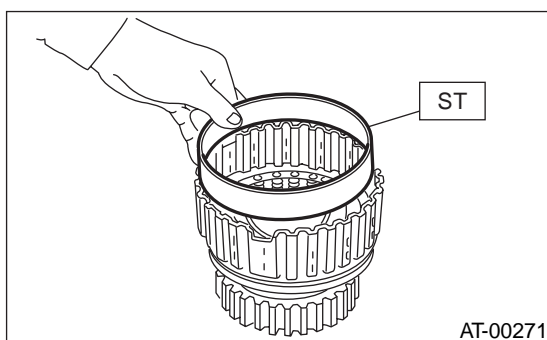
- 3) Install spring retainer to low clutch piston.



- (A) Spring retainer
- (B) Low clutch drum

- 4) Install ST to low clutch drum.

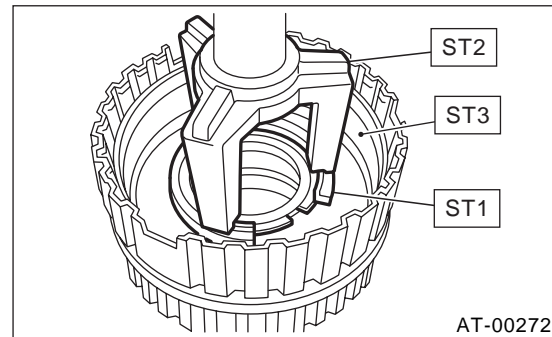
ST 498437100 LOW CLUTCH PISTON GUIDE



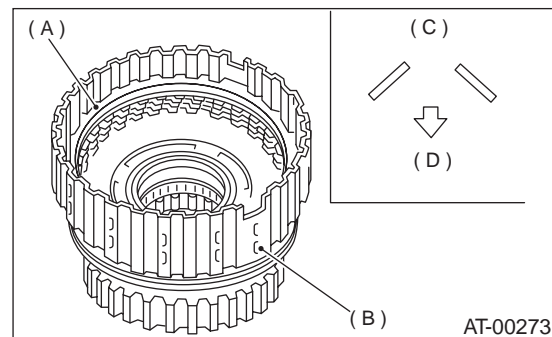
- 5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring. At this time, be careful not to fold cover seal during installation.

ST1 498627100 SEAT
ST2 398673600 COMPRESSOR

ST3 498437100 LOW CLUTCH PISTON GUIDE



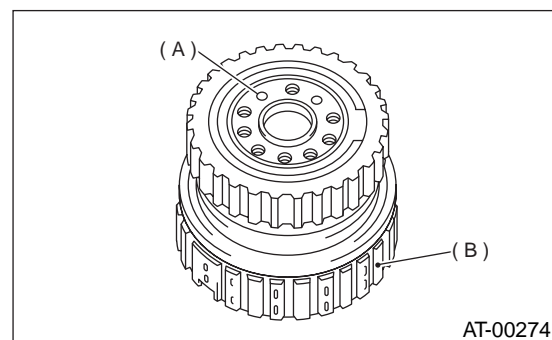
- 6) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring.



- (A) Snap ring
- (B) Low clutch drum
- (C) Dish plate
- (D) Low clutch piston side

- 7) Check the low clutch for operation.

- (1) Remove one-way clutch. <Ref. to AT-149, REMOVAL, One-way Clutch.>
- (2) Set the one-way clutch inner race, and apply compressed air for checking.



- (A) Apply compressed air
- (B) Low clutch drum

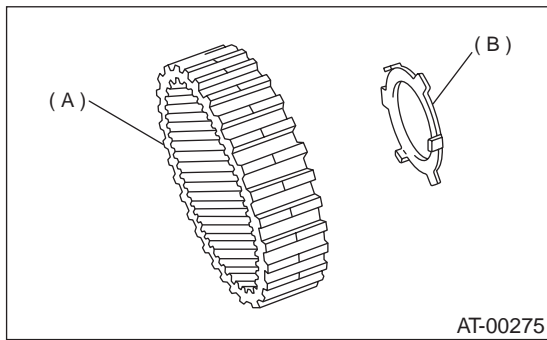
- 8) Checking low clutch clearance. <Ref. to AT-143, INSPECTION, Planetary Gear and Low Clutch.>

AT-140

PLANETARY GEAR AND LOW CLUTCH

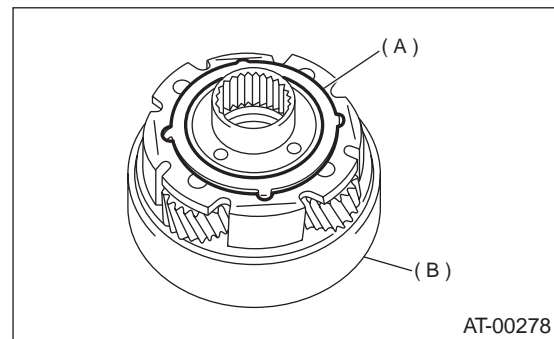
AUTOMATIC TRANSMISSION

9) Install washer to rear internal gear.



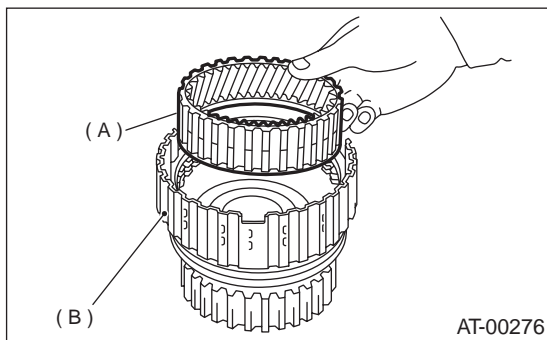
- (A) Rear internal gear
- (B) Washer

12) Install the washer by aligning protrusion of washer and hole of rear planetary carrier.



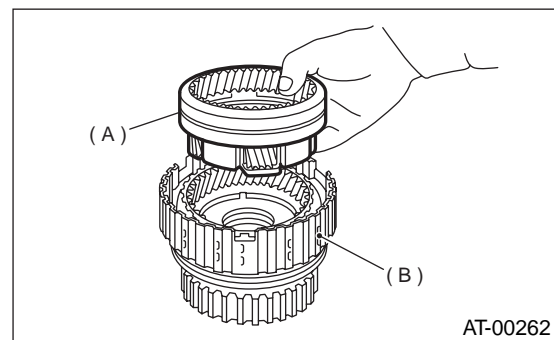
- (A) Washer
- (B) Rear planetary carrier

10) Install rear internal gear.



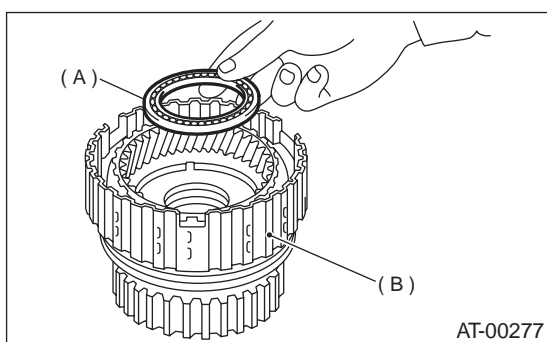
- (A) Rear internal gear
- (B) Low clutch drum

13) Install rear planetary carrier to low clutch drum.



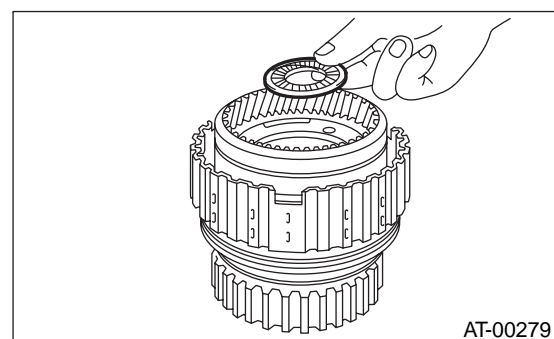
- (A) Rear planetary carrier
- (B) Low clutch drum

11) Install thrust needle bearing in the correct direction.



- (A) Thrust needle bearing
- (B) Low clutch drum

14) Install thrust needle bearing in the correct direction.

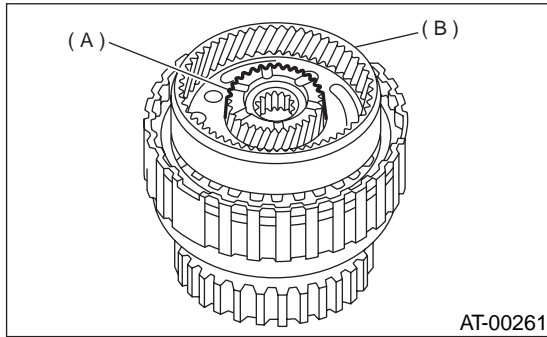


AT-141

PLANETARY GEAR AND LOW CLUTCH

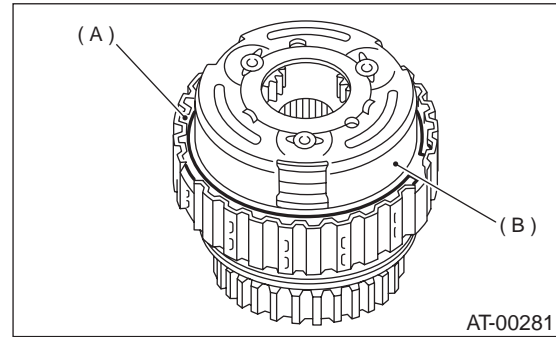
AUTOMATIC TRANSMISSION

15) Install the rear sun gear in proper direction.



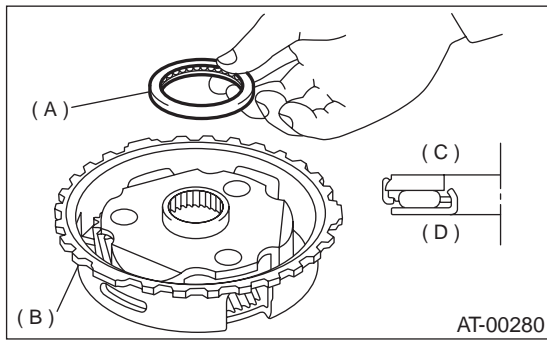
- (A) Rear sun gear
- (B) Rear planetary carrier

18) Install snap ring to low clutch drum.



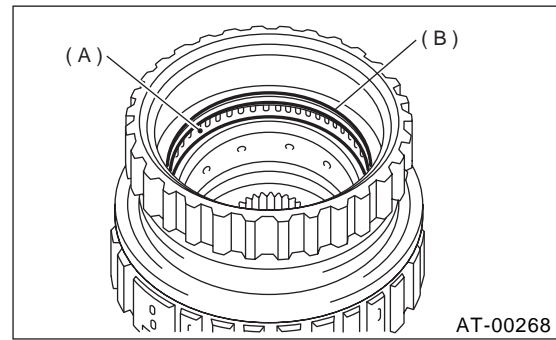
- (A) Snap ring
- (B) Front planetary carrier

16) Install the thrust needle bearing in proper direction.



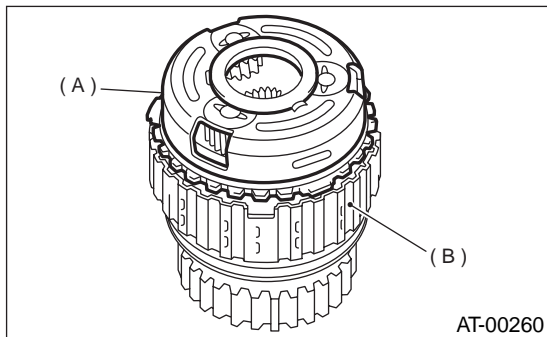
- (A) Thrust needle bearing
- (B) Front planetary carrier
- (C) Rear sun gear side
- (D) Front planetary carrier side

19) Install the needle bearing, and secure with the snap ring.



- (A) Needle bearing
- (B) Snap ring

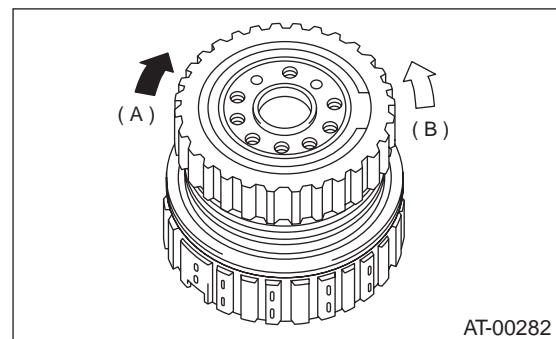
17) Install front planetary carrier to low clutch drum.



- (A) Front planetary carrier
- (B) Low clutch drum

20) Install the one-way clutch, one-way clutch inner race and plate, and secure with the snap ring.

21) Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



- (A) Locked
- (B) Free

PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

E: INSPECTION

1) Inspect the following items.

- Drive plate facing for wear and damage
- Snap ring for wear, return spring for breakage or setting, and spring retainer for deformation
- Lip seal and lathe cut seal ring for damage
- Piston check ball for operation
- Measure the total end play and adjust to within specifications.

<Ref. to AT-116, ADJUSTMENT, Oil Pump.>

2) Place the same thickness of shim on both sides to prevent retaining plate from tilting.

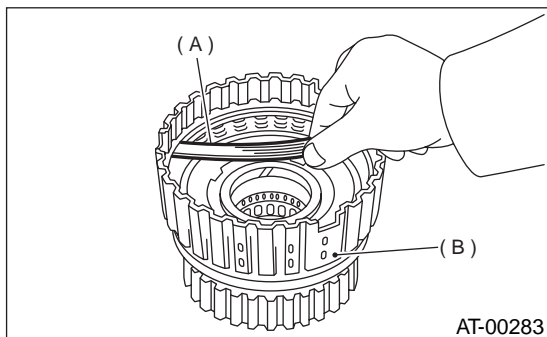
3) Inspect clearance between retaining plate and operation of the low clutch.

Standard value:

0.7 — 1.1 mm (0.028 — 0.043 in)

Allowable limit:

1.6 mm (0.063 in)



(A) Thickness gauge

(B) Low clutch drum

4) If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

Available retaining plates	
Part No.	Thickness mm (in)
31567AA830	3.8 (0.150)
31567AA840	4.0 (0.157)
31567AA850	4.2 (0.165)
31567AA860	4.4 (0.173)
31567AA870	4.6 (0.181)

AT-143

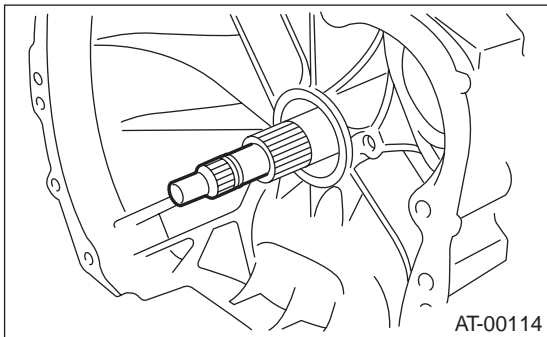
2-4 BRAKE

AUTOMATIC TRANSMISSION

40.2-4 Brake

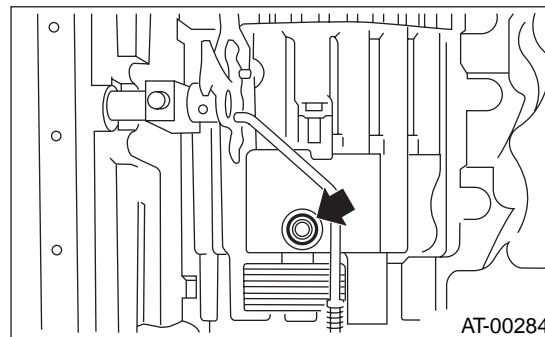
A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-84, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Disconnect the air breather hose. <Ref. to AT-82, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-83, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes with washers. <Ref. to AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to AT-85, REMOVAL, Extension Case.>
- 10) Remove the reduction drive gear. (MPT model) <Ref. to AT-103, REMOVAL, Reduction Drive Gear.>
- 11) Remove the center differential carrier. (VTD model) <Ref. to AT-105, REMOVAL, Center Differential Carrier.>
- 12) Remove reduction driven gear. <Ref. to AT-100, REMOVAL, Reduction Driven Gear.>
- 13) Separation of torque converter clutch case and transmission case. <Ref. to AT-108, REMOVAL, Torque Converter Clutch Case.>
- 14) Remove the oil pan and control valve body. <Ref. to AT-60, REMOVAL, Control Valve Body.>
- 15) Remove the oil pump housing. <Ref. to AT-111, REMOVAL, Oil Pump.>

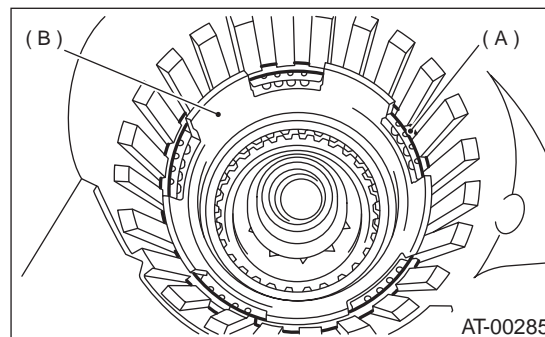
- 16) Remove 2-4 brake seal.



- 17) Take out the high clutch and reverse clutch assembly. <Ref. to AT-129, REMOVAL, High Clutch and Reverse Clutch.>

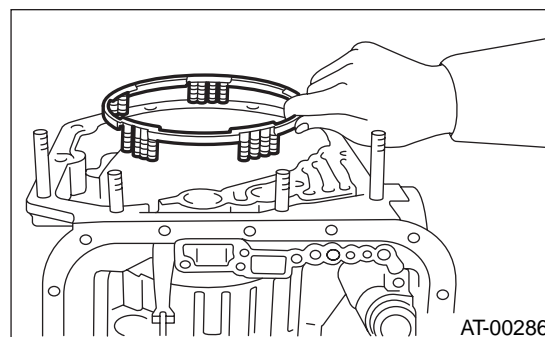
- 18) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly. <Ref. to AT-135, REMOVAL, Planetary Gear and Low Clutch.>

- 19) Remove snap ring.



- (A) Snap ring
(B) 2-4 brake piston

- 20) Take out 2-4 brake return spring.

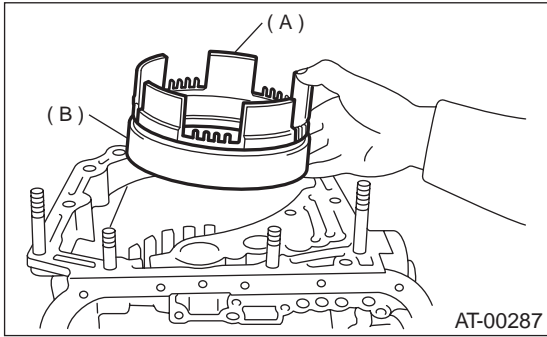


AT-144

2-4 BRAKE

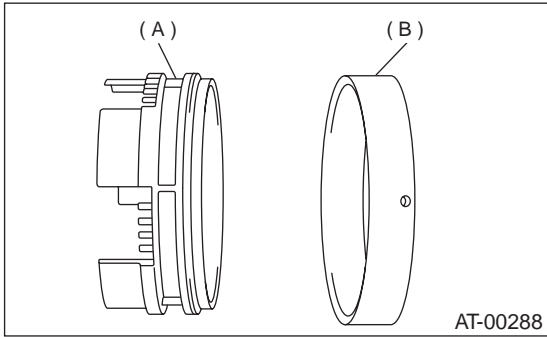
AUTOMATIC TRANSMISSION

21) Remove the 2-4 brake piston and piston retainer without damaging.



- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

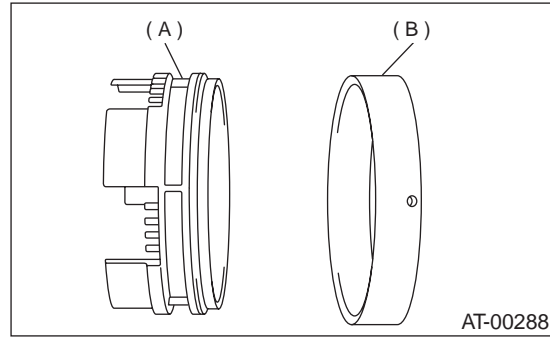
22) Separate 2-4 brake piston and piston retainer.



- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

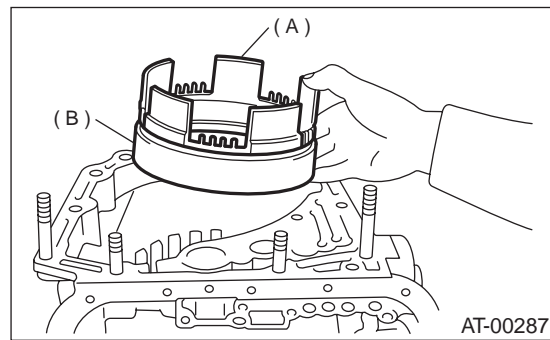
B: INSTALLATION

1) Install 2-4 brake piston to 2-4 brake piston retainer.



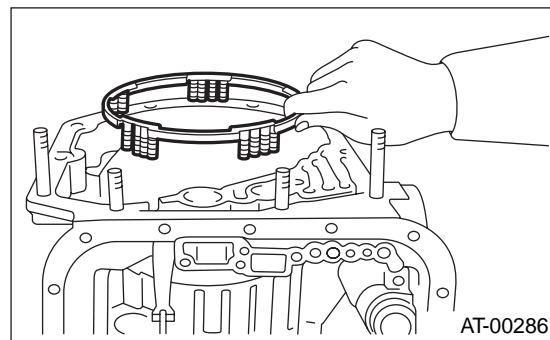
- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

2) Install the 2-4 brake piston and 2-4 brake retainer by aligning hole of 2-4 brake retainer and hole of transmission case.



- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

3) Install 2-4 brake piston return spring to transmission case.

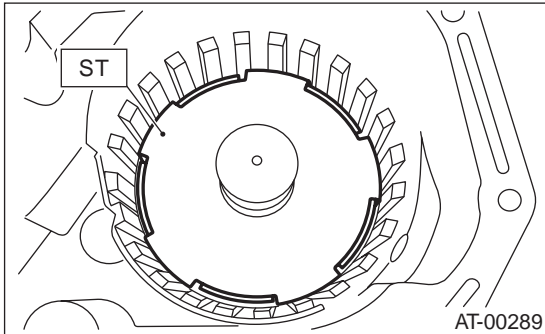


AT-145

2-4 BRAKE

AUTOMATIC TRANSMISSION

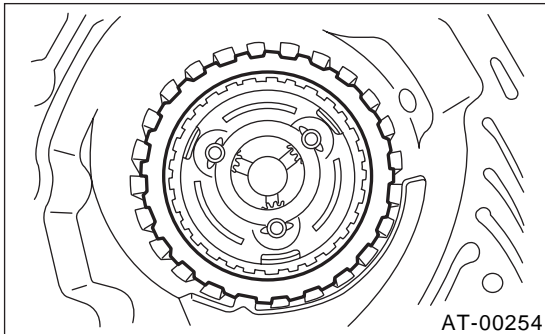
4) Position snap ring in transmission. Using ST, press the snap ring into place.
ST 498677100 COMPRESSOR



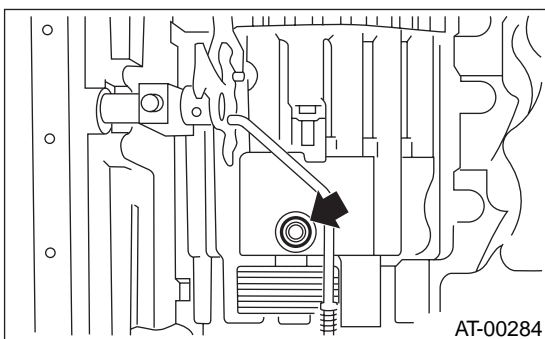
5) Install planetary gear and low clutch assembly to transmission case.

Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring. <Ref. to AT-136, INSTALLATION, Planetary Gear and Low Clutch.>

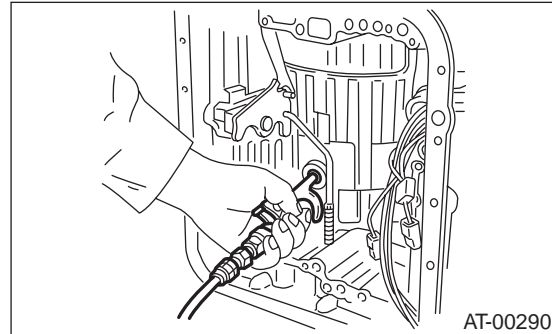
6) Install pressure plate, drive plate, driven plate, retaining plate and snap ring.



7) Install a new 2-4 brake oil seal to transmission case.

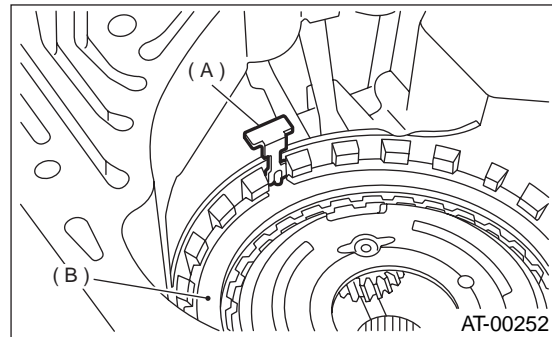


8) After all 2-4 brake component parts have been installed, blow in air intermittently and confirm the operation of the brake.



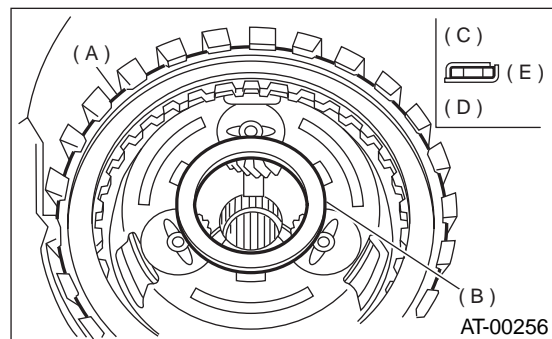
9) Check the clearance between the retaining plate and the snap ring. <Ref. to AT-148, INSPECTION, 2-4 Brake.>

10) Be careful not to mistake the location of the leaf spring to be inserted.



- (A) Leaf spring
- (B) Retaining plate

11) Install thrust needle bearing in the correct direction.



- (A) Snap ring
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside

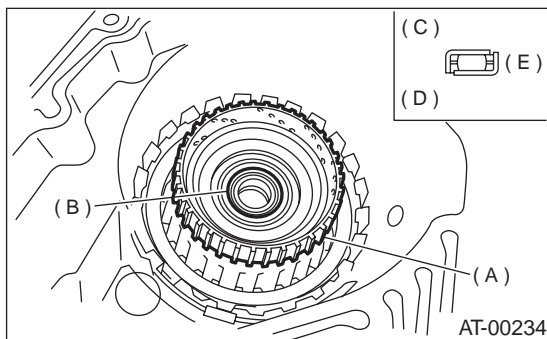
12) Install front sun gear.

AT-146

2-4 BRAKE

AUTOMATIC TRANSMISSION

13) Install thrust needle bearing in the correct direction.



- (A) High clutch hub
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

14) Install the high clutch assembly. <Ref. to AT-130, INSTALLATION, High Clutch and Reverse Clutch.>

15) Install oil pump housing to transmission case. <Ref. to AT-112, INSTALLATION, Oil Pump.>

16) Install the control valve body and oil pan. <Ref. to AT-61, INSTALLATION, Control Valve Body.>

17) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-109, INSTALLATION, Torque Converter Clutch Case.>

18) Install the reduction driven gear. <Ref. to AT-101, INSTALLATION, Reduction Driven Gear.>

19) Install the reduction drive gear. (MPT model) <Ref. to AT-103, INSTALLATION, Reduction Drive Gear.>

20) Install the center differential carrier. (VTD model) <Ref. to AT-105, INSTALLATION, Center Differential Carrier.>

21) Insert inhibitor switch and transmission connector into stay.

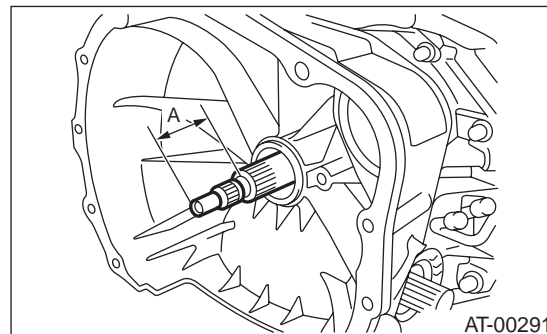
22) Install air breather hose. <Ref. to AT-82, INSTALLATION, Air Breather Hose.>

23) Install the oil cooler pipes. <Ref. to AT-79, INSTALLATION, ATF Cooler Pipe and Hose.>

24) Install the oil charger pipe with O-ring. <Ref. to AT-83, INSTALLATION, Oil Charger Pipe.>

25) Insert the input shaft while turning lightly by hand.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



26) Install the torque converter clutch assembly. <Ref. to AT-84, INSTALLATION, Torque Converter Clutch Assembly.>

27) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

AT-147

2-4 BRAKE

AUTOMATIC TRANSMISSION

C: INSPECTION

- Drive plate facing for wear and damage
- Snap ring for wear and spring retainer for deformation
- Lip seal and lathe cut seal ring for damage
- Measure the total end play and adjust to within specifications.<Ref. to AT-116, ADJUSTMENT, Oil Pump.>

1) Inspect the clearance between the retaining plate and the snap ring.

NOTE:

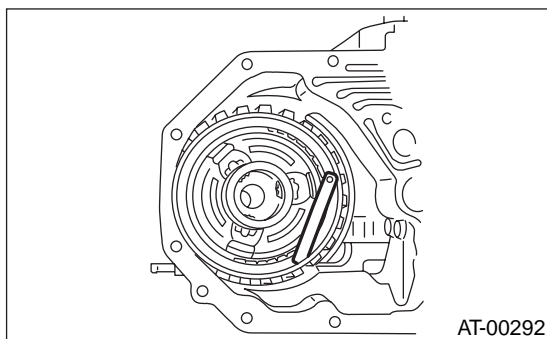
Select a retaining plate with a suitable value from the following table, so that the clearance becomes the standard value.

Standard value:

0.8 — 1.2 mm (0.031 — 0.047 in)

Allowable limit:

1.5 mm (0.059 in)



Available retaining plates	
Part No.	Thickness mm (in)
31567AA612	5.6 (0.220)
31567AA622	5.8 (0.228)
31567AA632	6.0 (0.236)
31567AA642	6.2 (0.244)
31567AA652	6.4 (0.252)
31567AA662	6.6 (0.260)

AT-148

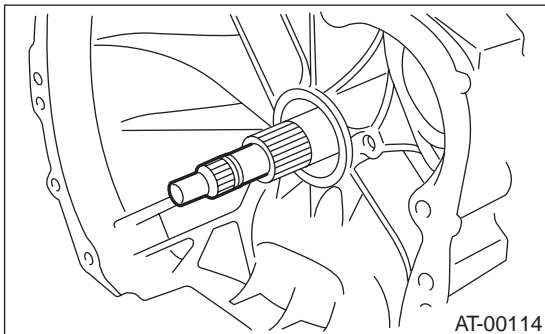
ONE-WAY CLUTCH

AUTOMATIC TRANSMISSION

41. One-way Clutch

A: REMOVAL

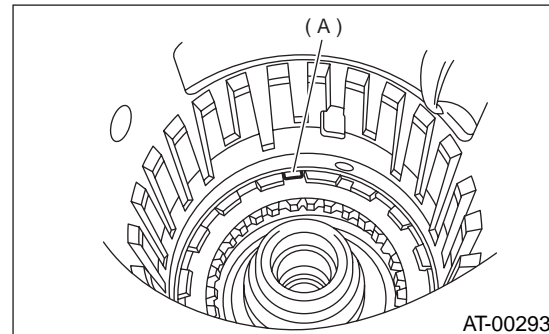
- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-84, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Disconnect the air breather hose. <Ref. to AT-82, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-83, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case. <Ref. to AT-108, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-85, REMOVAL, Extension Case.>
- 11) Remove the reduction driven gear. <Ref. to AT-100, REMOVAL, Reduction Driven Gear.>
- 12) Remove the reduction drive gear. (MPT model) <Ref. to AT-100, REMOVAL, Reduction Driven Gear.>
- 13) Remove the center differential carrier. (VTD model) <Ref. to AT-105, REMOVAL, Center Differential Carrier.>
- 14) Remove control valve assembly. <Ref. to AT-60, REMOVAL, Control Valve Body.>
- 15) Remove the oil pump housing. <Ref. to AT-111, REMOVAL, Oil Pump.>
- 16) Take out the high clutch and reverse clutch assembly. <Ref. to AT-129, REMOVAL, High Clutch and Reverse Clutch.>
- 17) Take out the thrust needle bearing, planetary gear assembly. <Ref. to AT-135, REMOVAL, Planetary Gear and Low Clutch.>

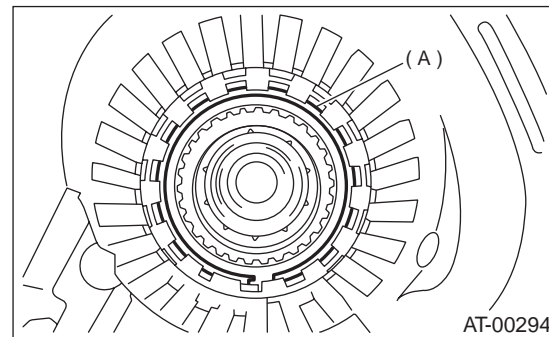
- 18) Take out 2-4 brake return spring, piston and piston retainer. <Ref. to AT-144, REMOVAL, 2-4 Brake.>

- 19) Pull out the leaf spring without folding.



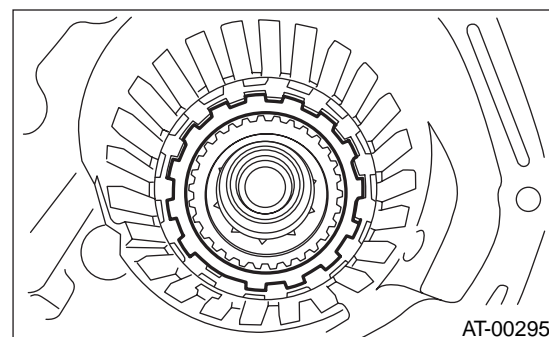
(A) Leaf spring

- 20) Remove snap ring.



(A) Snap ring

- 21) Take out retaining plate, drive plate, driven plate and dish plate.

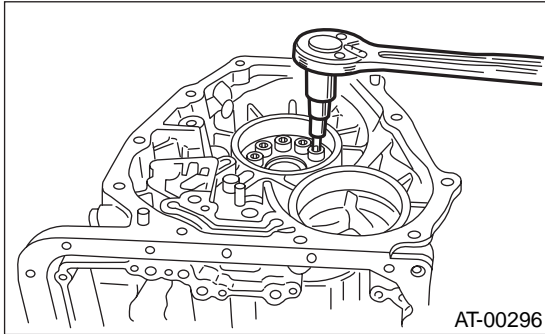


AT-149

ONE-WAY CLUTCH

AUTOMATIC TRANSMISSION

22) Turn the transmission case upside down, and then take out the socket bolts while holding the one-way clutch inner race with hand.

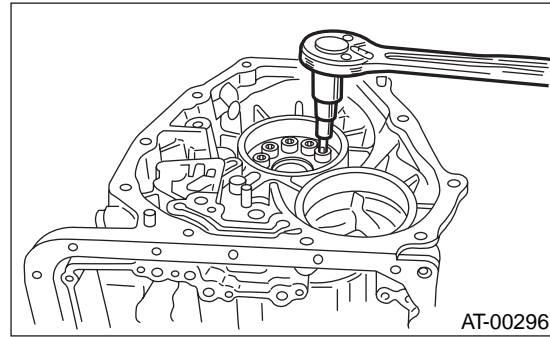


B: INSTALLATION

- 1) Install the one-way clutch inner race, spring retainer and return spring.
- 2) Tighten socket head bolts evenly from the rear side of the transmission case.

Tightening torque:

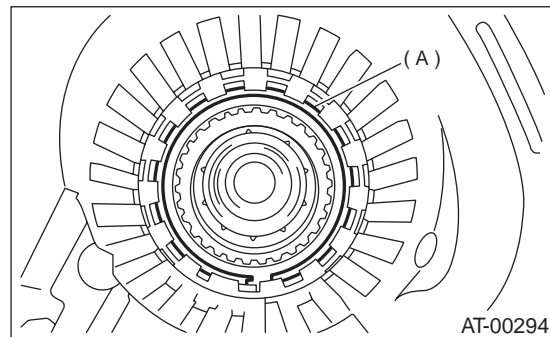
25 N·m (2.5 kgf·m, 18.1 ft·lb)



- 3) Place transmission case with the front facing up.
- 4) Install thrust needle bearing.
- 5) Installation of the low & reverse brake: Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

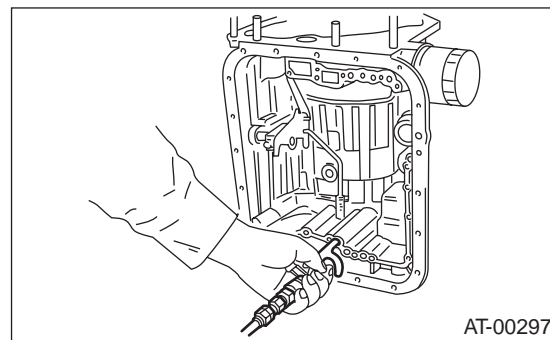
NOTE:

Pay attention to the orientation of the dish plate.



(A) Snap ring

- 6) Apply compressed air intermittently to check for operation.



- 7) Check the clearance and select retaining plate.
<Ref. to AT-156, INSPECTION, Low and Reverse Brake.>

AT-150

ONE-WAY CLUTCH

AUTOMATIC TRANSMISSION

8) Install 2-4 brake. <Ref. to AT-145, INSTALLATION, 2-4 Brake.>

9) Install planetary gear and low clutch assembly to transmission case.

Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring. <Ref. to AT-136, INSTALLATION, Planetary Gear and Low Clutch.>

10) Install the high clutch assembly. <Ref. to AT-130, INSTALLATION, High Clutch and Reverse Clutch.>

11) Install the oil pump housing assembly. <Ref. to AT-112, INSTALLATION, Oil Pump.>

12) Install control valve assembly and oil pan. <Ref. to AT-61, INSTALLATION, Control Valve Body.>

13) Install the torque converter clutch case assembly. <Ref. to AT-109, INSTALLATION, Torque Converter Clutch Case.>

14) Install reduction driven gear. <Ref. to AT-101, INSTALLATION, Reduction Driven Gear.>

15) Install reduction drive gear. (MPT model)

16) Install the center differential carrier. (VTD model) <Ref. to AT-105, INSTALLATION, Center Differential Carrier.>

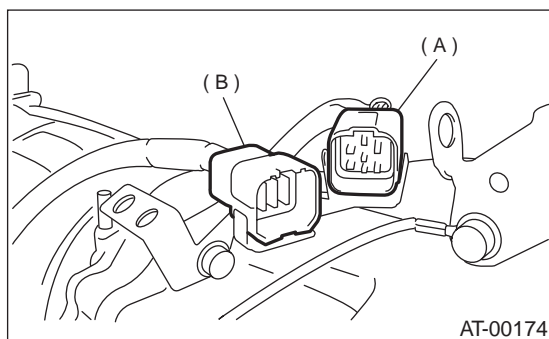
17) Install the extension case to the transmission case. <Ref. to AT-85, INSTALLATION, Extension Case.>

18) Install the rear vehicle speed sensor.

Tightening torque:

7 N·m (0.7 kgf·m, 5.1 ft·lb)

19) Insert inhibitor switch and transmission connector into stay.



- (A) Transmission harness
(B) Inhibitor switch harness

20) Install air breather hose. <Ref. to AT-82, INSTALLATION, Air Breather Hose.>

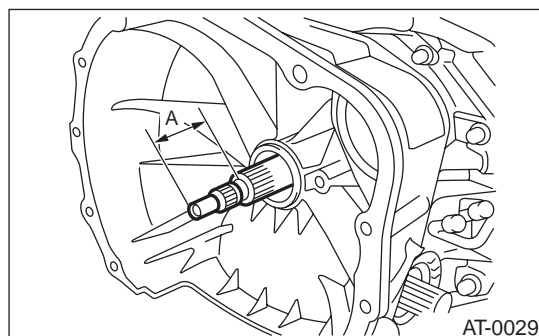
21) Install the oil cooler pipes. <Ref. to AT-79, INSTALLATION, ATF Cooler Pipe and Hose.>

22) Install the oil charger pipe with O-ring. <Ref. to AT-83, INSTALLATION, Oil Charger Pipe.>

23) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



24) Install the torque converter clutch assembly. <Ref. to AT-84, INSTALLATION, Torque Converter Clutch Assembly.>

25) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

AT-151

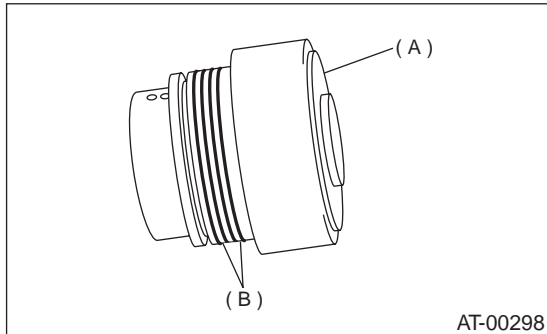
ONE-WAY CLUTCH

AUTOMATIC TRANSMISSION

C: DISASSEMBLY

1. ONE-WAY CLUTCH INNER RACE

1) Remove seal rings.

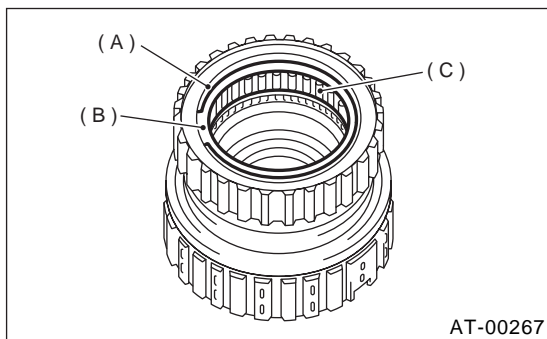


- (A) One way clutch inner race
- (B) Seal rings

2) Using ST, remove needle bearing.
ST 398527700 PULLER ASSY

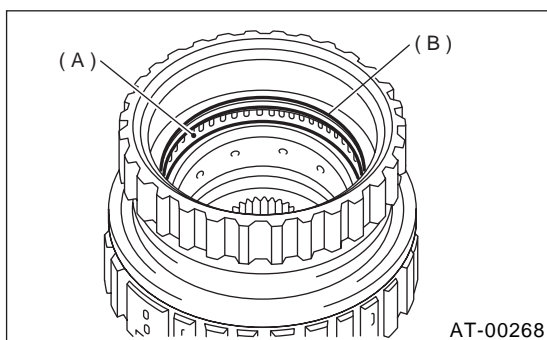
2. ONE-WAY CLUTCH OUTER RACE

1) Remove the one-way clutch after taking out the snap ring.



- (A) Snap ring
- (B) Plate
- (C) One-way clutch

2) Remove the needle bearing after taking out the snap ring.



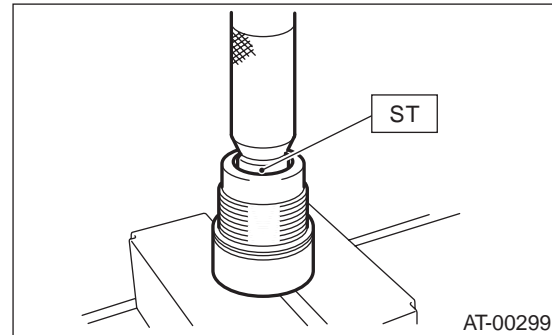
- (A) Needle bearing
- (B) Snap ring

D: ASSEMBLY

1. ONE-WAY CLUTCH INNER RACE

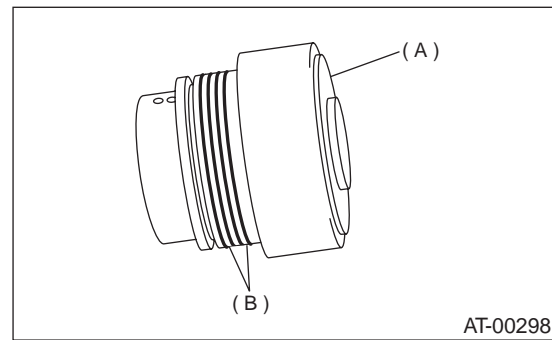
1) Using a press and ST, install the needle bearing to the inner race.

ST 398497701 ADAPTER



2) Apply vaseline to the groove of the inner race and to the seal ring.

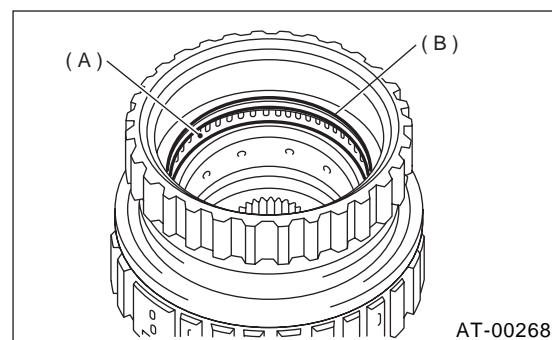
3) Install two seal rings to one-way clutch inner race.



- (A) One way clutch inner race
- (B) Seal rings

2. ONE-WAY CLUTCH OUTER RACE

1) Install the needle bearing, and secure with the snap ring.



- (A) Needle bearing
- (B) Snap ring

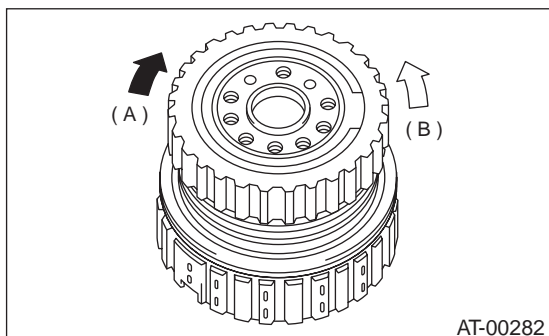
2) Install the one-way clutch, one-way clutch inner race and plate, and secure with the snap ring.

AT-152

ONE-WAY CLUTCH

AUTOMATIC TRANSMISSION

3) Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



- (A) Locked
- (B) Free

E: INSPECTION

- Make sure the snap ring is not worn and the seal rings are not damaged.
- Measure the total end play and adjust to within specifications. <Ref. to AT-116, ADJUSTMENT, Oil Pump.>

AT-153

LOW AND REVERSE BRAKE

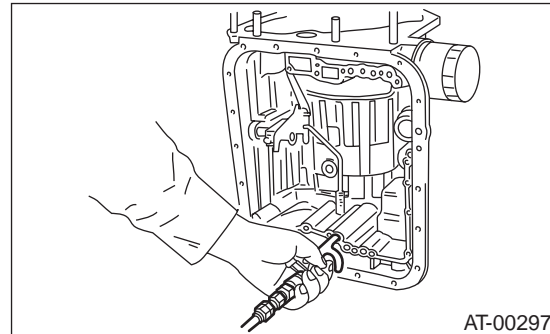
AUTOMATIC TRANSMISSION

42.Low and Reverse Brake

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-84, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.
- 4) Disconnect the air breather hose. <Ref. to AT-82, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-83, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-77, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case.<Ref. to AT-108, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-85, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. <Ref. to AT-103, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to AT-105, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to AT-100, REMOVAL, Reduction Driven Gear.>
- 14) Remove the oil pump housing. <Ref. to AT-111, REMOVAL, Oil Pump.>
- 15) Remove control valve assembly. <Ref. to AT-60, REMOVAL, Control Valve Body.>
- 16) Take out the high clutch and reverse clutch assembly. <Ref. to AT-129, REMOVAL, High Clutch and Reverse Clutch.>
- 17) Take out the thrust needle bearing, planetary gear assembly. <Ref. to AT-135, REMOVAL, Planetary Gear and Low Clutch.>
- 18) Take out 2-4 brake return spring, piston and piston retainer. <Ref. to AT-144, REMOVAL, 2-4 Brake.>
- 19) Remove one-way clutch inner race. <Ref. to AT-149, REMOVAL, One-way Clutch.>

- 20) Take out the low & reverse piston by applying compressed air.



- 21) Take out the spring retainer, return spring and low & reverse piston.

AT-154

LOW AND REVERSE BRAKE

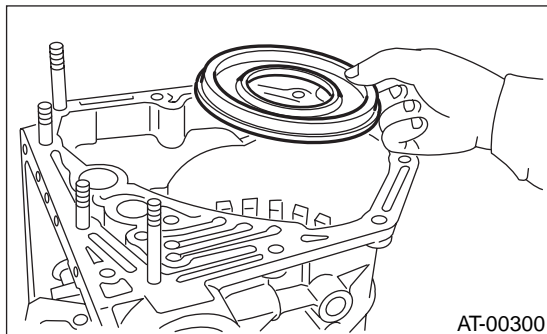
AUTOMATIC TRANSMISSION

B: INSTALLATION

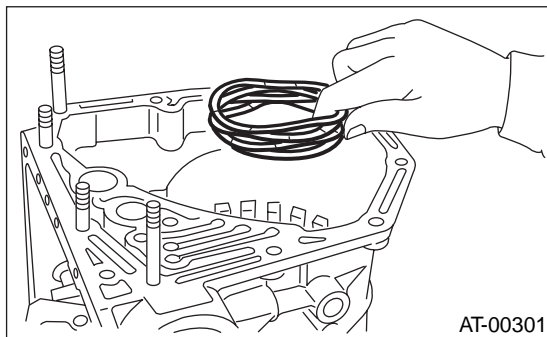
1) Install the low and reverse piston without tilting.

NOTE:

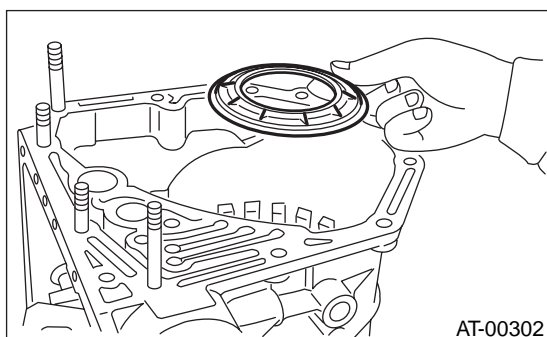
Be careful not to damage the lip seal.



2) Install return spring.



3) Install spring retainer.



4) Install the one-way clutch inner race. <Ref. to AT-150, INSTALLATION, One-way Clutch.>

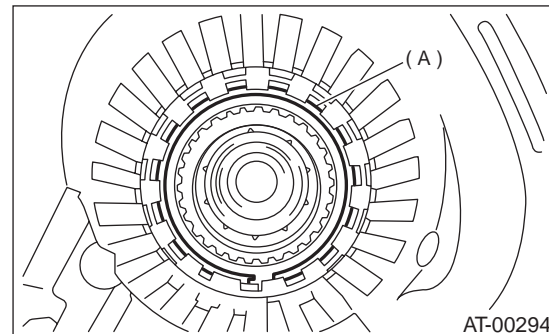
5) Install thrust needle bearing.

NOTE:

Place transmission case with the front facing up.

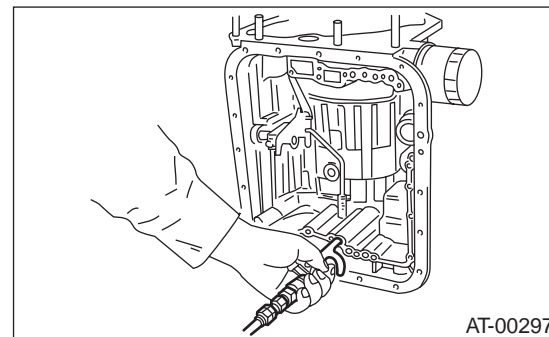
6) Installation of the low & reverse brake:
Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.**NOTE:**

Pay attention to the orientation of the dish plate.



(A) Snap ring

7) Apply compressed air intermittently to check for operation.

8) Check the clearance and select retaining plate.
<Ref. to AT-156, INSPECTION, Low and Reverse Brake.>

9) Install 2-4 brake piston, retainer and return spring to transmission case. <Ref. to AT-145, INSTALLATION, 2-4 Brake.>

10) Install planetary gear and low clutch assembly to transmission case.

Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring. <Ref. to AT-136, INSTALLATION, Planetary Gear and Low Clutch.>

11) Install the high clutch assembly. <Ref. to AT-130, INSTALLATION, High Clutch and Reverse Clutch.>

12) Install the oil pump housing assembly. <Ref. to AT-112, INSTALLATION, Oil Pump.>

13) Install the control assembly and oil pan. <Ref. to AT-61, INSTALLATION, Control Valve Body.>

14) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-109, INSTALLATION, Torque Converter Clutch Case.>

15) Install reduction driven gear.

<Ref. to AT-101, INSTALLATION, Reduction Driven Gear.>

AT-155

LOW AND REVERSE BRAKE

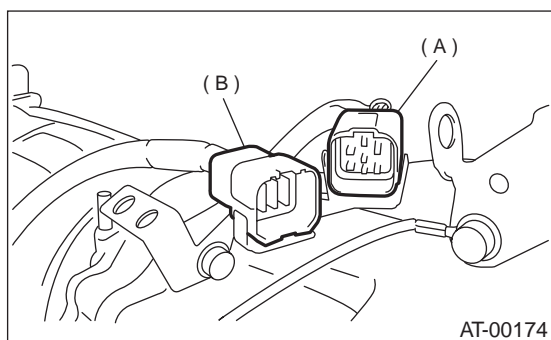
AUTOMATIC TRANSMISSION

16) Install reduction drive gear. <Ref. to AT-103, INSTALLATION, Reduction Drive Gear.>

17) Install the center differential carrier. (VTD model) <Ref. to AT-105, INSTALLATION, Center Differential Carrier.>

18) Install the extension case and rear vehicle speed sensor to the transmission case. <Ref. to AT-85, INSTALLATION, Extension Case.>

19) Insert inhibitor switch and transmission connector into stay.



- (A) Transmission harness
(B) Inhibitor switch harness

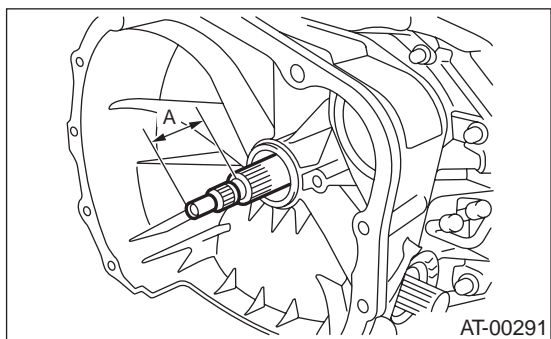
20) Install air breather hose. <Ref. to AT-82, INSTALLATION, Air Breather Hose.>

21) Install the oil cooler pipes. <Ref. to AT-79, INSTALLATION, ATF Cooler Pipe and Hose.>

22) Install the oil charger pipe with O-ring. <Ref. to AT-83, INSTALLATION, Oil Charger Pipe.>

23) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



24) Install the torque converter clutch assembly. <Ref. to AT-84, INSTALLATION, Torque Converter Clutch Assembly.>

25) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Check for the following.

- Drive plate facing for wear or damage
- Snap ring for wear and spring retainer for deformation

1) Place the same thickness of shim on both sides to prevent retaining plate from tilting.

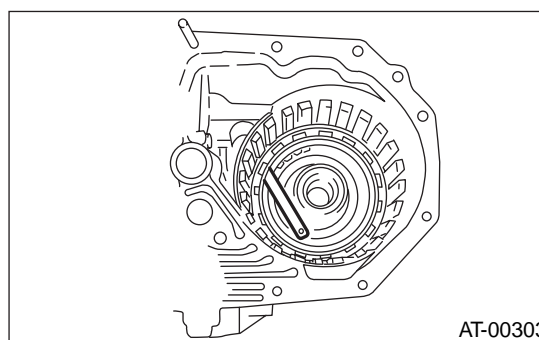
2) Inspect clearance and select retaining plate.

Standard value:

0.7 — 1.2 mm (0.028 — 0.047 in)

Allowable limit:

2.2 mm (0.087 in)



Available retaining plates	
Part No.	Thickness mm (in)
31667AA320	4.1 (0.161)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

AT-156

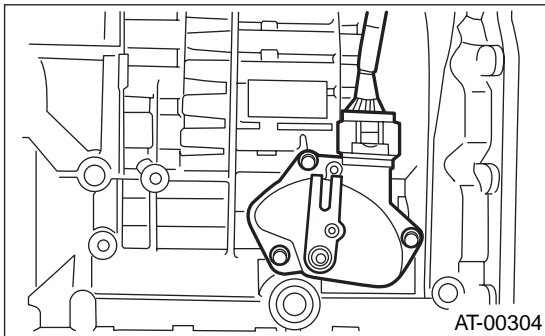
TRANSMISSION CONTROL DEVICE

AUTOMATIC TRANSMISSION

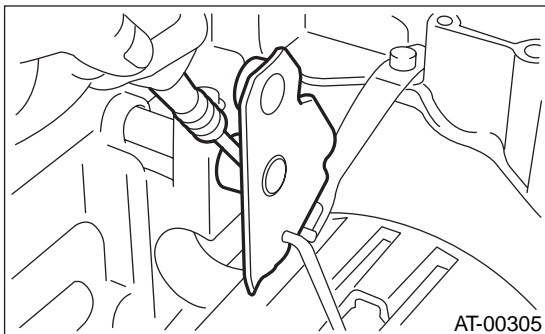
43. Transmission Control Device

A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-84, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.
- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect the air breather hoses. <Ref. to AT-82, REMOVAL, Air Breather Hose.>
- 6) Disconnect inhibitor switch connector from stay.
- 7) Wrap vinyl tape around the nipple attached to the air breather hose.
- 8) Remove pitching stopper bracket.
- 9) Remove the inhibitor switch.



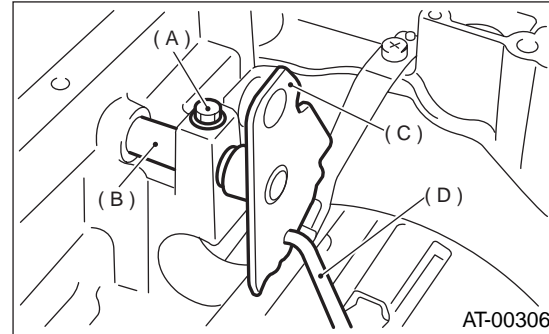
- 10) Remove control valve body assembly. <Ref. to AT-60, REMOVAL, Control Valve Body.>
- 11) Pull off the straight pin of manual plate.



- 12) Remove bolts securing select lever, then remove select lever, manual plate and parking rod.

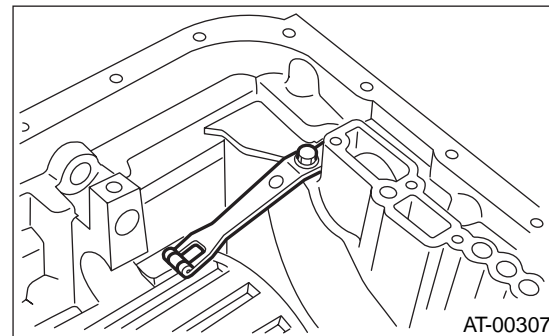
NOTE:

Be careful not to damage the lips of the press-fitted oil seal in the case.



- (A) Bolt
- (B) Range select lever
- (C) Manual plate
- (D) Parking rod

- 13) Remove the detention spring.



AT-157

TRANSMISSION CONTROL DEVICE

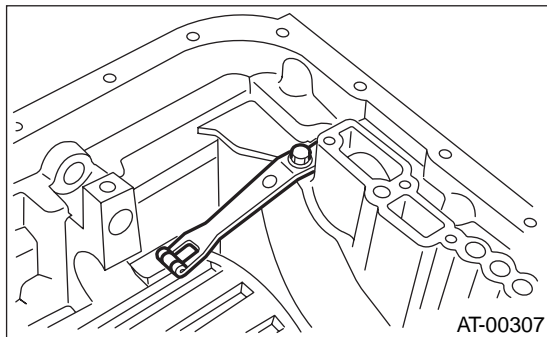
AUTOMATIC TRANSMISSION

B: INSTALLATION

1) Install detention spring to transmission case.

Tightening torque:

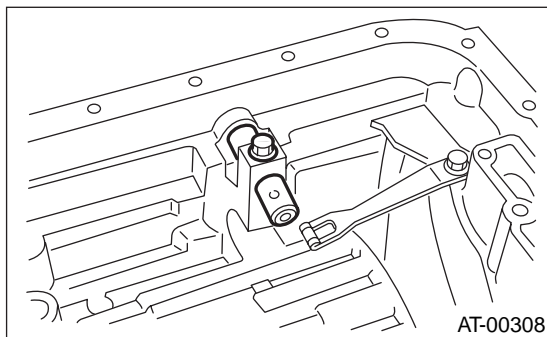
6 N·m (0.6 kgf-m, 4.3 ft-lb)



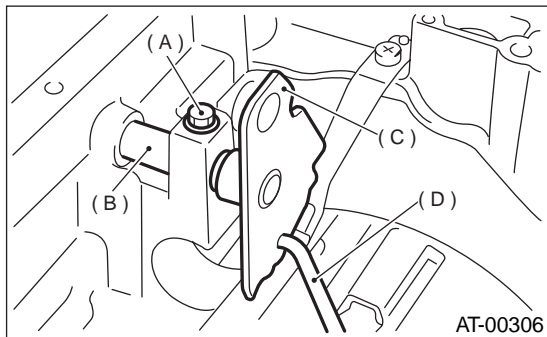
2) Insert range select lever, and tighten bolt.

Tightening torque:

6 N·m (0.6 kgf-m, 4.3 ft-lb)

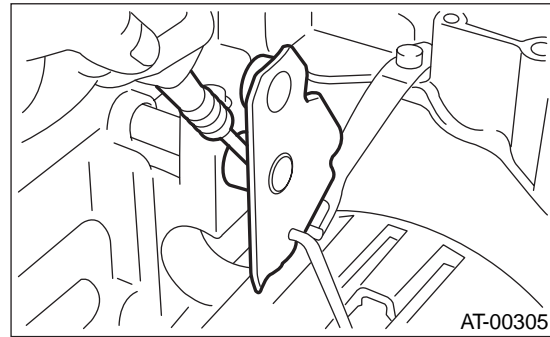


3) Insert manual plate and parking rod.



- (A) Bolt
- (B) Range select lever
- (C) Manual plate
- (D) Parking rod

4) Insert spring pin to manual plate.



5) Install control valve assembly and oil pan. <Ref. to AT-61, INSTALLATION, Control Valve Body.>

6) Turn over the transmission case to its original position.

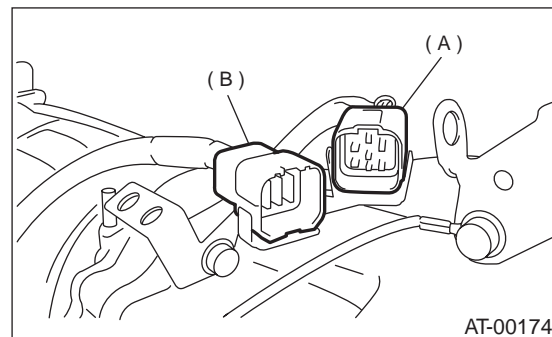
7) Install pitching stopper bracket.

Tightening torque:

41 N·m (4.2 kgf-m, 30.4 ft-lb)

8) Install inhibitor switch and adjust the inhibitor switch. <Ref. to AT-49, Inhibitor Switch.>

9) Insert inhibitor switch and transmission connector into stay.



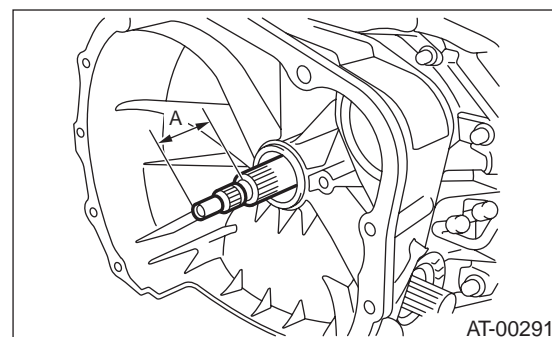
- (A) Transmission harness
- (B) Inhibitor switch harness

10) Install air breather hose. <Ref. to AT-82, INSTALLATION, Air Breather Hose.>

11) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



AT-158

TRANSMISSION CONTROL DEVICE

AUTOMATIC TRANSMISSION

- 12) Install the torque converter clutch assembly.
<Ref. to AT-84, INSTALLATION, Torque Converter Clutch Assembly.>
- 13) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Make sure the manual lever and detent spring are not worn or otherwise damaged.

AT-159

Vehicle-id:
SIE-id::C:INSPECTION

TRANSMISSION CONTROL DEVICE

AUTOMATIC TRANSMISSION

MEMO:

AT-160

Vehicle-id:
SIE-id::C:INSPECTION

~

BASIC DIAGNOSTIC PROCEDURE

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

1. Basic Diagnostic Procedure

A: PROCEDURE

Step	Value	Yes	No
1 CHECK PRE-INSPECTION. 1) Ask the customer when and how the trouble occurred using interview checklist. <Ref. to AT-5, Check List for Interview.> 2) Before performing diagnosis, inspect the following items which might influence the AT problems. •General inspection <Ref. to AT-6, INSPECTION, General Description.> •Oil leak •Stall speed test <Ref. to AT-33, Stall Test.> •Line pressure test <Ref. to AT-36, Line Pressure Test.> •Transfer clutch pressure test <Ref. to AT-38, Transfer Clutch Pressure Test.> •Time lag test <Ref. to AT-35, Time Lag Test.> •Road test <Ref. to AT-32, Road Test.> •Inhibitor switch <Ref. to AT-49, Inhibitor Switch.> Is unit that might influence the AT problem normal?	Normal.	Go to step 2.	Repair or replace each item.
2 CHECK AT OIL TEMP WARNING LIGHT. Turn ignition switch to ON. Does the AT OIL TEMP warning light light up?	Lights up.	Go to step 4.	Go to step 3.
3 CHECK AT OIL TEMP WARNING LIGHT. 1) Turn ignition switch to OFF. 2) Repair AT OIL TEMP warning light circuit or power supply and ground line circuit. <Ref. to AT-32, Diagnostic Procedure for AT OIL TEMP Warning Light.> 3) Turn ignition switch to ON. Is the AT OIL TEMP warning light flashing?	Lights up.	Go to step 4.	Go to step 5.
4 CHECK INDICATION OF DTC. Calling up the DTC. Without SUBARU SELECT MONITOR <Ref. to AT-26, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-27, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of the select monitor cannot be executed normally, check the communication circuit. <Ref. to AT-40, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Select Monitor Communication.> Is the DTC displayed?	DTC indicated.	Go to step 6. NOTE: Record all DTCs.	Go to step 5.

AT-2

BASIC DIAGNOSTIC PROCEDURE**AUTOMATIC TRANSMISSION (DIAGNOSTICS)**

Step	Value	Yes	No
5 PERFORM THE GENERAL DIAGNOSTICS. 1) Inspect using "Diagnostic Procedure for No-diagnostic Trouble Code (DTC)". <Ref. to AT-129, Diagnostic Procedure for No-diagnostic Trouble Code (DTC).> 2) Inspect using "Symptom Related Diagnostic". <Ref. to AT-160, Symptom Related Diagnostic.> 3) Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-29, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-29, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to AT-28, Inspection Mode.> Calling up the diagnostic trouble code (DTC). Without SUBARU SELECT MONITOR <Ref. to AT-26, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-27, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> Is the DTC displayed?	DTC indicated.	Go to step 6.	Complete the diagnosis.

BASIC DIAGNOSTIC PROCEDURE

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
<p>6 PERFORM THE DIAGNOSIS.</p> <p>1) Inspect using "Diagnostics Chart with Diagnostic Trouble Code". <Ref. to AT-44, Diagnostic Procedure with Diagnostic Trouble Code (DTC).></p> <p>NOTE: For trouble code table, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to AT-31, List of Diagnostic Trouble Code (DTC).></p> <p>2) Repair trouble cause.</p> <p>3) Perform the clear memory mode. With SUBARU SELECT MONITOR <Ref. to AT-29, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> Without SUBARU SELECT MONITOR <Ref. to AT-29, WITHOUT SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.></p> <p>4) Perform the inspection mode. <Ref. to AT-28, Inspection Mode.></p> <p>5) Calling up the diagnostic trouble code (DTC). Without SUBARU SELECT MONITOR <Ref. to AT-26, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> With SUBARU SELECT MONITOR <Ref. to AT-27, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> Is the DTC displayed?</p>	<p>DTC indicated.</p>	<p>Inspect using "Diagnostics Chart with Diagnostic Connector". <Ref. to AT-44, Diagnostic Procedure with Diagnostic Trouble Code (DTC).></p>	<p>Complete the diagnosis.</p>

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

3. General Description

A: CAUTION

- **Supplemental Restraint System "Airbag"**

Airbag system wiring harness is routed near the transmission control module (TCM).

CAUTION:

- All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
- Be careful not to damage airbag system wiring harness when performing diagnostics and servicing the TCM.
- **Measurement**

When measuring voltage and resistance of the ECM, TCM or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin more than 0.65 mm (0.0256 in).

B: INSPECTION

1. BATTERY

Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V or more

Specific gravity: Above 1.260

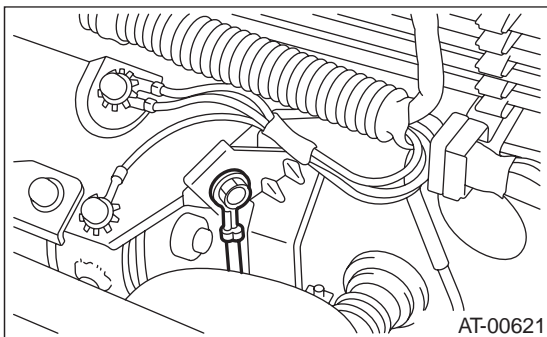
2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

- **Chassis side**

Tightening torque:

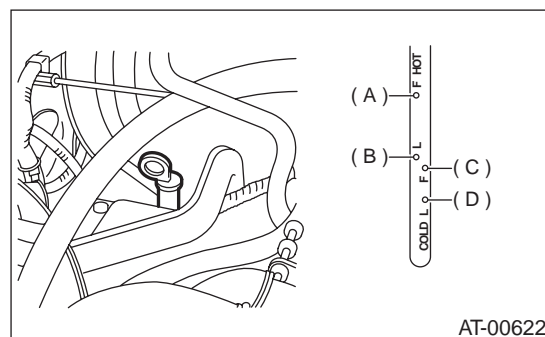
13 N·m (1.3 kgf·m, 9.4 ft·lb)



3. ATF LEVEL

Make sure that ATF level is in the specification.

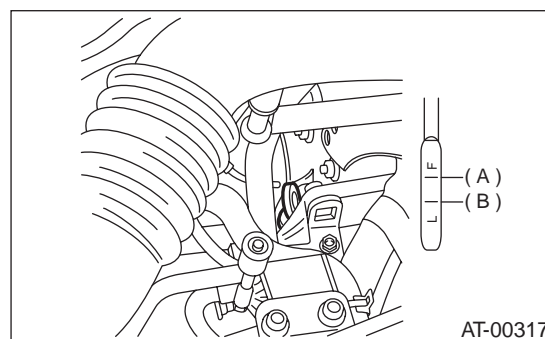
<Ref. to AT-30, INSPECTION, Automatic Transmission Fluid.>



- (A) Upper level (hot)
- (B) Lower level (hot)
- (C) Upper level (cold)
- (D) Lower level (cold)

4. FRONT DIFFERENTIAL OIL LEVEL

Make sure that front differential oil level is in the specification. <Ref. to AT-31, INSPECTION, Differential Gear Oil.>



- (A) Upper level
- (B) Lower level

5. OPERATION OF SHIFT SELECT LEVER

Make sure there is no abnormal noise, dragging or contact pattern in each select lever range.

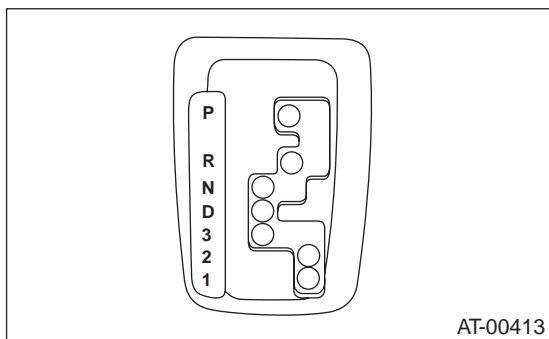
WARNING:

Stop the engine while checking operation of select lever.

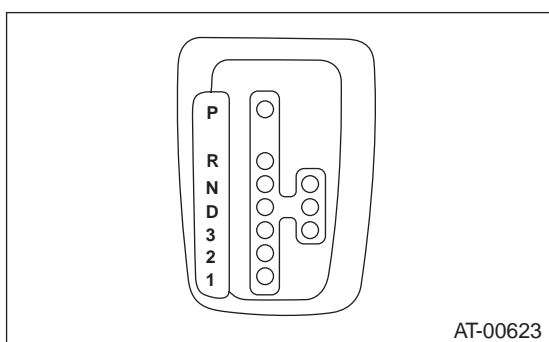
GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

- Without SPORT shift



- With SPORT shift



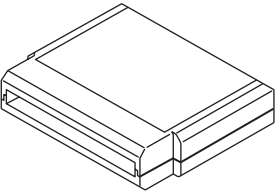

AT-7

GENERAL DESCRIPTION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA210	24082AA210 (Newly adopted tool)	CARTRIDGE	Troubleshooting for electrical systems.
 ST22771AA030	22771AA030	SELECT MONI- TOR KIT	Troubleshooting for electrical systems. <ul style="list-style-type: none"> • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

AT-8

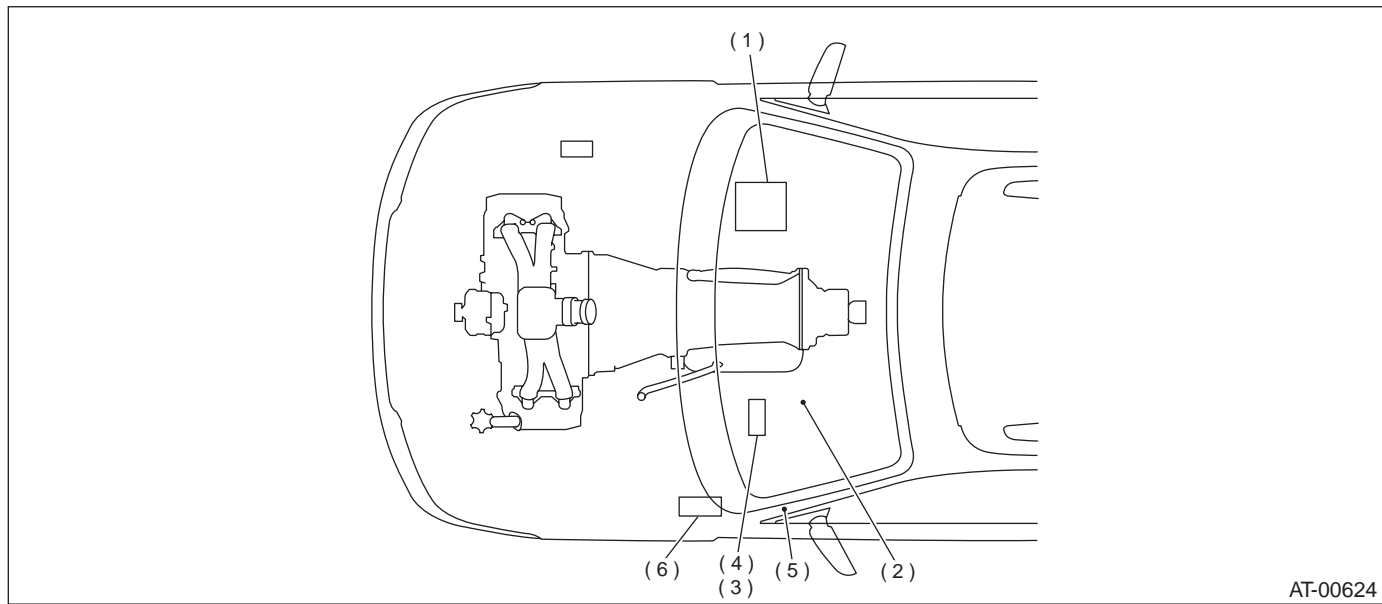
ELECTRICAL COMPONENTS LOCATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

4. Electrical Components Location

A: LOCATION

1. CONTROL MODULE



- (1) Engine control module (ECM)
- (2) AT OIL TEMP warning light (AT diagnostic indicator light)
- (3) Transmission control module (TCM) (Without VDC system and SPORT shift)

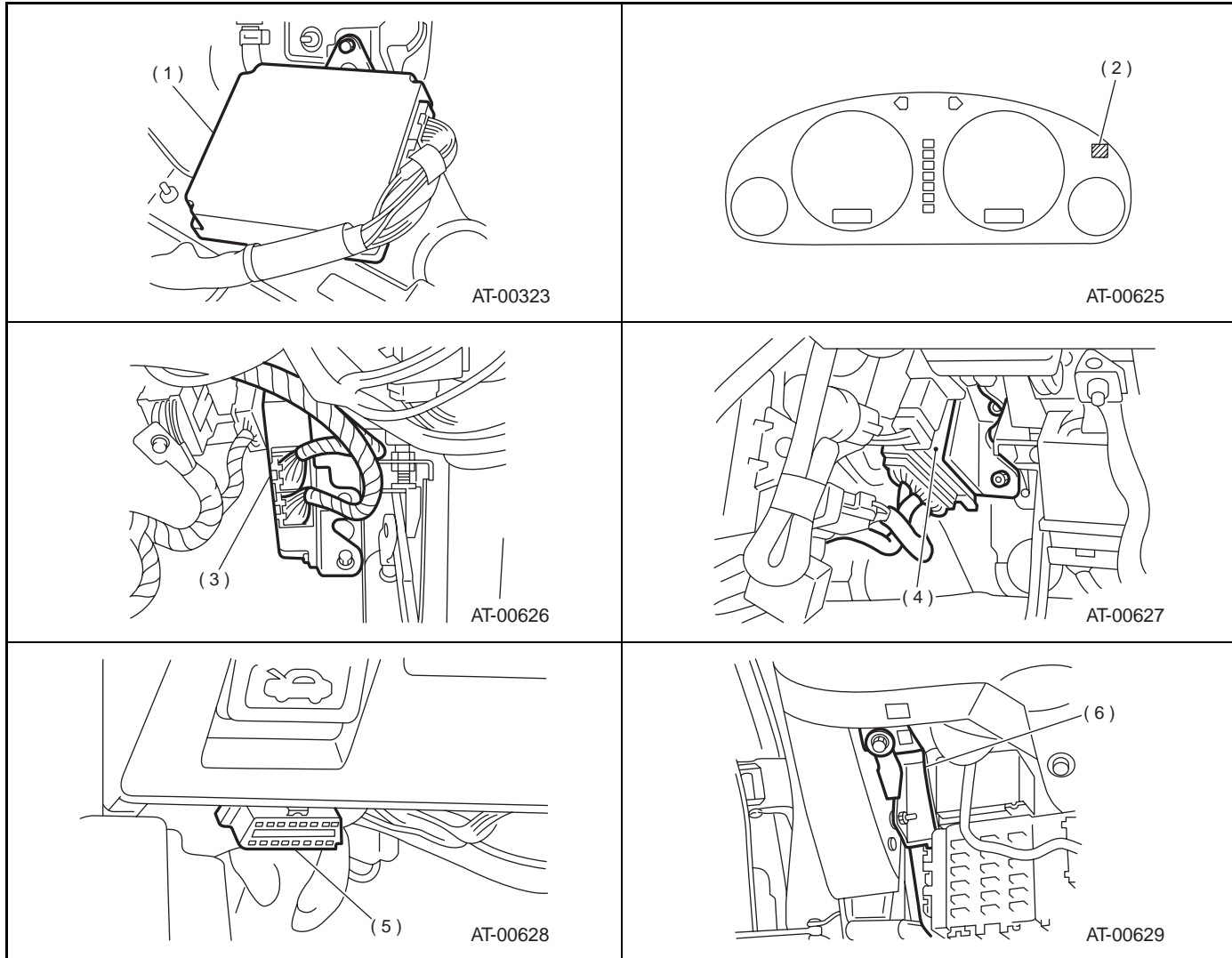
- (4) Transmission control module (TCM) (With VDC system or SPORT shift)
- (5) Data link connector

- (6) Vehicle dynamic control module (With VDC system)

AT-9

ELECTRICAL COMPONENTS LOCATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

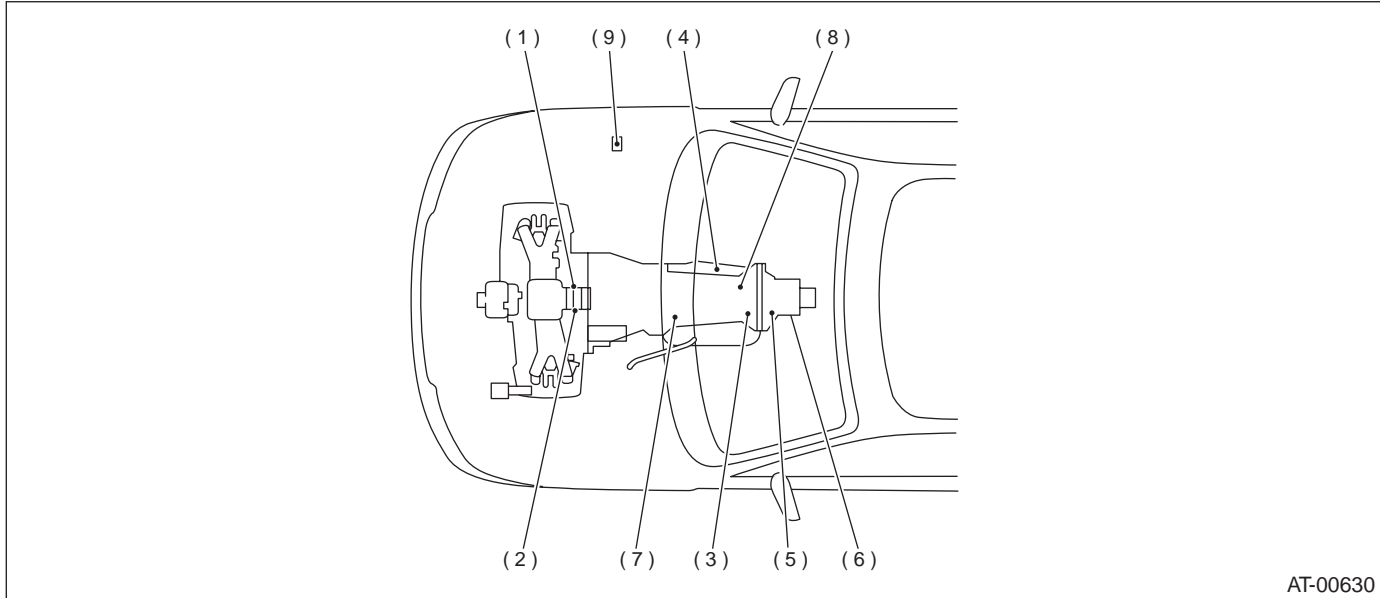


AT-10

ELECTRICAL COMPONENTS LOCATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. SENSOR



AT-00630

(1) Throttle position sensor (2.5L model)

(2) Throttle position sensor (3.0L model)

(3) Front vehicle speed sensor

(4) Inhibitor switch

(5) Rear vehicle speed sensor (Without VDC system and SPORT shift)

(6) Rear vehicle system sensor (With VDC system or SPORT shift)

(7) Torque converter turbine speed signal

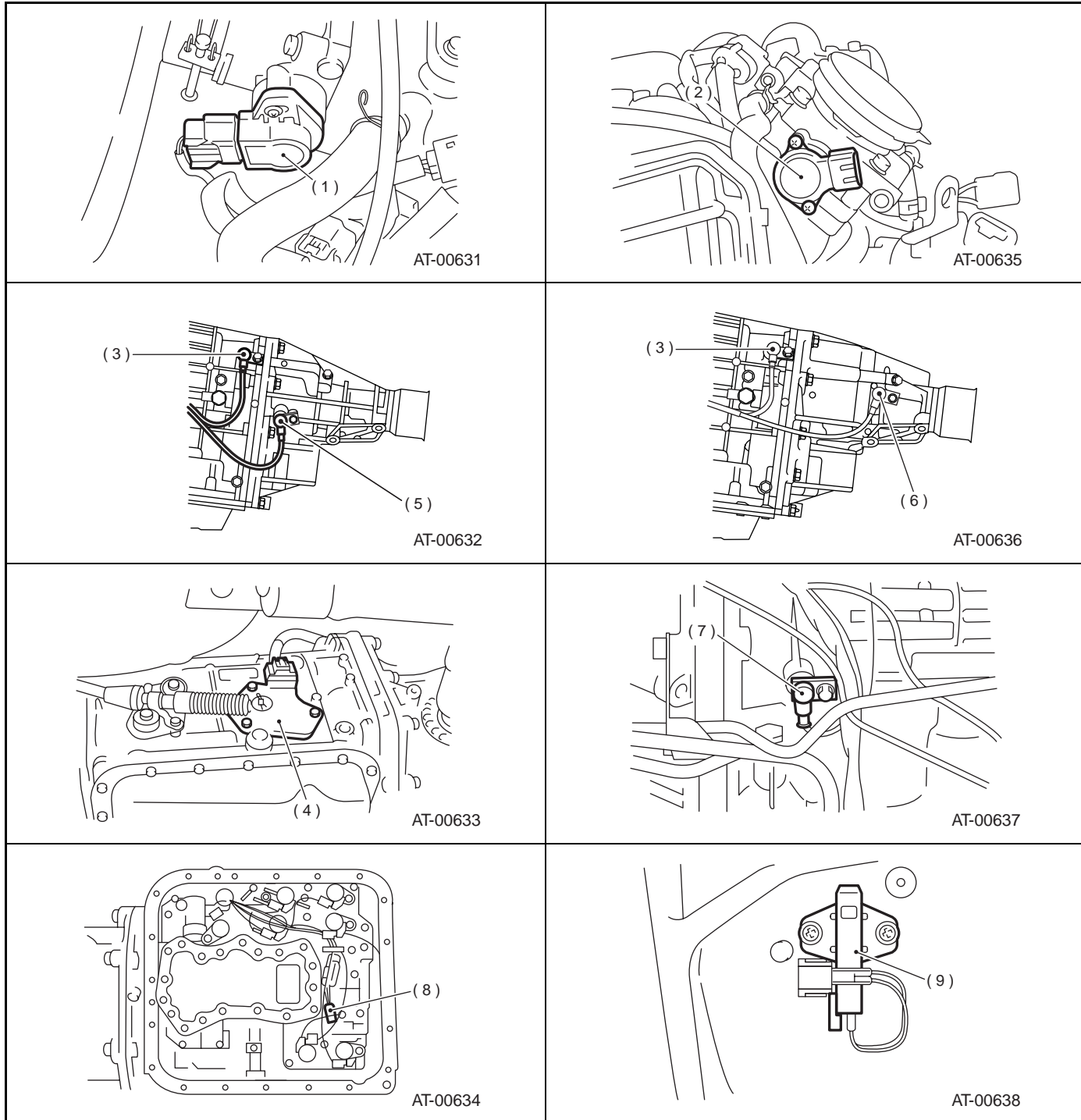
(8) ATF temperature sensor

(9) Dropping resistor (With VDC system or SPORT shift)

AT-11

ELECTRICAL COMPONENTS LOCATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

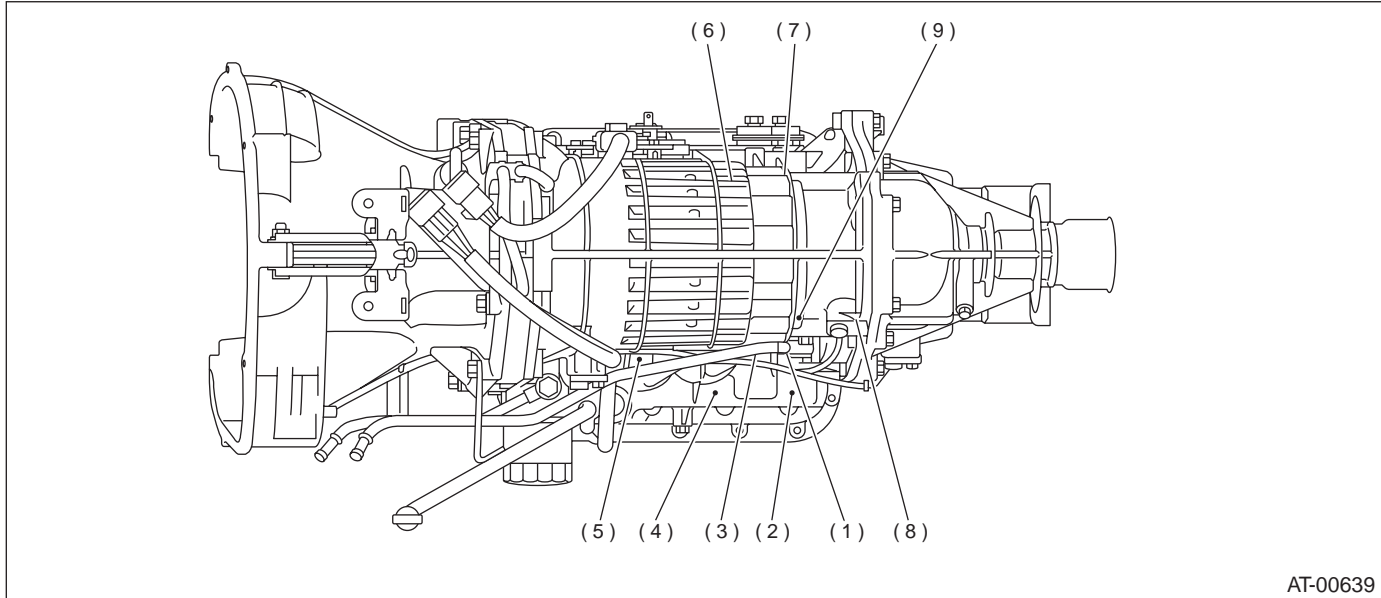


AT-12

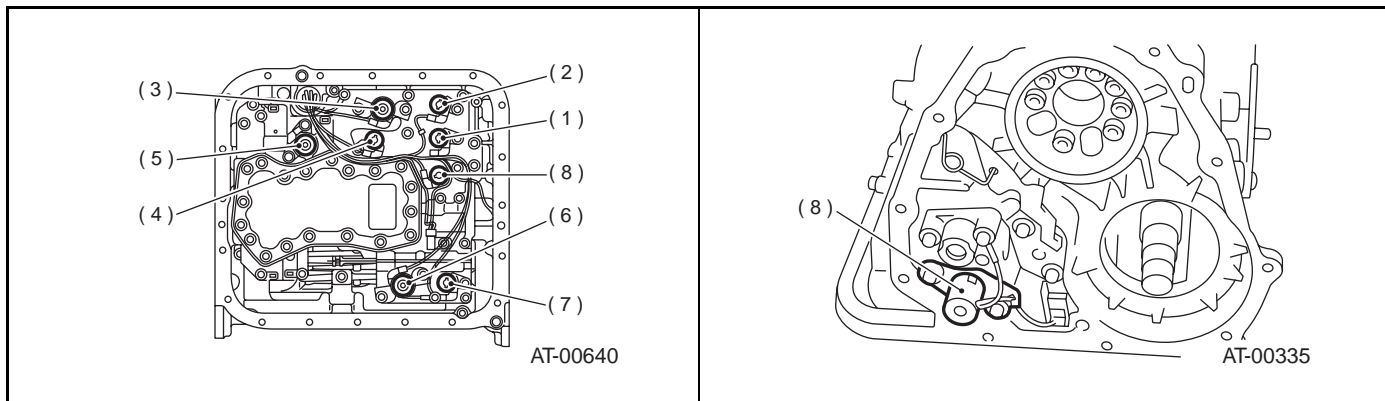
ELECTRICAL COMPONENTS LOCATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

3. SOLENOID



- | | | |
|---------------------------------|--------------------------------|---|
| (1) Solenoid 1 | (4) Low clutch timing solenoid | (7) 2-4 brake timing solenoid |
| (2) Solenoid 2 | (5) Lock-up duty solenoid | (8) Transfer duty solenoid |
| (3) Line pressure duty solenoid | (6) 2-4 brake duty solenoid | (9) SPORT shift solenoid (With SPORT shift) |



AT-13

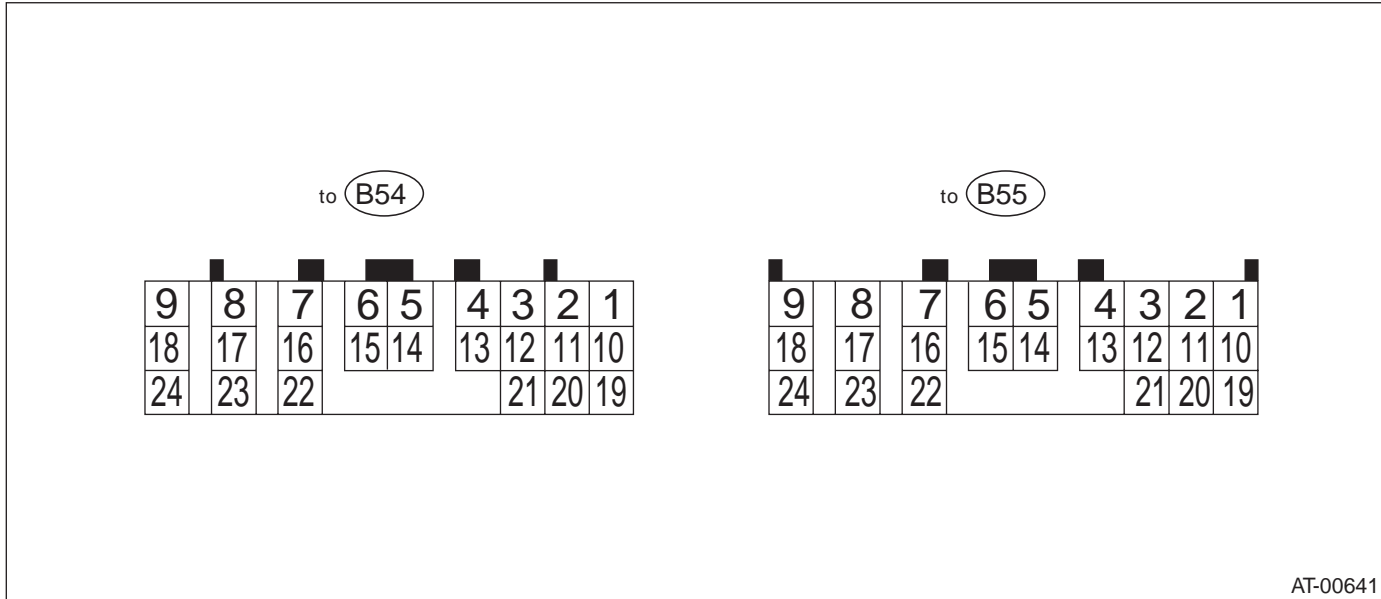
TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

5. Transmission Control Module (TCM) I/O Signal

A: ELECTRICAL SPECIFICATION

1. WITHOUT VDC SYSTEM AND SPORT SHIFT



Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply	B55	6	Ignition switch OFF	10 — 13	—
Ignition power supply	B54	23	Ignition switch ON (with engine OFF)	10 — 13	—
	B54	24			
Inhibitor switch	"P" range switch	B55	23	Select lever in "P" range	Less than 1
				Select lever in any other than "P" range (except "N" range)	More than 8
	"N" range switch	B55	22	Select lever in "N" range	Less than 1
				Select lever in any other than "N" range (except "P" range)	More than 8
	"R" range switch	B55	17	Select lever in "R" range	Less than 1
				Select lever in any other than "R" range	More than 8
	"D" range switch	B55	8	Select lever in "D" range	Less than 1
				Select lever in any other than "D" range	More than 8
	"3" range switch	B55	18	Select lever in "3" range	Less than 1
				Select lever in any other than "3" range	More than 8
	"2" range switch	B54	10	Select lever in "2" range	Less than 1
				Select lever in any other than "2" range	More than 8
	"1" range switch	B54	1	Select lever in "1" range	Less than 1
				Select lever in any other than "1" range	More than 8
Brake switch	B55	24	Brake pedal depressed.	More than 10.5	
			Brake pedal released.	Less than 1	
ABS signal	B54	19	ABS switch ON	Less than 1	
			ABS switch OFF	More than 6.5	
"AT OIL TEMP" warning light	B54	3	Light ON	Less than 1	
			Light OFF	More than 9	
Throttle position sensor	B55	2	Throttle fully closed.	0.2 — 1.0	
			Throttle fully open.	4.2 — 4.7	

AT-14

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Throttle position sensor power supply	B55	1	Ignition switch ON (With engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B55	11	ATF temperature 20°C (68°F)	1.6 — 2.0	2.1 — 2.9 k
			ATF temperature 80°C (176°F)	0.4 — 0.9	275 — 375
Rear vehicle speed sensor	B55	3	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	5	Vehicle stopped	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Torque converter turbine speed sensor	B55	12	Engine idling after warm-up (D range)	0	450 — 650
			Engine idling after warm-up (N range)	More than 1 (AC range)	
Vehicle speed output signal	B55	13	Vehicle speed at most 10 km/h (6 MPH)	Less than 1 ← → More than 4	—
Engine speed signal	B55	4	Ignition switch ON (with engine OFF)	0	—
			Ignition switch ON (with engine ON)	0 — 13 or more	
Cruise set signal	B54	11	When cruise control is set (SET light ON)	Less than 1	—
			When cruise control is not set (SET light OFF)	More than 6.5	
Torque control signal 1	B54	13	Ignition switch ON (with engine ON)	More than 4.0	—
Torque control signal 2	B54	21	Ignition switch ON (with engine ON)	More than 4.0	—
Torque control cut signal	B54	2	Ignition switch ON	8	—
Intake manifold pressure signal	B55	20	Engine idling after warm-up.	0.4 — 1.6	—
Shift solenoid 1	B54	7	1st gear	More than 9	10 — 16
			3rd gear	Less than 1	
Shift solenoid 2	B54	6	2nd gear	More than 9	10 — 16
			4th gear	Less than 1	
Line pressure duty solenoid	B54	9	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 1	
Line pressure dropping resistor	B54	18	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
Lock-up duty solenoid	B54	16	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid	B54	15	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	8	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 5.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake dropping resistor	B54	17	Throttle fully closed (with engine OFF) after warm-up.	More than 8.5	9 — 15
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	

AT-15

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

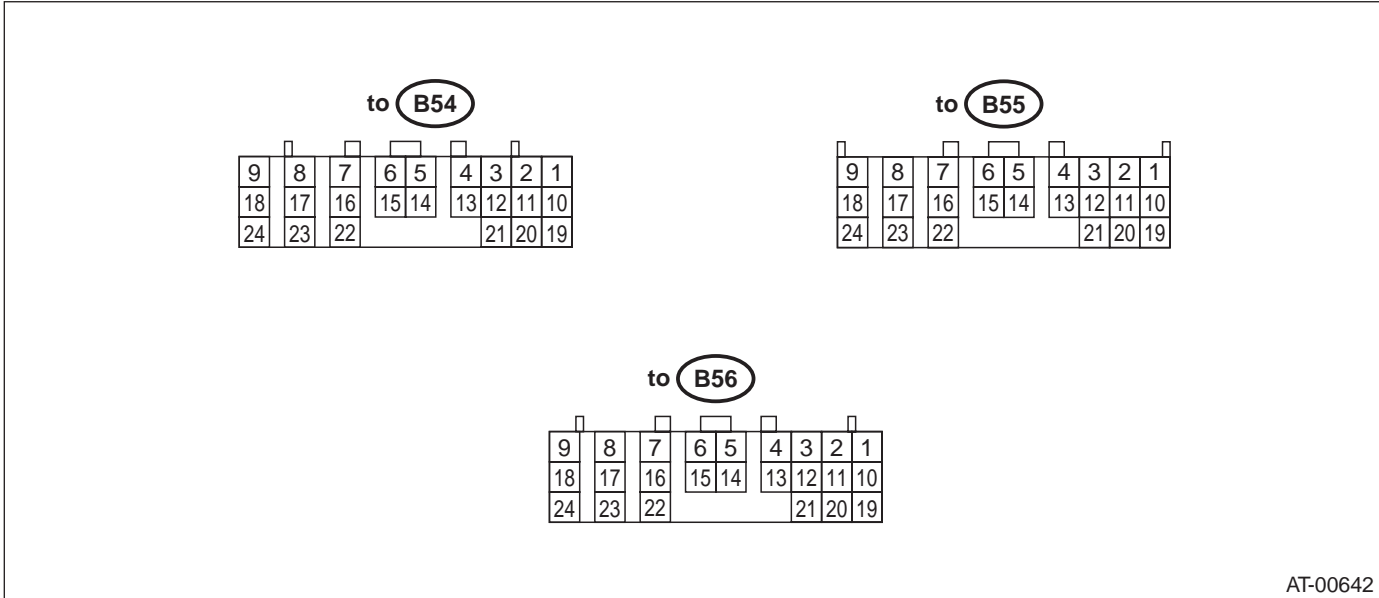
Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
2-4 brake timing solenoid	B54	5	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	14	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
Sensor ground line 1	B55	10	—	0	Less than 1
Sensor ground line 2	B55	21	—	0	Less than 1
System ground line	B55	9	—	0	Less than 1
		19			
FWD switch	B55	14	Fuse removed.	More than 9	—
			Fuse installed.	Less than 1	
FWD indicator light	B54	12	Fuse on FWD switch	Less than 1	—
			Fuse removed from FWD switch	More than 9	
AT diagnosis signal (Waveform)	B54	4	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B55	7	—	—	—

AT-16

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

2. WITH VDC SYSTEM OR SPORT SHIFT



Check with ignition switch ON.						
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)	
Back-up power supply	B56	1	Ignition switch OFF	10 — 13	—	
Ignition power supply	B54	23	Ignition switch ON (with engine OFF)	10 — 13	—	
	B54	24				
Inhibitor switch	"P" range switch	B55	1	Select lever in "P" range	Less than 1	—
				Select lever in any other than "P" range (except "N" range)	More than 8	
	"N" range switch	B55	14	Select lever in "N" range	Less than 1	—
				Select lever in any other than "N" range (except "P" range)	More than 8	
	"R" range switch	B55	3	Select lever in "R" range	Less than 1	—
				Select lever in any other than "R" range	More than 8	
	"D" range switch	B55	4	Select lever in "D" range	Less than 1	—
				Select lever in any other than "D" range	More than 8	
	"3" range switch	B55	5	Select lever in "3" range	Less than 1	—
				Select lever in any other than "3" range	More than 8	
	"2" range switch	B55	6	Select lever in "2" range	Less than 1	—
				Select lever in any other than "2" range	More than 8	
	"1" range switch	B55	7	Select lever in "1" range	Less than 1	—
				Select lever in any other than "1" range	More than 8	
Brake switch	B55	12	Brake pedal depressed.	More than 10.5	—	
			Brake pedal released.	Less than 1		
VDC communication signal +	B56	9	Ignition ON	(+) — (-) Pulse signal	—	
VDC communication signal -	B56	18		(+) — (-) Pulse signal	—	
AT OIL TEMP warning light	B56	10	Light ON	Less than 1	—	
			Light OFF	More than 9		
Throttle position sensor	B54	3	Throttle fully closed.	0.2 — 1.0	—	
			Throttle fully open.	4.2 — 4.7		

AT-17

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL**AUTOMATIC TRANSMISSION (DIAGNOSTICS)**

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Throttle position sensor power supply	B54	2	Ignition switch ON (With engine OFF)	4.8 — 5.3	—
ATF temperature sensor	B54	11	ATF temperature 20°C (68°F)	1.6 — 2.0	2.1 k — 2.9 k
			ATF temperature 80°C (176°F)	0.4 — 0.9	275 — 375
Rear vehicle speed sensor	B55	24	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor	B55	18	Vehicle stopped.	0	450 — 650
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Torque converter turbine speed sensor	B55	8	Engine idling after warm-up. (D range)	0	450 — 650
			Engine idling after warm-up. (N range)	More than 1 (AC range)	
Vehicle speed output signal	B56	17	Vehicle speed at most 10 km/h (6 MPH)	Less than 1 ← → More than 4	—
Engine speed signal	B55	17	Ignition switch ON (with engine OFF)	0	—
			Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal	B55	22	When cruise control is set (SET lamp ON)	Less than 1	—
			When cruise control is not set (SET lamp OFF)	More than 6.5	
Torque control signal 1	B56	5	Ignition switch ON (with engine ON)	More than 4	—
Torque control signal 2	B56	14	Ignition switch ON (with engine ON)	More than 4	—
Torque control cut signal	B55	10	Ignition switch ON	8	—
Intake manifold pressure signal	B54	1	Engine idling after warm-up.	0.4 — 1.6	—
Shift solenoid 1	B54	22	1st or 4th gear	More than 9	10 — 16
			2nd or 3rd gear	Less than 1	
Shift solenoid 2	B54	5	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	
Line pressure duty solenoid	B54	9	Ignition switch ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 4.0	2.0 — 4.5
			Ignition switch ON (with engine OFF) Throttle fully open after warm-up.	Less than 0.5	
Lock-up duty solenoid	B54	7	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid	B54	6	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
2-4 brake duty solenoid	B54	18	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 4.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	16	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	15	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
ABS signal (Without VDC system)	B55	21	ABS switch ON	Less than 1	—
			ABS switch OFF	6.5 — 15	—
Sensor ground line 1	B54	20	—	0	Less than 1
Sensor ground line 2	B55	9	—	0	Less than 1

AT-18

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

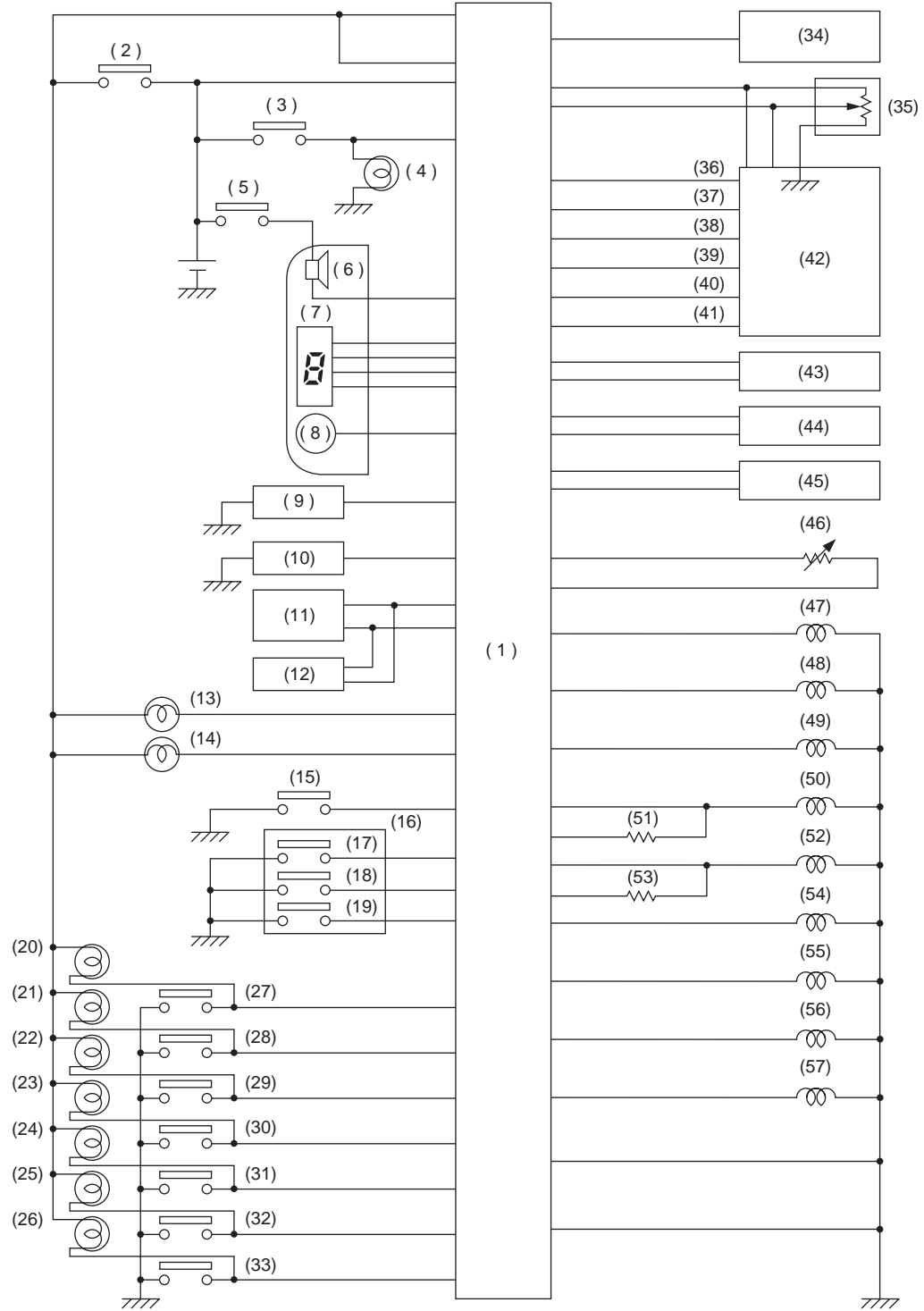
Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
System ground line	B56	19	—	0	Less than 1
	B54	21			
Sensor ground line 3	B54	10	—	0	Less than 1
Sensor ground line 4	B54	19	—	0	Less than 1
AT diagnosis signal (Waveform)	B56	21	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B56	15	—	—	—
SPORT shift solenoid (with SPORT shift)	B54	14	SPORT shift activated	More than 8	10 — 17
			SPORT shift deactivated	Less than 1	
SPORT shift mode switch (with SPORT shift)	B55	15	SPORT shift mode switch ON	Less than 1	—
			SPORT shift mode switch OFF	More than 8	
Shift up switch (with SPORT shift)	B55	13	Shift up switch ON	Less than 1	—
			Shift up switch OFF	More than 8	
Shift down switch (with SPORT shift)	B55	12	Shift down switch ON	Less than 1	—
			Shift down switch OFF	More than 8	
Buzzer (with SPORT shift)	B56	21	ON	Less than 1	—
			OFF	More than 8	
SPORT shift indicator (with SPORT shift)	B56	12	SPORT shift mode OFF	More than 4	—
			Shift down indicator ON	Less than 1	
SPORT shift indicator (with SPORT shift)	B56	13	SPORT shift mode OFF	More than 4	—
			SPORT shift mode with 4th gear	Less than 1	
SPORT shift indicator (with SPORT shift)	B56	3	SPORT shift mode OFF	More than 4	—
			SPORT shift mode with 2nd and 3rd gear	Less than 1	
SPORT shift indicator (with SPORT shift)	B56	4	SPORT shift mode OFF	More than 4	—
			SPORT shift mode with 1st and 3rd gear	Less than 1	

AT-19

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: SCHEMATIC



AT-00643

AT-20

TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

- | | | |
|---|--------------------------------------|---|
| (1) Transmission control module | (20) "P" range indicator light | (45) Torque converter turbine speed sensor |
| (2) Ignition switch | (21) "R" range indicator light | (46) ATF temperature sensor |
| (3) Brake switch | (22) "N" range indicator light | (47) Shift solenoid 1 |
| (4) Brake light | (23) "D" range indicator light | (48) Shift solenoid 2 |
| (5) Ignition relay | (24) "3" range indicator light | (49) 2-4 brake timing solenoid |
| (6) Buzzer (with SPORT shift) | (25) "2" range indicator light | (50) 2-4 brake duty solenoid |
| (7) SPORT shift indicator (with SPORT shift) | (26) "1" range indicator light | (51) 2-4 brake dropping resistor (without VDC system and SPORT shift) |
| (8) Speedometer | (27) "P" range switch | (52) Line pressure duty solenoid |
| (9) Cruise control module | (28) "R" range switch | (53) Line pressure dropping resistor (without VDC system and SPORT shift) |
| (10) ABS control module (without VDC system) | (29) "N" range switch | (54) Lock-up duty solenoid |
| (11) VDC control module (with VDC system) | (30) "D" range switch | (55) Low clutch timing solenoid |
| (12) Steering angle sensor (with VDC system) | (31) "3" range switch | (56) Transfer duty solenoid |
| (13) FWD indicator light (without VDC system and SPORT shift) | (32) "2" range switch | (57) SPORT shift solenoid (with SPORT shift) |
| (14) "AT OIL TEMP" warning light | (33) "1" range switch | |
| (15) FWD switch (without VDC system and SPORT shift) | (34) Data link connector | |
| (16) SPORT shift (with SPORT shift) | (35) Throttle position sensor | |
| (17) SPORT shift mode switch | (36) Engine speed signal | |
| (18) Up switch | (37) Torque control cut signal | |
| (19) Down switch | (38) Torque control signal 2 | |
| | (39) Torque control signal 1 | |
| | (40) Intake manifold pressure signal | |
| | (41) AT diagnosis signal | |
| | (42) Engine control module | |
| | (43) Front vehicle speed sensor | |
| | (44) Rear vehicle speed sensor | |

AT-21

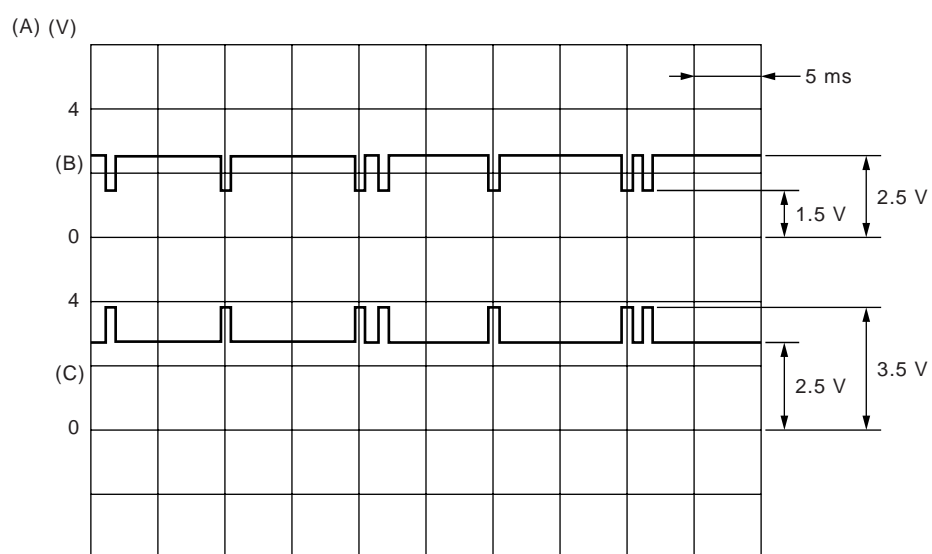
TRANSMISSION CONTROL MODULE (TCM) I/O SIGNAL

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: MEASUREMENT

Only for models with VDC system, measure input/output signal voltage.

1. WAVEFORM



AT-00644

- (A) Can communication line
- (B) Terminal No. :
(B56) No. 9 — (B55) No. 9
- (C) Terminal No. :
(B56) No. 18 — (B55) No. 9

AT-22

SUBARU SELECT MONITOR

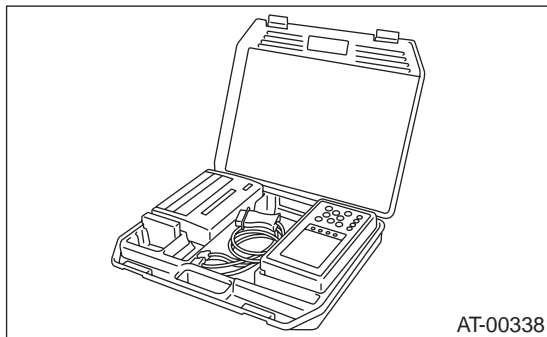
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

6. Subaru Select Monitor

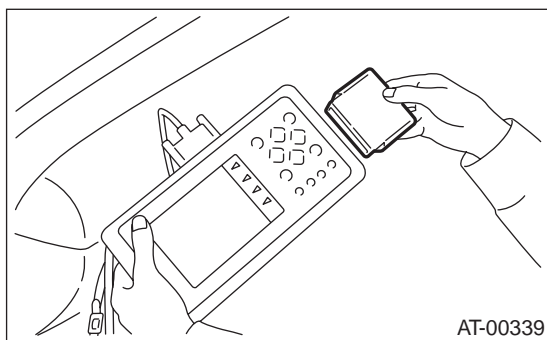
A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE

- 1) Prepare Subaru Select Monitor kit.
<Ref. to AT-8, PREPARATION TOOL, General Description.>

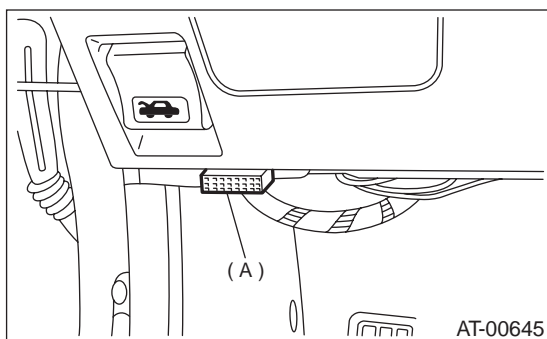


- 2) Connect diagnosis cable to Subaru Select Monitor.
3) Insert cartridge into Subaru Select Monitor.



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

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



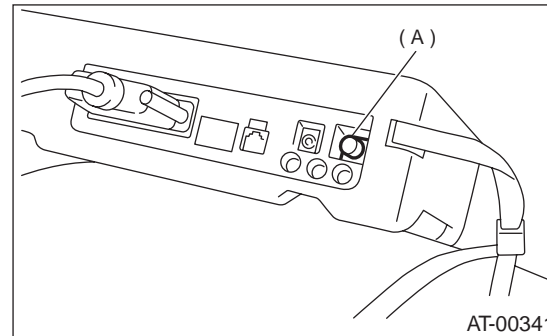
(A) Data link connector

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

NOTE:

Do not connect scan tools except for Subaru Select Monitor and OBD-II general scan tool.

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



(A) Power switch

- 6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
8) Press the [YES] key after displayed the information of transmission type.
9) On the «Transmission Diagnosis» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.
10) On the «Diagnostic Code(s) Display» display screen, select the {Latest Diagnostic Code(s)} or {Memorized Diagnostic Code(s)} and press the [YES] key.

NOTE:

• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

• For detailed concerning diagnostic trouble codes, refer to the DIAGNOSTIC TROUBLE CODE LIST. <Ref. to AT-31, 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 Control System} and press the [YES] key.
3) Press the [YES] key after displayed the information of transmission type.
4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.

SUBARU SELECT MONITOR

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

5) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.

6) Using the scroll key, move the display screen up or down until the desired data is shown.

- A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h or MPH
Front vehicle speed sensor signal	Front Wheel Speed	km/h or MPH
Engine speed signal	Engine Speed	rpm
Automatic transmission fluid temperature signal	ATF Temp.	°C or °F
Throttle position signal	Throttle Sensor Voltage	V
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lock up clutch control duty ratio	Lock Up Duty Ratio	%
Transfer clutch control duty ratio	Transfer Duty Ratio	%
Power supply for throttle position sensor	Throttle Sensor Power	V
Torque converter turbine speed signal	Turbine Revolution Speed	rpm
2-4 brake timing pressure control duty ratio	Brake Clutch Duty Ratio	%
Intake manifold pressure sensor voltage	Mani. Pressure Voltage	V
FWD switch signal (Without VDC system and SPORT shift)	FWD Switch	ON or OFF
Stop lamp switch signal	Stop Light Switch	ON or OFF
SPORT shift mode signal	Tip Mode Switch	ON or OFF
Shift-up signal (With SPORT shift)	Down Switch	ON or OFF
Shift-down signal (With SPORT shift)	Up Switch	ON or OFF
Anti lock brake system signal	ABS Signal	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
Parking range signal	P Range Signal	ON or OFF
Neutral range signal	N Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
Shift control solenoid A	Shift Solenoid #1	ON or OFF
Shift control solenoid B	Shift Solenoid #2	ON or OFF
Torque control output signal #1	Torque Control Signal 1	ON or OFF
Torque control output signal #2	Torque Control Signal 2	ON or OFF
Torque control cut signal	Torque Control Cut Sig.	ON or OFF
2-4 brake timing control solenoid valve	2-4 Brake Timing Sol.	ON or OFF
Low clutch timing control solenoid valve	Low Clutch Timing Sol.	ON or OFF
SPORT shift solenoid valve (With SPORT shift)	Tip solenoid	ON or OFF
Automatic transmission diagnosis indicator lamp	Diagnosis Lamp	ON or OFF
Automatic transmission fluid temperature lamp	ATF Temperature Lamp	ON or OFF

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

SUBARU SELECT MONITOR

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

3. 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 {Transmission Control System} and press the [YES] key.
- 3) Press the [YES] key after displayed the information of transmission type.
- 4) On the «Transmission Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.
- 5) When the `Done' and `Turn Ignition Switch OFF' are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:

For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

AT-25

READ DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. WITHOUT SUBARU SELECT MONITOR

Step	Value	Yes	No
1 PERFORM READ DIAGNOSTIC TROUBLE CODE (DTC). 1) Warm-up the engine. 2) Turn ignition switch to OFF. 3) Turn ignition switch to ON. 4) Start the engine. 5) Drive vehicle at speeds greater than 20 km/h (12 MPH). 6) Stop vehicle. 7) Brake pedal depressed and move select lever to 1 range. 8) Turn ignition switch to OFF. 9) Turn ignition switch to ON. 10) Move select lever 2 range. 11) Move select lever 1 range. 12) Move select lever 2 range. 13) Move select lever 3 range. 14) Move select lever D range. Does indicator light blink at 4-Hz intervals? NOTE: Blinks every 0.125 (1/8) seconds (until ignition switch is turned OFF).	Blinks at 4-Hz intervals.	Repair power supply and ground circuit. <Ref. to AT-36, CHECK POWER SUPPLY AND GROUND LINE, Diagnostic Procedure for AT OIL TEMP Warning Light.>	Go to step 2.
2 CHECK INDICATOR LIGHT. Does indicator light blink at 2-Hz intervals? NOTE: Blinks every 0.25 (1/4) seconds (until ignition switch is turned OFF).	Blinks at 2-Hz intervals.	AT system is normal.	Go to step 3.
3 CHECK INDICATOR LIGHT. Is DTC displayed?	DTC indicated.	Inspect problem corresponding with DTC. NOTE: Record all DTCs.	Go to step 4.
4 CHECK INDICATOR LIGHT. Does indicator light remain illuminated?	Remains illuminated.	Repair AT OIL TEMP warning light circuit <Ref. to AT-32, Diagnostic Procedure for AT OIL TEMP Warning Light.> , or Inspect inhibitor switch, wiring, TCM, etc.	Calling up trouble code again.

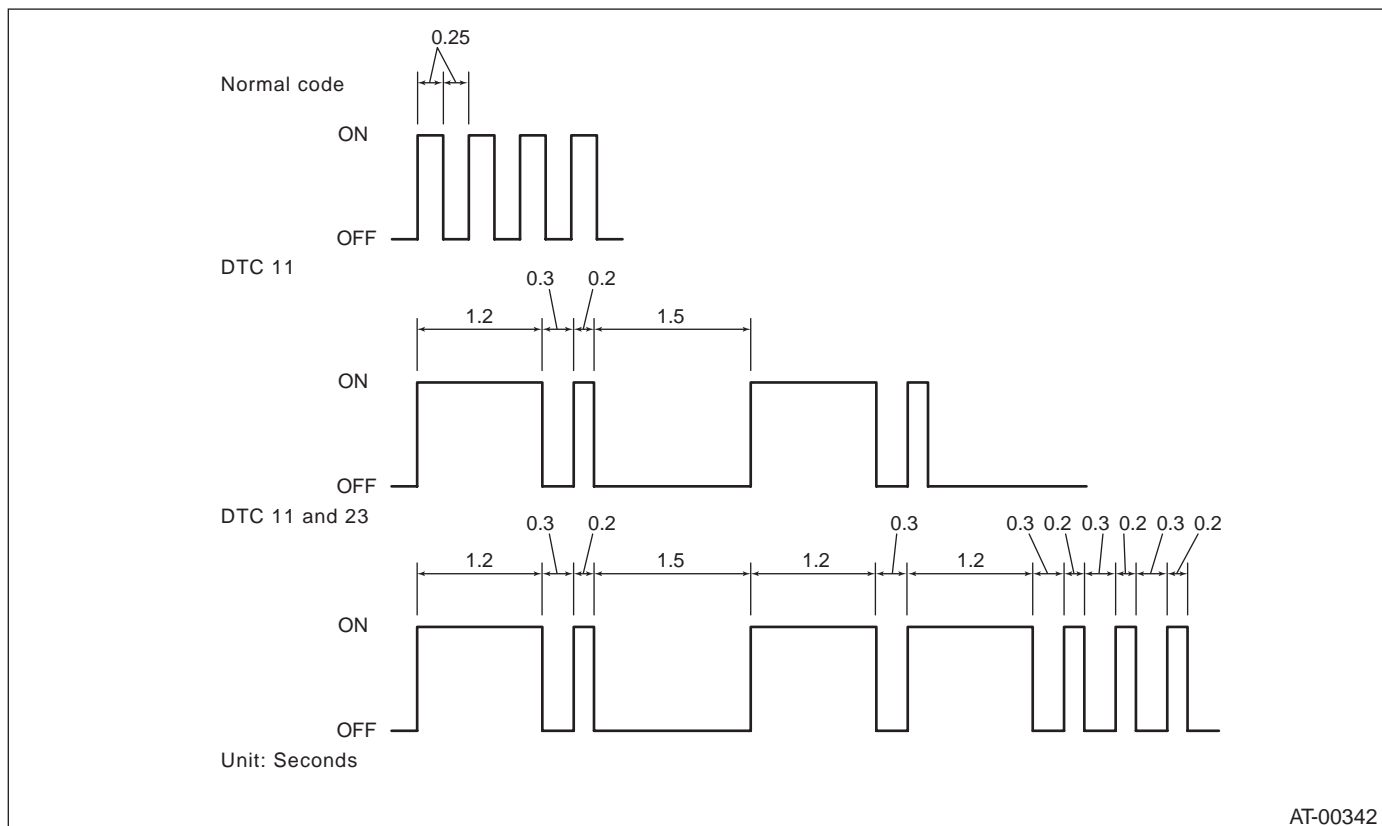
The AT OIL TEMP warning light flashes the code corresponding to the faulty part.

AT-26

READ DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.2 sec on) signifies a “one”.



2. WITH SUBARU SELECT MONITOR

Refer to SUBARU SELECT MONITOR for information about how to obtain and understand trouble codes. <Ref. to AT-23, OPERATION, Subaru Select Monitor.>

INSPECTION MODE

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

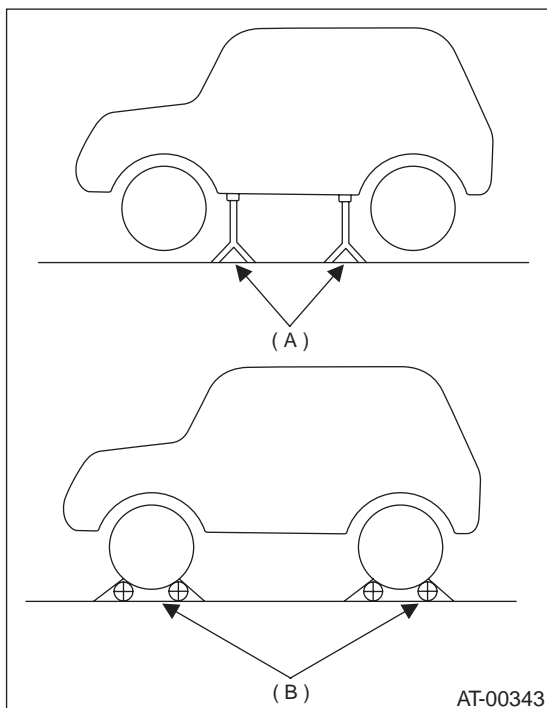
8. Inspection Mode

A: OPERATION

Raise the vehicle using a garage jack and place on safety stands or drive the vehicle onto free rollers.

WARNING:

- Before raising the vehicle, ensure parking brakes are applied.
- Do not use a pantograph jack in place of a safety stand.
- Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
- Do not abruptly depress/release clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
- In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the safety stands and the vehicle.
- Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



- (A) Safety stand
(B) Free rollers

AT-28

CLEAR MEMORY MODE

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

9. Clear Memory Mode

A: OPERATION

1. WITHOUT SUBARU SELECT MONITOR

Current trouble codes shown on the display are cleared by turning the ignition switch OFF after conducting on-board diagnostics operation. Previous trouble codes, however, cannot be cleared since they are stored in the TCM memory which is operating on the back-up power supply. These trouble codes can be cleared by removing the specified TCM connector for at least 2 minutes.

CLEAR MEMORY:

Without VDC system and SPORT shift:

Remove the TCM connector (B55).

With VDC system or SPORT shift:

Remove the TCM connector (B56).

- The TCM connector is located in the line to the memory back-up power supply of the TCM. Removal of this fuse clears the previous trouble codes stored in the TCM memory.
- Be sure to remove the TCM connector for at least the specified length of time. Otherwise, trouble codes may not be cleared.

2. WITH SUBARU SELECT MONITOR

Refer to SUBARU SELECT MONITOR for information about how to clear trouble codes.

<Ref. to AT-25, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

AT-29

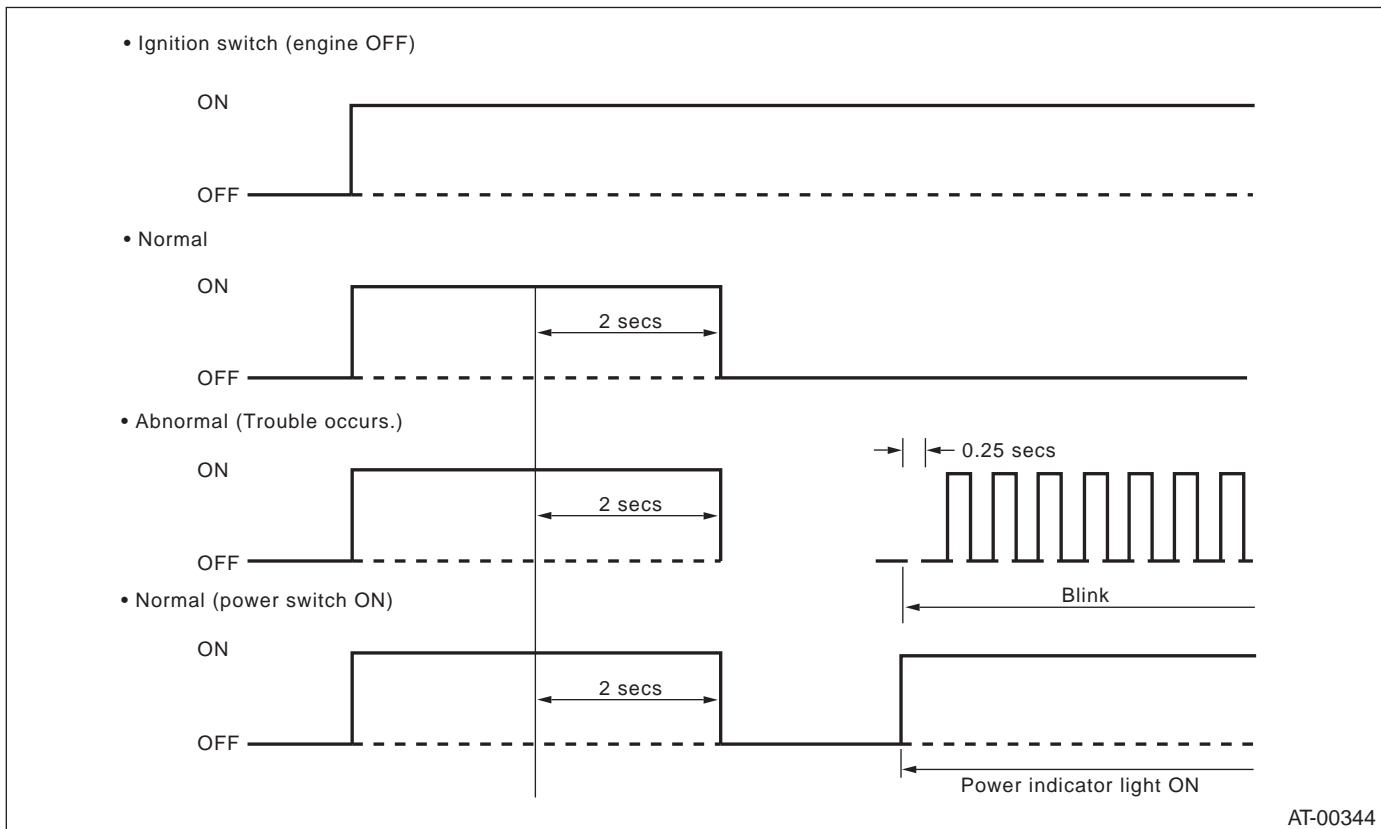
AT OIL TEMP WARNING LIGHT DISPLAY

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

10.AT OIL TEMP Warning Light Display

A: INSPECTION

When any on-board diagnostics item is malfunctioning, the display on the AT OIL TEMP warning light blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or unit can be determined by a DTC during on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the AT OIL TEMP warning 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 the select monitor. Indicator signal is as shown in the figure.



AT-30

LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

11. List of Diagnostic Trouble Code (DTC)**A: LIST**

DTC No.	Item	Content of diagnosis	Index
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to AT-44, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
27	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to AT-48, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Throttle position sensor	Detects open or shorted input signal circuit.	<Ref. to AT-52, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	Front vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-58, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-64, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
38	Torque control signal	Detects open or shorted input signal circuit.	<Ref. to AT-68, DTC 38 TORQUE CONTROL SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
45	Intake manifold pressure signal	Detects open or shorted input signal circuit.	<Ref. to AT-72, DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
71	Shift solenoid 1	Detects open or shorted output signal circuit.	<Ref. to AT-76, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
72	Shift solenoid 2	Detects open or shorted output signal circuit.	<Ref. to AT-80, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
73	Low clutch timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-84, DTC 73 LOW CLUTCH TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
74	2-4 brake timing solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-88, DTC 74 2-4 BRAKE TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
75	Line pressure duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-92, DTC 75 LINE PRESSURE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
76	2-4 brake duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-98, DTC 76 2-4 BRAKE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
77	Lock-up duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-104, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
78	SPORT shift solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-110, DTC 78 SPORT SHIFT SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
79	Transfer duty solenoid	Detects open or shorted output signal circuit.	<Ref. to AT-114, DTC 79 TRANSFER DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
86	VDC communication signal	Detects open or shorted input signal circuit.	<Ref. to AT-120, DTC 86 VDC COMMUNICATION SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
93	Rear vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to AT-124, DTC 93 REAR VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AT-31

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

12.Diagnostic Procedure for AT OIL TEMP Warning Light

A: AT OIL TEMP WARNING LIGHT DOES NOT COME ON OR GO OFF

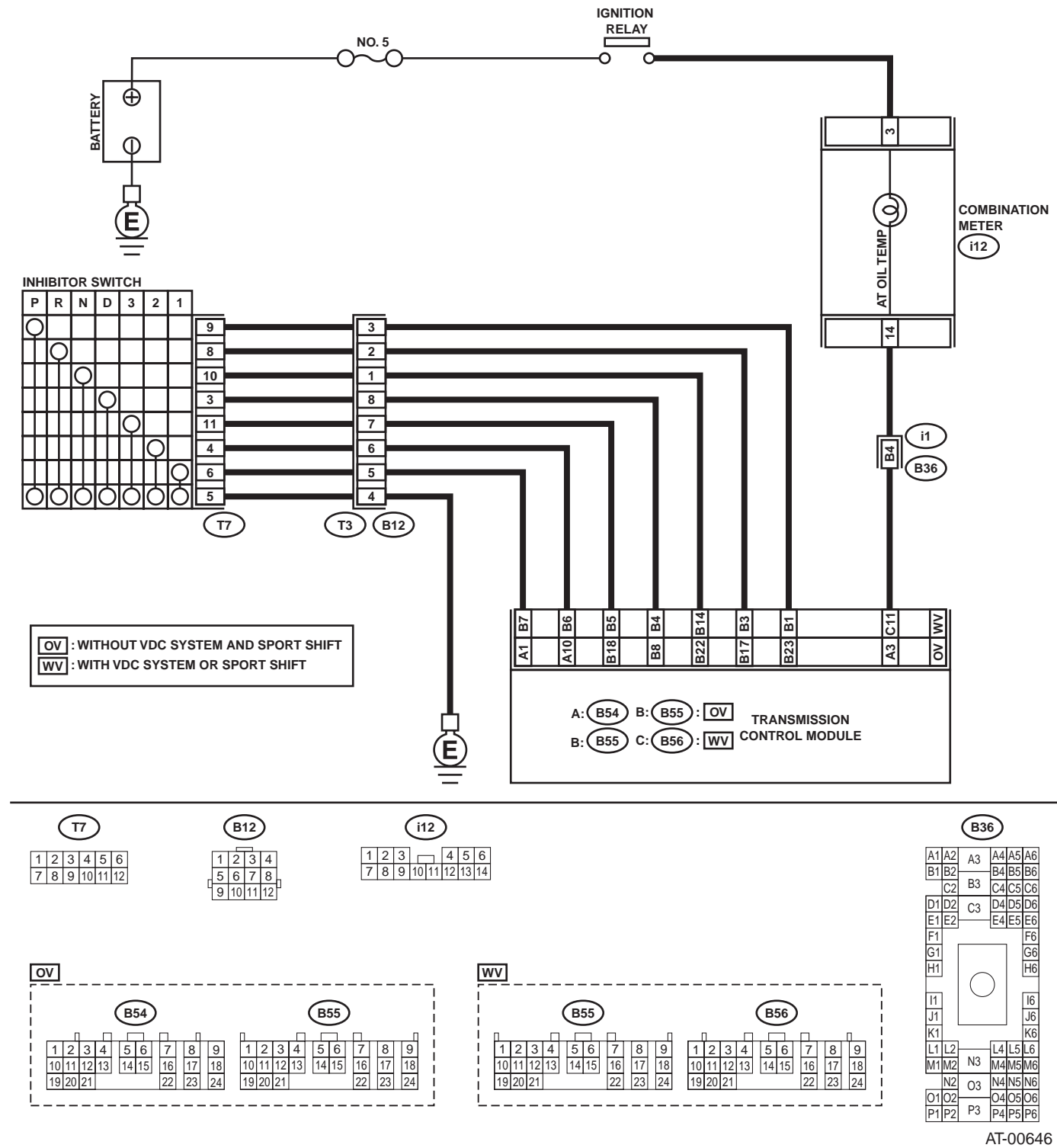
DIAGNOSIS:

The AT OIL TEMP warning light circuit is open or shorted.

TROUBLE SYMPTOM:

- When ignition switch is turned to ON (engine OFF), AT OIL TEMP warning light does not illuminate.
- When on-board diagnostics is performed, AT OIL TEMP warning light remains illuminated.

WIRING DIAGRAM:



AT-00646

AT-32

Vehicle-id:
 SIE-id::A:AT Oil Temp Warning Light does not Come
 On or Go Off

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK AT OIL TEMP WARNING LIGHT. Turn ignition switch to ON (engine OFF). Does AT OIL TEMP warning light illuminate?	Indicator light illuminates.	Go to step 3.	Go to step 2.
2 CHECK AT OIL TEMP WARNING LIGHT. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove AT OIL TEMP warning light bulb from combination meter. Is AT OIL TEMP warning light bulb OK?	Bulb is OK.	Go to step 4.	Replace AT OIL TEMP warning light bulb.
3 CHECK AT OIL TEMP WARNING LIGHT. Perform "Read Diagnostic Trouble Code (DTC)". <Ref. to AT-26, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> Does AT OIL TEMP warning light blink?	Blinks.	A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM, inhibitor switch and combination meter.	Go to step 9.
4 CHECK FUSE (No. 5). Remove fuse (No. 5). Is the fuse (No. 5) blown out?	Fuse (No. 5) is blown out.	Replace fuse (No. 5). If replaced fuse (No. 5) is blown out easily, repair short circuit in harness between fuse (No. 5) and combination meter.	Go to step 5.
5 CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION RELAY. 1) Turn ignition switch to ON (engine OFF). 2) Measure voltage between combination meter connector and chassis ground. Connector & terminal (i12) No. 3 (+) — Chassis ground (-): Does the measured value exceed the specified value?	9 V	Go to step 6.	Repair open or short circuit in harness between combination meter and battery.
6 CHECK COMBINATION METER. Measure voltage between combination meter connector and chassis ground. Connector & terminal (i12) No. 14 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Repair combination meter. <Ref. to IDI-4, Combination Meter System.>	Go to step 7.
7 CHECK OPEN CIRCUIT OF HARNESS. 1) Turn ignition switch to OFF. 2) Disconnect TCM and combination meter connector. 3) Measure resistance of harness between combination meter. Connector & terminal With VDC system or SPORT shift: (B56) No. 11 — (i12) No. 14: Without VDC system and SPORT shift: (B54) No. 3 — (i12) No. 14: Is the measured value less than the specified value?	1 Ω	Go to step 8.	Repair open circuit in harness between TCM and combination meter, and poor contact in coupling connector.

AT-33

Vehicle-id:
 SIE-id::A:AT Oil Temp Warning Light does not
 Come On or Go Off

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT**AUTOMATIC TRANSMISSION (DIAGNOSTICS)**

Step	Value	Yes	No
8 CHECK INPUT SIGNAL FOR TCM. 1) Connect connector to TCM and combination meter. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B56) No. 11 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 3 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if AT OIL TEMP warning lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
9 CHECK SUBARU SELECT MONITOR. Do you have SUBARU SELECT MONITOR?	Subaru Select Monitor is available.	Go to step 10.	Go to step 11.
10 CHECK INHIBITOR SWITCH. 1) Connect Subaru Select Monitor to data link connector. 2) Turn ignition switch to ON. 3) Subaru Select Monitor to ON. 4) Read data of range switch using Subaru Select Monitor. •Range switch is indicated in ON ⇔ OFF. When each range is selected, does LED of Subaru Select Monitor light up?	LED lights up.	Go to step 11.	Check inhibitor switch circuit. <Ref. to AT-136, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>
11 CHECK SHORT CIRCUIT OF HARNESS. 1) Disconnect connector from TCM. 2) Remove combination meter. 3) Disconnect connector from combination meter. 4) Measure resistance of harness connector between TCM and chassis ground. Connector & terminal/specified resistance With VDC system or SPORT shift: (B56) No. 11 — Chassis ground: Without VDC system and SPORT shift: (B54) No. 3 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>	Repair short circuit in harness between combination meter connector and TCM connector.

AT-34

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-35

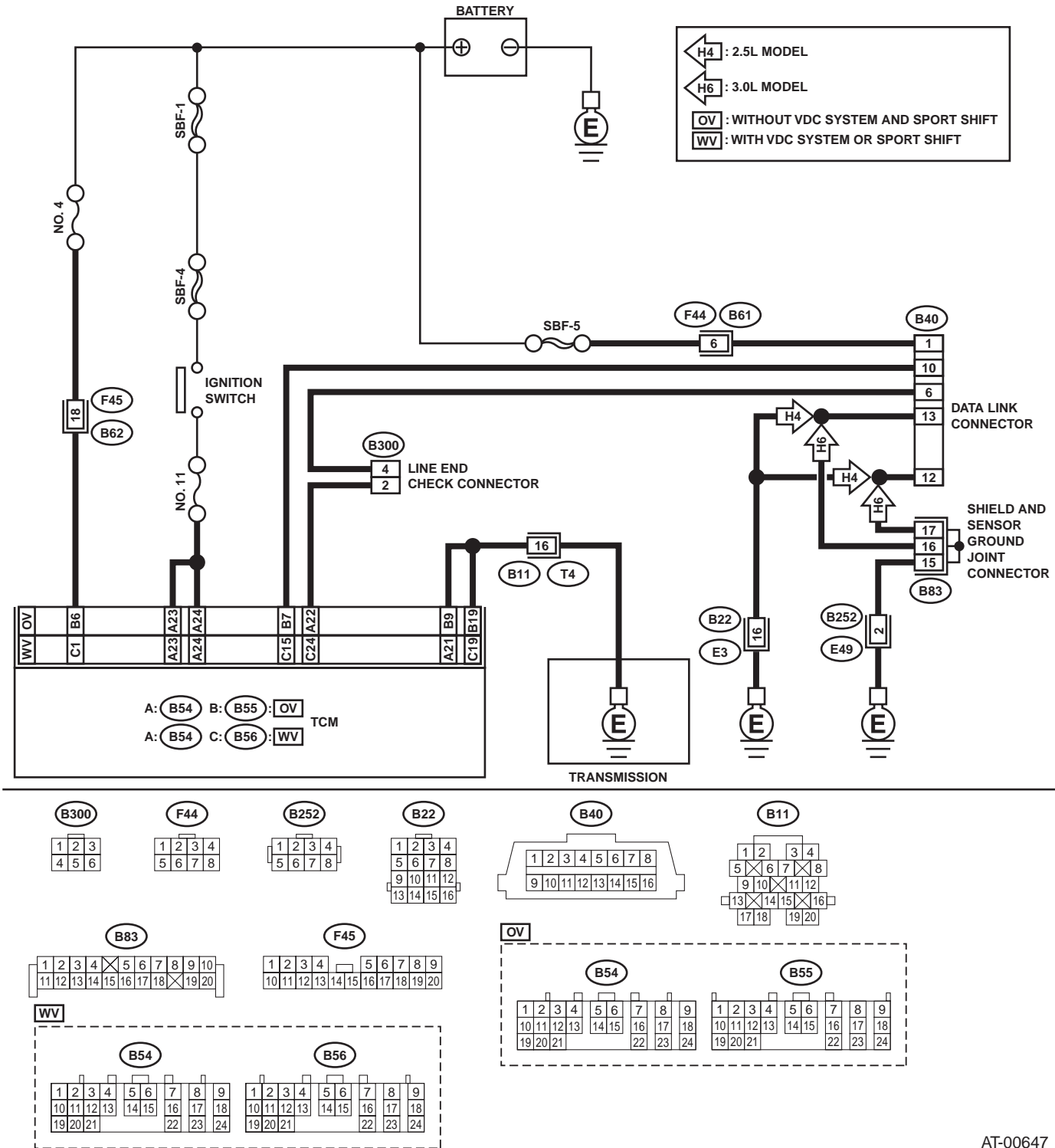
Vehicle-id:
SIE-id::A:AT Oil Temp Warning Light does not
Come On or Go Off
~

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: CHECK POWER SUPPLY AND GROUND LINE

WIRING DIAGRAM:



AT-00647

AT-36

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK BATTERY TERMINAL. Turn ignition switch to OFF.	Is there poor contact at battery terminal?	Repair battery terminal.	Go to step 2.
2 CHECK POWER SUPPLY OF TCM. 1) Disconnect connector from TCM. 2) Turn ignition switch to ON. 3) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B56) No. 1 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 6 (+) — Chassis ground (-): Is the measured value within the specified range?	10 - 15 V	Go to step 4.	Go to step 3.
3 CHECK FUSE (NO. 4). Remove fuse (No. 4). Is the fuse (No. 4) blown out?	Fuse (No. 4) is blown out.	Replace fuse (No. 4). If replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.	Repair open circuit in harness between fuse (No. 4) and TCM, or fuse (No. 4) and battery, and poor contact in coupling connector.
4 CHECK IGNITION POWER SUPPLY CIRCUIT. 1) Turn ignition switch to ON (engine OFF). 2) Measure ignition power supply voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 23 (+) — Chassis ground (-): (B54) No. 24 (+) — Chassis ground (-): Does the measured value exceed the specified value?	10 V	Go to step 6.	Go to step 5.
5 CHECK FUSE (NO. 11). Remove fuse (No. 11). Is the fuse (No. 11) blown out?	Fuse (No. 11) is blown out.	Replace fuse (No. 11). If replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.	Repair open circuit in harness between fuse (No. 11) and TCM, or fuse (No. 11) and battery, and poor contact in coupling connector.
6 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B56) No. 19 — (B11) No. 16: (B54) No. 21 — (B11) No. 16: Without VDC system and SPORT shift: (B55) No. 19 — (B11) No. 16: (B55) No. 9 — (B11) No. 16: Is the measured value less than the specified value?	1 Ω	Go to step 7.	Repair open circuit in harness between TCM and transmission harness connector, and poor contact in coupling connector.

AT-37

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
7 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND. Measure resistance of harness between transmission and transmission ground. Connector & terminal (T4) No. 16 — Transmission ground: Is the measured value less than the specified value?	1 Ω	Go to step 8 .	Repair open circuit in harness between transmission and transmission ground.
8 CHECK POOR CONTACT IN CONNECTORS. Is there poor contact in control module power supply and ground line?	There is poor contact.	Repair connector.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-38

DIAGNOSTIC PROCEDURE FOR AT OIL TEMP WARNING LIGHT

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-39

Vehicle-id:
SIE-id: :B:Check Power Supply and Ground Line

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

13. Diagnostic Procedure for Select Monitor Communication

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

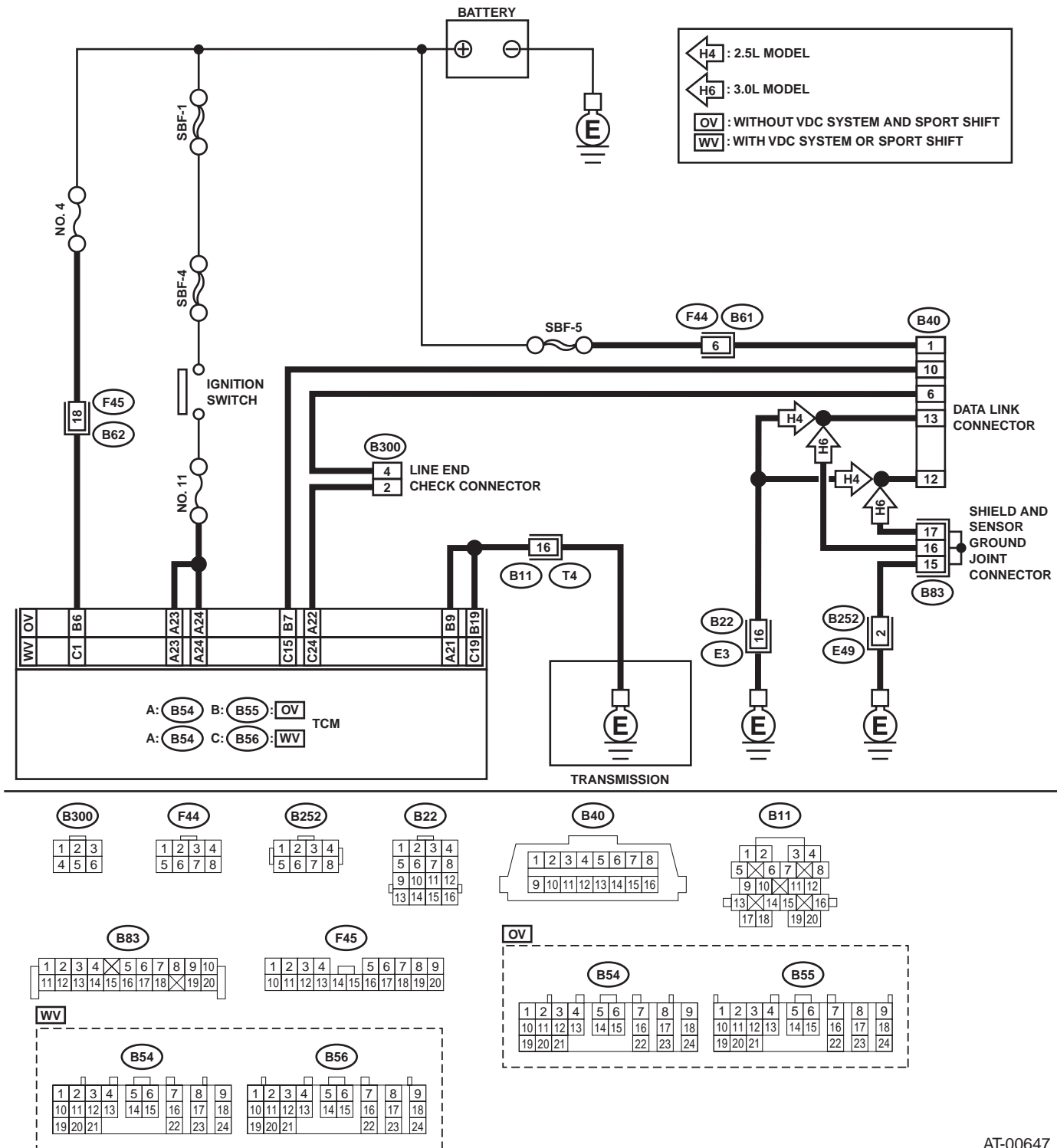
DIAGNOSIS:

- Faulty harness connector

TROUBLE SYMPTOM:

- Select monitor communication failure

WIRING DIAGRAM:



AT-00647

AT-40

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT. Measure voltage between data link connector and chassis ground. Connector & terminal (B40) No. 1 — Chassis ground: Does the measured value exceed the specified value?	10 V	Go to step 2.	Repair harness and connector between battery and data link connector, and poor contact in coupling connector.
2 CHECK SUBARU SELECT MONITOR GROUND CIRCUIT. Measure resistance of harness between data link connector and chassis ground. Connector & terminal (B40) No. 12 — Chassis ground: (B40) No. 13 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between data link connector and ground terminal, and poor contact in coupling connector.
3 CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn ignition switch to ON. 2) Using the select monitor, check whether communication to engine systems can be executed normally. Are the name and year of the system displayed on the select monitor?	Name and year displayed.	Go to step 6.	Go to step 4.
4 CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn ignition switch to OFF. 2) Disconnect TCM connector. 3) Check whether communication to engine systems can be executed normally. Are the name and year of the system displayed on the select monitor?	Name and year displayed.	Go to step 8.	Go to step 5.
5 CHECK COMMUNICATION OF SELECT MONITOR. 1) Turn ignition switch to OFF. 2) Connect TCM connector. 3) Disconnect ECM connector. 4) Check whether communication to transmission systems can be executed normally. Are the name and year of the system displayed on the select monitor?	Name and year displayed.	Inspect ECM.	Go to step 6.
6 CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR. 1) Turn ignition switch to OFF. 2) Disconnect TCM and ECM connectors. 3) Measure resistance between data link connector and chassis ground. Connector & terminal (B40) No. 10 — Chassis ground: (B40) No. 6 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 7.	Repair harness and connector between each control module and data link connector.

AT-41

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
7 CHECK OUTPUT SIGNAL FOR TCM. 1) Turn ignition switch to ON. 2) Measure voltage between data link connector and chassis ground. Connector & terminal (B40) No. 10 — Chassis ground: (B40) No. 6 — Chassis ground: Does the measured value exceed the specified value?	1 V	Repair harness and connector between each control module and data link connector.	A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the circuit.
8 CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR. Measure resistance between TCM connector and data link connector. Connector & terminal With VDC system or SPORT shift: (B56) No. 15 — (B40) No. 10: Without VDC system and SPORT shift: (B55) No. 7 — (B40) No. 10: Is the measured value less than the specified value?	0.5 Ω	Go to step 9.	Repair harness and connector between TCM and data link connector.
9 CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR. Measure resistance between TCM connector and data link connector. Connector & terminal With VDC system or SPORT shift: (B56) No. 24 — (B40) No. 6: Without VDC system and SPORT shift: (B54) No. 22 — (B40) No. 6: Does the measured value exceed the specified value?	1 MΩ	Go to step 10.	Repair harness and connector between TCM and data link connector.
10 CHECK INSTALLATION OF TCM CONNECTOR. Turn ignition switch to OFF. Is TCM connector inserted into TCM?	There is poor contact.	Go to step 11.	Insert TCM connector into TCM.
11 CHECK POOR CONTACT IN CONNECTORS. Is there poor contact in control module and data link connector?	Connector is inserted into TCM.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-42

DIAGNOSTIC PROCEDURE FOR SELECT MONITOR COMMUNICATION

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-43

Vehicle-id:
SIE-id: :A:Communication for Initializing Impossible

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

14. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 11 ENGINE SPEED SIGNAL

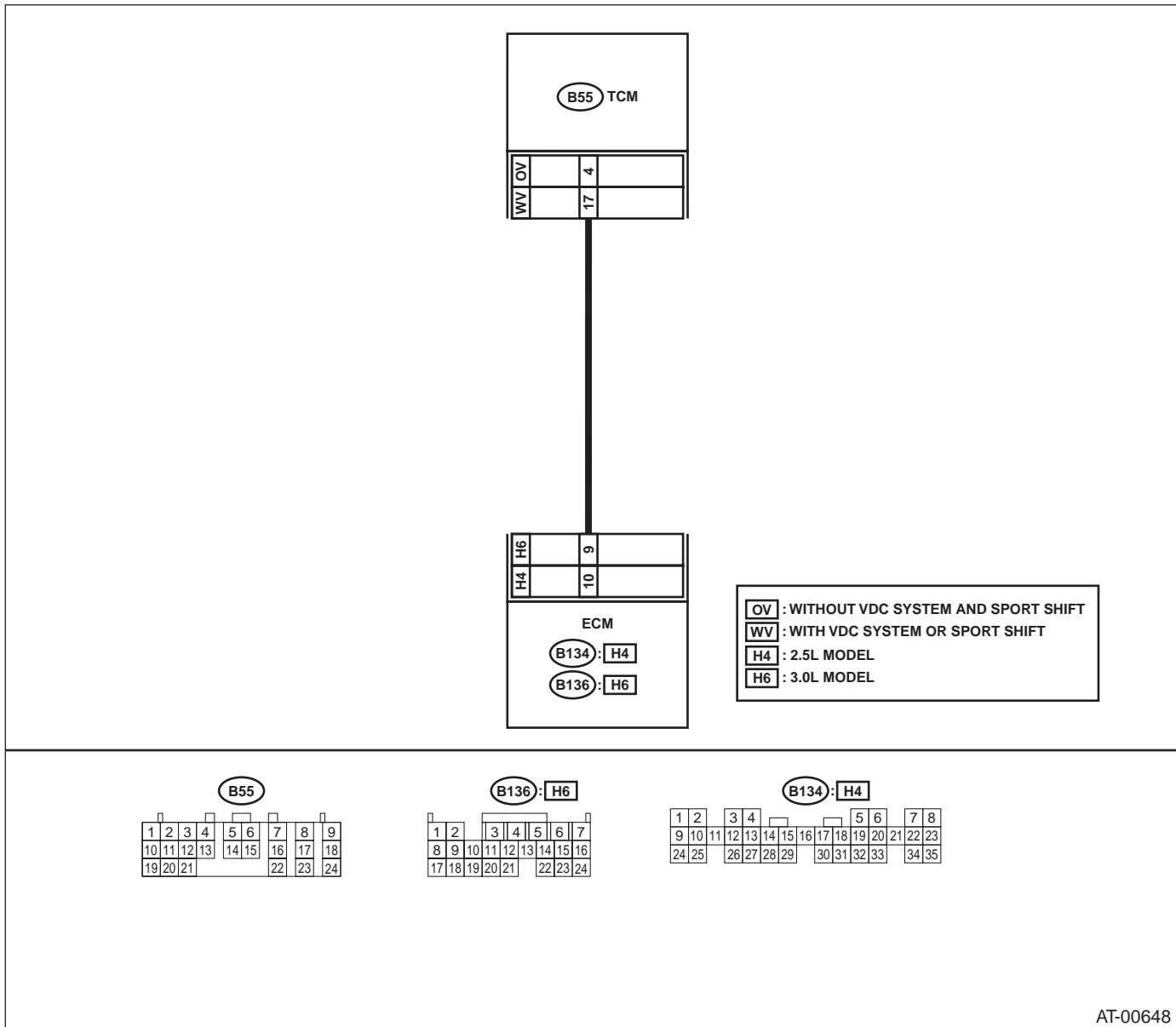
DIAGNOSIS:

Engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up).
- AT OIL TEMP warning light remains on when vehicle speed is "0".

WIRING DIAGRAM:



AT-44

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. Connector & terminal With SPORT shift: (B55) No. 17 — (B135) No. 10: With VDC system: (B55) No. 17 — (B136) No. 9: 2.5 L model (Without VDC system and SPORT shift): (B55) No. 4 — (B134) No. 10: 3.0 L model (Without VDC system and SPORT shift): (B55) No. 4 — (B136) No. 9: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 17 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 4 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 3.	Repair short circuit in harness between TCM and ECM connector.
3 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	Subaru Select Monitor is available.	Go to step 5.	Go to step 4.
4 CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 17 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 4 (+) — Chassis ground (-): Does the measured value exceed the specified value?	10.5 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 6.

AT-45

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
5 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Engine idling. 6) Read data of engine speed using Subaru Select Monitor. •Display shows engine speed signal value sent from ECM. Is the revolution value the same as the tachometer reading shown on the combination meter?	Same.	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 6.
6 CHECK POOR CONTACT. Is there poor contact in engine speed signal circuit?	There is poor contact.	Repair poor contact.	Go to step 7.
7 CONFIRM DTC 11. Replace ECM with a new one. Does the diagnostic trouble code (DTC) appear again, after the memory has been cleared?	DTC 11 indicated.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>	Replace ECM.

AT-46

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-47

Vehicle-id:
SIE-id::A:DTC 11 Engine Speed Signal

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: DTC 27 ATF TEMPERATURE SENSOR

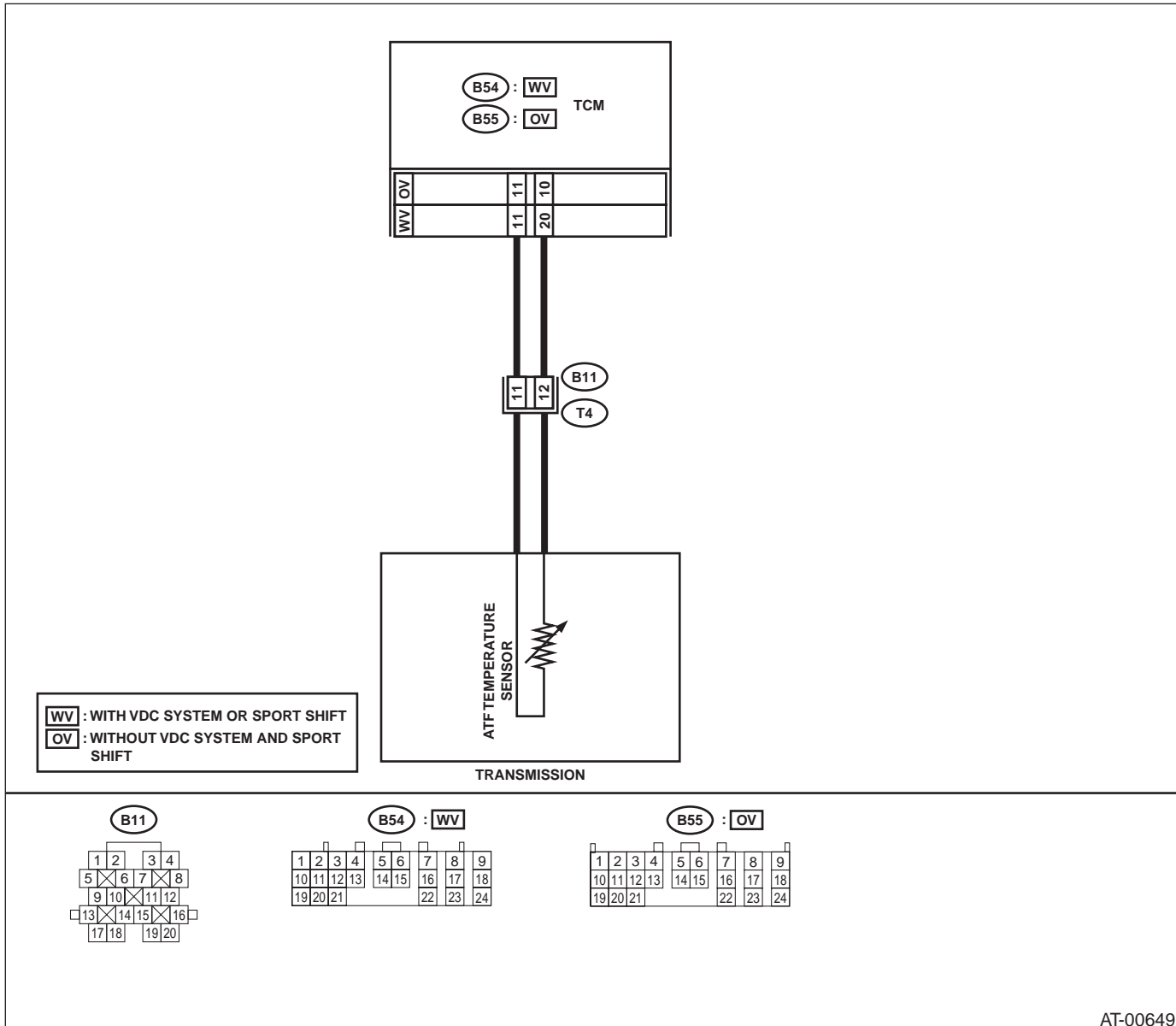
DIAGNOSIS:

Input signal circuit of TCM to ATF temperature sensor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-00649

AT-48

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 20 — (B11) No. 12: Without VDC system and SPORT shift: (B55) No. 10 — (B11) No. 12: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 11 — (B11) No. 11: Without VDC system and SPORT shift: (B55) No. 11 — (B11) No. 12: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 20 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 10 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 11 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 11 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.

AT-49

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
5 CHECK ATF TEMPERATURE SENSOR. 1) Turn ignition switch to OFF. 2) Connect connectors to transmission and TCM. 3) Turn ignition switch to ON and start engine. 4) Warm-up the transmission until ATF temperature reaches to 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect connector from transmission. 6) Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 12: Is the measured value within the specified range?	275 - 375 Ω	Go to step 6.	Replace ATF temperature sensor. <Ref. to AT-67, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
6 CHECK ATF TEMPERATURE SENSOR. 1) Turn ignition switch to ON (engine OFF). 2) Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 11 — No. 12: Does the resistance value increase while the ATF temperature decreases?	Resistance value increases.	Go to step 7.	Replace ATF temperature sensor. <Ref. to AT-67, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
7 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	Subaru Select Monitor is available.	Go to step 9.	Go to step 8.
8 CHECK INPUT SIGNAL FOR TCM. 1) Connect connector to transmission. 2) Warm-up the transmission until ATF temperature is about 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Measure voltage between TCM connector terminal. Connector & terminal With VDC system or SPORT shift: (B54) No. 11 (+) — No. 20 (-): Without VDC system and SPORT shift: (B55) No. 11 (+) — No. 10 (-): Is the measured value within the specified range?	0.4 - 0.9 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step 10.

AT-50

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
9 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connector to transmission. 2) Turn ignition switch to ON (engine OFF). Does the ATF temperature gradually decrease?	ATF temperature gradually increases.	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the case. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step 10.
10 CHECK POOR CONTACT. Is there poor contact in ATF temperature sensor circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-51

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: DTC 31 THROTTLE POSITION SENSOR

DIAGNOSIS:

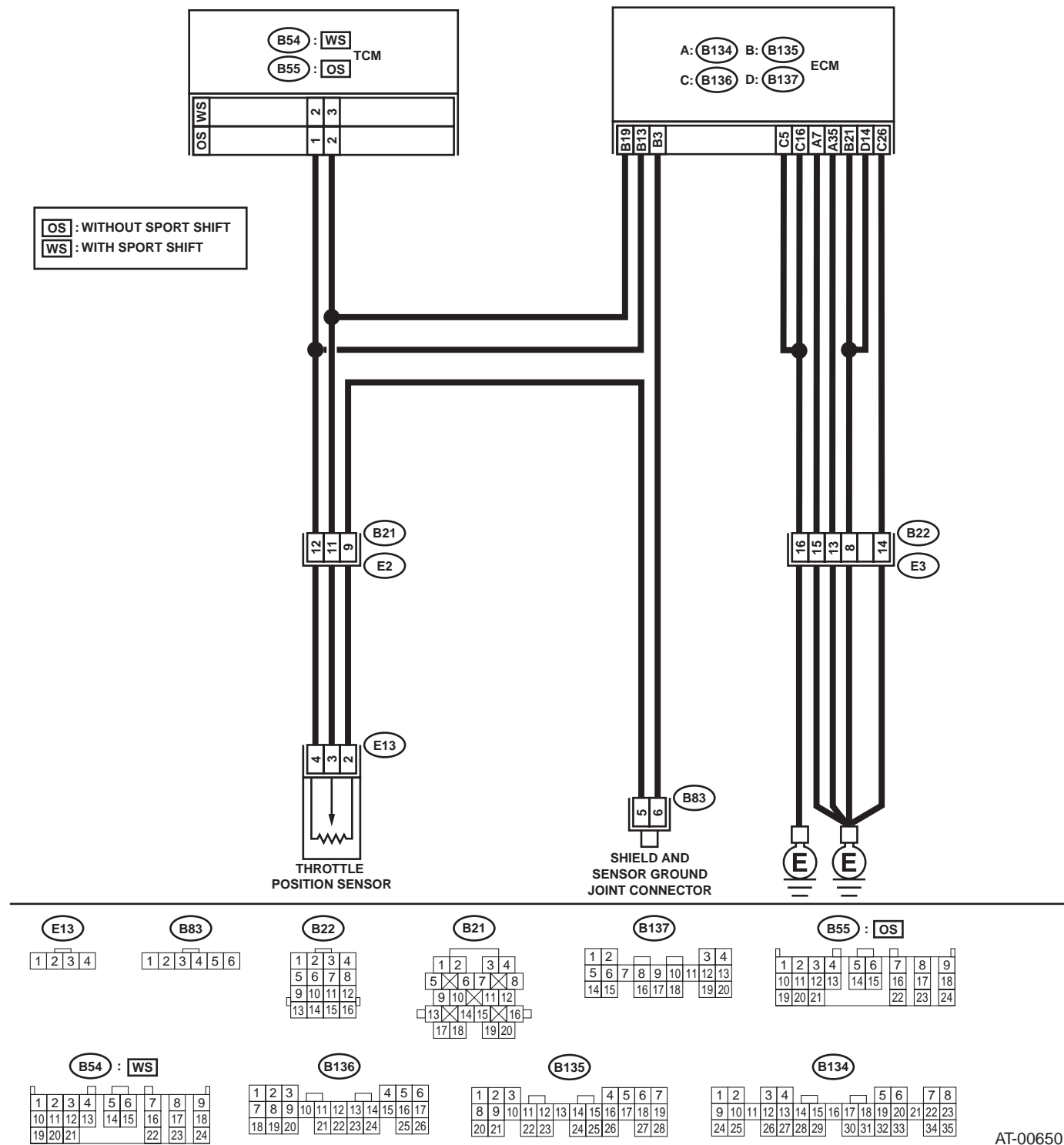
Input signal circuit of throttle position sensor is open or shorted.

TROUBLE SYMPTOM:

Shift point too high or too low; excessive shift shock; excessive tight corner "braking".

WIRING DIAGRAM:

EXCEPT 2.5 L MODEL

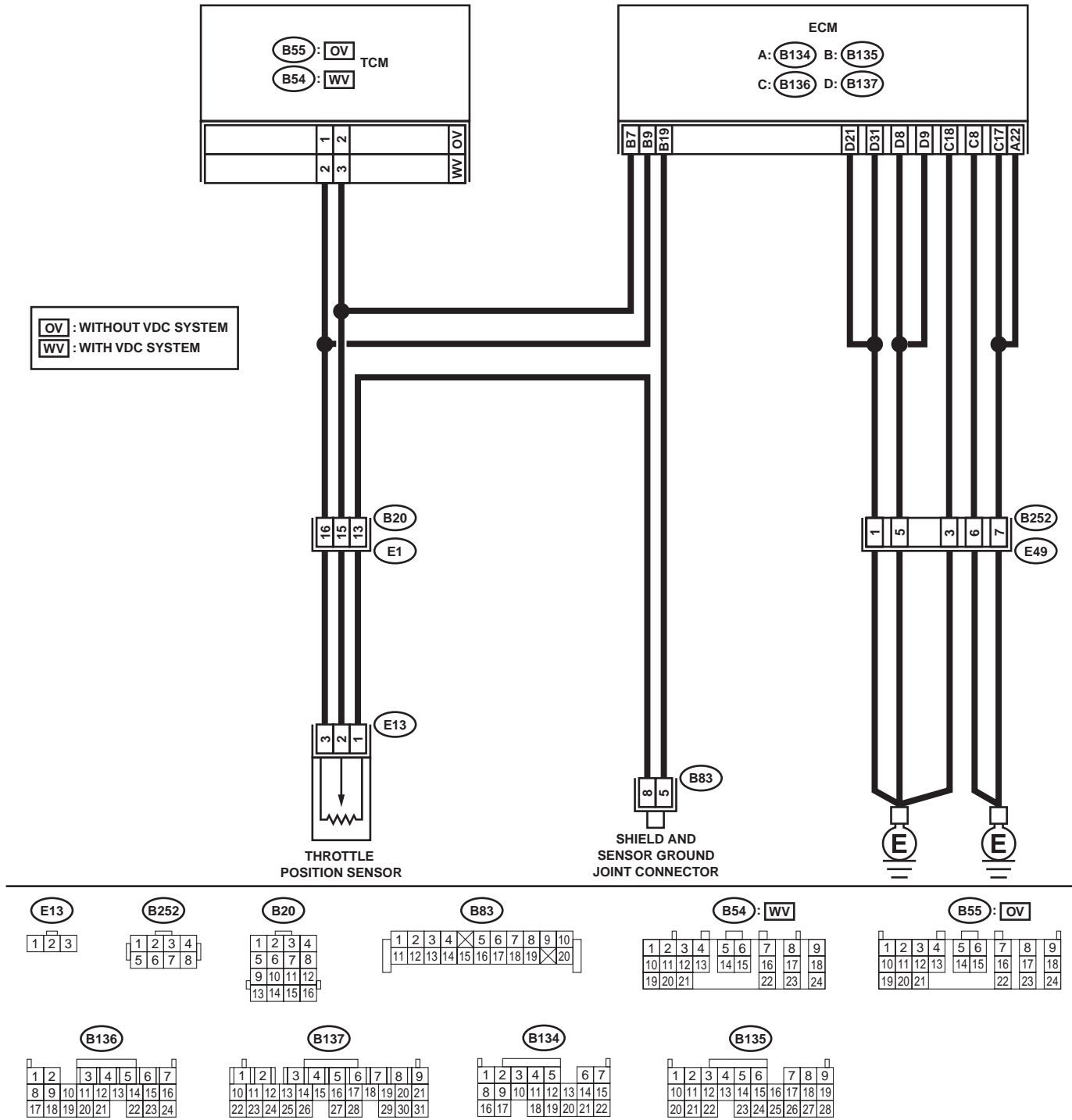


AT-00650

AT-52

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC) AUTOMATIC TRANSMISSION (DIAGNOSTICS)

3.0 L MODEL



AT-00651

AT-53

Vehicle-id:
 SIE-id: :C:DTC 31 Throttle Position Sensor

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK ENGINE GROUND TERMINALS. Have engine ground terminals been tightened?	Terminals have been tightened.	Go to step 2.	Tighten engine ground terminals.
2 CHECK GROUND CIRCUIT OF ECM. 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and engine ground. Connector & terminal 2.5 L model: <i>(B134) No. 7 — Engine ground:</i> <i>(B134) No. 35 — Engine ground:</i> <i>(B136) No. 5 — Engine ground:</i> <i>(B136) No. 16 — Engine ground:</i> <i>(B136) No. 26 — Engine ground:</i> <i>(B135) No. 21 — Engine ground:</i> <i>(B137) No. 14 — Engine ground:</i> 3.0 L model: <i>(B134) No. 22 — Engine ground:</i> <i>(B136) No. 8 — Engine ground:</i> <i>(B136) No. 17 — Engine ground:</i> <i>(B136) No. 18 — Engine ground:</i> <i>(B137) No. 8 — Engine ground:</i> <i>(B137) No. 9 — Engine ground:</i> <i>(B137) No. 21 — Engine ground:</i> <i>(B137) No. 31 — Engine ground:</i> Is the measured value less than the specified value?	5 Ω	Go to step 3.	Repair open circuit in harness between ECM connector and engine grounding terminal.
3 CHECK THROTTLE POSITION SENSOR. 1) Disconnect connector from throttle position sensor. 2) Measure resistance between throttle position sensor connector receptacle's terminals. Terminals 2.5 L model: <i>No. 4 — No. 2:</i> 3.0 L model: <i>No. 1 — No. 3:</i> Is the measured value within the specified range?	3.0 - 4.2 kΩ	Go to step 4.	Replace throttle position sensor.
4 CHECK THROTTLE POSITION SENSOR. Measure resistance between throttle position sensor connector receptacle's terminals. Terminals 2.5 L model: <i>No. 2 — No. 3:</i> 3.0 L model: <i>No. 1 — No. 2:</i> Is the measured value within the specified range?	0.35 - 0.5 kΩ	Go to step 5.	Replace throttle position sensor.

AT-54

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and throttle position sensor connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 3 — (E13) No. 2: Without VDC system and SPORT shift: (B55) No. 2 — (E13) No. 3: Is the measured value less than the specified value?	1 Ω	Go to step 6.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
6 CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure resistance of harness between TCM and throttle position sensor connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 2 — (E13) No. 3: Without VDC system and SPORT shift: (B55) No. 1 — (E13) No. 4: Is the measured value less than the specified value?	1 Ω	Go to step 7.	Repair open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
7 CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 3 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 2 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 8.	Repair short circuit in harness between TCM and throttle position sensor connector.
8 CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 2 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 1 — Chassis ground:	1 MΩ	Go to step 9.	Repair short circuit in harness between TCM and throttle position sensor connector.
9 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM and ECM connector. Connector & terminal 2.5 L model (With SPORT shift) : (B54) No. 3 — (B135) No. 19: 2.5 L model (Without SPORT shift) : (B55) No. 2 — (B135) No. 19: 3.0 L model (With VDC system) : (B54) No. 3 — (B135) No. 7: 3.0 L model (Without VDC system) : (B55) No. 2 — (B135) No. 7: Does the measured value exceed the specified value?	1 Ω	Go to step 10.	Repair open circuit in harness between TCM and ECM connector.

AT-55

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
10 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM and ECM connector. Connector & terminal 2.5 L model (With SPORT shift) : (B54) No. 2 — (B135) No. 13: 2.5 L model (Without SPORT shift) : (B55) No. 1 — (B135) No. 13: 3.0 L model (With VDC system) : (B54) No. 2 — (B135) No. 9: 3.0 L model (With VDC system) : (B55) No. 1 — (B135) No. 9: Is the measured value less than the specified value?	1 Ω	Go to step 11.	Repair open circuit in harness between TCM and ECM connector.
11 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	Subaru Select Monitor is available.	Go to step 14.	Go to step 12.
12 CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM, throttle position sensor and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Close the throttle completely. 4) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 3 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 2 (+) — Chassis ground (-): Is the measured value within the specified range?	0.2 - 1.0 V	Go to step 13.	Go to step 18.
13 CHECK INPUT SIGNAL FOR TCM. 1) Open the throttle completely. 2) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 3 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 2 (+) — Chassis ground (-): Is the measured value within the specified range?	4.2 - 4.7 V	Go to step 16.	Go to step 18.
14 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM, throttle position sensor and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON (engine OFF). 4) Turn Subaru Select Monitor switch to ON. 5) Throttle fully closed. 6) Read data of throttle position sensor using Subaru Select Monitor. •Throttle position sensor input signal is indicated. Is data of throttle position sensor within the specified range?	0.2 - 1.0 V	Go to step 15.	Go to step 18.

AT-56

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
15 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. Throttle fully open. NOTE: Must be changed correspondingly with accelerator pedal operation (from "released" to "depressed" position). Data of throttle position sensor is within the specified range?	4.2 - 4.7 V	Go to step 18.	Go to step 17.
16 CHECK INPUT SIGNAL FOR TCM (THROTTLE POSITION SENSOR POWER SUPPLY). Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 2 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 1 (+) — Chassis ground (-): Is the measured value within the specified range?	4.8 - 5.3 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.	Go to step 18.
17 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY). Read data of throttle position sensor power supply using Subaru Select Monitor. •Throttle position sensor power supply voltage is indicated. Is data of throttle position sensor power supply within the specified range?	4.8 - 5.3 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in throttle position sensor circuit.	Go to step 18.
18 CHECK POOR CONTACT. Is there poor contact in throttle position sensor circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-57

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

D: DTC 33 FRONT VEHICLE SPEED SENSOR

DIAGNOSIS:

- The vehicle speed signal is abnormal.
- The circuit in combination meter is faulty.
- The harness connector between TCM and vehicle speed sensor is in short or open.

TROUBLE SYMPTOM:

- Erroneous idling.
- Engine stalls.
- Poor driving performance.

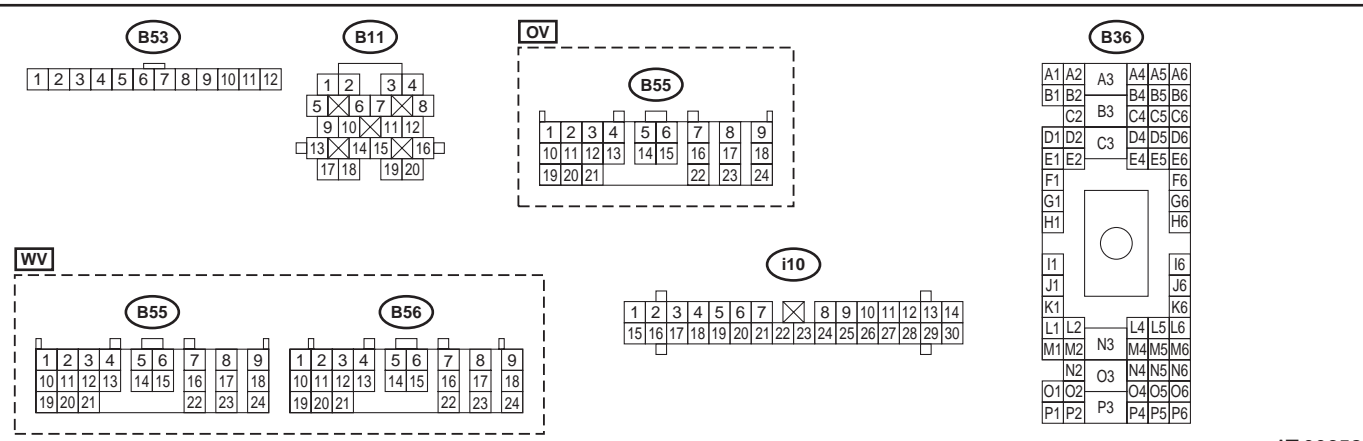
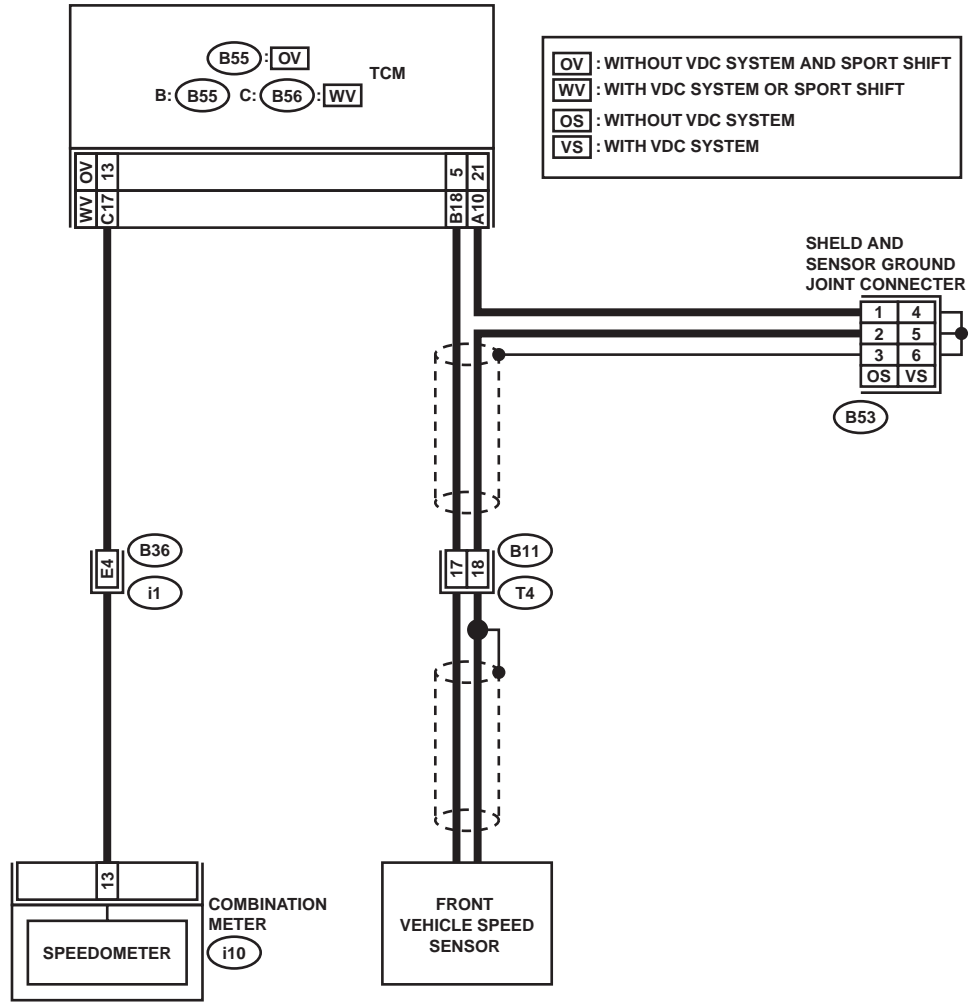
AT-58

Vehicle-id:
SIE-id: :D:DTC 33 Front Vehicle Speed Sensor

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

WIRING DIAGRAM:



AT-00652

AT-59

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 18 — (B11) No. 17: Without VDC system and SPORT shift: (B55) No. 5 — (B11) No. 17: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 10 — (B11) No. 18: Without VDC system and SPORT shift: (B55) No. 5 — (B11) No. 18: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 10 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 21 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal (B55) No. 18 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 5.	Repair short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
5 CHECK FRONT VEHICLE SPEED SENSOR. Measure resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 17 — No. 18: Is the measured value within the specified range?	450 - 650 Ω	Go to step 6.	Replace front vehicle speed sensor. <Ref. to AT-54, Front Vehicle Speed Sensor.>
6 PREPARE OSCILLOSCOPE. Do you have oscilloscope?	Oscilloscope is available.	Go to step 9.	Go to step 7.
7 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	Subaru Select Monitor is available.	Go to step 10.	Go to step 8.

AT-60

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
<p>8 CHECK INPUT SIGNAL FOR TCM.</p> <p>1) Connect all connectors. 2) Lift-up or raise the vehicle and place safety stands.</p> <p>NOTE: Raise all wheels off floor.</p> <p>3) Start the engine and set vehicle in 20 km/h (12 MPH) condition.</p> <p>NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.></p> <p>4) Measure voltage between TCM connector terminals.</p> <p>Connector & terminal With VDC system or SPORT shift: (B55) No. 18 (+) — (B54) No. 10 (-): Without VDC system and SPORT shift: (B55) No. 5 (+) — No. 21 (-):</p> <p>Does the measured value exceed the specified value?</p>	More than AC 1 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.
<p>9 CHECK FRONT VEHICLE SPEED SENSOR USING OSCILLOSCOPE.</p> <p>1) Connect all connectors. 2) Lift-up the vehicle and place safety stand.</p> <p>NOTE: Raise all wheels off ground.</p> <p>3) Set oscilloscope to TCM connector terminals.</p> <p>Connector & terminal With VDC system or SPORT shift: Positive probe; (B55) No. 18 Ground; (B54) No. 10 Without VDC system and SPORT shift: Positive probe; (B55) No. 5 Ground; (B55) No. 21</p> <p>4) Start the engine, and drive the wheels slowly.</p> <p>NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When AT control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to ABS-22, Clear Memory Mode.></p> <p>5) Measure signal voltage indicated on oscilloscope. Does the measured value exceed the specified value?</p>	AC 4 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.

AT-61

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
10 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect all connectors. 2) Connect Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place safety stands. NOTE: Raise all wheels off floor. 4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read data of vehicle speed using Subaru Select Monitor. •Compare speedometer with Subaru Select Monitor indications. •Vehicle speed is indicated in "km/h" or "MPH". 7) Slowly increase vehicle speed to 60 km/h or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> Does the speedometer indication increase as the Subaru Select Monitor data increases?	Speedometer indication increases as the Subaru Select Monitor data increases.	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the case. Repair harness or connector in the front vehicle speed sensor circuit.	Go to step 11.
11 CHECK POOR CONTACT. Is there poor contact in front vehicle speed sensor circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-62

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-63

Vehicle-id:
SIE-id: :D:DTC 33 Front Vehicle Speed Sensor

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

E: DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR

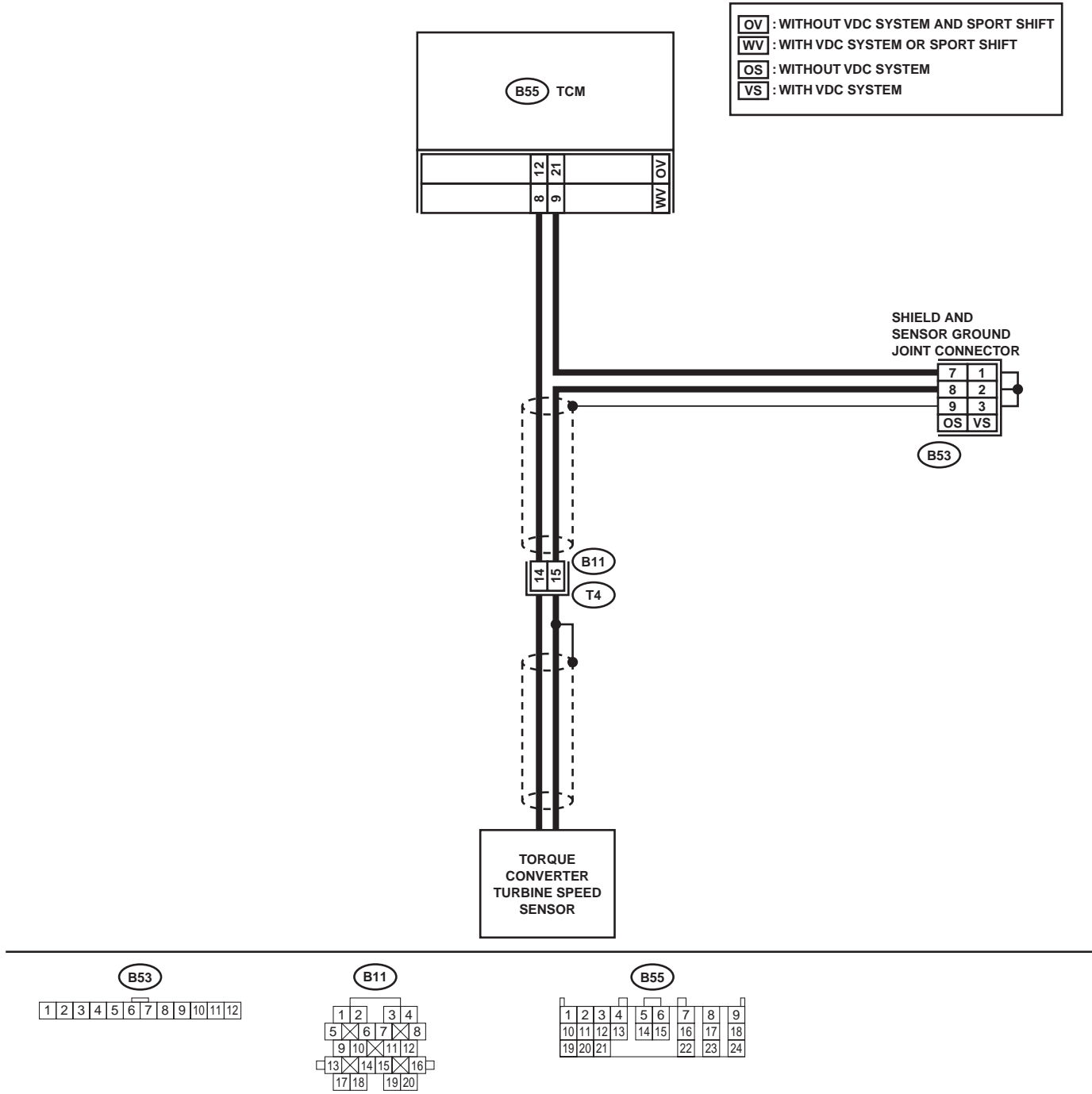
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-00653

AT-64

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK TORQUE CONVERTER TURBINE SPEED SENSOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission. 3) Measure resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 14 — No. 15: Is the measured value within the specified range?	450 - 650 Ω	Go to step 2.	Replace turbine speed sensor. <Ref. to AT-59, Torque Converter Turbine Speed Sensor.>
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 8 — (B11) No. 14: Without VDC system and SPORT shift: (B55) No. 12 — (B11) No. 14: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 9 — (B11) No. 15: Without VDC system and SPORT shift: (B55) No. 21 — (B11) No. 15: Is the measured value less than the specified value?	1 Ω	Go to step 4.	Repair open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 9 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 21 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 8 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 12 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 6.	Repair short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
6 PREPARE OSCILLOSCOPE. Do you have oscilloscope?	Oscilloscope is available.	Go to step 10.	Go to step 7.
7 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	Subaru Select Monitor data increase.	Go to step 9.	Go to step 8.

AT-65

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
8 CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and transmission. 2) Start the engine and move select lever to "P" or "N" range. 3) Measure voltage between TCM connector terminals. Connector & terminal With VDC system or SPORT shift: (B55) No. 8 (+) — No. 9 (-): Without VDC system and SPORT shift: (B55) No. 12 (+) — No. 21 (-): Does the measured value exceed the specified value?	AC 1 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.
9 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON. 4) Start the engine. 5) Move select lever to "P" or "N" range. 6) Read data of turbine speed using Subaru Select Monitor. •Compare tachometer with Subaru Select Monitor indications. Is the revolution value same as the tachometer reading shown on the combination meter?	Same as tachometer indication.	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.
10 CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1) Connect connectors to TCM and transmission. 2) Set oscilloscope to TCM connector terminals. Connector & terminal With VDC system or SPORT shift: Positive probe; (B55) No. 8 Without VDC system and SPORT shift: Positive probe; (B55) No. 12 Ground; (B55) No. 21 3) Start the engine and move select lever to "P" or "N" range. Does the measured value exceed the specified value?	AC 1 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.
11 CHECK POOR CONTACT. Is there poor contact in torque converter turbine speed sensor circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-66

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-67

Vehicle-id:
SIE-id: :E:DTC 36 Torque Converter Turbine Speed
Sensor
~

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

F: DTC 38 TORQUE CONTROL SIGNAL

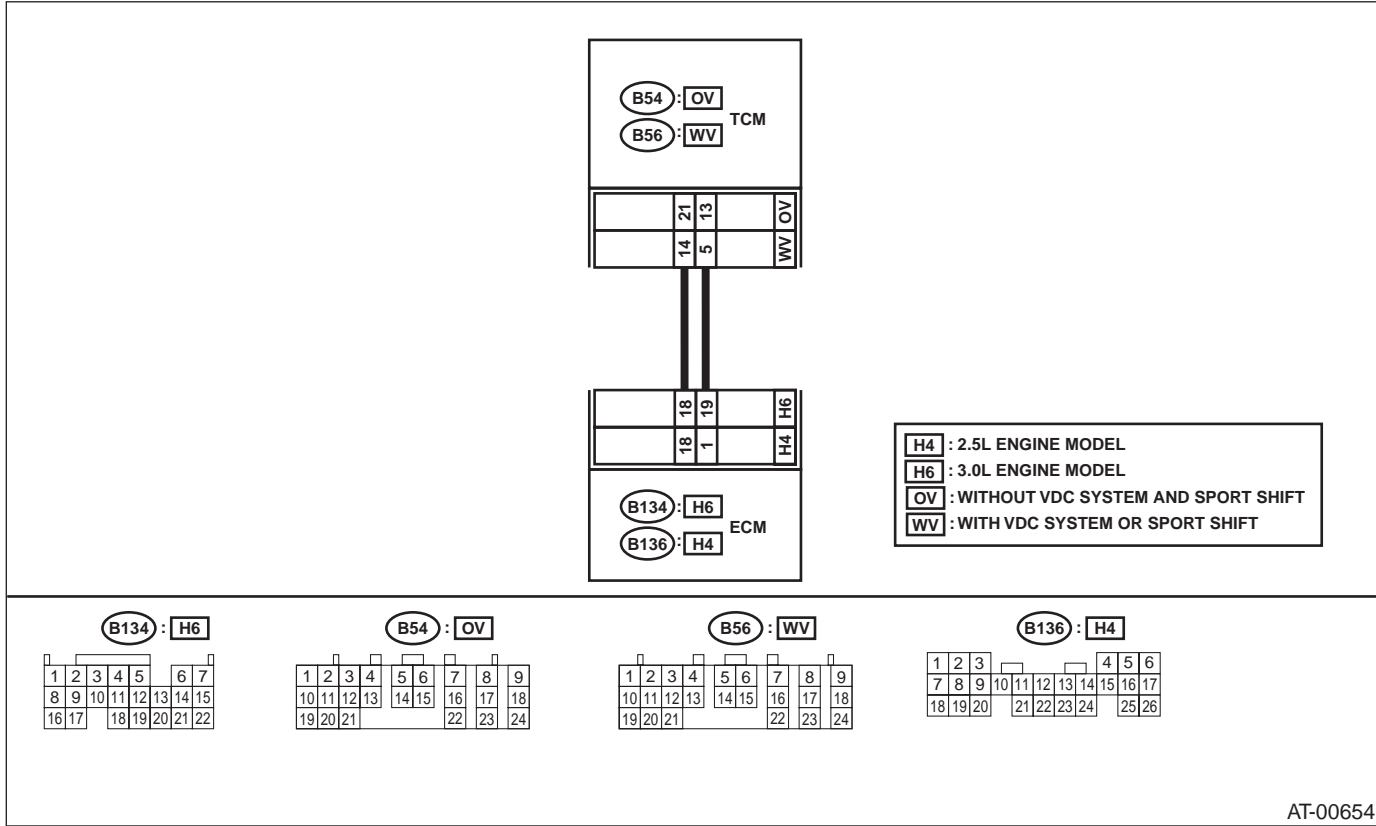
DIAGNOSIS:

- The signal circuit is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
<p>1 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</p> <p>1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector.</p> <p>Connector & terminal 3.0 L model (With VDC system) : (B56) No. 14 — (B136) No. 18: (B56) No. 5 — (B136) No. 19: 3.0 L model (Without VDC system) : (B54) No. 21 — (B134) No. 18: (B54) No. 13 — (B134) No. 19: 2.5 L model (With SPORT shift) : (B56) No. 14 — (B136) No. 18: (B56) No. 5 — (B136) No. 1: 2.5 L model (Without SPORT shift) : (B54) No. 21 — (B136) No. 18: (B54) No. 13 — (B136) No. 1:</p> <p>Is the measured value less than the specified value?</p>	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and ECM connector.
<p>2 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.</p> <p>Measure resistance of harness between TCM connector and chassis ground.</p> <p>Connector & terminal With VDC system or SPORT shift: (B56) No. 14 — Chassis ground: (B56) No. 5 — Chassis ground: Without VDC system and SPORT shift: (B54) No. 21 — Chassis ground: (B54) No. 13 — Chassis ground:</p> <p>Does the measured value exceed the specified value?</p>	1 MΩ	Go to step 3.	Repair short circuit in harness between TCM and ECM connector.
<p>3 CHECK OUTPUT SIGNAL EMITTED FROM TCM.</p> <p>1) Connect connectors to TCM and ECM. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector terminals.</p> <p>Connector & terminal With VDC system or SPORT shift: (B56) No. 14 (+) — Chassis ground (-): (B56) No. 5 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 21 (+) — Chassis ground (-): (B54) No. 13 (+) — Chassis ground (-):</p> <p>Does the measured value exceed the specified value?</p>	4.8 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 4.
<p>4 CHECK POOR CONTACT.</p> <p>Is there poor contact in torque control signal circuit?</p>	There is poor contact.	Repair poor contact.	Go to step 5.
<p>5 CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.</p> <p>Check installing condition of ground line in transmission and body. Is there any dirt or rust at ground line installing point?</p>	There is dirt or rust.	Remove dirt and rust.	Go to step 6.

AT-69

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
6 CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY. Check installing condition of ground line in transmission and body. Is tightening torque value within specification?	10 – 16 N·m (1.0 – 1.6 kgf-m, 7.2 – 11.6 ft-lb)	Go to step 7.	Tighten to specified torque.
7 CHECK GROUND LINE INSIDE TRANSMISSION. 1) Drain AT fluid and remove oil pan. 2) Check tightening torque value of ground line installing bolt. Is tightening torque value within specification?	7 – 9 N·m (0.7 – 0.9 kgf-m, 5.1 – 6.5 ft-lb)	Go to step 9.	Tighten to specified torque.
8 CHECK GROUND CIRCUIT OF ECM. <Ref. to AT-52, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there any trouble?	There is a problem.	Repair ground terminal and/or ground circuit of ECM.	Go to step 9.
9 RECHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B56) No. 14 (+) — Chassis ground (-): (B56) No. 5 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 21 (+) — Chassis ground (-): (B54) No. 13 (+) — Chassis ground (-): Does the measured value exceed the specified value?	4.0 V	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>	Replace ECM.

AT-70

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-71

Vehicle-id:
SIE-id: :F:DTC 38 Torque Control Signal

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

G: DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL

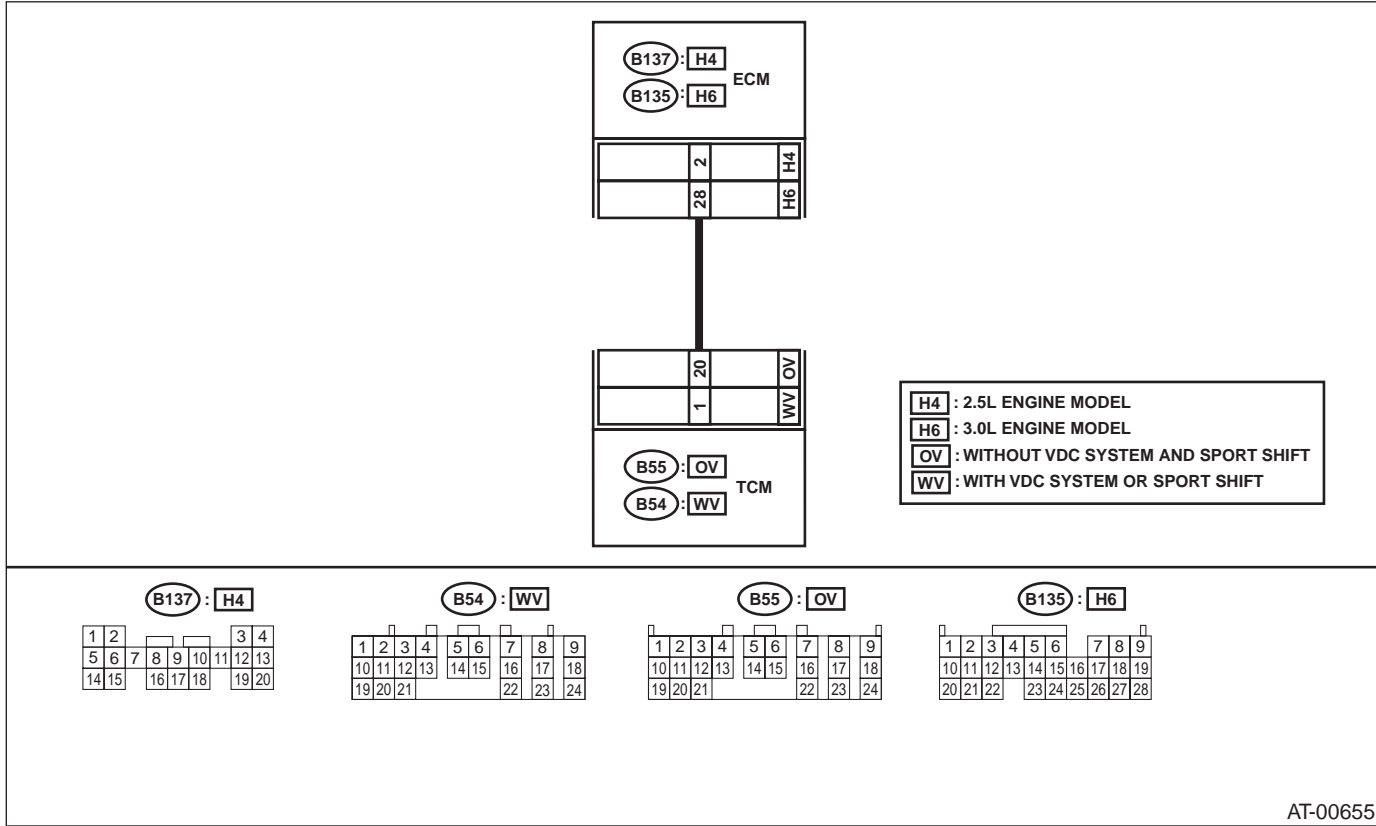
DIAGNOSIS:

Input signal circuit of TCM from ECM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM <Ref. to AT-52, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Is there any trouble?	There is a problem in ground terminal or ground circuit.	Repair ground terminal and/or ground circuit of ECM.	Go to step 2.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and ECM. 3) Measure resistance of harness between TCM and ECM connector. Connector & terminal 3.0 L model (With VDC system) : (B54) No. 1 — (B135) No. 28: 3.0 L model (Without VDC system) : (B54) No. 20 — (B135) No. 28: 2.5 L model (With SPORT shift:) : (B54) No. 1 — (B137) No. 2: 2.5 L model (Without SPORT shift:) : (B54) No. 20 — (B137) No. 2: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and ECM connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 1 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 20 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 4.	Repair short circuit in harness between TCM and ECM connector.
4 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	Subaru Select Monitor data increase.	Go to step 6.	Go to step 5.
5 CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and ECM. 2) Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Engine idling. 4) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 1 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 20 (+) — Chassis ground (-): Is the measured value within the specified range?	0.4 - 1.6 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 7.

AT-73

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
6 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and ECM. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select monitor switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Engine idling. 6) Read data of intake manifold pressure signal using Subaru Select Monitor. •Display shows intake manifold pressure signal value sent from ECM. Is the measured value within the specified range?	0.4 - 1.6 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step 7.
7 CHECK POOR CONTACT. Is there poor contact in intake manifold pressure signal circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-74

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-75

Vehicle-id:
SIE-id: :G:DTC 45 Intake Manifold Pressure Signal

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

H: DTC 71 SHIFT SOLENOID 1

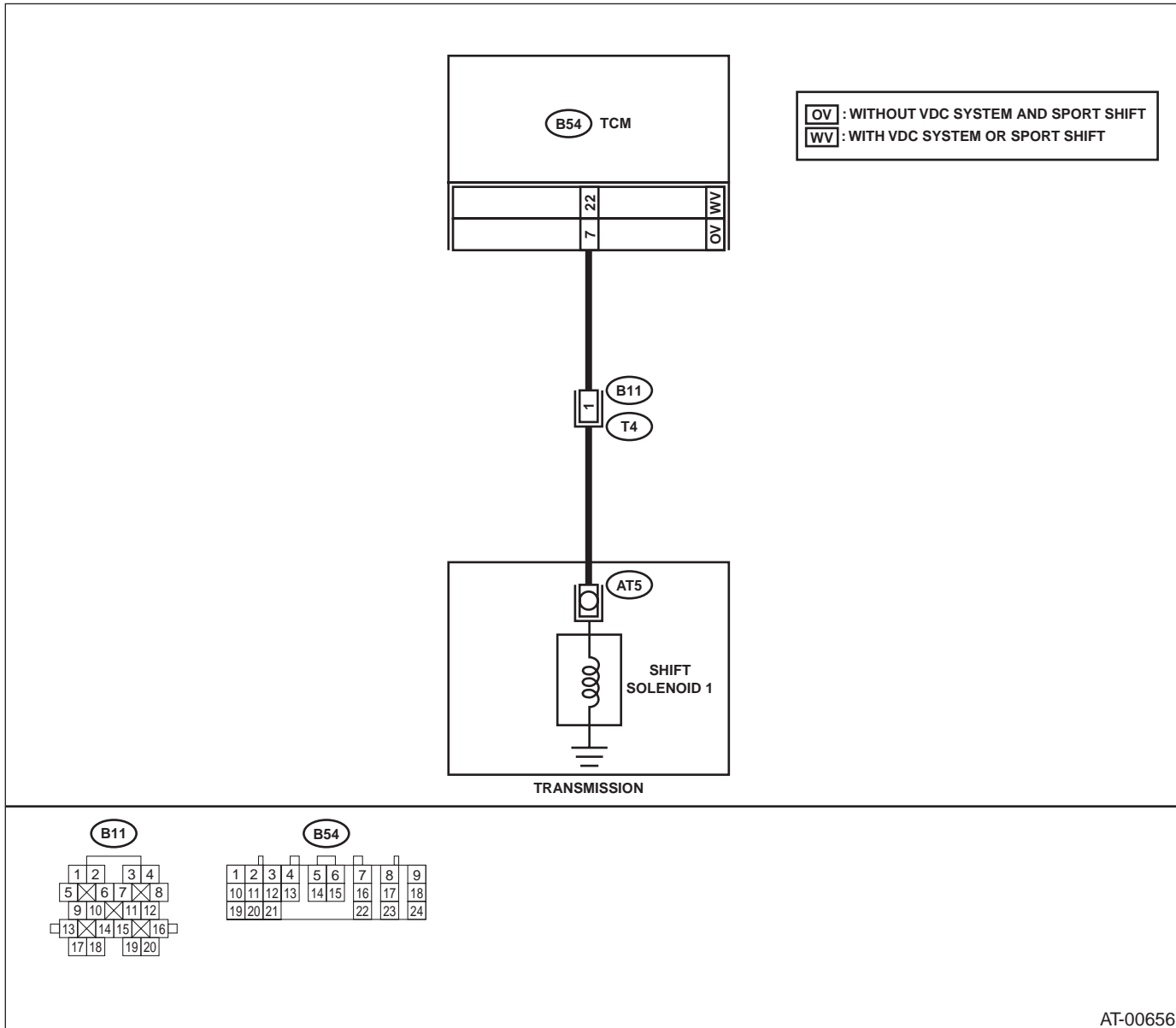
DIAGNOSIS:

Output signal circuit of shift solenoid 1 is open or shorted.

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:



AT-76

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and shift solenoid 1 connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 22 — (B11) No. 1: Without VDC system and SPORT shift: (B54) No. 7 — (B11) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 22 — Chassis ground: Without VDC system and SPORT shift: (B54) No. 7 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3 CHECK SHIFT SOLENOID 1. Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 1 — No. 16: Is the measured value within the specified range?	10 - 16 Ω ?	Go to step 4.	Go to step 7.
4 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Move select lever to "D" range. 4) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 22 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 7 (+) — Chassis ground (-): Does the measured value exceed the specified value?	9 V	Go to step 5.	Go to step 6.

AT-77

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Move select lever to "2" range. 2) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 22 (+) — Chassis ground (-): With VDC system or SPORT shift: (B54) No. 7 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.	Go to step 6.
6 CHECK POOR CONTACT. Is there poor contact in shift solenoid 1 circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
7 CHECK SHIFT SOLENOID 1 (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. 3) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4) Remove oil pan, and disconnect connector from shift solenoid 1. 5) Measure resistance between shift solenoid 1 connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	10 - 16 Ω	Go to step 8.	Replace shift solenoid 1. <Ref. to AT-67, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8 CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION. Measure resistance of harness between shift solenoid 1 and transmission connector. Connector & terminal (AT5) No. 1 — (T4) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 9.	Repair open circuit in harness between shift solenoid 1 and transmission connector.
9 CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION. Measure resistance of harness between shift solenoid 1 connector and transmission ground. Connector & terminal (T4) No. 1 — Transmission ground: Does the measured value exceed the specified value?	1 MΩ	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 1 and transmission.	Repair short circuit harness between shift solenoid 1 and transmission connector.

AT-78

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-79

Vehicle-id:
SIE-id: :H:DTC 71 Shift Solenoid 1

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

I: DTC 72 SHIFT SOLENOID 2

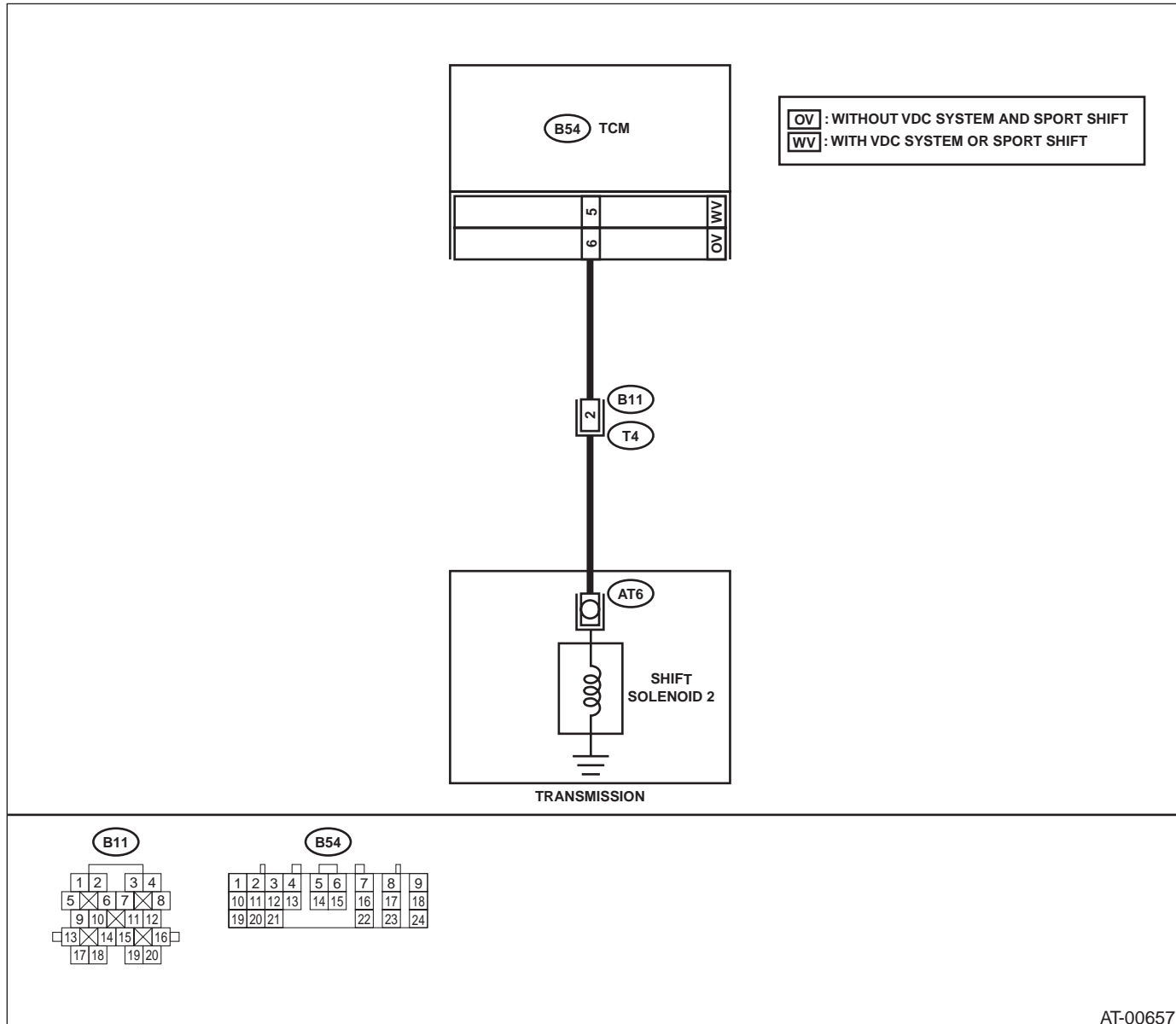
DIAGNOSIS:

Output signal circuit of shift solenoid 2 is open or shorted.

TROUBLE SYMPTOM:

Does not shift.

WIRING DIAGRAM:



AT-80

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and shift solenoid 2 connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 5 — (B11) No. 2: Without VDC system and SPORT shift: (B54) No. 6 — (B11) No. 2: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 5 — Chassis ground: Without VDC system and SPORT shift: (B54) No. 6 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3 CHECK SHIFT SOLENOID 2. Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 2 — No. 16: Is the measured value within the specified range?	10 - 16 Ω	Go to step 4.	Go to step 6.

AT-81

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
<p>4 CHECK OUTPUT SIGNAL EMITTED FROM TCM.</p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Lift-up or raise the vehicle and support with safety stand.</p> <p>NOTE: Raise all wheels off ground.</p> <p>3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).</p> <p>NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.</p> <p>4) Move selector lever to "D", and slowly increase vehicle speed to 50 km/h (31 MPH).</p> <p>NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.></p> <p>5) Measure voltage between TCM connector and chassis ground.</p> <p>Connector & terminal With VDC system or SPORT shift: (B54) No. 22 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 6 (+) — Chassis ground (-):</p> <p>Is the measured value less than the specified value?</p>	1 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 5.
<p>5 CHECK POOR CONTACT.</p> <p>Is there poor contact in shift solenoid 2 circuit?</p>	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
<p>6 CHECK SHIFT SOLENOID 2 (IN TRANSMISSION).</p> <p>1) Remove transmission connector from bracket.</p> <p>2) Drain automatic transmission fluid.</p> <p>CAUTION: Do not drain the automatic transmission fluid until it cools down.</p> <p>3) Remove oil pan, and disconnect connector from shift solenoid 2.</p> <p>4) Measure resistance between shift solenoid 2 connector and transmission ground.</p> <p>Connector & terminal No. 1 — Transmission ground:</p> <p>Is the measured value within the specified range?</p>	10 - 16 Ω?	Go to step 7.	Replace shift solenoid 2 assembly. <Ref. to AT-67, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

AT-82

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
7 CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION. Measure resistance of harness between shift solenoid 2 and transmission connector. Connector & terminal (AT6) No. 1 — (T4) No. 2: Is the measured value less than the specified value?	1 Ω	Go to step 8 .	Repair open circuit in harness between shift solenoid 2 and transmission connector.
8 CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION. Measure resistance of harness between shift solenoid 2 connector and transmission ground. Connector & terminal (T4) No. 2 — Transmission ground: Does the measured value exceed the specified value?	1 M Ω	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in shift solenoid 2 and transmission.	Repair short circuit harness between shift solenoid 2 and transmission connector.

AT-83

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

J: DTC 73 LOW CLUTCH TIMING SOLENOID

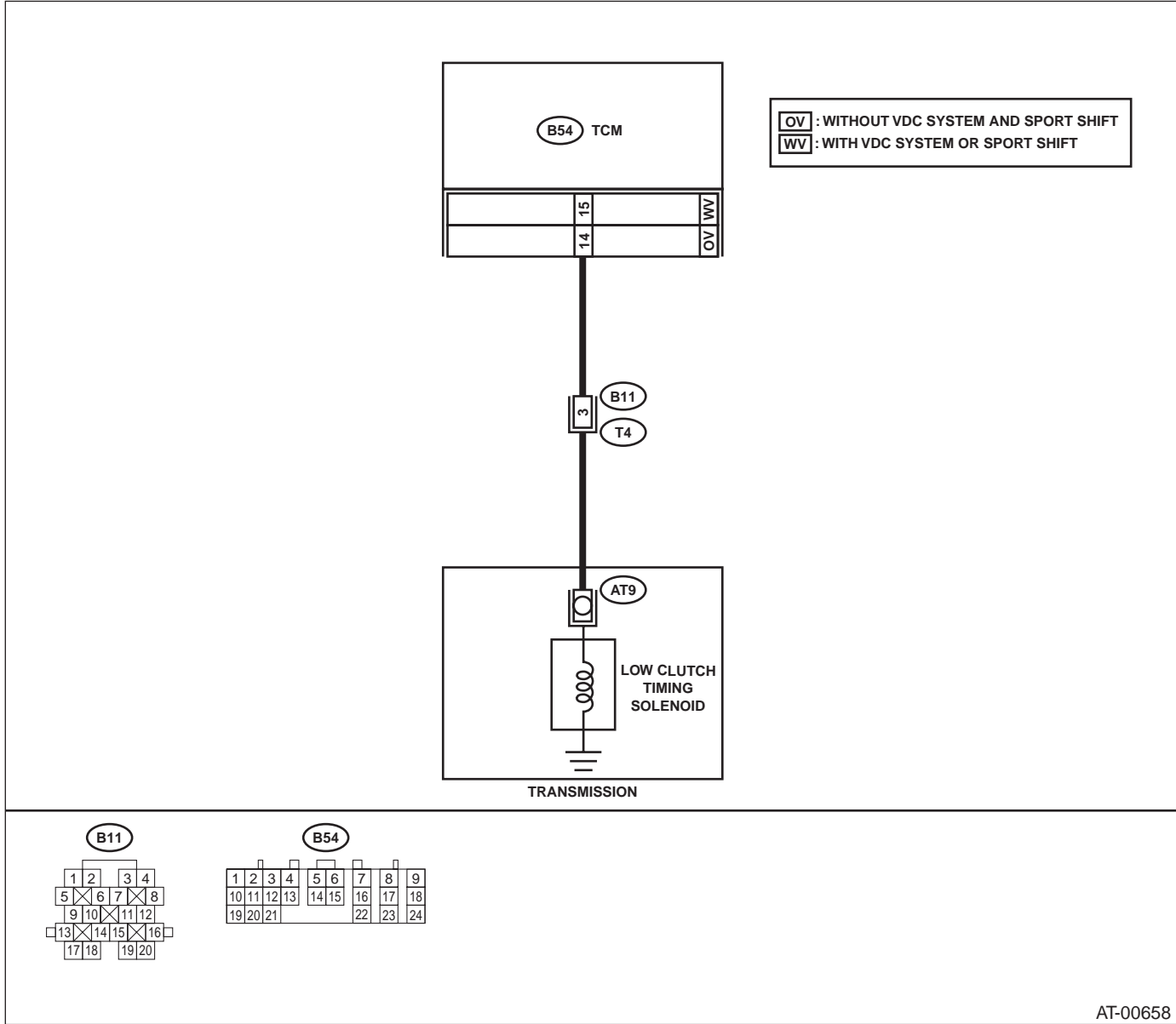
DIAGNOSIS:

Output signal circuit of low clutch timing solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-84

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 15 — (B11) No. 3: Without VDC system and SPORT shift: (B54) No. 14 — (B11) No. 3: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 15 — Chassis ground: Without VDC system and SPORT shift: (B54) No. 14 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3 CHECK LOW CLUTCH TIMING SOLENOID. Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 3 — No. 16: Is the measured value within the specified range?	10 - 16 Ω	Go to step 4.	Go to step 7.
4 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Move select lever to "D" range. 4) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 15 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 14 (+) — Chassis ground (-): Does the measured value exceed the specified value?	9 V	Go to step 5.	Go to step 6.

AT-85

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Move select lever to "2" range. 2) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 15 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 14 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM and transmission.	Go to step 6.
6 CHECK POOR CONTACT. Is there poor contact in low clutch timing solenoid circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
7 CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. 3) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4) Remove oil pan, and disconnect connector from low clutch timing solenoid. 5) Measure resistance between low clutch timing solenoid connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	10 - 16 Ω	Go to step 8.	Replace low clutch timing solenoid. <Ref. to AT-67, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8 CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION. Measure resistance of harness between low clutch timing solenoid and transmission connector. Connector & terminal (AT9) No. 1 — (T4) No. 3: Is the measured value less than the specified value?	1 Ω	Go to step 9.	Repair open circuit in harness between low clutch timing solenoid and transmission connector.

AT-86

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
9 CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION. Measure resistance of harness between low clutch timing solenoid connector and transmission ground. Connector & terminal (T4) No. 3 — Transmission ground: Does the measured value exceed the specified value?	1 M Ω	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in low clutch timing solenoid and transmission.	Repair short circuit harness between low clutch timing solenoid and transmission connector.

AT-87

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

K: DTC 74 2-4 BRAKE TIMING SOLENOID

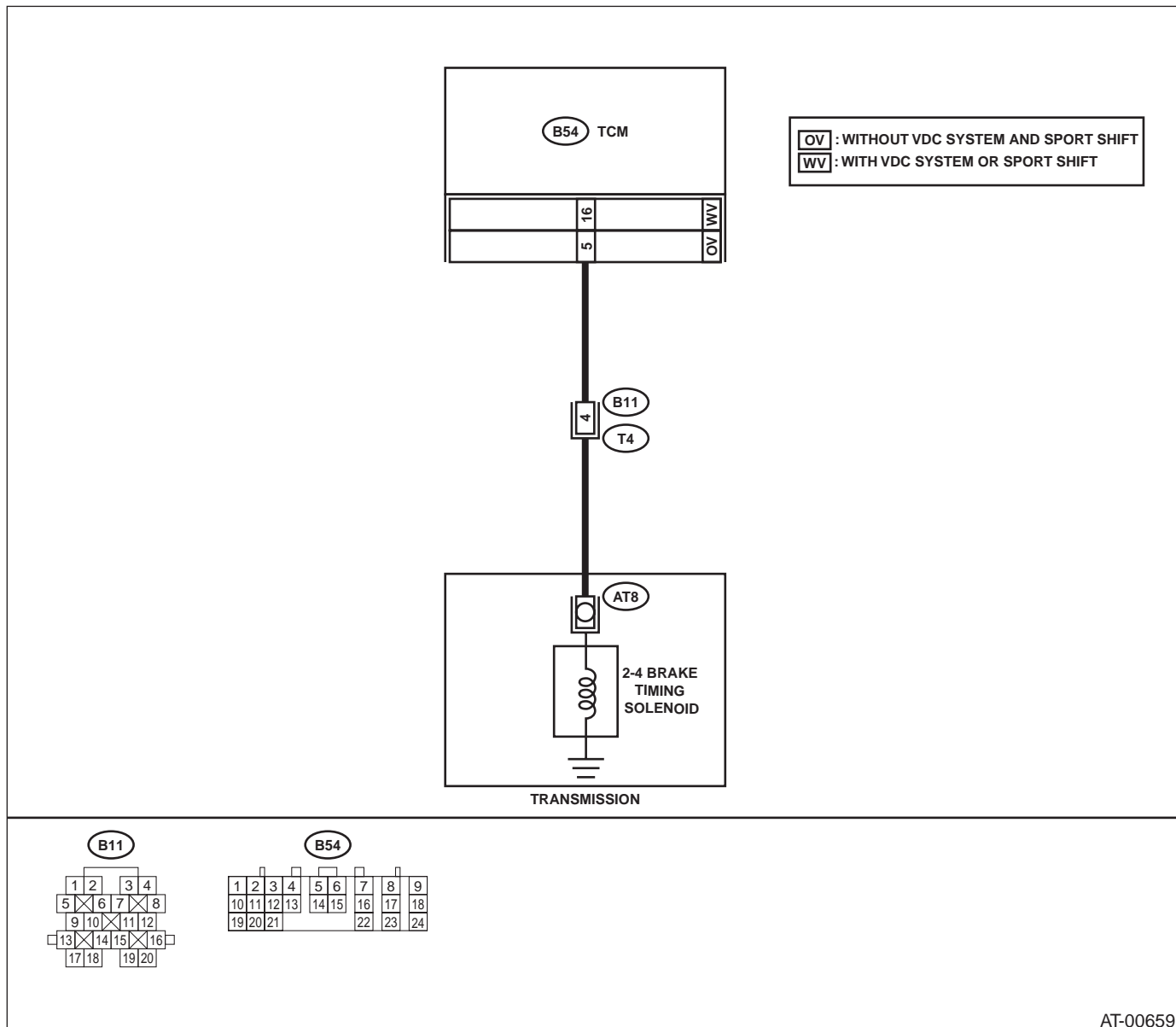
DIAGNOSIS:

Output signal circuit of 2-4 brake timing solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-00659

AT-88

Vehicle-id:
 SIE-id: :K:DTC 74 2-4 Brake Timing Solenoid

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 16 — (B11) No. 4: Without VDC system and SPORT shift: (B54) No. 5 — (B11) No. 4: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and transmission ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 16 — Chassis ground: Without VDC system and SPORT shift: (B54) No. 5 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3 CHECK 2-4 BRAKE TIMING SOLENOID. Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 4 — No. 16: Is the measured value within the specified range?	10 - 16 Ω	Go to step 4.	Go to step 7.

AT-89

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
<p>4 CHECK OUTPUT SIGNAL EMITTED FROM TCM.</p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Lift-up or raise the vehicle and support with safety stand.</p> <p>NOTE: Raise all wheels off ground.</p> <p>3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).</p> <p>NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.</p> <p>4) Move selector lever to "1", and slowly increase vehicle speed to 10 km/h (6 MPH).</p> <p>NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.></p> <p>5) Measure voltage between TCM connector and chassis ground.</p> <p>Connector & terminal With VDC system or SPORT shift: (B54) No. 16 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 5 (+) — Chassis ground (-): Is the measured value less than the specified value?</p>	1 V	Go to step 5.	Go to step 6.
<p>5 CHECK OUTPUT SIGNAL EMITTED FROM TCM.</p> <p>1) Move selector lever to "D", and slowly increase vehicle speed to 65 km/h (40 MPH).</p> <p>NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.></p> <p>2) Measure voltage between TCM connector and chassis ground.</p> <p>Connector & terminal With VDC system or SPORT shift: (B54) No. 16 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 5 (+) — Chassis ground (-): Does the measured value exceed the specified value?</p>	9 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the transmission.	Go to step 6.

AT-90

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
6 CHECK POOR CONTACT. Is there poor contact in 2-4 brake timing solenoid circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
7 CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Lift-up or raise the vehicle and support with safety stand. 3) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 4) Remove oil pan, and disconnect connector from 2-4 brake timing solenoid. 5) Measure resistance between 2-4 brake timing solenoid connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	10 - 16 Ω?	Go to step 8.	Replace 2-4 brake timing solenoid. <Ref. to AT-67, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8 CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION. Measure resistance of harness between 2-4 brake timing solenoid and transmission connector. Connector & terminal (AT8) No. 1 — (T4) No. 4: Is the measured value less than the specified value?	1 Ω	Go to step 9.	Repair open circuit in harness between 2-4 brake timing solenoid and transmission connector.
9 CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION. Measure resistance of harness between 2-4 brake timing solenoid connector and transmission ground. Connector & terminal (T4) No. 4 — Transmission ground: Does the measured value exceed the specified value?	1 MΩ	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in 2-4 brake timing solenoid and transmission.	Repair short circuit harness between 2-4 brake timing solenoid and transmission connector.

AT-91

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

L: DTC 75 LINE PRESSURE DUTY SOLENOID

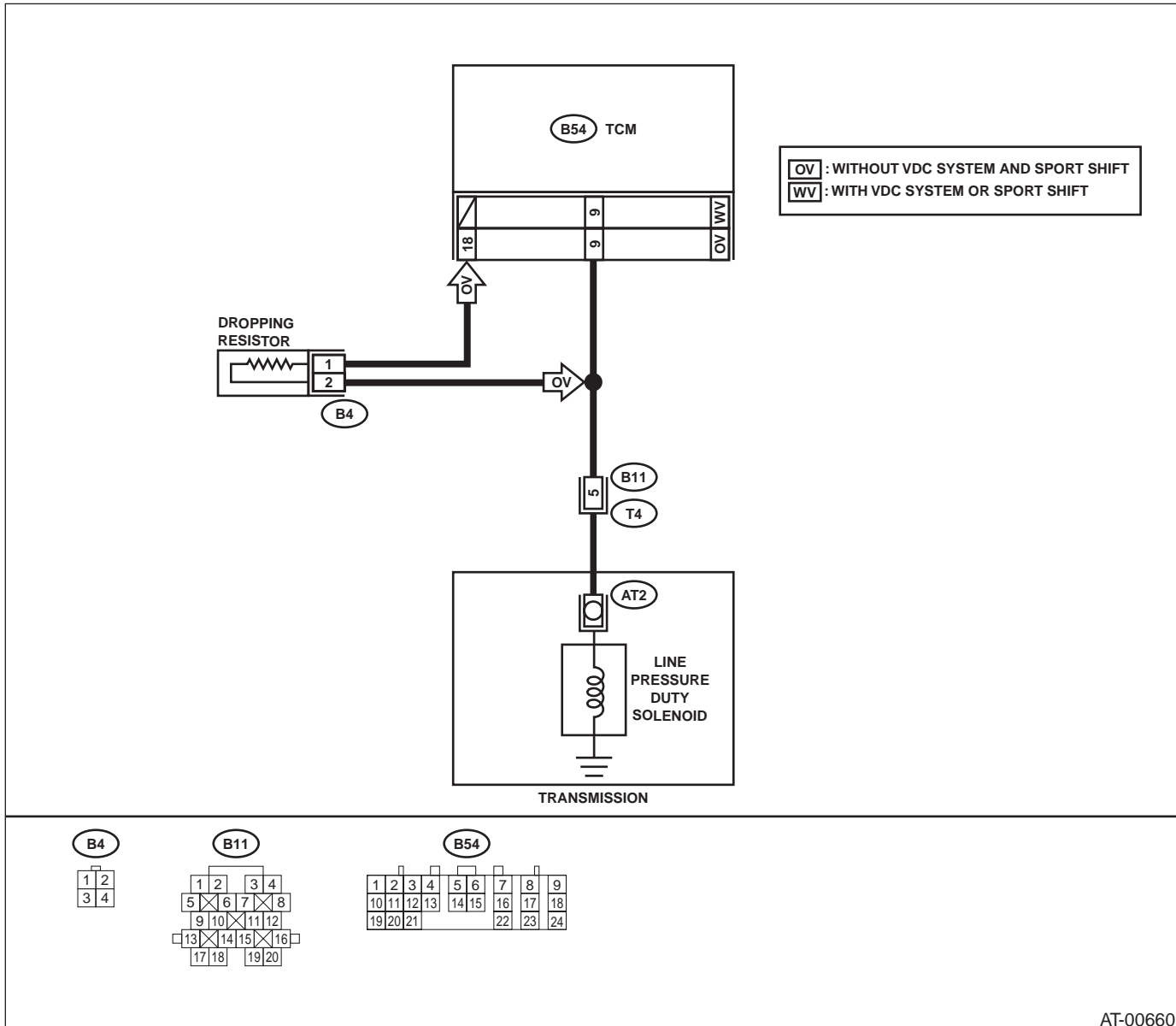
DIAGNOSIS:

Output signal circuit of line pressure duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-92

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK VEHICLE. Is the target model equipped with VDC system or SPORT shift?	Model with VDC system or SPORT shift	Go to step 7.	Go to step 2.
2 CHECK DROPPING RESISTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resistor. 3) Measure resistance between dropping resistor terminals. Terminal No. 1 — No. 2: Is the measured value within the specified range?	9 - 15 Ω	Go to step 3.	Replace dropping resistor. <Ref. to AT-76, Dropping Resistor.>
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. 1) Disconnect connector from TCM. 2) Measure resistance between TCM and dropping resistor. Connector & terminal (B54) No. 18 — (B4) No.1 : Is the measured value less than the specified value?	1 Ω	Go to step 4.	Repair open circuit in harness between TCM and dropping resistor connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. Measure resistance between dropping resistor connector and chassis ground. Connector & terminal (B4) No. 1 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 5.	Repair short circuit in harness between TCM and dropping resistor connector.
5 CHECK HARNESS CONNECTOR BETWEEN DROPPING RESISTOR AND TRANSMISSION. Measure resistance of harness between dropping resistor connector and transmission. Connector & terminal (B4) No. 2 — (B11) No.5 : Is the measured value less than the specified value?	1 Ω	Go to step 6.	Repair open circuit in harness between dropping resistor and transmission connector.
6 CHECK HARNESS CONNECTOR BETWEEN DROPPING RESISTOR AND TRANSMISSION. Measure resistance between dropping resistor connector and chassis ground. Connector & terminal (B4) No. 2 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 7.	Repair short circuit in harness between TCM and dropping resistor connector.
7 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal (B54) No. 9 — (B11) No. 5: Is the measured value less than the specified value?	1 Ω	Go to step 8.	Repair open circuit in harness between TCM and transmission connector.

AT-93

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
8 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure resistance of harness between TCM and chassis ground. Connector & terminal (B54) No. 9 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 9.	Repair short circuit in harness between TCM and transmission connector.
9 CHECK LINE PRESSURE DUTY SOLENOID. Measure resistance between transmission connector receptacle's terminals. Terminal (T4) No. 5 — No. 16: Is the measured value within the specified range?	2.0 - 4.5 Ω ?	Go to step 10.	Go to step 16.
10 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	Subaru Select Monitor is available.	Go to step 11.	Go to step 12.
11 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect all connectors. 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Turn ignition switch to ON (engine OFF). 4) Move select lever to "N". 5) Throttle is fully closed. 6) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 9 (+) — Chassis ground (-): Is the measured value within the specified range?	1.5 - 5.0 V	Go to step 12.	Go to step 15.
12 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Throttle is fully open. 2) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 9 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in transmission.	Go to step 15.

AT-94

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
13 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move select lever to "N". 7) Read data of line pressure duty solenoid using Subaru Select Monitor. •Line pressure duty solenoid is indicated in "%". 8) Throttle is fully closed. Is the data of line pressure duty solenoid same as the specified value?	100%	Go to step 14.	Go to step 15.
14 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Turn ignition switch to ON (Engine OFF). 2) Throttle is fully open. Is the data of line pressure duty solenoid less than the specified value?	25%	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in transmission.	Go to step 15.
15 CHECK POOR CONTACT. Is there poor contact in line pressure duty solenoid circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
16 CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove oil pan, and disconnect connector from line pressure duty solenoid. 4) Measure resistance between line pressure duty solenoid connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	2.0 - 4.5 Ω	Go to step 17.	Replace line pressure duty solenoid. <Ref. to AT-67, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

AT-95

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
17 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID. Measure resistance of harness between line pressure duty solenoid and transmission connector. Connector & terminal (T4) No. 5 — (AT2) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 18.	Repair open circuit in harness between line pressure duty solenoid and transmission connector.
18 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID. Measure resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 5 — Transmission ground: Does the measured value exceed the specified value?	1 MΩ	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission.	Repair short circuit in harness between line pressure duty solenoid and transmission connector.

AT-96

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-97

Vehicle-id:
SIE-id: :L:DTC 75 Line Pressure Duty Solenoid

~

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

M: DTC 76 2-4 BRAKE DUTY SOLENOID

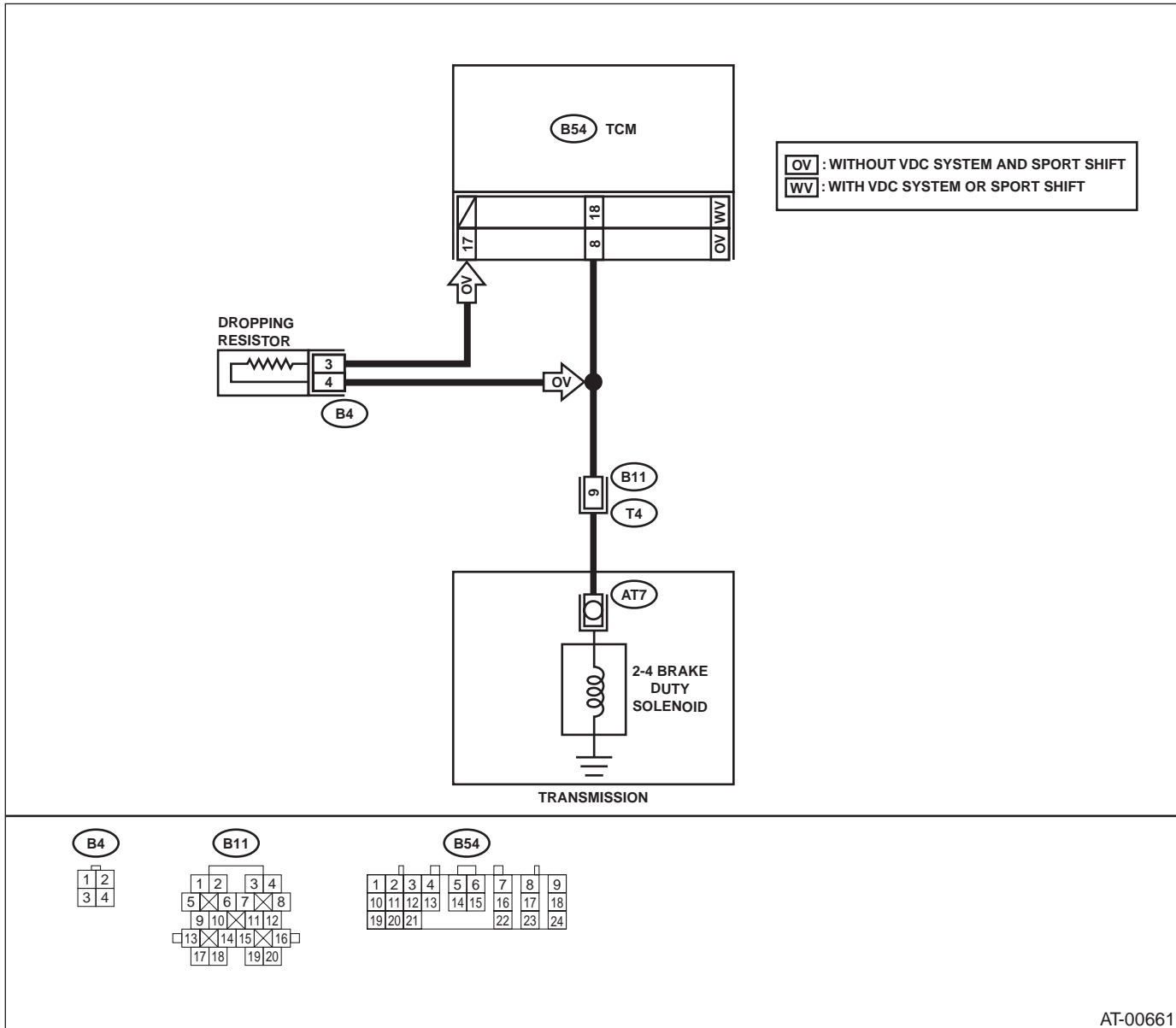
DIAGNOSIS:

Output signal circuit of 2-4 brake duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



AT-98

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK VEHICLE. Is the target model equipped with VDC system or SPORT shift?	Model with VDC system or SPORT shift	Go to step 7.	Go to step 2.
2 CHECK DROPPING RESISTOR. 1) Turn ignition switch to OFF. 2) Disconnect connector from dropping resistor. 3) Measure resistance between dropping resistor terminals. Terminal No. 3 — No. 4: Is the measured value within the specified range?	9 - 15 Ω	Go to step 3.	Replace dropping resistor. <Ref. to AT-76, Dropping Resistor.>
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. 1) Disconnect connector from TCM. 2) Measure resistance between TCM and dropping resistor. Connector & terminal (B54) No. 17 — (B4) No. 3 : Is the measured value less than the specified value?	1 Ω	Go to step 4.	Repair open circuit in harness between TCM and dropping resistor connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND DROPPING RESISTOR. Measure resistance between dropping resistor connector and chassis ground. Connector & terminal (B4) No. 3 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 5.	Repair short circuit in harness between TCM and dropping resistor connector.
5 CHECK HARNESS CONNECTOR BETWEEN DROPPING RESISTOR AND TRANSMISSION. Measure resistance of harness between dropping resistor connector and transmission. Connector & terminal (B4) No. 4 — (B11) No.9 : Is the measured value less than the specified value?	1 Ω	Go to step 6.	Repair open circuit in harness between dropping resistor and transmission connector.
6 CHECK HARNESS CONNECTOR BETWEEN DROPPING RESISTOR AND TRANSMISSION. Measure resistance between dropping resistor connector and chassis ground. Connector & terminal (B4) No. 4 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 7.	Repair short circuit in harness between TCM and dropping resistor connector.

AT-99

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
7 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from transmission and TCM. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 18 — (B11) No. 9: Without VDC system and SPORT shift: (B54) No. 8 — (B11) No. 9: Is the measured value less than the specified value?	1 Ω	Go to step 8.	Repair open circuit in harness between TCM and transmission connector.
8 CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND. Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 18 — Chassis ground: Without VDC system and SPORT shift: (B54) No. 8 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 9.	Repair short circuit in harness between TCM and transmission connector.
9 CHECK 2-4 BRAKE DUTY SOLENOID. Measure resistance between transmission connector receptacle's terminals. Terminal (T4) No. 16 — No. 9: Is the measured value within the specified range?	2.0 - 4.5 Ω	Go to step 10.	Go to step 16.
10 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	Subaru Select Monitor is available.	Go to step 13.	Go to step 11.
11 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect all connectors. 2) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Turn ignition switch to ON (engine OFF). 4) Move select lever to "N". 5) Throttle is fully closed. 6) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 18 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 8 (+) — Chassis ground (-): Is the measured value within the specified range?	1.5 - 5.0 V	Go to step 12.	Go to step 15.

AT-100

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
12 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Throttle is fully open. 2) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 18 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 8 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 15.
13 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect all connectors. 2) Connect Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor switch to ON. 4) Warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move select lever to "N". 7) Read data of 2-4 brake duty solenoid using Subaru Select Monitor. •2-4 brake duty solenoid is indicated in "%". 8) Throttle is fully closed. Is 2-4 brake duty solenoid same as the specified value?	100%	Go to step 14.	Go to step 15.
14 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Turn ignition switch to ON (Engine OFF). 2) Throttle is fully open. 3) Read data of 2-4 brake duty solenoid using Subaru Select Monitor. Is 2-4 brake duty solenoid less than the specified value?	25%	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 15.
15 CHECK POOR CONTACT. Is there poor contact in 2-4 brake duty solenoid circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-101

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
16 CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove oil pan, and disconnect connector from 2-4 brake duty solenoid. 4) Measure resistance between 2-4 brake duty solenoid connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	2.0 - 4.5 Ω	Go to step 17.	Replace 2-4 brake duty solenoid. <Ref. to AT-67, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
17 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID. Measure resistance of harness between 2-4 brake duty solenoid and transmission connector. Connector & terminal (T4) No. 9 — (AT7) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 18.	Repair open circuit in harness between 2-4 brake duty solenoid and transmission connector.
18 CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID. Measure resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 9 — Transmission ground: Does the measured value exceed the specified value?	1 M Ω	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in line pressure duty solenoid and transmission.	Repair short circuit in harness between 2-4 brake duty solenoid and transmission connector.

AT-102

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-103

Vehicle-id:
SIE-id: :M:DTC 76 2-4 Brake Duty Solenoid

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

N: DTC 77 LOCK-UP DUTY SOLENOID

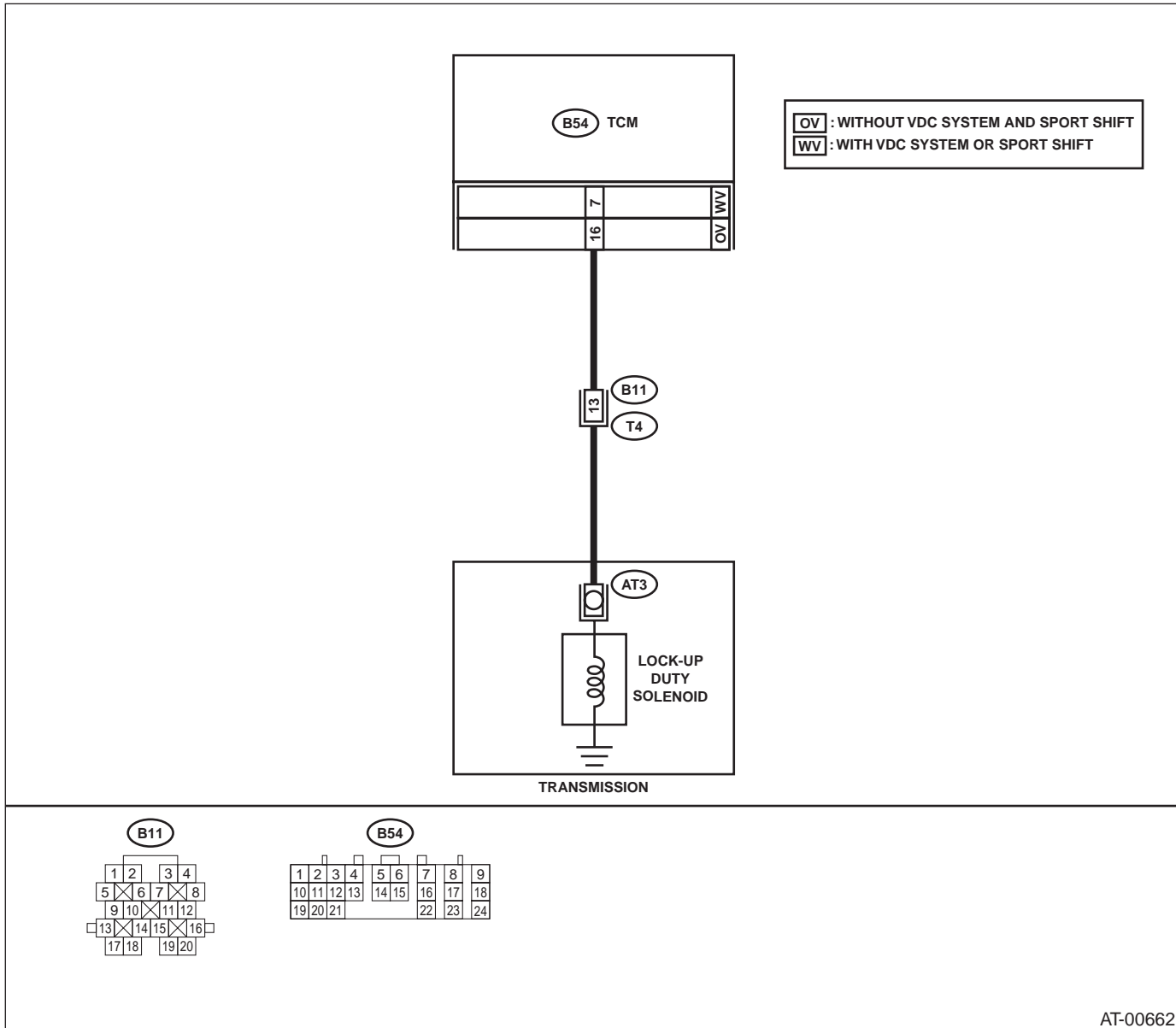
DIAGNOSIS:

Output signal circuit of lock-up duty solenoid is open or shorted.

TROUBLE SYMPTOM:

No "lock-up" (after engine warm-up).

WIRING DIAGRAM:



AT-104

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK DTC. Do multiple trouble codes appear in the on-board diagnostics test mode?	DTC indicated.	Go to another Diagnostic trouble code (DTC).	Go to step 2.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 7 — (B11) No. 13: Without VDC system and SPORT shift: (B54) No. 16 — (B11) No. 13: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and transmission connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness connector between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 7 — Chassis ground: Without VDC system and SPORT shift: (B54) No. 16 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4 CHECK LOCK-UP DUTY SOLENOID. Measure resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 13 — No. 16: Is the measured value within the specified range?	10 - 17 Ω	Go to step 5.	Go to step 11.
5 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	Subaru Select Monitor is available.	Go to step 8.	Go to step 6.

AT-105

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
<p>6 CHECK OUTPUT SIGNAL EMITTED FROM TCM.</p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Lift-up the vehicle and place safety stand.</p> <p>NOTE: Raise all wheels off ground.</p> <p>3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).</p> <p>NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.</p> <p>4) Move selector lever to "D" and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up.</p> <p>NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.></p> <p>5) Measure voltage between TCM connector and chassis ground.</p> <p>Connector & terminal With VDC system or SPORT shift: (B54) No. 7 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 16 (+) — Chassis ground (-):</p> <p>Does the measured value exceed the specified value?</p>	8.5 V	Go to step 7.	Go to step 10.
<p>7 CHECK OUTPUT SIGNAL EMITTED FROM TCM.</p> <p>1) Return the engine to idling speed and move select lever to "N".</p> <p>2) Measure voltage between TCM connector and chassis ground.</p> <p>Connector & terminal With VDC system or SPORT shift: (B54) No. 7 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 16 (+) — Chassis ground (-):</p> <p>Is the measured value less than the specified value?</p>	0.5 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 10.

AT-106

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
<p>8 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Lift-up the vehicle and place safety stand.</p> <p>NOTE: Raise all wheels off ground.</p> <p>3) Connect Subaru Select Monitor to data link connector.</p> <p>4) Start the engine, and turn Subaru Select Monitor switch to ON.</p> <p>5) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F).</p> <p>NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature.</p> <p>6) Read data of lock-up duty solenoid using Subaru Select Monitor.</p> <p>•Lock-up duty solenoid is indicated in “%”.</p> <p>7) Move selector lever to “D” and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up.</p> <p>NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.></p> <p style="padding-left: 20px;">Is the data of lock-up duty solenoid same as the specified value?</p>	95%	Go to step 9.	Go to step 10.
<p>9 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.</p> <p>1) Return the engine to idling speed and move selector lever to “N”.</p> <p>NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.></p> <p>2) Read data of lock-up duty solenoid using Subaru Select Monitor.</p> <p style="padding-left: 20px;">Is the data of lock-up duty solenoid same as the specified value?</p>	5%	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in TCM and transmission.	Go to step 10.
<p>10 CHECK POOR CONTACT.</p> <p>Is there poor contact in lock-up duty solenoid circuit?</p>	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-107

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
11 CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION). 1) Remove transmission connector from bracket. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove oil pan, and disconnect connector from lock-up duty solenoid. 4) Measure resistance between lock-up duty solenoid connector and transmission ground. Terminal No. 1 — Transmission ground: Is the measured value within the specified range?	10 - 17 Ω	Go to step 12.	Replace lock-up duty solenoid. <Ref. to AT-67, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
12 CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION. Measure resistance of harness between lock-up duty solenoid and transmission connector. Connector & terminal (T4) No. 13 — (AT3) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 13.	Repair open circuit in harness between TCM and transmission connector.
13 CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION. Measure resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 13 — Transmission ground: Does the measured value exceed the specified value?	1 M Ω	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in lock-up duty solenoid and transmission.	Repair short circuit in harness between lock-up duty solenoid and transmission connector.

AT-108

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-109

Vehicle-id:
SIE-id: :N:DTC 77 Lock-up Duty Solenoid

~

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

O: DTC 78 SPORT SHIFT SOLENOID

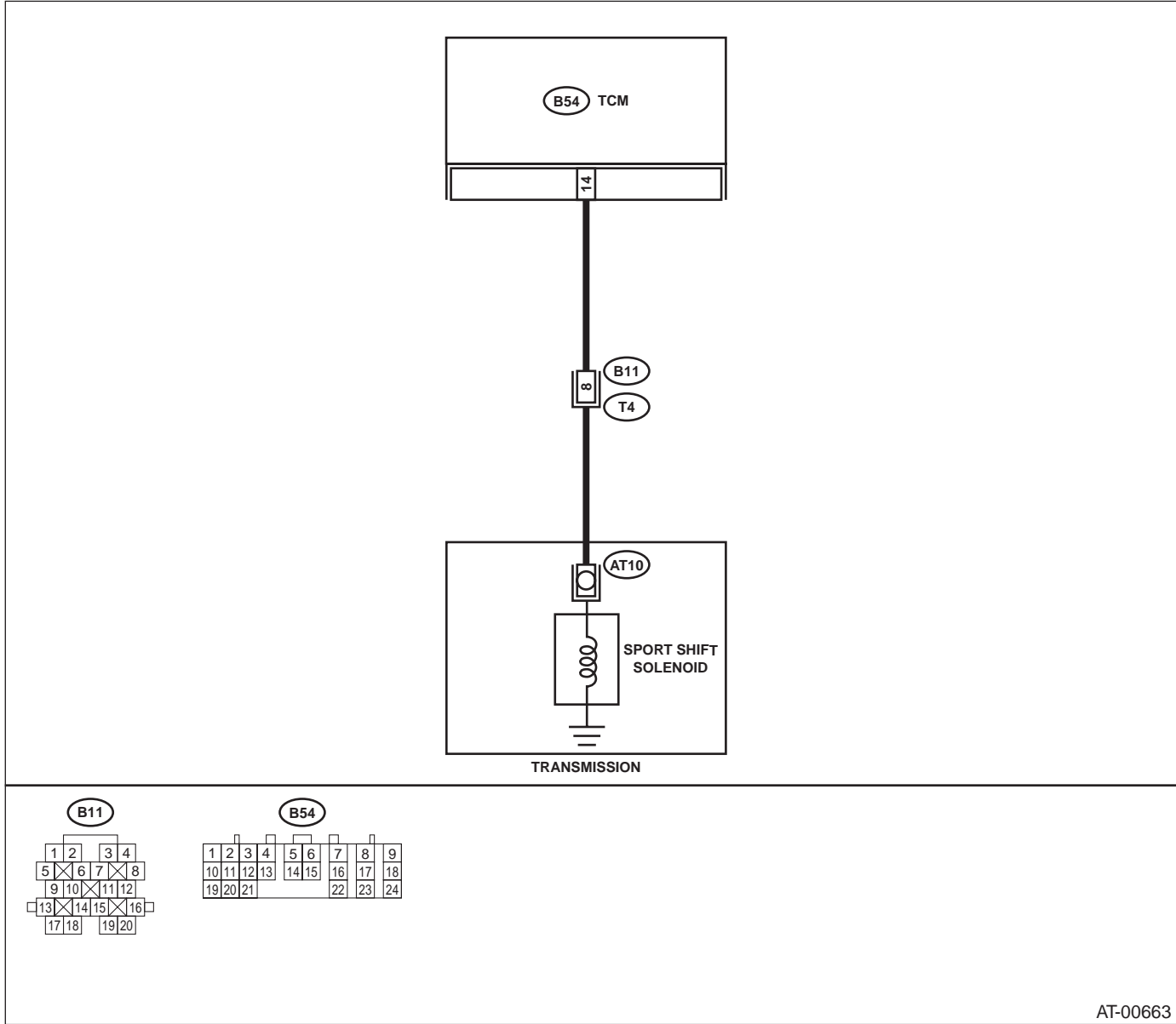
DIAGNOSIS:

Output signal circuit of SPORT shift solenoid is open or shorted.

TROUBLE SYMPTOM:

Engine brake is effected when select lever is in "D" or "3" range with 1st gear.

WIRING DIAGRAM:



AT-110

Vehicle-id:
SIE-id::0:DTC 78 SPORT Shift Solenoid

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and SPORT shift solenoid connector. Connector & terminal (B54) No. 14 — (B11) No. 8: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM connector and chassis ground. Connector & terminal (B54) No. 14 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3 CHECK SHIFT SOLENOID 1. Measure resistance between transmission connector terminals. Connector & terminal (T4) No. 8 — No. 16: Is the measured value within the specified range?	10 - 16 Ω	Go to step 4.	Go to step 7.
4 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 14 (+) — Chassis ground (-): Does the measured value exceed the specified value?	9 V	Go to step 5.	Go to step 6.
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Move select lever to SPORT shift mode. 2) Measure voltage between TCM connector and chassis ground. Connector & terminal (B54) No. 14 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the TCM.	Go to step 6.
6 CHECK POOR CONTACT. Is there poor contact in SPORT shift solenoid circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-111

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
<p>7 CHECK SPORT SHIFT SOLENOID (IN TRANSMISSION).</p> <p>1) Remove transmission connector from bracket.</p> <p>2) Lift-up or raise the vehicle and support with safety stand.</p> <p>NOTE: On AWD models, raise all wheels off ground.</p> <p>3) Drain automatic transmission fluid.</p> <p>CAUTION: Do not drain the automatic transmission fluid until it cools down.</p> <p>4) Remove oil pan, and disconnect connector from SPORT shift solenoid.</p> <p>5) Measure resistance between SPORT shift solenoid connector and transmission ground.</p> <p>Terminal No. 1 — Transmission ground: Is the measured value within the specified range?</p>	10 - 16 Ω	Go to step 8.	Replace SPORT shift solenoid. <Ref. to AT-67, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
<p>8 CHECK HARNESS CONNECTOR BETWEEN SPORT SHIFT SOLENOID AND TRANSMISSION.</p> <p>Measure resistance of harness between SPORT shift solenoid and transmission connector.</p> <p>Connector & terminal (AT10) No. 1 — (T4) No. 8: Is the measured value less than the specified value?</p>	1 Ω	Go to step 9.	Repair open circuit in harness between SPORT shift solenoid and transmission connector.
<p>9 CHECK HARNESS CONNECTOR BETWEEN SPORT SHIFT SOLENOID AND TRANSMISSION.</p> <p>Measure resistance of harness between SPORT shift solenoid connector and transmission ground.</p> <p>Connector & terminal (T4) No. 8 — Transmission ground: Does the measured value exceed the specified value?</p>	1 M Ω	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in SPORT shift solenoid and transmission.	Repair short circuit harness between SPORT shift solenoid and transmission connector.

AT-112

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-113

Vehicle-id:
SIE-id: :0:DTC 78 SPORT Shift Solenoid

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

P: DTC 79 TRANSFER DUTY SOLENOID

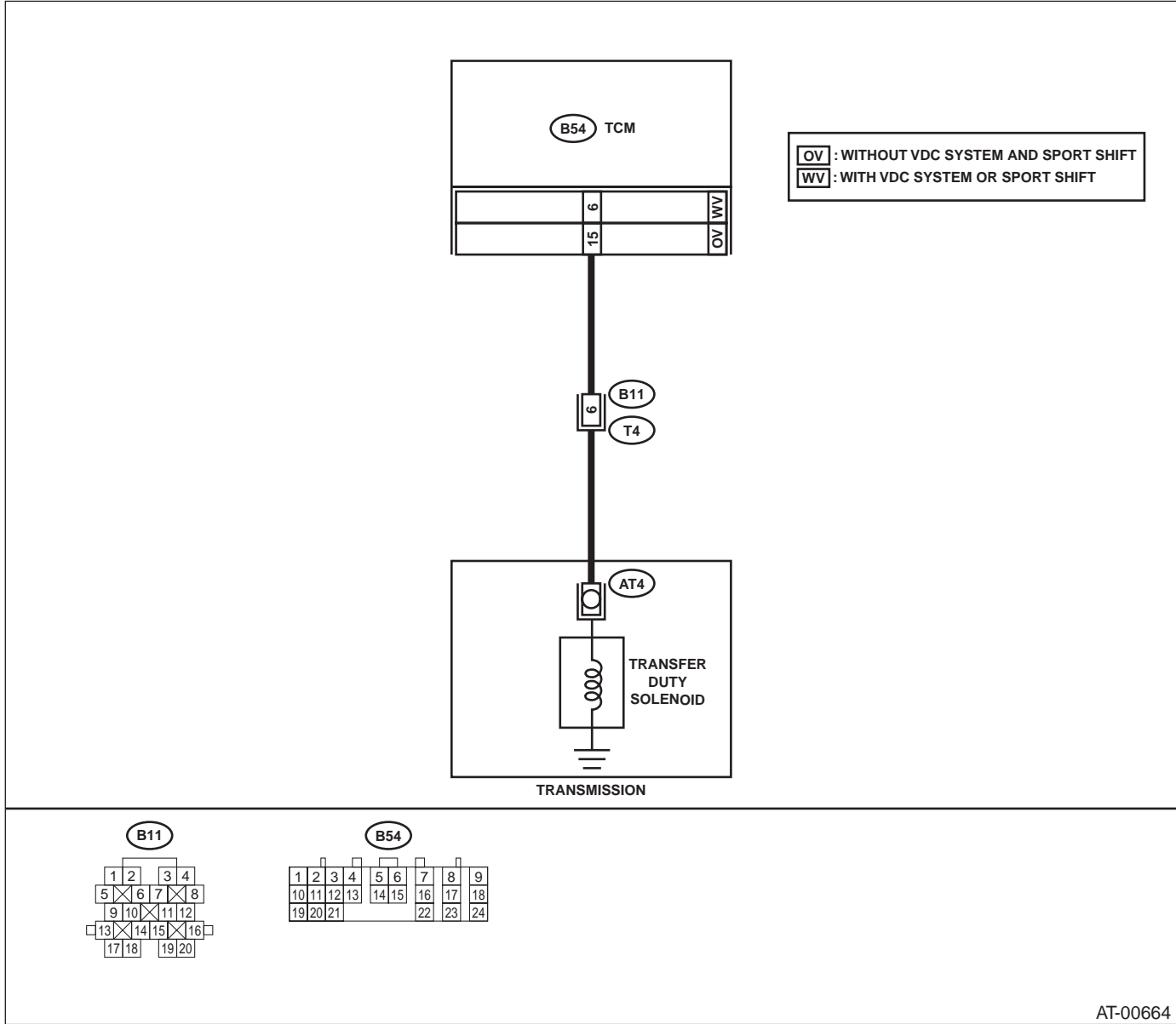
DIAGNOSIS:

Output signal circuit of transfer duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive "braking" in tight corners.

WIRING DIAGRAM:



AT-114

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 6 — (B11) No. 6: Without VDC system and SPORT shift: (B54) No. 15 — (B11) No. 6: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance harness connector between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 6 — Chassis ground: Without VDC system and SPORT shift: (B54) No. 15 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 3.	Repair short circuit in harness between TCM and transmission connector.
3 CHECK TRANSFER DUTY SOLENOID. Measure resistance between transmission connector and transmission terminals. Connector & terminal (T4) No. 6 — No. 16: Is the measured value within the specified range?	10 - 17 Ω	Go to step 4.	Go to step 13.
4 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	Subaru Select Monitor is available.	Go to step 7.	Go to step 5.
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connectors to TCM and transmission. 2) Turn ignition switch to ON (engine OFF). 3) Move select lever to "P" range. 4) Throttle is fully closed. 5) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 6 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 15 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 9.	Go to step 12.

AT-115

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
6 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Move select lever to "D" range. 2) Measure voltage between TCM connector and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 6 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 15 (+) — Chassis ground (-): Is the measured value within the specified range?	5 - 7 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the transfer duty solenoid and TCM connector.	Go to step 12.
7 CHECK SPECIFICATION. Is the vehicle equipped with the VDC system?	VDC system or SPORT shift is equipped.	Go to step 10.	Go to step 8.
8 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON. 4) Move select lever to "D" with throttle fully open (vehicle speed 0 km/h or 0 MPH). 5) Read data of transfer duty solenoid using Subaru Select Monitor. •Transfer duty solenoid is indicated in "%". Is the data of transfer duty solenoid within the specified value?	5 - 10%	Go to step 9.	Go to step 12.
9 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Move select lever to "N" with throttle fully closed (vehicle speed 0 km/h or 0 MPH). 2) Read data of transfer duty solenoid using Subaru Select Monitor. •Transfer duty solenoid is indicated in "%". Is the data of transfer duty solenoid within the specified value?	Approx. 60 - 70%	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the transfer duty solenoid and TCM connector.	Go to step 12.

AT-116

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
10 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Connect connectors to TCM and transmission. 2) Connect Subaru Select Monitor to data link connector. 3) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON. 4) Move select lever to "D" with throttle fully open (vehicle speed 0 km/h or 0 MPH). 5) Read data of transfer duty solenoid using Subaru Select Monitor. •Transfer duty solenoid is indicated in "%". Is the data of transfer duty solenoid within the specified value?	80 - 95%	Go to step 11.	Go to step 12.
11 CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR. 1) Move select lever to "N" with throttle fully close (vehicle speed 0 km/h or 0 MPH). 2) Rear data of transfer duty solenoid using Subaru Select Monitor. •Transfer duty solenoid is indicated in "%". Is the data of transfer duty solenoid same as the specified value?	Approx. 40%	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the transfer duty solenoid and TCM connector.	Go to step 12.
12 CHECK POOR CONTACT. Is there poor contact in transfer duty solenoid circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
13 CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION). 1) Lift-up the vehicle and place safety stand. 2) Drain automatic transmission fluid. CAUTION: Do not drain the automatic transmission fluid until it cools down. 3) Remove extension case, and disconnect connector from transfer duty solenoid. 4) Measure resistance between transfer duty solenoid connector and transmission ground. Connector & terminal (AT4) No. 1 — Transmission ground: Is the measured value within the specified range?	10 - 17 Ω	Go to step 14.	Replace transfer duty solenoid. <Ref. to AT-70, Transfer Duty Solenoid and Valve Body.>

AT-117

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
14 CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION. Measure resistance of harness between transfer duty solenoid and transmission connector. Connector & terminal (T4) No. 6 — (AT4) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 15.	Repair open circuit in harness between transfer duty solenoid and transmission connector.
15 CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION. Measure resistance of harness between transmission connector and transmission ground. Connector & terminal (T4) No. 6 — Transmission ground: Does the measured value exceed the specified value?	1 MΩ	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or contact in the transfer duty solenoid and transmission connector.	Repair short circuit in harness between transfer duty solenoid and transmission connector.

AT-118

Vehicle-id:
 SIE-id::P:DTC 79 Transfer Duty Solenoid
 ~

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-119

Vehicle-id:
SIE-id: :P:DTC 79 Transfer Duty Solenoid
~

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

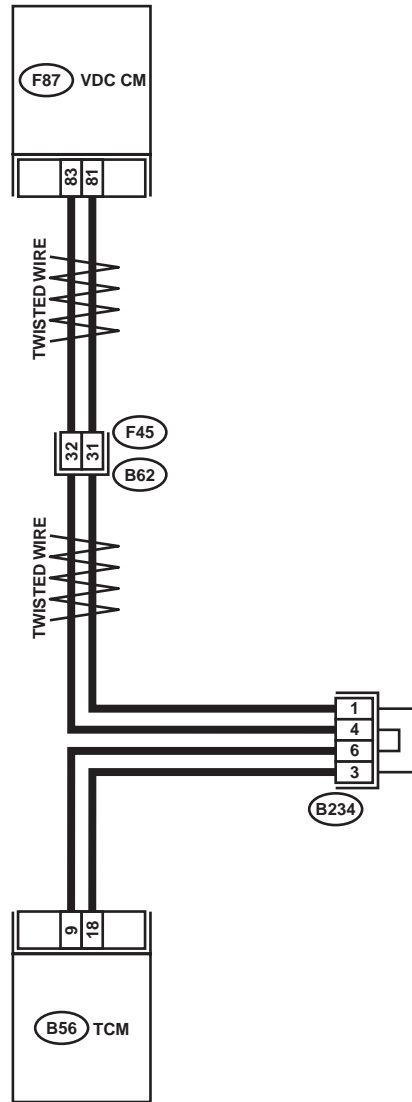
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Q: DTC 86 VDC COMMUNICATION SIGNAL

DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

WIRING DIAGRAM:



B234

1	2	3	4	5	6
---	---	---	---	---	---

B56

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

F45

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				

F87

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

AT-00665

AT-120

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK TROUBLE CODE. Do multiple trouble codes appear in the on-board diagnostics test mode?	DTC indicated.	Go to another trouble code.	Go to step 2.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and VDCCM. 3) Measure resistance of harness between TCM and VDCCM connector. Connector & terminal (B56) No. 18 — (F87) No. 81: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and VDCCM, and poor contact in coupling connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM. Measure resistance of harness between TCM and VDCCM connector. Connector & terminal (B56) No. 9 — (F87) No. 83: Is the measured value less than the specified value?	1 Ω	Go to step 4.	Repair open circuit in harness between TCM and VDCCM, and poor contact in coupling connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM. Measure resistance of harness between TCM and VDCCM connector. Connector & terminal (B56) No. 18 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 5.	Repair short circuit in harness between TCM and VDCCM connector.
5 CHECK HARNESS CONNECTOR BETWEEN TCM AND VDCCM. Measure resistance of harness between TCM and VDCCM connector. Connector & terminal (B56) No. 9 — Chassis ground: Is the measured value less than the specified value?	1 MΩ	Go to step 6.	Repair short circuit in harness between TCM and VDCCM connector.
6 PREPARE OSCILLOSCOPE. Do you have oscilloscope?	Oscilloscope is available.	Go to step 8.	Go to step 7.
7 CHECK INPUT SIGNAL FOR TCM. 1) Connect connectors to TCM and VDCCM. 2) Turn ignition switch to ON (engine OFF). 3) Measure voltage between TCM connector and chassis ground. Connector & terminal (B56) No. 9 (+) — Chassis ground (-): (B56) No. 18 (+) — Chassis ground (-): Does input voltage value change?	Input voltage value changes.	Go to step 10.	Repair poor contact in VDCCM.

AT-121

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
8 CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1) Set oscilloscope to TCM connector terminals. Connector & terminal Positive probe; (B56) No. 9 Ground; (B55) No. 9 2) Turn ignition switch to ON (engine OFF). Check signal waveform pattern on oscilloscope. <Ref. to AT-22, WAVEFORM, MEASUREMENT, Transmission Control Module (TCM) I/O Signal.> Is waveform pattern same as that shown in the figure?	Waveform pattern is same as that shown in the figure.	Go to step 9 .	Repair poor contact in VDCCM.
9 CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1) Set oscilloscope to TCM connector terminals. Connector & terminal Positive probe; (B56) No. 18 Ground; (B55) No. 9 2) Turn ignition switch to ON (engine OFF). Check signal waveform pattern on oscilloscope. <Ref. to AT-22, WAVEFORM, MEASUREMENT, Transmission Control Module (TCM) I/O Signal.> Is waveform pattern same as that shown in the figure?	Waveform pattern is same as that shown in the figure.	Go to step 10 .	Repair poor contact in VDCCM.
10 CHECK POOR CONTACT. Is there poor contact in TCM?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-122

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-123

Vehicle-id:
SIE-id: :Q:DTC 86 VDC Communication Signal

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

R: DTC 93 REAR VEHICLE SPEED SENSOR

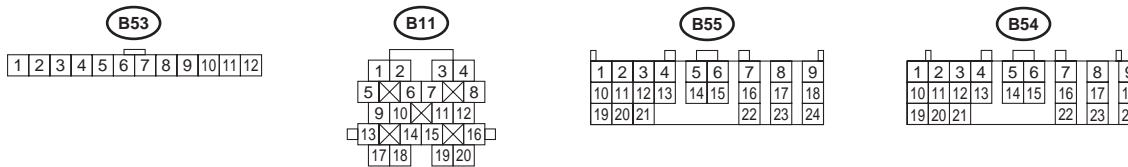
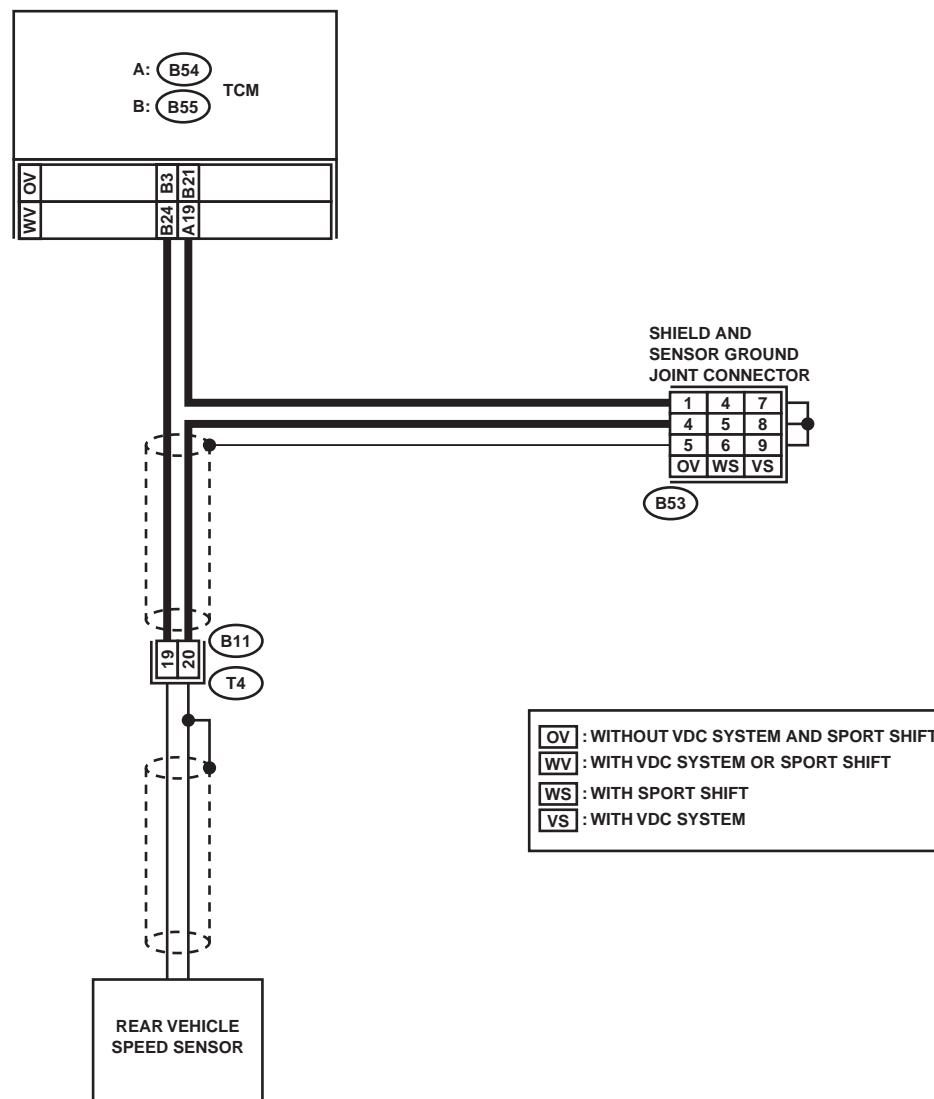
DIAGNOSIS:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

No lock-up or excessive tight corner "braking".

WIRING DIAGRAM:



AT-00666

AT-124

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and transmission. 3) Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 24 — (B11) No. 19: Without VDC system and SPORT shift: (B55) No. 3 — No. 21: Is the measured value less than the specified value?	1 Ω	Go to step 2.	Repair open circuit in harness between TCM and transmission connector.
2 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and transmission connector. Connector & terminal With VDC system or SPORT shift: (B54) No. 19 — (B11) No. 20: Without VDC system and SPORT shift: (B55) No. 21 — (B11) No. 20: Is the measured value less than the specified value?	1 Ω	Go to step 3.	Repair open circuit in harness between TCM and transmission, and poor contact in coupling connector.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 24 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 3 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 4.	Repair short circuit in harness between TCM and transmission connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION. Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B54) No. 19 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 21 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 5.	Repair short circuit in harness between TCM and transmission connector.
5 CHECK REAR VEHICLE SPEED SENSOR. Measure resistance between transmission connector receptacle's terminals. Connector & terminal (T4) No. 19 — No. 20: Is the measured value within the specified range?	450 - 650 Ω	Go to step 6.	Replace rear vehicle speed sensor. <Ref. to AT-58, Rear Vehicle Speed Sensor.>
6 PREPARE OSCILLOSCOPE. Do you have oscilloscope?	Oscilloscope is available.	Go to step 10.	Go to step 7.
7 PREPARE SUBARU SELECT MONITOR. Do you have a Subaru Select Monitor?	Subaru Select Monitor is available.	Go to step 9.	Go to step 8.

AT-125

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
<p>8 CHECK INPUT SIGNAL FOR TCM.</p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Lift-up or raise the vehicle and place safety stands.</p> <p>NOTE: Raise all wheels off floor.</p> <p>3) Start the engine and set vehicle in 20 km/h (12 MPH) condition.</p> <p>NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.></p> <p>4) Measure voltage between TCM connector terminals.</p> <p>Connector & terminal With VDC system or SPORT shift: (B55) No. 24 (+) — (B54) No. 19 (-): Without VDC system and SPORT shift: (B55) No. 3 (+) — No. 21 (-):</p> <p>Does the measured value exceed the specified value?</p>	AC 1 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.
<p>9 CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.</p> <p>1) Connect connectors to TCM and transmission.</p> <p>2) Connect Subaru Select Monitor to data link connector.</p> <p>3) Lift-up or raise the vehicle and place safety stands.</p> <p>NOTE: Raise all wheels off floor.</p> <p>4) Turn ignition switch to ON and turn Subaru Select Monitor switch to ON.</p> <p>5) Start the engine.</p> <p>6) Read data of vehicle speed using Subaru Select Monitor.</p> <p>•Compare speedometer with Subaru Select Monitor indications. •Vehicle speed is indicated in "km/h" or "MPH".</p> <p>7) Slowly increase vehicle speed to 60 km/h or 37 MPH.</p> <p>NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.></p> <p>Does the speedometer indication increase as the Subaru Select Monitor data increases?</p>	Subaru Select Monitor data increase.	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.

AT-126

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
10 CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE. 1) Connect connectors to TCM and transmission. 2) Lift-up or raise the vehicle and place safety stands. NOTE: Raise all wheels off floor. 3) Set oscilloscope to TCM connector terminals. Connector & terminal Positive probe; (B55) No. 24 Ground; (B54) No. 19 4) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5) Measure signal voltage indicated on oscilloscope. Does the measured value exceed the specified value?	AC 1 V	Even if AT OIL TEMP warning light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and transmission.	Go to step 11.
11 CHECK POOR CONTACT. Is there poor contact in rear vehicle speed sensor circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-127

DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-128

Vehicle-id:
SIE-id: :R:DTC 93 Rear Vehicle Speed Sensor
~

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

15. Diagnostic Procedure for No-diagnostic Trouble Code (DTC)

A: CHECK GEAR POSITION.

Step	Value	Yes	No
1 CHECK GEAR POSITION. 1) Lift-up the vehicle and place safety stand. NOTE: Raise all wheels off ground. 2) Start the engine. 3) Move select lever to "D", and drive vehicle. 4) Read data of gear position using Subaru Select Monitor. •Gear position is indicated. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> Does the transmission gear correspond to the gear which is shown on display?	Transmission gear corresponds to the display indication.	Go to step 2.	Check shift solenoid 1 and shift solenoid 2 signal circuit. <Ref. to AT-76, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> and <Ref. to AT-80, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2 CHECK VEHICLE. Is the target model without VDC system or without SPORT shift?	VDC system or SPORT shift is equipped.	Go to step CHECK FWD SWITCH. <Ref. to AT-130, CHECK FWD SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Go to step CHECK BRAKE SWITCH. <Ref. to AT-133, CHECK BRAKE SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>

AT-129

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

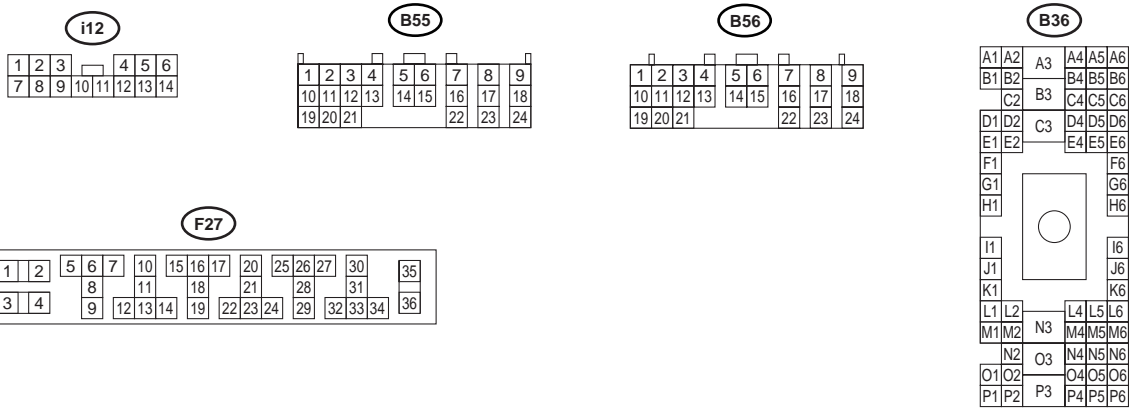
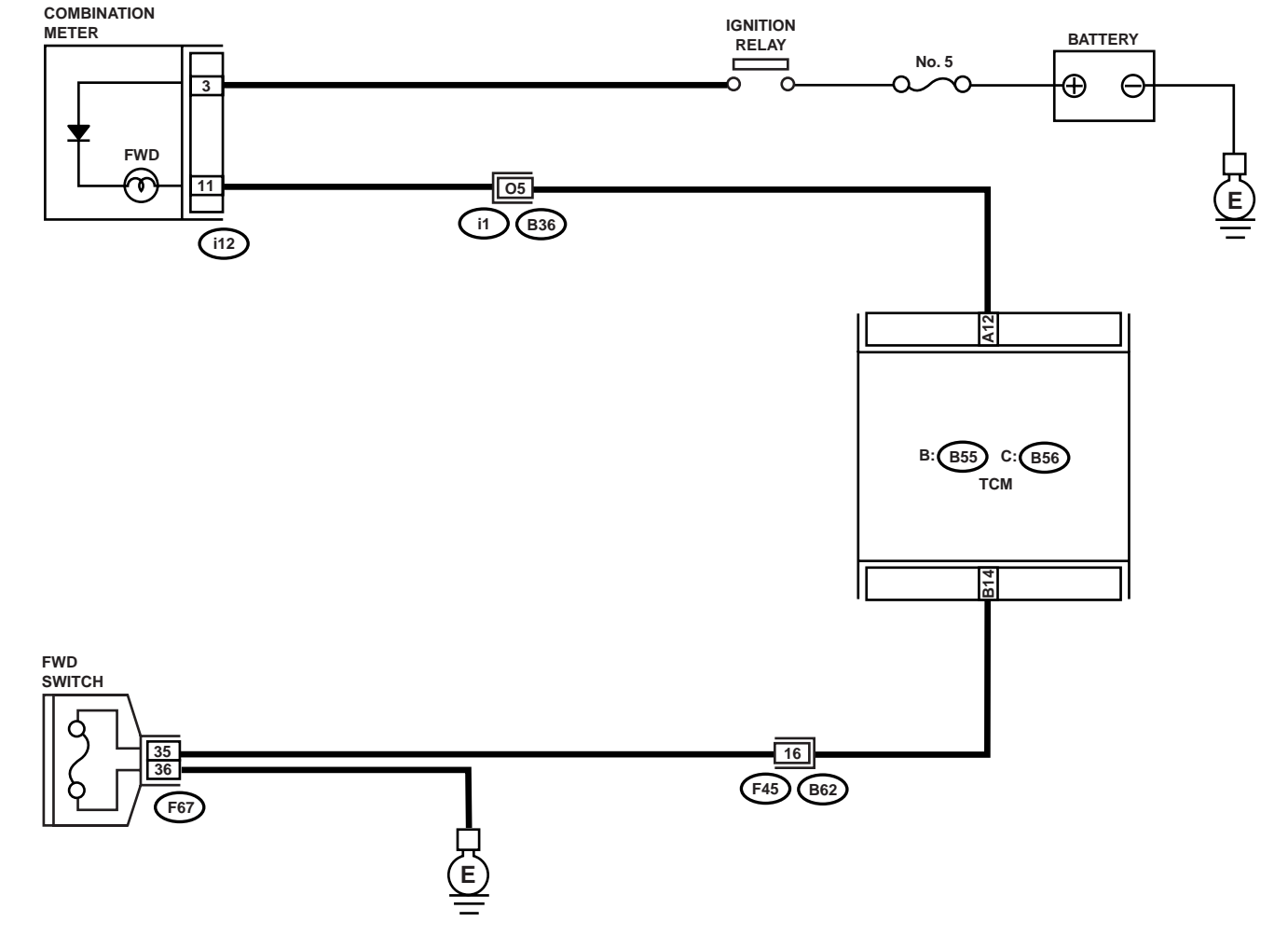
AUTOMATIC TRANSMISSION (DIAGNOSTICS)

B: CHECK FWD SWITCH.

DIAGNOSIS:

- LED does not come on even if FWD switch is ON.
- FWD switch circuit is open or shorted.

WIRING DIAGRAM:



AT-00667

AT-130

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK FWD SWITCH. When fuse is inserted to FWD switch, does LED light up?	LED lights up.	Go to step CHECK BRAKE SWITCH.<Ref. to AT-133, CHECK BRAKE SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Go to step 2.
2 CHECK FWD INDICATOR LIGHT. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove FWD indicator light bulb from combination meter. Is FWD indicator light bulb OK?	Bulb is OK.	Go to step 3.	Replace FWD indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and FWD switch. 3) Measure resistance of harness between TCM and FWD switch connector. Connector & terminal (B55) No. 14 — (F27) No. 35: Is the measured value less than the specified value?	1 Ω	Go to step 4.	Repair open circuit in harness between TCM and FWD switch connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH. Measure resistance of harness connector between TCM and body to make sure that circuit does not short. Connector & terminal (B55) No. 14 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 5.	Repair short circuit in harness between TCM and FWD switch connector.
5 CHECK HARNESS CONNECTOR BETWEEN FWD SWITCH AND CHASSIS GROUND. Measure resistance of harness between FWD switch and chassis ground. Connector & terminal (F27) No. 36 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Go to step 6.	Repair open circuit in harness between FWD switch connector and chassis ground.
6 CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and FWD switch. 3) Turn ignition switch to ON. 4) Measure signal voltage for TCM while installing the fuse to FWD switch connector. Connector & terminal (B55) No. 20 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 7.	Go to step 11.

AT-131

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
7 CHECK INPUT SIGNAL FOR TCM. Measure signal voltage for TCM while removing the fuse from FWD switch connector. Connector & terminal (B55) No. 20 (+) — Chassis ground (-): Does the measured value exceed the specified value?	9 V	Go to step 8.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
8 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and combination meter. 3) Measure resistance of harness between TCM and diagnosis connector. Connector & terminal (B56) No. 2 — (i12) No. 11: Is the measured value less than the specified value?	1 Ω	Go to step 9.	Repair open circuit in harness between TCM and combination meter and poor contact in coupling connector.
9 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. Measure resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. Connector & terminal (B54) No. 12 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 10.	Repair short circuit in harness between TCM and combination meter connector.
10 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and combination meter. 3) Turn ignition switch to ON. 4) Measure signal voltage for TCM while installing and removing the fuse to FWD switch connector. Connector & terminal (B56) No. 2 — Chassis ground: Is the measured value less than the specified value?	1 V	Go to step 11.	Go to step 12.
11 CHECK OUTPUT SIGNAL EMITTED FROM TCM. Measure signal voltage for TCM while removing the fuse from FWD switch connector. Connector & terminal (B56) No. 2 — Chassis ground: Does the measured value exceed the specified value?	9 V	Go to step 12.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
12 CHECK POOR CONTACT. Is there poor contact in FWD switch circuit?	There is poor contact.	Repair poor contact.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>

AT-132

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

C: CHECK BRAKE SWITCH.

Step	Value	Yes	No
1 CHECK BRAKE SWITCH. When the brake pedal is depressed, does LED light up?	LED lights up.	Go to step CHECK ABS SWITCH. <Ref. to AT-134, CHECK ABS SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Check brake switch circuit. <Ref. to WI-58, A/T Control System.>

AT-133

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)
 AUTOMATIC TRANSMISSION (DIAGNOSTICS)

D: CHECK ABS SWITCH.

	Step	Value	Yes	No
1	CHECK ABS SWITCH. Does the LED of ABS switch light up?	LED lights up.	Check ABS switch circuit. <Ref. to ABS-64, DTC 44 A COMBINATION OF AT CONTROL ABNORMAL, Diagnostics Chart with Diagnosis Connector.>	Go to step CHECK CRUISE CONTROL SWITCH. <Ref. to AT-135, CHECK CRUISE CONTROL SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>

AT-134

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

E: CHECK CRUISE CONTROL SWITCH.

Step	Value	Yes	No
1 CHECK CRUISE CONTROL SWITCH. When cruise control is set, does LED light up?	LED lights up.	Go to step CHECK INHIBITOR SWITCH. <Ref. to AT-136, CHECK INHIBITOR SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Check cruise control. <Ref. to CC-2, Basic Diagnostic Procedure.>

AT-135

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

F: CHECK INHIBITOR SWITCH.

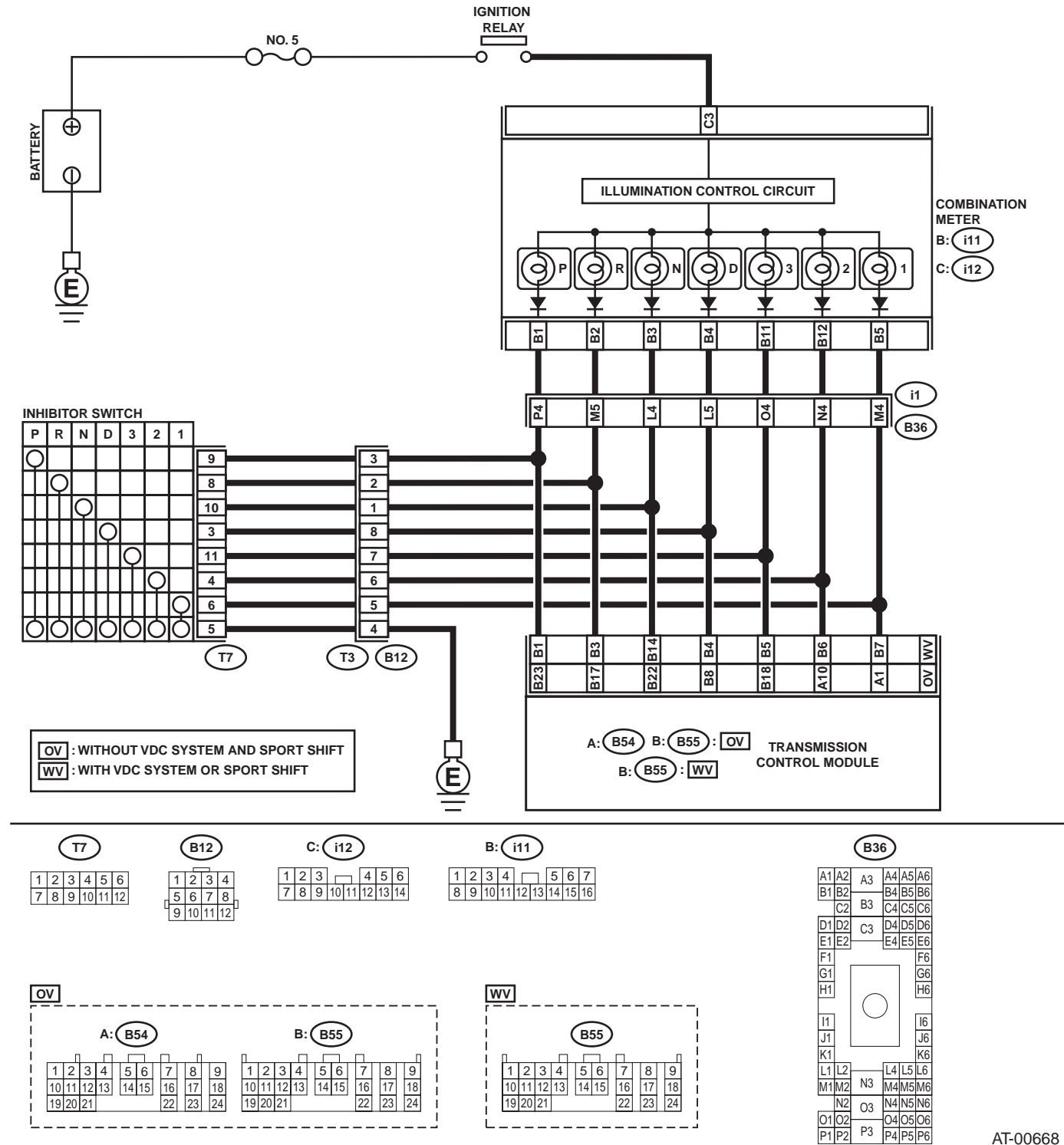
DIAGNOSIS:

Input signal circuit of inhibitor switch is open or shorted.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in "3" range.
- Engine brake is not effected when selector lever is in "2" range.
- Engine brake is not effected when selector lever is in "1" range.

WIRING DIAGRAM:



AT-136

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK "P" RANGE SWITCH. When "P" range is selected, does LED light up?	LED lights up.	Go to step 2 .	Go to step 22 .
2 CHECK INDICATOR LIGHT. Does combination meter "P" range indicator illuminate?	Indicator lights up.	Go to step 3 .	Go to step 26 .
3 CHECK "P" RANGE SWITCH. When the "R" range is selected, does "P" range LED light up?	LED lights up.	Go to step 28 .	Go to step 4 .
4 CHECK "R" RANGE SWITCH. When the "R" range is selected, does LED light up?	LED lights up.	Go to step 5 .	Go to step 29 .
5 CHECK INDICATOR LIGHT. Does combination meter "R" range indicator illuminate?	Indicator lights up.	Go to step 6 .	Go to step 32 .
6 CHECK "R" RANGE SWITCH. When the "N" range is selected, does "R" range LED light up?	LED lights up.	Go to step 34 .	Go to step 7 .
7 CHECK "N" RANGE SWITCH. When the "N" range is selected, does LED light up?	LED lights up.	Go to step 8 .	Go to step 35 .
8 CHECK INDICATOR LIGHT. Does combination meter "N" range indicator illuminate?	Indicator lights up.	Go to step 9 .	Go to step 38 .
9 CHECK "N" RANGE SWITCH. When the "D" range is selected, does "N" range LED light up?	LED lights up.	Go to step 40 .	Go to step 10 .
10 CHECK "D" RANGE SWITCH. When the "D" range is selected, does LED light up?	LED lights up.	Go to step 11 .	Go to step 41 .
11 CHECK INDICATOR LIGHT. Does combination meter "D" range indicator illuminate?	Indicator lights up.	Go to step 12 .	Go to step 44 .
12 CHECK "D" RANGE SWITCH. When the "3" range is selected, does "D" range LED light up?	LED lights up.	Go to step 46 .	Go to step 13 .
13 CHECK "3" RANGE SWITCH. When the "3" range is selected, does LED light up?	LED lights up.	Go to step 14 .	Go to step 47 .
14 CHECK INDICATOR LIGHT. Does combination meter "3" range indicator illuminate?	Indicator lights up.	Go to step 15 .	Go to step 50 .
15 CHECK "3" RANGE SWITCH. When the "2" range is selected, does "3" range LED light up?	LED lights up.	Go to step 52 .	Go to step 16 .
16 CHECK "2" RANGE SWITCH. When the "2" range is selected, does LED light up?	LED lights up.	Go to step 17 .	Go to step 53 .
17 CHECK INDICATOR LIGHT. Does combination meter "2" range indicator illuminate?	Indicator lights up.	Go to step 18 .	Go to step 56 .
18 CHECK "2" RANGE SWITCH. When the "1" range is selected, does "2" range LED light up?	LED lights up.	Go to step 58 .	Go to step 19 .
19 CHECK "1" RANGE SWITCH. When the "1" range is selected, does LED light up?	LED lights up.	Go to step 20 .	Go to step 59 .

AT-137

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
20 CHECK INDICATOR LIGHT. Does combination meter "1" range indicator illuminate?	Indicator lights up.	Go to step 21.	Go to step 62.
21 CHECK "1" RANGE SWITCH. When the "2" range is selected, does "1" range LED light UP?	LED lights up.	Go to step 64.	Go to step CHECK SPORT SHIFT SWITCH. <Ref. to AT-150, CHECK SPORT SHIFT SWITCH., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>
22 CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND. 1) Turn ignition switch to OFF. 2) Disconnect connector from inhibitor switch. 3) Measure resistance of harness between inhibitor switch and chassis ground. Connector & terminal (T7) No. 5 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Go to step 23.	Repair open circuit in harness between inhibitor switch connector and chassis ground, and poor contact in coupling connector.
23 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 1 — (T7) No. 9 Without VDC system and SPORT shift: (B55) No. 23 — (T7) No. 9 : Is the measured value less than the specified value?	1 Ω	Go to step 24.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
24 CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Move select lever to "P" range. 5) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 1 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 23 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 25.	Go to step 65.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
25 CHECK INPUT SIGNAL FOR TCM. 1) Move select lever to any range other than "P". 2) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 1 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 23 (+) — Chassis ground (-): Does the measured value exceed the specified value?	8 V	Go to step 65 .	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
26 CHECK "P" RANGE INDICATOR LIGHT BULB. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove "P" range indicator light bulb from combination meter. Is "P" range indicator light bulb OK?	Bulb is OK.	Go to step 27 .	Replace "P" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
27 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Disconnect connectors from TCM and combination meter. 2) Measure resistance of harness between TCM and combination meter. Connector & terminal With VDC system or SPORT shift: (B55) No. 1 — (i11) No. 1: Without VDC system and SPORT shift: (B55) No. 23 — (i11) No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 65 .	Repair open circuit in harness between inhibitor switch connector and combination meter, and poor contact in coupling connector.
28 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 1 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 23 — (i11) No.1 : Does the measured value exceed the specified value?	1 M Ω	Go to step 29 .	Repair ground short circuit in "P" range circuit.

AT-139

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
29 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 3 — (T7) No. 8: Without VDC system and SPORT shift: (B55) No. 17 — (T7) No. 8: Is the measured value less than the specified value?	1 Ω	Go to step 30.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
30 CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Move select lever to "R" range. 5) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 3 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 17 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 31.	Go to step 65.
31 CHECK INPUT SIGNAL FOR TCM. 1) Move select lever to any range other than "R". 2) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 3 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 17 (+) — Chassis ground (-): Does the measured value exceed the specified value?	8 V	Go to step 65.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
32 CHECK "R" RANGE INDICATOR LIGHT BULB. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove "R" range indicator light bulb from combination meter. Is "R" range indicator light bulb OK?	Bulb is OK.	Go to step 33.	Replace "R" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>

AT-140

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
33 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Disconnect connectors from TCM and combination meter. 2) Measure resistance of harness between TCM and combination meter. Connector & terminal With VDC system or SPORT shift: (B55) No. 3 — (i11) No. 2: Without VDC system and SPORT shift: (B55) No. 17 — (i11) No. 2: Is the measured value less than the specified value?	1 Ω	Go to step 65 .	Repair open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
34 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 3 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 17 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 35 .	Repair ground short circuit in "R" range circuit.
35 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 14 — (T7) No. 10: Without VDC system and SPORT shift: (B55) No. 22 — (T7) No. 10: Is the measured value less than the specified value?	1 Ω	Go to step 36 .	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
36 CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Move select lever to "N" range. 5) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 14 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 22 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 37 .	Go to step 65 .

AT-141

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
37 CHECK INPUT SIGNAL FOR TCM. 1) Move select lever to any range other than "N". 2) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 14 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 22 (+) — Chassis ground (-): Does the measured value exceed the specified value?	8 V	Go to step 65 .	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
38 CHECK "N" RANGE INDICATOR LIGHT BULB. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove "N" range indicator light bulb from combination meter. Is "N" range indicator light bulb OK?	Bulb is OK.	Go to step 39 .	Replace "N" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
39 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Disconnect connectors from TCM and combination meter. 2) Measure resistance of harness between TCM and combination meter. Connector & terminal With VDC system or SPORT shift: (B55) No. 14 — (i11) No. 3: Without VDC system and SPORT shift: (B55) No. 22 — (i11) No. 3: Is the measured value less than the specified value?	1 Ω	Go to step 65 .	Repair open circuit in harness between inhibitor switch connector and combination meter.
40 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 14 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 22 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 41 .	Repair ground short circuit in "N" range circuit.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
41 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 4 — (T7) No. 3: Without VDC system and SPORT shift: (B55) No. 8 — (T7) No. 3: Is the measured value less than the specified value?	1 Ω	Go to step 42.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
42 CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Move select lever to "D" range. 5) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 4 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 8 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 43.	Go to step 65.
43 CHECK INPUT SIGNAL FOR TCM. 1) Move select lever to any range other than "D". 2) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 4 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 8 (+) — Chassis ground (-): Does the measured value exceed the specified value?	8 V	Go to step 65.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
44 CHECK "D" RANGE INDICATOR LIGHT BULB. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove "D" range indicator light bulb from combination meter. Is "D" range indicator light bulb OK?	Bulb is OK.	Go to step 45.	Replace "D" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>

AT-143

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
45 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Disconnect connectors from TCM and combination meter. 2) Measure resistance of harness between TCM and combination meter. Connector & terminal With VDC system or SPORT shift: (B55) No. 4 — (i11) No. 4: Without VDC system and SPORT shift: (B55) No. 8 — (i11) No. 4: Is the measured value less than the specified value?	1 Ω	Go to step 65.	Repair open circuit in harness between inhibitor switch connector and combination meter.
46 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 4 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 8 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 47.	Repair ground short circuit in "D" range circuit.
47 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 5 — (T7) No. 11: Without VDC system and SPORT shift: (B55) No. 18 — (T7) No. 11: Is the measured value less than the specified value?	1 Ω	Go to step 48.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
48 CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Move selec lever to "3" range. 5) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 5 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 18 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 49.	Go to step 65.

AT-144

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
49 CHECK INPUT SIGNAL FOR TCM. 1) Move select lever to any range other than "3". 2) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 5 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 18 (+) — Chassis ground (-): Does the measured value exceed the specified value?	8 V	Go to step 65 .	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
50 CHECK "3" RANGE INDICATOR LIGHT BULB. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove "3" range indicator light bulb from combination meter. Is "3" range indicator light bulb OK?	Bulb is OK.	Go to step 51 .	Replace "3" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
51 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Disconnect connectors from TCM and combination meter. 2) Measure resistance of harness between TCM and combination meter. Connector & terminal With VDC system or SPORT shift: (B55) No. 5 — (i11) No. 11: Without VDC system and SPORT shift: (B55) No. 18 — (i11) No. 11: Is the measured value less than the specified value?	1 Ω	Go to step 65 .	Repair open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
52 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 5 — Chassis ground: Without VDC system and SPORT shift: (B55) No. 18 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 53 .	Repair ground short circuit in "3" range circuit.

AT-145

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
53 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 6 — (T7) No. 4: Without VDC system and SPORT shift: (B54) No. 10 — (T7) No. 4: Is the measured value less than the specified value?	1 Ω	Go to step 54.	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
54 CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Move select lever to "2" range. 5) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 6 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 10 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 55.	Go to step 65.
55 CHECK INPUT SIGNAL FOR TCM. 1) Move select lever to any range other than "2". 2) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 6 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 10 (+) — Chassis ground (-): Does the measured value exceed the specified value?	8 V	Go to step 65.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
56 CHECK "2" RANGE INDICATOR LIGHT BULB. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove "2" range indicator light bulb from combination meter. Is "2" range indicator light bulb OK?	Bulb is OK.	Go to step 57.	Replace "2" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>

AT-146

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
57 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Disconnect connectors from TCM and combination meter. 2) Measure resistance of harness between TCM and combination meter. Connector & terminal With VDC system or SPORT shift: (B55) No. 6 — (i11) No. 12: Without VDC system and SPORT shift: (B54) No. 10 — (i11) No. 12: Is the measured value less than the specified value?	1 Ω	Go to step 65 .	Repair open circuit in harness between TCM and combination meter, and poor contact in TCM connector.
58 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 6 — Chassis ground: Without VDC system and SPORT shift: (B54) No. 10 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 59 .	Repair ground short circuit in "2" range circuit.
59 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM and inhibitor switch. 3) Measure resistance of harness between TCM and inhibitor switch connector. Connector & terminal With VDC system or SPORT shift: (B55) No. 7 — (T7) No. 6: Without VDC system and SPORT shift: (B54) No. 1 — (T7) No. 6: Is the measured value less than the specified value?	1 Ω	Go to step 60 .	Repair open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
60 CHECK INPUT SIGNAL FOR TCM. 1) Turn ignition switch to OFF. 2) Connect connector to TCM and inhibitor switch. 3) Turn ignition switch to ON. 4) Move select lever to "1" range. 5) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 7 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B54) No. 1 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 61 .	Go to step 65 .

AT-147

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
61 CHECK INPUT SIGNAL FOR TCM. 1) Move select lever to any range other than "1". 2) Measure voltage between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 7 (+) — Chassis ground (-): Without VDC system and SPORT shift: (B55) No. 1 (+) — Chassis ground (-): Does the measured value exceed the specified value?	8 V	Go to step 65 .	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
62 CHECK "1" RANGE INDICATOR LIGHT BULB. 1) Turn ignition switch to OFF. 2) Remove combination meter. 3) Remove "1" range indicator light bulb from combination meter. Is "1" range indicator light bulb OK?	Bulb is OK.	Go to step 63 .	Replace "1" range indicator light bulb. <Ref. to IDI-12, Combination Meter Assembly.>
63 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Disconnect connectors from TCM and combination meter. 2) Measure resistance of harness between TCM and combination meter. Connector & terminal With VDC system or SPORT shift: (B55) No. 7 — (i11) No. 5: Without VDC system and SPORT shift: (B54) No. 1 — (i11) No. 5: Is the measured value less than the specified value?	1 Ω	Go to step 65 .	Repair open circuit in harness between TCM and combination meter, and poor contact in TCM connector.
64 CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH. 1) Turn ignition switch to OFF. 2) Disconnect connectors from TCM, inhibitor switch and combination meter. 3) Measure resistance of harness between TCM and chassis ground. Connector & terminal With VDC system or SPORT shift: (B55) No. 7 — Chassis ground: Without VDC system and SPORT shift: (B54) No. 1 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 65 .	Repair ground short circuit in "1" range circuit.
65 CHECK POOR CONTACT. Is there poor contact in inhibitor switch circuit?	There is poor contact.	Repair poor contact.	Adjust inhibitor switch and select cable. <Ref. to AT-50, ADJUSTMENT, Inhibitor Switch.> and <Ref. to CS-31, Select Cable.>

AT-148

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-149

Vehicle-id:
SIE-id: :F:Check Inhibitor Switch.

~

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

G: CHECK SPORT SHIFT SWITCH.

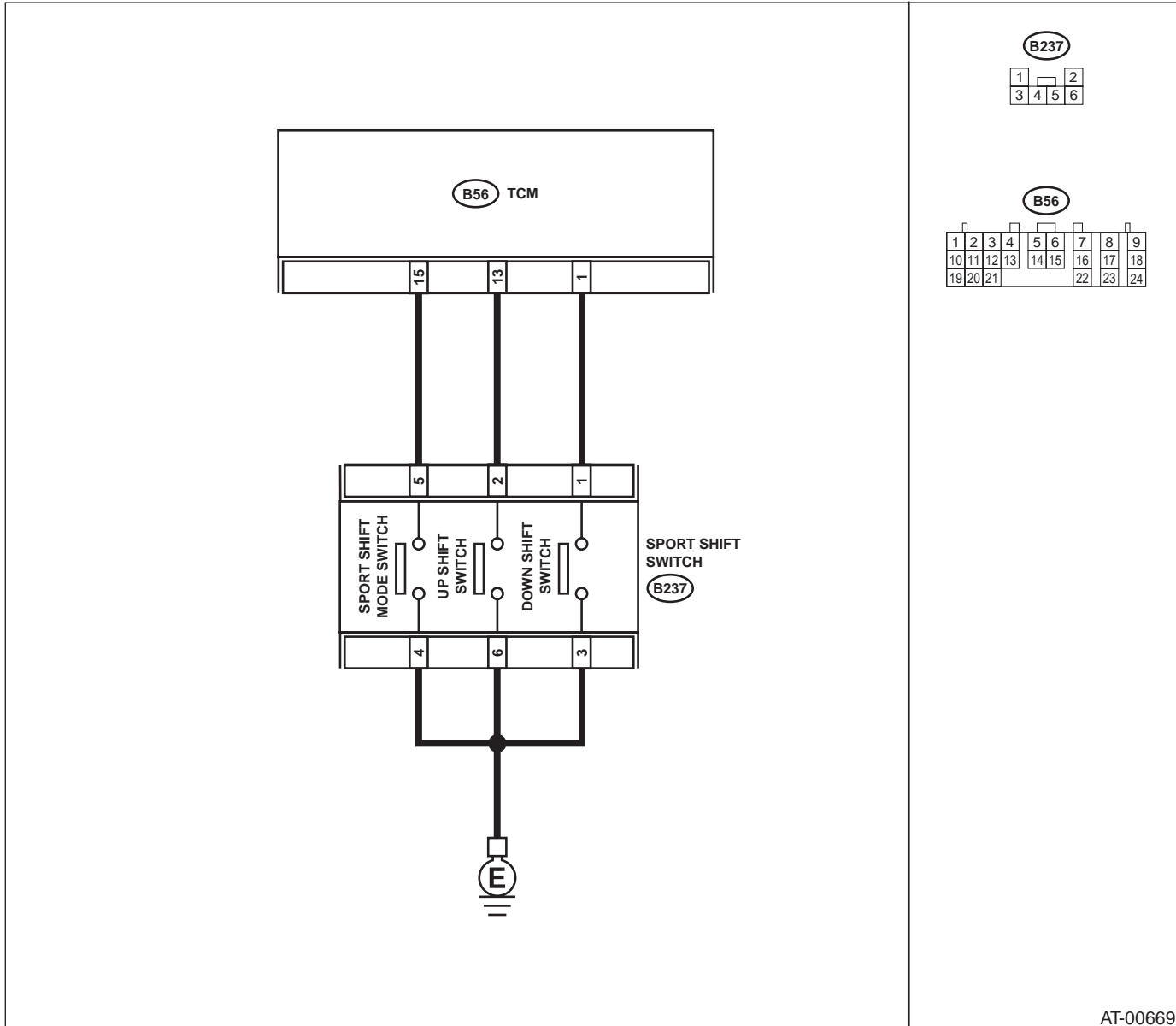
DIAGNOSIS:

SPORT shift switch input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No SPORT shift mode occurs.
- Does not shift gears in SPORT shift mode.

WIRING DIAGRAM:



AT-150

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK VEHICLE. Is the target model equipped with SPORT shift?	Model with sport shift	Go to step 2.	Go to step SYMPTOM RELATED DIAGNOSTIC. <Ref. to AT-160, Symptom Related Diagnostic.>
2 CHECK SPORT SHIFT SWITCH. Does LED light up when select lever is moved to SPORT shift mode?	Lights up.	Go to step 3.	Go to step 5.
3 CHECK SPORT SHIFT SWITCH. Does LED light up when select lever is moved to shift up side?	Lights up.	Go to step 4.	Go to step 12.
4 CHECK SPORT SHIFT SWITCH. Does LED light up when select lever is moved to shift down side?	Lights up.	Go to step CHECK SPORT SHIFT INDICATOR. <Ref. to AT-156, CHECK SPORT SHIFT INDICATOR., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Go to step 19.
5 CHECK SPORT SHIFT SWITCH GROUND LINE. 1) Turn ignition switch to OFF. 2) Disconnect connector from SPORT shift switch. 3) Measure resistance of harness between SPORT shift switch connector and chassis ground. Connector & terminal (B237) No. 4 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Go to step 6.	Repair open circuit in harness between SPORT shift switch and chassis ground.
6 CHECK SPORT SHIFT SWITCH. Measure resistance between SPORT shift switch terminals. Connector & terminal (B237) No. 4 — No. 5: Does the measured value exceed the specified value?	1 MΩ	Go to step 7.	Replace lever plate assembly.
7 CHECK SPORT SHIFT SWITCH. 1) Move select lever to SPORT shift mode. 2) Measure resistance between SPORT shift switch terminals. Connector & terminal (B237) No. 4 — No. 5: Is the measured value less than the specified value?	1 Ω	Go to step 8.	Replace lever plate assembly.
8 CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM connector and SPORT shift switch connector. Connector & terminal (B237) No. 5 — (B56) No. 15: Is the measured value less than the specified value?	1 Ω	Go to step 9.	Repair open circuit in harness between SPORT shift switch connector and TCM connector and poor contact in coupling connector.

AT-151

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
9 CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH. 1) Disconnect connector from TCM. 2) Measure resistance of harness between SPORT shift switch connector and chassis ground. Connector & terminal (B237) No. 5 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 10.	Repair short circuit in harness between SPORT shift switch connector and TCM connector.
10 CHECK INPUT SIGNAL FOR TCM. 1) Connect connector to TCM and SPORT shift switch. 2) Turn ignition switch to ON. (Engine is stopped.) 3) Move select lever to normal mode. 4) Measure signal voltage for TCM. Connector & terminal (B56) No. 15 (+) — Chassis ground (-): Does the measured value exceed the specified value?	9 V	Go to step 11.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
11 CHECK INPUT SIGNAL FOR TCM. 1) Move select lever to SPORT shift mode. 2) Measure signal voltage for TCM. Connector & terminal (B56) No. 15 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 26.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
12 CHECK SPORT SHIFT SWITCH GROUND LINE. 1) Turn ignition switch to OFF. 2) Disconnect connector from SPORT shift switch. 3) Measure resistance of harness between SPORT shift switch connector and chassis ground. Connector & terminal (B237) No. 6 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Go to step 13.	Repair open circuit in harness between SPORT shift switch and chassis ground.
13 CHECK SPORT SHIFT SWITCH. 1) Measure resistance between SPORT shift switch terminals. Connector & terminal (B237) No. 6 — No. 2: Does the measured value exceed the specified value?	1 M Ω	Go to step 14.	Replace guide plate assembly.
14 CHECK SPORT SHIFT SWITCH. 1) Move select lever to SPORT shift mode. 2) Measure resistance between SPORT shift switch terminals. Connector & terminal (B237) No. 6 — No. 2: Is the measured value less than the specified value?	1 Ω	Go to step 15.	Replace guide plate assembly.

AT-152

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
15 CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM connector and SPORT shift switch connector. Connector & terminal (B237) No. 2 — (B56) No. 13: Is the measured value less than the specified value?	1 Ω	Go to step 16.	Repair open circuit in harness between SPORT shift switch connector and TCM connector and poor contact in coupling connector.
16 CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH. 1) Disconnect connector from TCM. 2) Measure resistance of harness between SPORT shift switch connector and chassis ground. Connector & terminal (B237) No. 2 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 17.	Repair short circuit in harness between SPORT shift switch connector and TCM connector.
17 CHECK INPUT SIGNAL FOR TCM. 1) Connect connector to TCM and SPORT shift switch. 2) Turn ignition switch to ON. (Engine is stopped.) 3) Measure signal voltage for TCM. Connector & terminal (B56) No. 13 (+) — Chassis ground (-): Does the measured value exceed the specified value?	9 V	Go to step 18.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
18 CHECK INPUT SIGNAL FOR TCM. 1) Move select lever to shift up side. 2) Measure signal voltage for TCM. Connector & terminal (B56) No. 13 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 26.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
19 CHECK SPORT SHIFT SWITCH GROUND LINE. 1) Turn ignition switch to OFF. 2) Disconnect connector from SPORT shift switch. 3) Measure resistance of harness between SPORT shift switch connector and chassis ground. Connector & terminal (B237) No. 3 — Chassis ground: Is the measured value less than the specified value?	1 Ω	Go to step 20.	Repair open circuit in harness between SPORT shift switch and chassis ground.
20 CHECK SPORT SHIFT SWITCH. Measure resistance between SPORT shift switch terminals. Connector & terminal (B237) No. 3 — No. 1: Does the measured value exceed the specified value?	1 M Ω	Go to step 21.	Replace guide plate assembly.

AT-153

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
21 CHECK SPORT SHIFT SWITCH. 1) Move select lever to SPORT shift mode. 2) Measure resistance between SPORT shift switch terminals. Connector & terminal (B237) No. 3 — No. 1: Is the measured value less than the specified value?	1 Ω	Go to step 22.	Replace guide plate assembly.
22 CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH. 1) Disconnect connector from TCM. 2) Measure resistance of harness between TCM connector and SPORT shift switch connector. Connector & terminal (B237) No. 1 — (B56) No. 2: Is the measured value less than the specified value?	1 Ω	Go to step 23.	Repair open circuit in harness between SPORT shift switch connector and TCM connector and poor contact in coupling connector.
23 CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH. 1) Disconnect connector from TCM. 2) Measure resistance of harness between SPORT shift switch connector and chassis ground. Connector & terminal (B237) No. 1 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 24.	Repair short circuit in harness between SPORT shift switch connector and TCM connector.
24 CHECK INPUT SIGNAL FOR TCM. 1) Connect connector to TCM and SPORT shift switch. 2) Turn ignition switch to ON. (Engine is stopped.) 3) Measure signal voltage for TCM. Connector & terminal (B56) No. 2 (+) — Chassis ground (-): Does the measured value exceed the specified value?	9 V	Go to step 25.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
25 CHECK INPUT SIGNAL FOR TCM. 1) Move select lever to shift up side. 2) Measure signal voltage for TCM. Connector & terminal (B56) No. 2 (+) — Chassis ground (-): Is the measured value less than the specified value?	1 V	Go to step 26.	Replace TCM. <Ref. to AT-75, Transmission Control Module (TCM).>
26 CHECK POOR CONTACT. Is there poor contact in SPORT shift switch circuit?	There is poor contact.	Repair poor contact.	Intermittent poor contact in SPORT shift switch circuit connector or harness

AT-154

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-155

Vehicle-id:
SIE-id: :G:Check SPORT SHIFT Switch.

~

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

H: CHECK SPORT SHIFT INDICATOR.

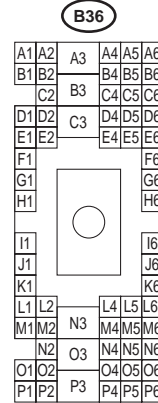
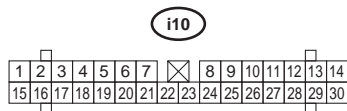
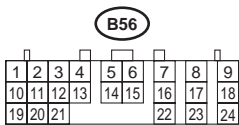
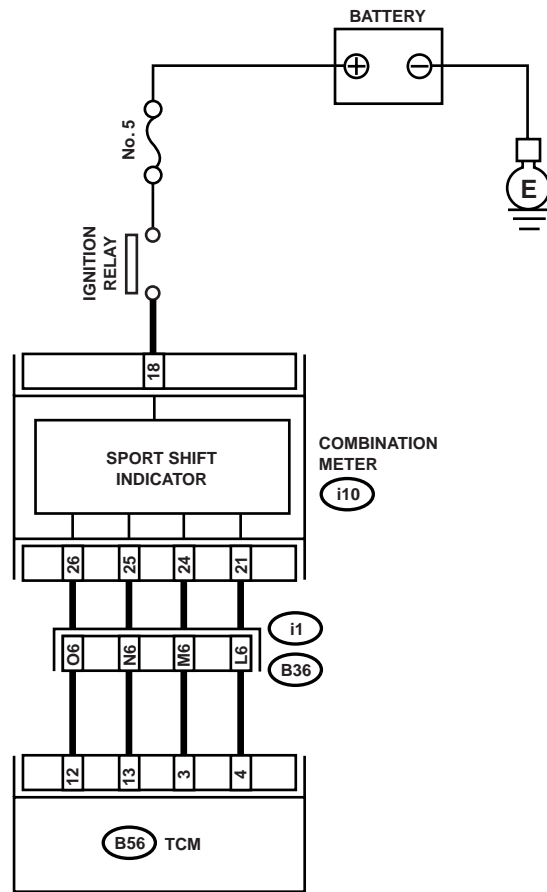
DIAGNOSIS:

SPORT shift indicator output signal circuit is open or shorted.

TROUBLE SYMPTOM:

- SPORT shift indicator does not illuminate or remains illuminated.
- SPORT shift indicator display does not change.

WIRING DIAGRAM:



AT-00670

AT-156

Vehicle-id:
SIE-id: :H:Check SPORT SHIFT INDICATOR.

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK SPORT SHIFT INDICATOR. Does SPORT shift indicator operate normally when driving in SPORT shift mode?	SPORT shift indicator operates normally.	<Ref. to AT-158, CHECK BUZZER., Diagnostic Procedure for No-diagnostic Trouble Code (DTC).>	Go to step 2.
2 CHECK COMBINATION METER. Do meters and indicators other than SPORT shift indicator operate normally?	Combination meter operates normally.	Go to step 3.	Check combination meter.
3 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and combination meter. 3) Measure resistance of harness between TCM and combination meter. Connector & terminal (B56) No. 3 — (i10) No. 24: (B56) No. 4 — (i10) No. 21: (B56) No. 12 — (i10) No. 26: (B56) No. 13 — (i10) No. 25: Is the measured value less than the specified value?	1 Ω	Go to step 4.	Repair open circuit in harness between TCM and combination meter connector and poor contact in coupling connector.
4 CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER. Measure resistance between TCM and chassis ground. Connector & terminal (B56) No. 3 — Chassis ground: (B56) No. 4 — Chassis ground: (B56) No. 12 — Chassis ground: (B56) No. 13 — Chassis ground: Does the measured value exceed the specified value?	1 MΩ	Go to step 5.	Repair short circuit in harness between TCM and combination meter connector.
5 CHECK OUTPUT SIGNAL EMITTED FROM TCM. 1) Connect connector to TCM and combination meter. 2) Turn ignition switch to ON. (Engine is stopped.) 3) Measure voltage between TCM and chassis ground. Connector & terminal (B56) No. 3 (+) — Chassis ground (-): (B56) No. 4 (+) — Chassis ground (-): (B56) No. 12 (+) — Chassis ground (-): (B56) No. 13 (+) — Chassis ground (-): Does the measured value exceed the specified value?	4	Go to step 6.	Replace combination meter.
6 CHECK POOR CONTACT. Is there poor contact in SPORT shift indicator circuit?	There is poor contact.	Repair poor contact.	Replace TCM.

AT-157

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

I: CHECK BUZZER.

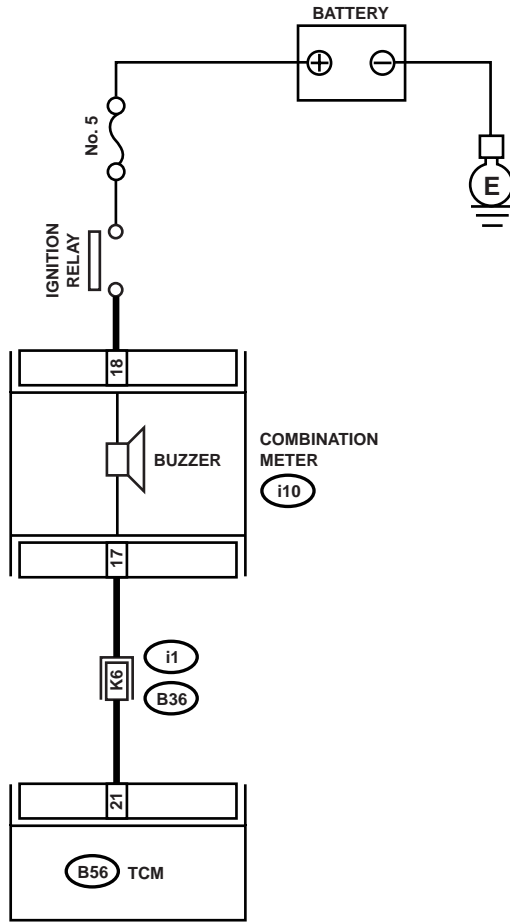
DIAGNOSIS:

Buzzer output signal circuit is open or shorted.

TROUBLE SYMPTOM:

Buzzer does not sound or remains sounded.

WIRING DIAGRAM:



(B56)

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

(i10)

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

(B36)

A1	A2	A3	A4	A5	A6
B1	B2	B3	B4	B5	B6
C1	C2	C3	C4	C5	C6
D1	D2	D3	D4	D5	D6
E1	E2	E3	E4	E5	E6
F1	F2	F3	F4	F5	F6
G1	G2	G3	G4	G5	G6
H1	H2	H3	H4	H5	H6
I1	I2	I3	I4	I5	I6
J1	J2	J3	J4	J5	J6
K1	K2	K3	K4	K5	K6
L1	L2	L3	L4	L5	L6
M1	M2	M3	M4	M5	M6
N1	N2	N3	N4	N5	N6
O1	O2	O3	O4	O5	O6
P1	P2	P3	P4	P5	P6

AT-00671

DIAGNOSTIC PROCEDURE FOR NO-DIAGNOSTIC TROUBLE CODE (DTC)

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Step	Value	Yes	No
1 CHECK BUZZER. Turn ignition switch to ON. (Engine is stopped.) Does buzzer sound?	Buzzer sounds.	Go to step 2.	Go to step 4.
2 CHECK HARNESS BETWEEN TCM AND COMBINATION METER. 1) Turn ignition switch to OFF. 2) Disconnect connector from combination meter and TCM. 3) Measure resistance between TCM connector and chassis ground. Connector & terminal (B56) No. 21 — Chassis ground: Does the measured value exceed the specified value?	1 M Ω	Go to step 3.	Repair short circuit in harness between TCM and combination meter connector.
3 CHECK COMBINATION METER. 1) Connect connector to combination meter. 2) Turn ignition switch to ON. (Engine is stopped.) Does buzzer sound?	Buzzer sounds.	Replace combination meter.	Go to step 7.
4 CHECK HARNESS AND CONNECTOR BETWEEN COMBINATION METER AND IGNITION RELAY. 1) Turn ignition switch to ON. 2) Measure voltage between combination meter connector and chassis ground. Connector & terminal (i10) No. 18 (+) — Chassis ground (-): Does the measured value exceed the specified value?	9 V	Go to step 5.	Repair open or short circuit in harness between combination meter and ignition relay.
5 CHECK BUZZER. Does buzzer sound when combination meter connector (i10) terminal 17 is shorted to chassis ground?	Buzzer sounds.	Go to step 6.	Replace combination meter.
6 CHECK HARNESS BETWEEN TCM AND COMBINATION METER. 1) Turn ignition switch to OFF. 2) Disconnect connector from TCM and combination meter. 3) Measure resistance between combination meter connector and TCM connector. Connector & terminal (B56) No. 21 — (i10) No. 17: Is the measured value less than the specified value?	1 Ω	Go to step 7.	Repair open circuit in harness between combination meter and TCM and poor contact in coupling connector.
7 CHECK POOR CONTACT. Is there poor contact in buzzer circuit?	There is poor contact.	Repair poor contact.	Replace TCM.

AT-159

SYMPTOM RELATED DIAGNOSTIC

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

16.Symptom Related Diagnostic

A: INSPECTION

Symptom	Problem parts
Starter does not rotate when select lever is in "P" or "N"; starter rotates when select lever is in "R", "D", "3" or "2".	<ul style="list-style-type: none"> • Inhibitor switch • Select cable • Select lever • Starter motor and harness
Abnormal noise when select lever is in "P" or "N".	<ul style="list-style-type: none"> • Strainer • Transfer duty solenoid • Oil pump • Drive plate • ATF level too high or too low
Hissing noise occurs during standing start.	<ul style="list-style-type: none"> • Strainer • ATF level too high or too low
Noise occurs while driving in "D1".	<ul style="list-style-type: none"> • Final gear • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in "D2".	
Noise occurs while driving in "D3".	<ul style="list-style-type: none"> • Final gear • Low & reverse brake • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in "D4".	<ul style="list-style-type: none"> • Final gear • Low & reverse brake • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Engine stalls while shifting from one range to another.	<ul style="list-style-type: none"> • Control valve • Lock-up damper • Engine performance • Input shaft
Vehicle moves when select lever is in "N".	<ul style="list-style-type: none"> • TCM • Low clutch
Shock occurs when select lever is moved from "N" to "D".	<ul style="list-style-type: none"> • TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is moved from "N" to "D".	<ul style="list-style-type: none"> • Control valve • Low clutch • Line pressure duty solenoid • Seal ring • Front gasket transmission case
Shock occurs when select lever is moved from "N" to "R".	<ul style="list-style-type: none"> • TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is moved from "N" to "R".	<ul style="list-style-type: none"> • Control valve • Low & reverse clutch • Reverse clutch • Line pressure duty solenoid • Seal ring • Front gasket transmission case
Vehicle does not start in any shift range (engine stalls).	<ul style="list-style-type: none"> • Parking brake mechanism • Planetary gear

AT-160

SYMPTOM RELATED DIAGNOSTIC**AUTOMATIC TRANSMISSION (DIAGNOSTICS)**

Symptom	Problem parts
Vehicle does not start in any shift range (engine revving up).	<ul style="list-style-type: none"> • Strainer • Line pressure duty solenoid • Control valve • Drive pinion • Hypoid gear • Axle shaft • Differential gear • Oil pump • Input shaft • Output shaft • Planetary gear • Drive plate • ATF level too low • Front gasket transmission case
Vehicle does not start in "R" range only (engine revving up).	<ul style="list-style-type: none"> • Select cable • Select lever • Control valve • Low & reverse clutch • Reverse clutch
Vehicle does not start in "R" range only (engine stalls).	<ul style="list-style-type: none"> • Low clutch • 2-4 brake • Planetary gear • Parking brake mechanism
Vehicle does not start in "D", "3" range only (engine revving up).	<ul style="list-style-type: none"> • Low clutch • One-way clutch
Vehicle does not start in "D", "3" or "2" range only (engine revving up).	<ul style="list-style-type: none"> • Low clutch
Vehicle does not start in "D", "3" or "2" range only (engine stalls).	<ul style="list-style-type: none"> • Reverse clutch
Vehicle starts in "R" range only (engine revving up).	<ul style="list-style-type: none"> • Control valve
Acceleration during standing starts is poor (high stall rpm).	<ul style="list-style-type: none"> • Control valve • Low clutch • Reverse clutch • ATF level too low • Front gasket transmission case • Differential gear oil level too high or too low
Acceleration during standing starts is poor (low stall rpm).	<ul style="list-style-type: none"> • Oil pump • Torque converter one-way clutch • Engine performance
Acceleration is poor when select lever is in "D", "3" or "2" range (normal stall rpm).	<ul style="list-style-type: none"> • TCM • Control valve • High clutch • 2-4 brake • Planetary gear
Acceleration is poor when select lever is in "R" (normal stall rpm).	<ul style="list-style-type: none"> • Control valve • High clutch • 2-4 brake • Planetary gear
No shift occurs from 1st to 2nd gear.	<ul style="list-style-type: none"> • TCM • Rear vehicle speed sensor • Front vehicle speed sensor • Throttle position sensor • Shift solenoid 1 • Control valve • 2-4 brake
No shift occurs from 2nd to 3rd gear.	<ul style="list-style-type: none"> • TCM • Control valve • High clutch • Shift solenoid 2

AT-161

SYMPTOM RELATED DIAGNOSTIC

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	<ul style="list-style-type: none"> • TCM • Shift solenoid 1 • ATF temperature sensor • Control valve • 2-4 brake
Engine brake is not effected when select lever is in "3" range.	<ul style="list-style-type: none"> • Inhibitor switch • TCM • Throttle position sensor • Control valve
Engine brake is not effected when select lever is in "3" or "2" range.	<ul style="list-style-type: none"> • Control valve
Engine brake is not effected when select lever is in "1" range.	<ul style="list-style-type: none"> • Control valve • Low & reverse brake
Shift characteristics are erroneous.	<ul style="list-style-type: none"> • Inhibitor switch • TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Throttle position sensor • Control valve • Ground earth
No lock-up occurs.	<ul style="list-style-type: none"> • TCM • Throttle position sensor • ATF temperature sensor • Control valve • Lock-up facing • Engine speed signal
Parking brake is not effected.	<ul style="list-style-type: none"> • Select cable
Shift lever cannot be moved or is hard to move from "P" range.	<ul style="list-style-type: none"> • Select lever • Parking mechanism
ATF spurts out.	<ul style="list-style-type: none"> • ATF level too high
Differential oil spurts out.	<ul style="list-style-type: none"> • Differential gear oil too high
Differential oil level changes excessively.	<ul style="list-style-type: none"> • Seal pipe • Double oil seal
Odor is produced from ATF supply pipe.	<ul style="list-style-type: none"> • High clutch • 2-4 brake • Low & reverse clutch • Reverse clutch • Lock-up facing • ATF deterioration
Shock occurs from 1st to 2nd gear.	<ul style="list-style-type: none"> • TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • ATF deterioration • Engine performance • 2-4 brake timing solenoid
Slippage occurs from 1st to 2nd gear.	<ul style="list-style-type: none"> • TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • 2-4 brake timing solenoid • High clutch

AT-162

SYMPTOM RELATED DIAGNOSTIC**AUTOMATIC TRANSMISSION (DIAGNOSTICS)**

Symptom	Problem parts
Shock occurs from 2nd to 3rd gear.	<ul style="list-style-type: none"> • TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • High clutch • 2-4 brake • ATF deterioration • Engine performance • 2-4 brake timing solenoid
Slippage occurs from 2nd to 3rd gear.	<ul style="list-style-type: none"> • TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • High clutch • 2-4 brake • 2-4 brake timing solenoid
Shock occurs from 3rd to 4th gear.	<ul style="list-style-type: none"> • TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake timing solenoid • 2-4 brake • ATF deterioration • Engine performance • Low clutch timing solenoid • Low clutch
Slippage occurs from 3rd to 4th gear.	<ul style="list-style-type: none"> • TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • 2-4 brake timing solenoid
Shock occurs when select lever is moved from "3" to "2" range.	<ul style="list-style-type: none"> • TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake duty solenoid • 2-4 brake • ATF deterioration • 2-4 brake timing solenoid
Shock occurs when select lever is moved from "D" to "1" range.	<ul style="list-style-type: none"> • TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • ATF deterioration • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid

AT-163

SYMPTOM RELATED DIAGNOSTIC**AUTOMATIC TRANSMISSION (DIAGNOSTICS)**

Symptom	Problem parts
Shock occurs when select lever is moved from "2" to "1" range.	<ul style="list-style-type: none"> • TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • Low & reverse clutch • ATF deterioration • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid
Shock occurs when accelerator pedal is released at medium speeds.	<ul style="list-style-type: none"> • TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • Lock-up damper • Engine performance • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid
Vibration occurs during straight-forward operation.	<ul style="list-style-type: none"> • TCM • Lock-up duty solenoid • Lock-up facing • Lock-up damper
Vibration occurs during turns (tight corner "braking" phenomenon).	<ul style="list-style-type: none"> • TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Throttle position sensor • ATF temperature sensor • Transfer clutch • Transfer valve • Transfer duty solenoid • ATF deterioration • Harness
Front wheel slippage occurs during standing starts.	<ul style="list-style-type: none"> • TCM • Front vehicle speed sensor • FWD switch • Throttle position sensor • ATF temperature sensor • Control valve • Transfer clutch • Transfer valve • Transfer pipe • Transfer duty solenoid
Vehicle is not set in FWD mode.	<ul style="list-style-type: none"> • TCM • FWD switch • Transfer clutch • Transfer valve • Transfer duty solenoid
Select lever is hard to move.	<ul style="list-style-type: none"> • Select cable • Select lever • Detent spring • Manual plate
Select lever is too high to move (unreasonable resistance).	<ul style="list-style-type: none"> • Detent spring • Manual plate
Select lever slips out of operation during acceleration or while driving on rough terrain.	<ul style="list-style-type: none"> • Select cable • Select lever • Detent spring • Manual plate

AT-164

SYMPTOM RELATED DIAGNOSTIC

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

Symptom	Problem parts
System does not shift to SPORT shift mode.	SPORT shift mode switch
Engine brake is not effected in SPORT shift mode with 1st gear.	<ul style="list-style-type: none">• SPORT shift solenoid• Control valve• Low & reverse clutch

AT-165

Vehicle-id:
SIE-id::A:Inspection

SYMPTOM RELATED DIAGNOSTIC

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

MEMO:

AT-166

Vehicle-id:
SIE-id::A:Inspection

~

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

1. General Description

A: SPECIFICATIONS

1. MANUAL TRANSMISSION AND DIFFERENTIAL

ItemType		Model			
		BRIGHTON	L	GT	GT
Type		5-forward speeds with synchromesh and 1 reverse			
Transmission gear ratio		1st	3.454		
		2nd	2.062		
		3rd	1.448		
		4th	1.088		
		5th	0.780	0.871	
		Reverse	3.333		
Front reduction gear	Final	Type of gear	Hypoid		
		Gear ratio	3.900	4.111	
Rear reduction gear	Transfer	Type of gear	Helical		
		Gear ratio	1.000		
	Final	Type of gear	Hypoid		
		Gear ratio	3.900	4.111	
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)		
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)		
Transmission gear oil		GL-5			
Transmission gear oil capacity		3.5 ℓ (3.7 US qt, 3.1 Imp qt)			

2. TRANSMISSION GEAR OIL

Recommended oil

(1)	
(2)	
(3)	
GL-5	
(4)	
(°C)	-30 -26 -15 -5 0 15 25 30
(°F)	-22 -15 5 23 32 59 77 86
MT-00001	

- (1) ITEM
 (2) Transmission gear oil
 (3) API Classification
 (4) SAE Viscosity No. and Applicable Temperature

3. TRANSMISSION CASE ASSEMBLY

Drive pinion shim adjustment

Hypoid gear backlash

0.13 — 0.18 mm (0.0051 — 0.0071 in)

Drive pinion shim			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)	32295AA071	0.250 (0.0098)
32295AA041	0.175 (0.0069)	32295AA081	0.275 (0.0108)
32295AA051	0.200 (0.0079)	32295AA091	0.300 (0.0118)
32295AA061	0.225 (0.0089)	32295AA101	0.500 (0.0197)

Selection of main shaft rear plate

Main shaft rear plate		
Dimension "A" mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

MT-2

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

4. DRIVE PINION ASSEMBLY

Preload adjustment of thrust bearing

Starting torque

0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

5. REVERSE IDLER GEAR

Adjustment of reverse idler gear position

Reverse idler gear to transmission case (LH) wall clearance

6.0 — 7.5 mm (0.236 — 0.295 in)

Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to the case wall

After installing a suitable reverse shifter lever, adjust reverse idler gear to transmission case wall clearance to within 0 to 0.5 mm (0 to 0.020 in) using washers.

Washer (20.5 × 26 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803020151	0.4 (0.016)	803020154	1.9 (0.075)
803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

6. SHIFTER FORK AND ROD

Select suitable shifter forks so that both coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.

Rod end clearance

A: 1st-2nd — 3rd-4th

0.4 — 1.4 mm (0.016 — 0.055 in)

B: 3rd-4th — 5th

0.5 — 1.3 mm (0.020 — 0.051 in)

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	Approach to 2nd gear by 0.2 mm (0.008 in)

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th shifter fork		
Part No.	Mark	Remarks
32812AA201	7	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA211	No mark	Standard
32812AA221	9	Become distant from 5th gear by 0.2 mm (0.008 in)

7. TRANSFER CASE

Neutral position adjustment

Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	3	Neutral position is closer to 1st.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

Reverse check plate adjustment

Reverse check plate			
Part No.	Mark	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

8. EXTENSION ASSEMBLY

Thrust washer (50 × 61 × t) to taper roller bearing table outer race side clearance
0.2 — 0.3 mm (0.008 — 0.012 in)

NOTE:

Value of clearance must be within the specified range.

Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

Thrust washer to center differential side clearance
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

9. FRONT DIFFERENTIAL

Bevel gear to pinion backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Washer (38.1 × 50 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

Pinion shaft to axle drive shaft clearance
0 — 0.2 mm (0 — 0.008 in)

Snap ring (Outer-28)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805028011	1.05 (0.0413)	805028012	1.20 (0.0472)

10. TRANSFER DRIVE GEAR

Snap ring (Outer-30) to ball bearing clearance
0.01 — 0.15 mm (0.004 — 0.0050 in)

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

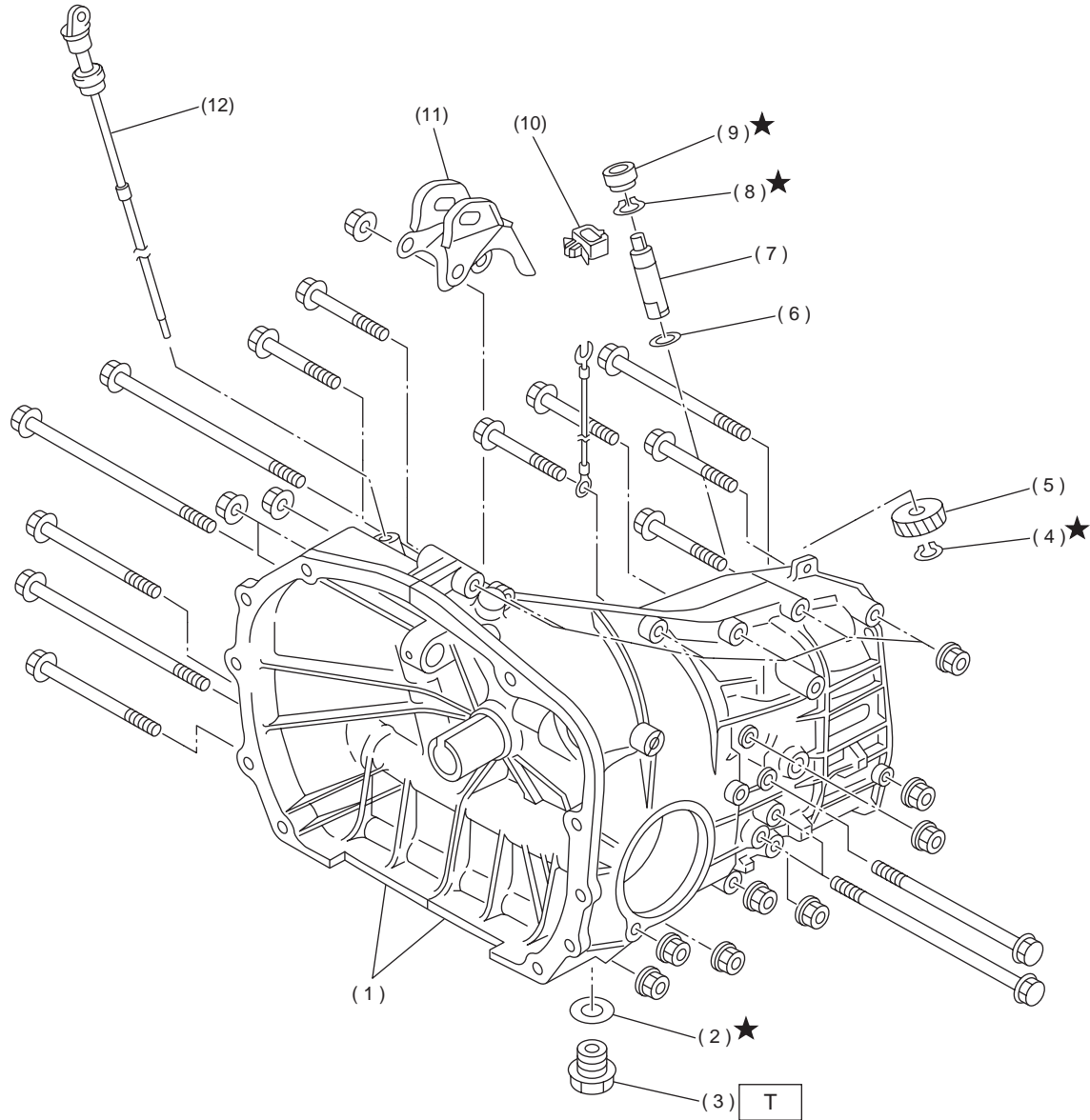
MT-4

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

B: COMPONENT

1. TRANSMISSION CASE



MT-00335

- (1) Transmission case ASSY
- (2) Gasket
- (3) Drain plug
- (4) Snap ring (Outer)
- (5) Speedometer driven gear

- (6) Washer
- (7) Speedometer shaft
- (8) Snap ring (Outer)
- (9) Oil seal
- (10) Clamp

- (11) Pitching stopper bracket
- (12) Oil level gauge

Tightening torque: N·m (kgf·m, ft·lb)

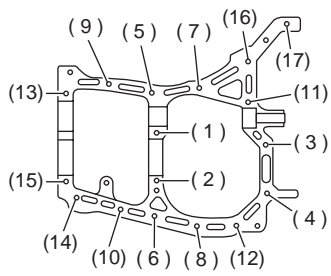
T: 44 (4.5, 32.5)

MT-5

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

- Transmission case tightening torque

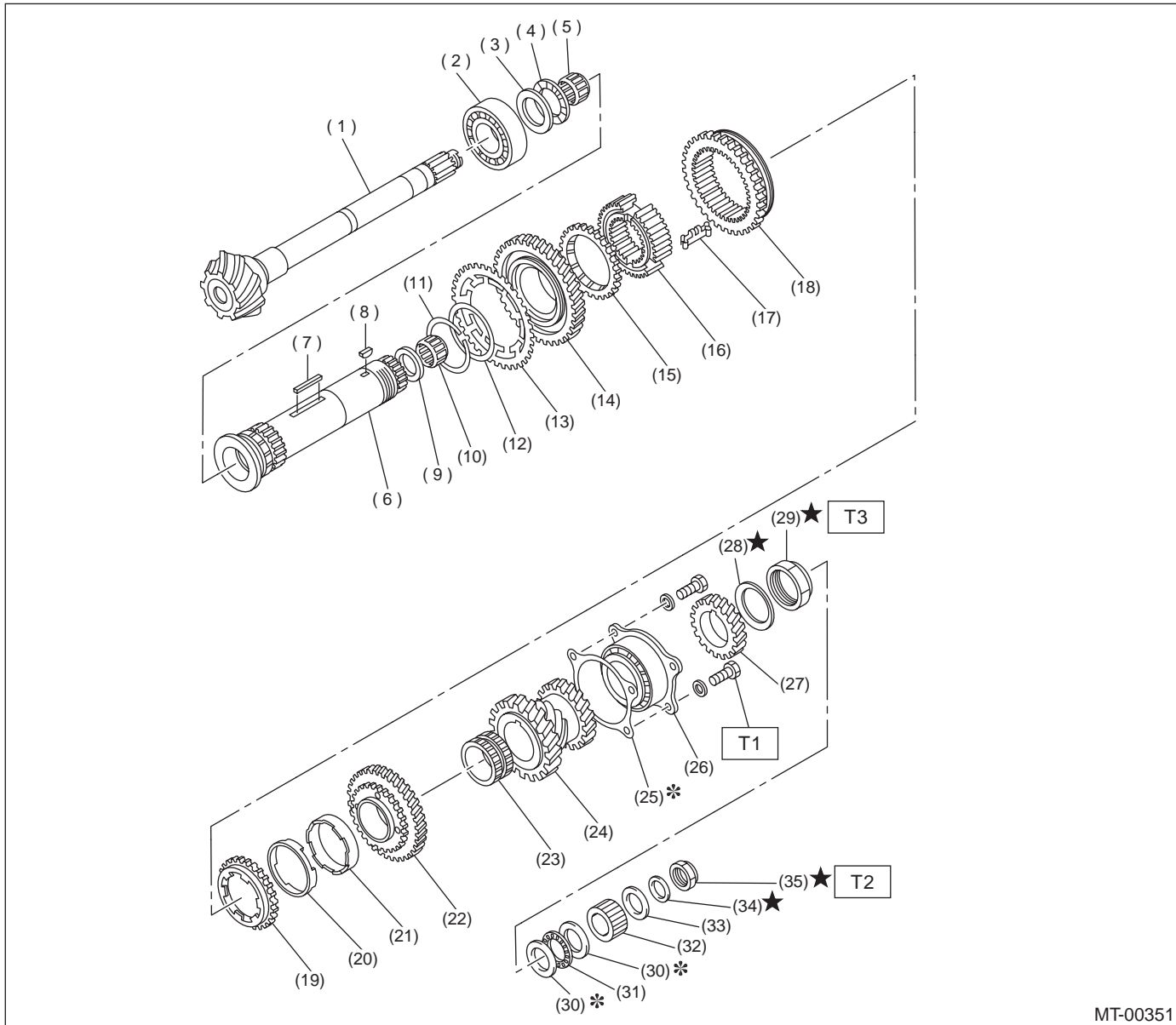
 MT-00003	Bolt No.	Bolt size	Tightening torque: N·m (kgf-m, ft-lb)
		<5> to <15>	8 mm
	<1> to <4> <16>, <17>	10 mm	39 (4.0, 28.9)

MT-6

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

2. DRIVE PINION ASSEMBLY



MT-00351

- | | | |
|-------------------------|-------------------------------|-------------------------------------|
| (1) Drive pinion shaft | (15) Baulk ring | (29) Lock nut |
| (2) Roller bearing | (16) 1st-2nd synchronizer hub | (30) Washer |
| (3) Washer | (17) Insert key | (31) Thrust bearing |
| (4) Thrust bearing | (18) Reverse driven gear | (32) Differential bevel gear sleeve |
| (5) Needle bearing | (19) Outer baulk ring | (33) Washer |
| (6) Driven shaft | (20) Synchro cone | (34) Lock washer |
| (7) Key | (21) Inner baulk ring | (35) Lock nut |
| (8) Woodruff key | (22) 2nd driven gear | |
| (9) Drive pinion collar | (23) 2nd driven gear bush | |
| (10) Needle bearing | (24) 3rd-4th driven gear | |
| (11) Snap ring (Outer) | (25) Driven pinion shim | |
| (12) Washer | (26) Roller bearing | |
| (13) Sub gear | (27) 5th driven gear | |
| (14) 1st driven gear | (28) Lock washer | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 30 (3.1, 22.4)

T2: 120 (12.2, 88.2)

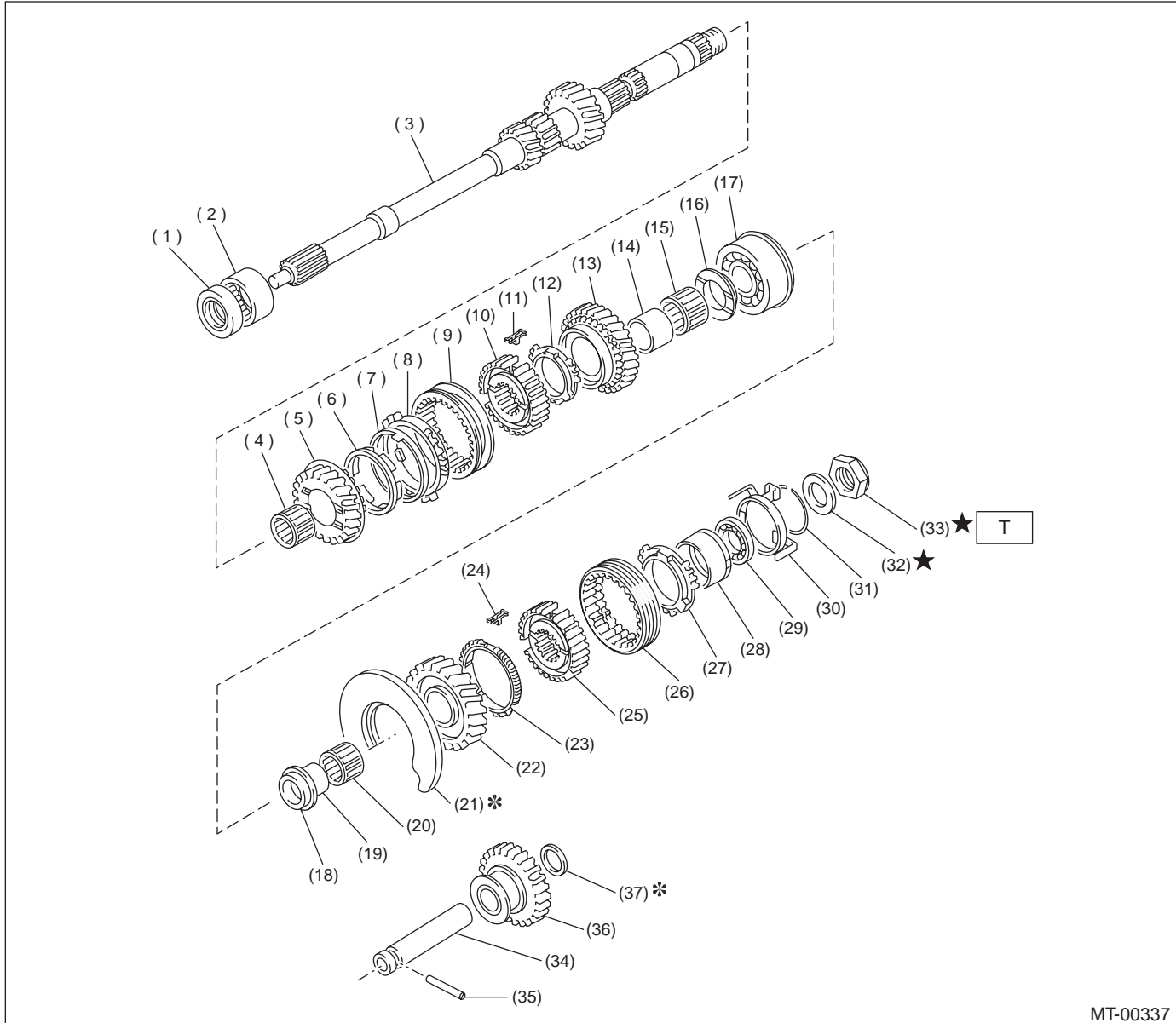
T3: 260 (26.5, 191.7)

MT-7

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

3. MAIN SHAFT ASSEMBLY



MT-00337

- (1) Oil seal
- (2) Needle bearing
- (3) Transmission main shaft
- (4) Needle bearing
- (5) 3rd drive gear
- (6) Inner baulk ring
- (7) 3rd synchro cone
- (8) Outer baulk ring
- (9) 3rd-4th coupling sleeve
- (10) 3rd-4th synchronizer hub
- (11) 3rd-4th shifting insert key
- (12) 4th baulk ring
- (13) 4th drive gear
- (14) 4th needle bearing race

- (15) Needle bearing
- (16) 4th gear thrust washer
- (17) Ball bearing
- (18) 5th gear thrust washer
- (19) 5th needle bearing race
- (20) Needle bearing
- (21) Main shaft rear plate
- (22) 5th drive gear
- (23) 5th baulk ring
- (24) 5th-Rev shifting insert key
- (25) 5th-Rev synchronizer hub
- (26) 5th-Rev coupling sleeve
- (27) Rev baulk ring
- (28) Rev synchro cone

- (29) Ball bearing
- (30) Synchro cone stopper
- (31) Snap ring
- (32) Lock washer
- (33) Lock nut
- (34) Reverse idler gear shaft
- (35) Straight pin
- (36) Reverse idler gear
- (37) Washer

Tightening torque: N·m (kgf·m, ft·lb)

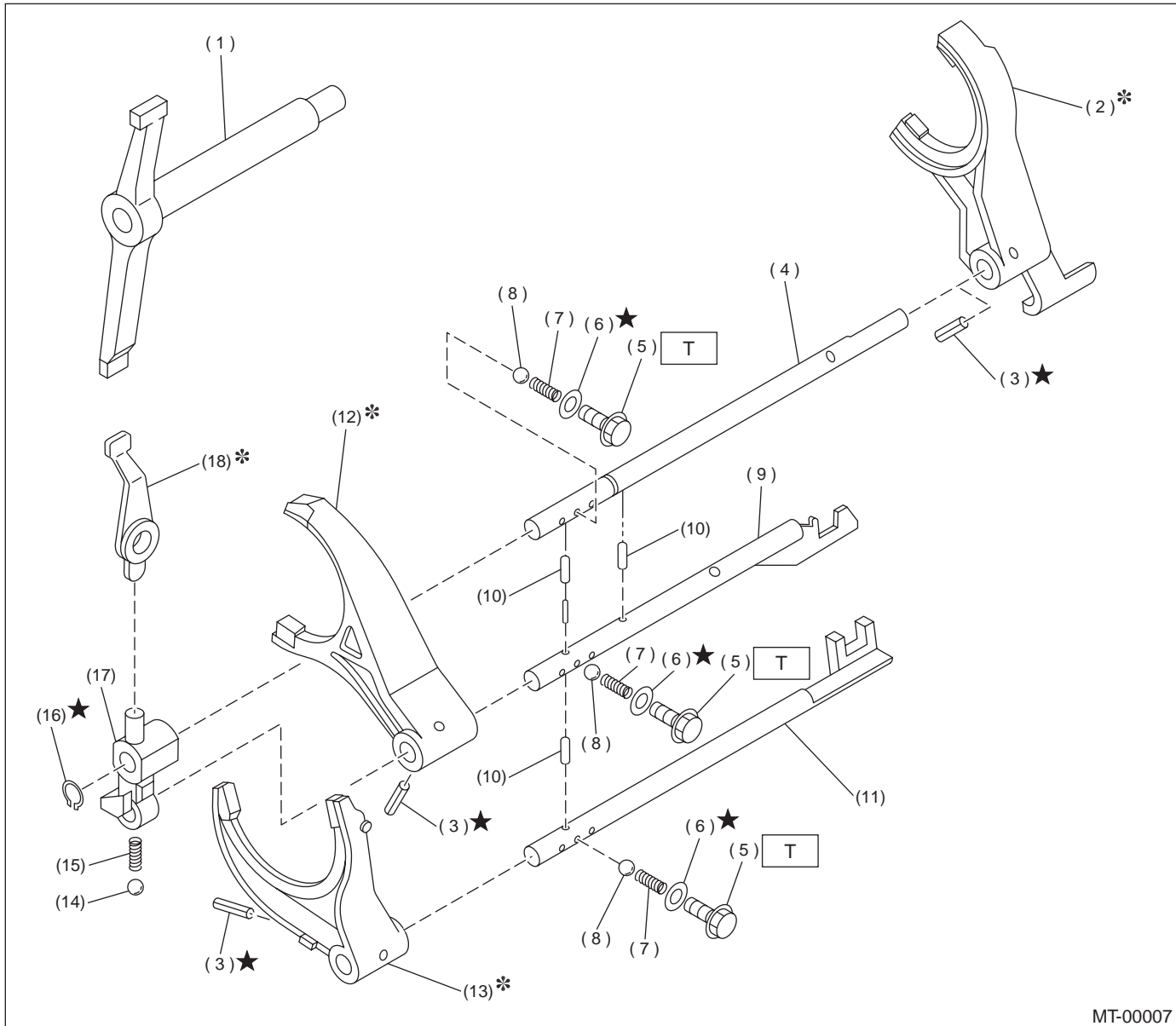
T: 120 (12.2, 88.2)

MT-8

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

4. SHIFTER FORK AND SHIFTER ROD



MT-00007

- | | |
|--------------------------|---------------------------|
| (1) Shifter arm | (9) 3rd-4th fork rod |
| (2) 5th shifter fork | (10) Interlock plunger |
| (3) Straight pin | (11) 1st-2nd fork rod |
| (4) Reverse fork rod | (12) 3rd-4th shifter fork |
| (5) Checking ball plug | (13) 1st-2nd shifter fork |
| (6) Gasket | (14) Ball |
| (7) Checking ball spring | (15) Spring |
| (8) Ball | (16) Snap ring (Outer) |

- | |
|----------------------------|
| (17) Reverse fork rod arm |
| (18) Reverse shifter lever |

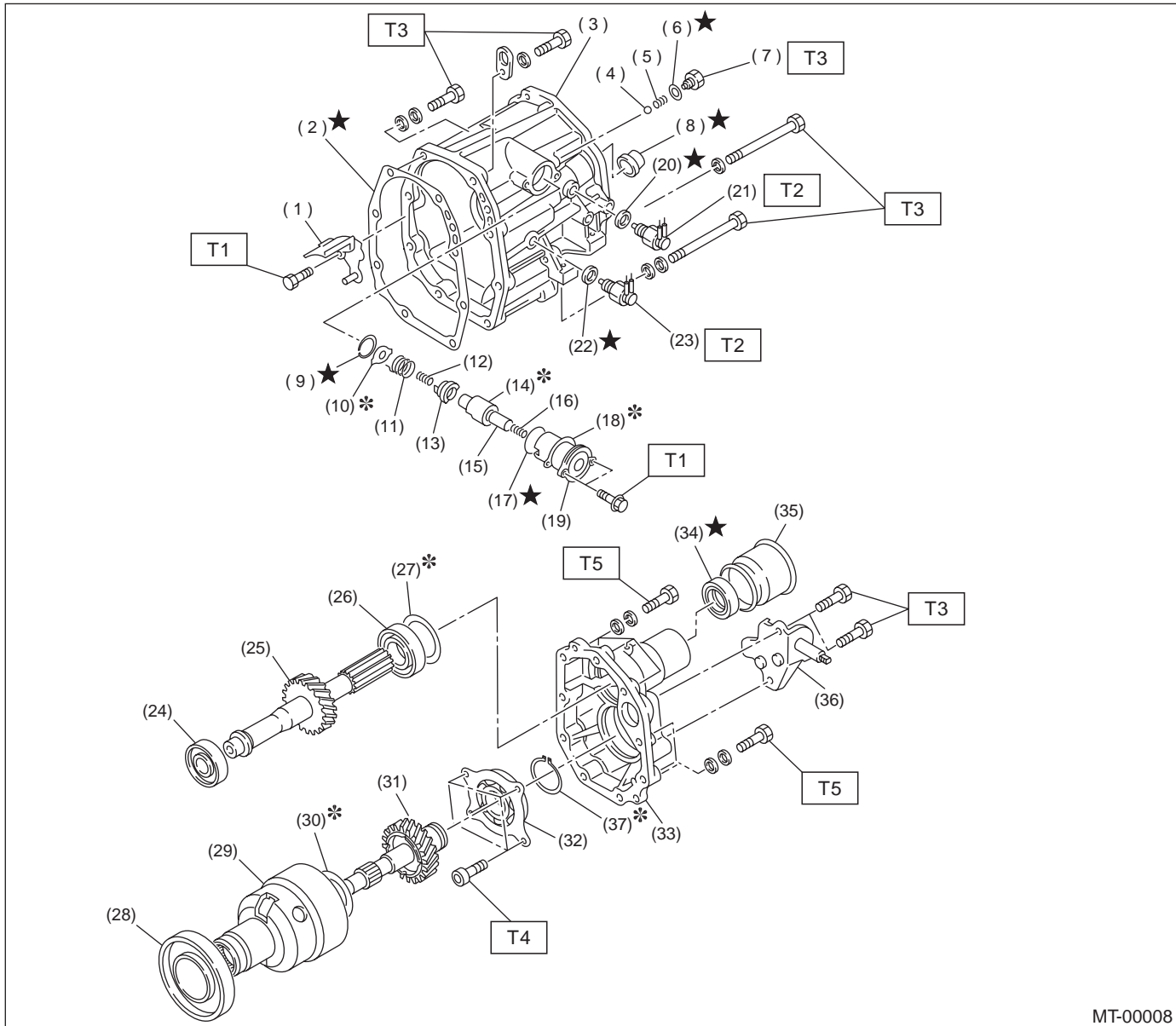
Tightening torque: N·m (kgf·m, ft·lb)
T: 20.0 (2.0, 14.5)

MT-9

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

5. TRANSFER CASE AND EXTENSION



MT-00008

- | | | |
|----------------------------|----------------------------|--------------------------|
| (1) Oil guide | (16) Return spring | (31) Transfer drive gear |
| (2) Gasket | (17) O-ring | (32) Ball bearing |
| (3) Transfer case | (18) Adjusting select shim | (33) Extension case |
| (4) Ball | (19) Reverse check sleeve | (34) Oil seal |
| (5) Reverse accent spring | (20) Gasket | (35) Dust cover |
| (6) Gasket | (21) Neutral switch | (36) Shift bracket |
| (7) Plug | (22) Gasket | (37) Snap ring |
| (8) Oil seal | (23) Back-up light switch | |
| (9) Snap ring (Inner) | (24) Roller bearing | |
| (10) Reverse check plate | (25) Transfer driven gear | |
| (11) Reverse check spring | (26) Roller bearing | |
| (12) Reverse return spring | (27) Adjusting washer | |
| (13) Reverse check cam | (28) Ball bearing | |
| (14) Reverse accent shaft | (29) Center differential | |
| (15) Return spring cap | (30) Adjusting washer | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 6.4 (0.65, 4.7)

T2: 9.75 (0.994, 7.2)

T3: 24.5 (2.5, 18.1)

T4: 26 (2.7, 20)

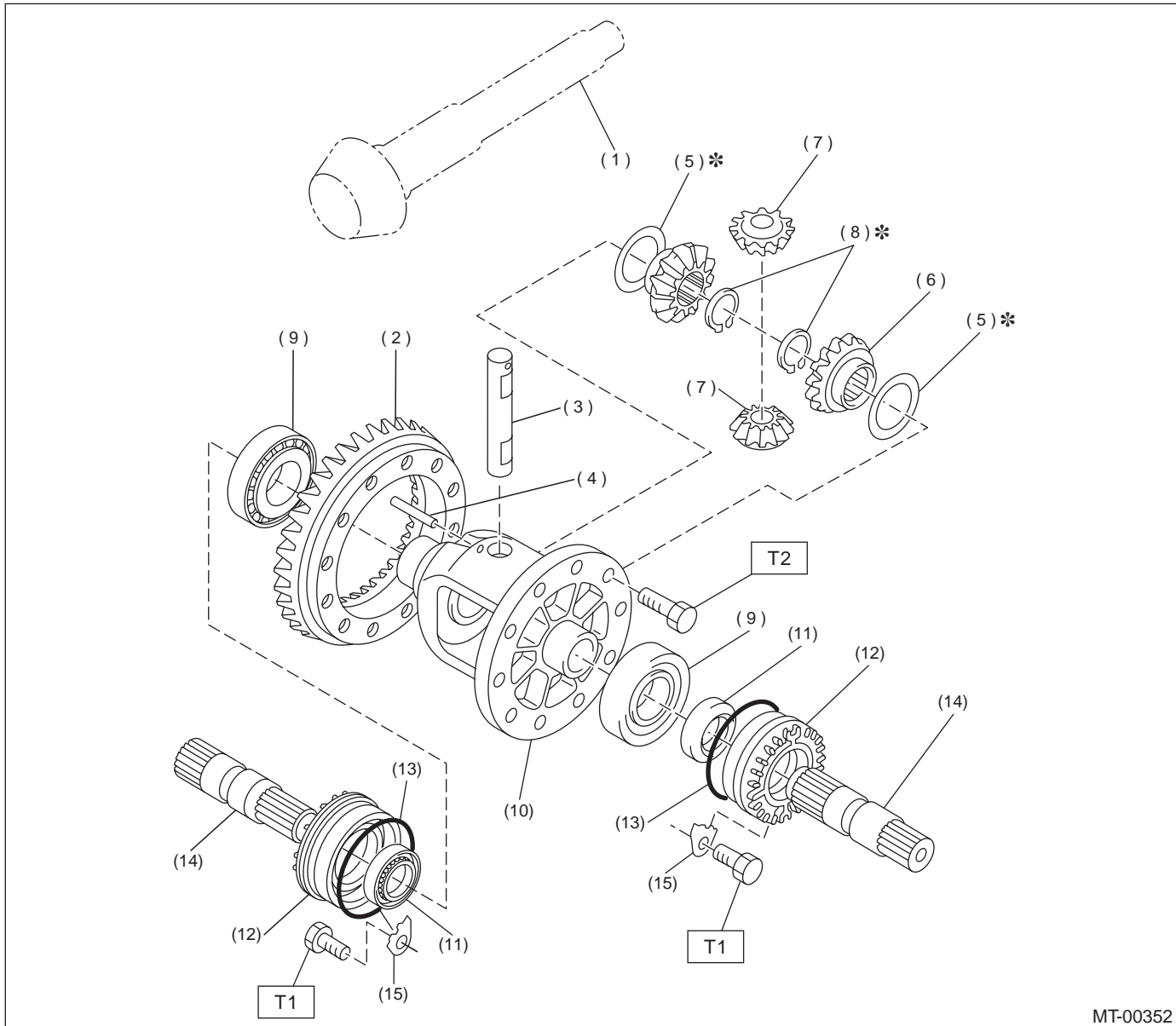
T5: 40 (4.1, 29.7)

MT-10

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

6. FRONT DIFFERENTIAL



- | | |
|-------------------------------|---------------------------------|
| (1) Drive pinion shaft | (8) Snap ring (Outer) |
| (2) Hypoid driven gear | (9) Roller bearing |
| (3) Pinion shaft | (10) Differential case |
| (4) Straight pin | (11) Oil seal |
| (5) Washer | (12) Differential side retainer |
| (6) Differential bevel gear | (13) O-ring |
| (7) Differential bevel pinion | (14) Axle drive shaft |

- (15) Retainer lock plate

Tightening torque: N·m (kgf·m, ft·lb)

T1: 25 (2.5, 18.1)

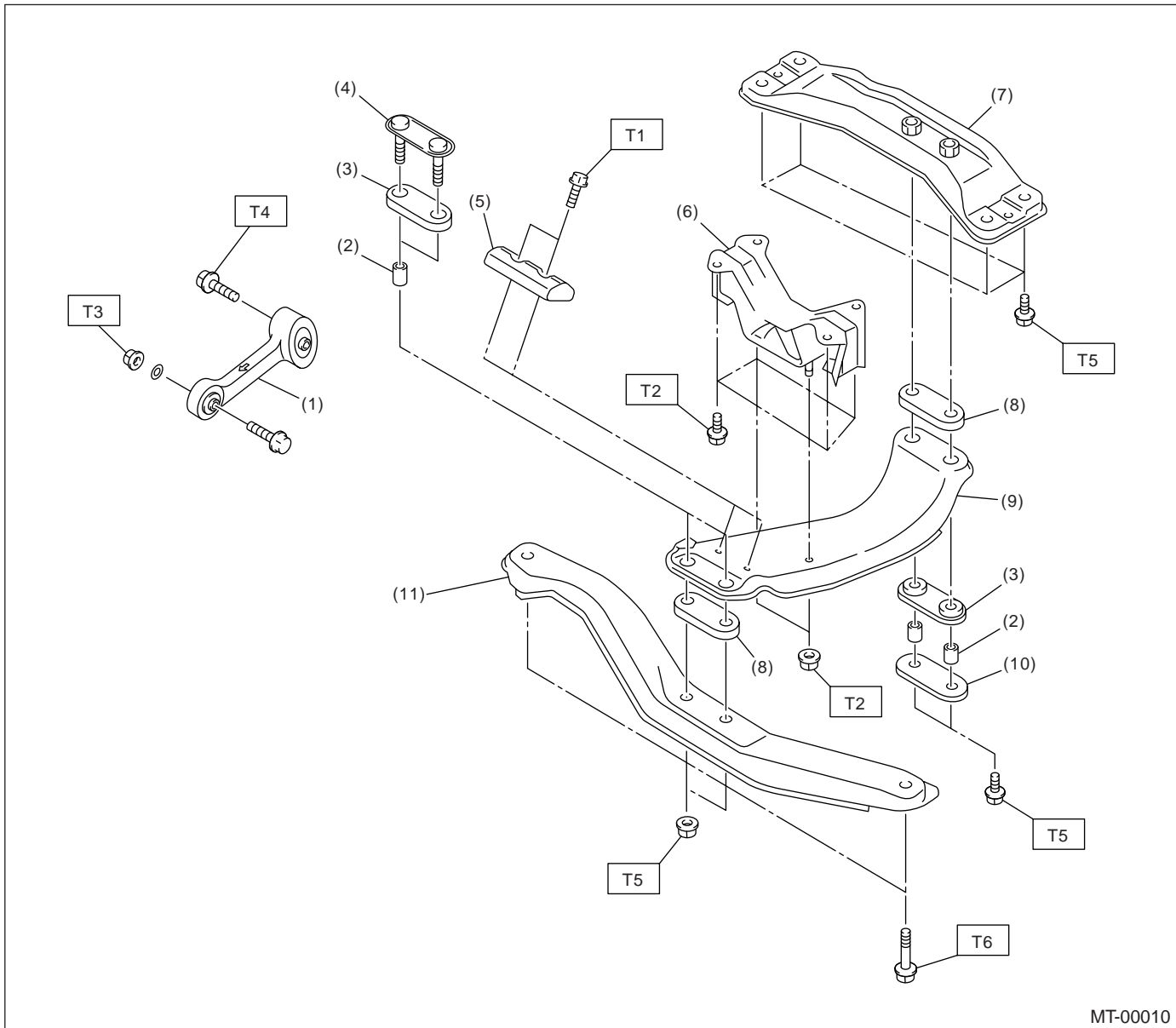
T2: 62 (6.3, 45.6)

MT-11

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

7. TRANSMISSION MOUNTING



MT-00010

- | | |
|------------------------------------|-------------------------|
| (1) Pitching stopper | (6) Rear cushion rubber |
| (2) Spacer | (7) Rear crossmember |
| (3) Cushion C | (8) Cushion D |
| (4) Front plate | (9) Center crossmember |
| (5) Dynamic damper (OUTBACK model) | (10) Rear plate |
| | (11) Front crossmember |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 7.5 (0.76, 5.5)

T2: 35 (3.6, 26)

T3: 50 (5.1, 37)

T4: 58 (5.9, 43)

T5: 70 (7.1, 51)

T6: 75 (7.6, 55)

T7: 140 (14.3, 103)

MT-12

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

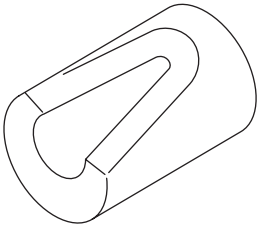
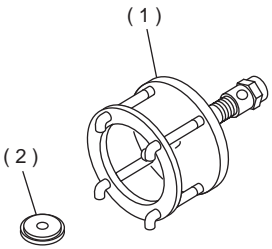
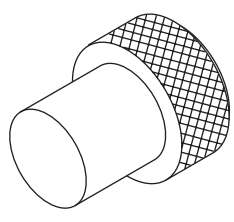
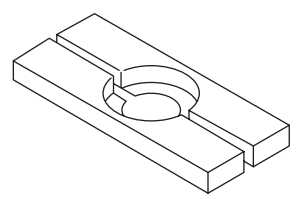
C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation, and disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
- When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Replace deformed or otherwise damaged snap rings with new ones.
- Before installing O-rings or oil seals, apply sufficient amount of gear oil to avoid damage and deformation.
- Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating surface of the case.
- Before applying sealant, completely remove the old seal.

MT-13

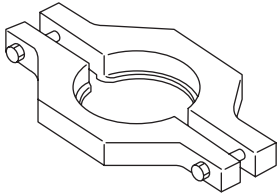
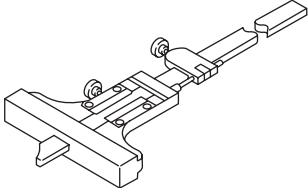
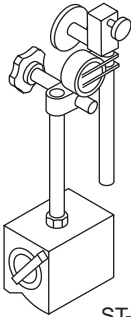
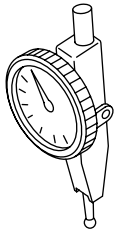
Vehicle-id:
SIE-id::C:Caution

GENERAL DESCRIPTION**MANUAL TRANSMISSION AND DIFFERENTIAL****D: PREPARATION TOOL****1. SPECIAL TOOLS**

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-399411700</p>	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.
 <p>ST-899524100</p>	899524100	PULLER SET	Used for removing and installing roller bearing (Differential). (1) PULLER (2) CAP
 <p>ST-399780104</p>	399780104	WEIGHT	Used for measuring preload on roller bearing.
 <p>ST-498077000</p>	498077000	5TH DRIVEN GEAR REMOVER	Used for removing roller bearing of drive pinion shaft.

MT-14

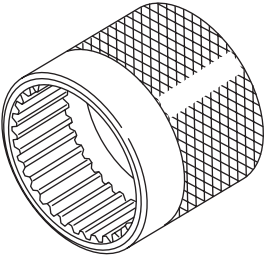
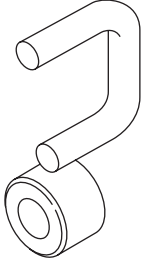
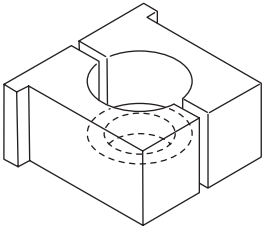
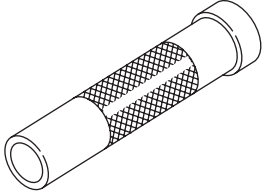
GENERAL DESCRIPTION**MANUAL TRANSMISSION AND DIFFERENTIAL**

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-498077300</p>	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.
 <p>ST-498147000</p>	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 <p>ST-498247001</p>	498247001	MAGNET BASE	<ul style="list-style-type: none"> Used for measuring backlash between side gear and pinion, and hypoid gear. Used with DIAL GAUGE (498247100).
 <p>ST-498247100</p>	498247100	DIAL GAUGE	<ul style="list-style-type: none"> Used for measuring backlash between side gear and pinion, and hypoid gear. Used with MAGNET BASE (498247001).

MT-15

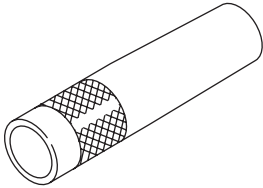
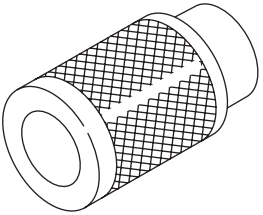
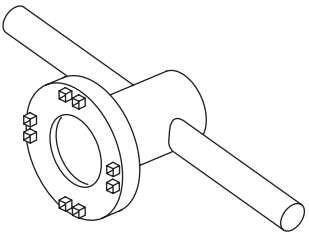
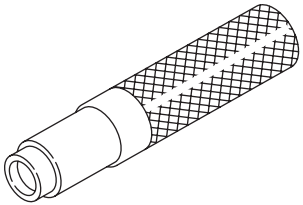
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-498427100</p>	498427100	STOPPER	Used for securing the drive pinion shaft assembly and driven gear assembly when removing the drive pinion shaft assembly lock nut.
 <p style="text-align: center;">ST-498787100</p>	498787100	MAIN SHAFT STOPPER	Used for removing and installing transmission main shaft lock nut.
 <p style="text-align: center;">ST-498937000</p>	498937000	TRANSMISSION HOLDER	Used for removing and installing transmission main shaft lock nut.
 <p style="text-align: center;">ST-499277100</p>	499277100	BUSH 1-2 INSTALLER	<ul style="list-style-type: none"> • Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bush. • Used for installing roller bearing outer races to differential case.

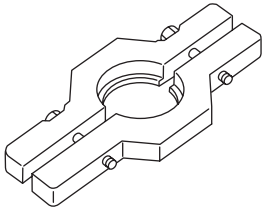
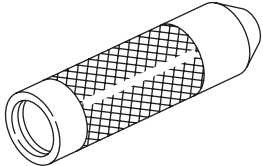
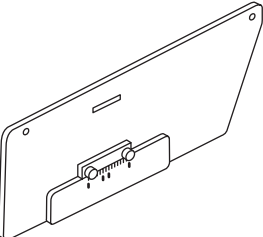
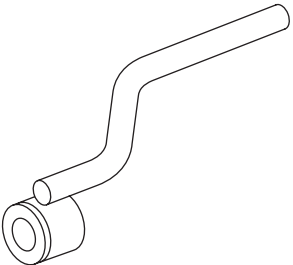
MT-16

GENERAL DESCRIPTION**MANUAL TRANSMISSION AND DIFFERENTIAL**

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499277200	499277200	INSTALLER	Used for press-fitting the 2nd driven gear, roller bearings, and 5th driven gear onto the driven shaft.
 ST-499757002	499757002	INSTALLER	<ul style="list-style-type: none"> • Used for installing snap ring (OUT 25), and ball bearing (25 x 26 x 17). • Used for installing bearing cone of transfer driven gear (extension core side).
 ST-499787000	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.
 ST-499827000	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.

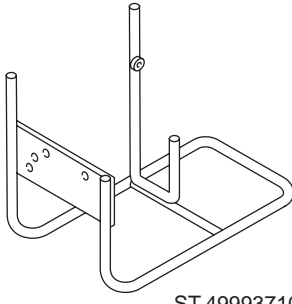
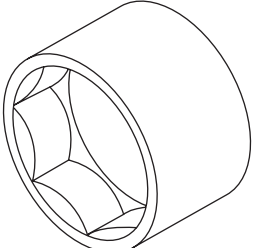
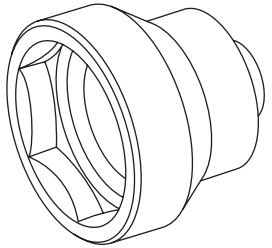
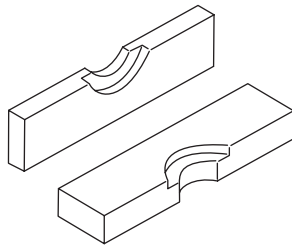
MT-17

GENERAL DESCRIPTION**MANUAL TRANSMISSION AND DIFFERENTIAL**

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499857000</p>	499857000	5TH DRIVEN GEAR REMOVER	Used for removing 5th driven gear.
 <p>ST-499877000</p>	499877000	RACE 4-5 INSTALLER	<ul style="list-style-type: none"> Used for installing 4th needle bearing race and ball bearing onto transmission main shaft. Used with REMOVER (899714110).
 <p>ST-499917500</p>	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting drive pinion shim.
 <p>ST-499927100</p>	499927100	HANDLE	Used for fitting transmission main shaft.

MT-18

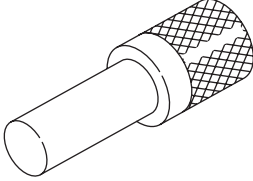
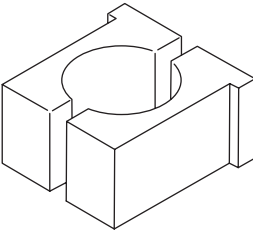
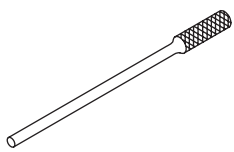
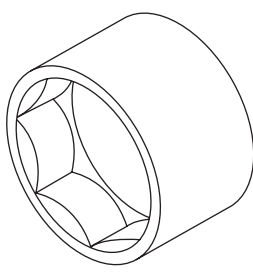
GENERAL DESCRIPTION**MANUAL TRANSMISSION AND DIFFERENTIAL**

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499937100</p>	499937100	TRANSMISSION STAND SET	Stand used for transmission disassembly and assembly.
 <p>ST-499987003</p>	499987003	SOCKET WRENCH (35)	Used for removing and installing driven pinion lock nut and main shaft lock nut.
 <p>ST-499987300</p>	499987300	SOCKET WRENCH (50)	Used for removing and installing driven gear assembly lock nut.
 <p>ST-899714110</p>	899714110	REMOVER	Used for fixing transmission main shaft, drive pinion, rear drive shaft.

MT-19

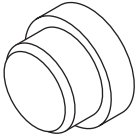
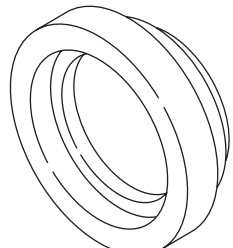
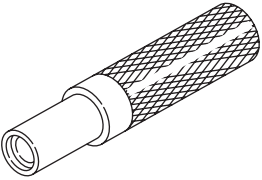
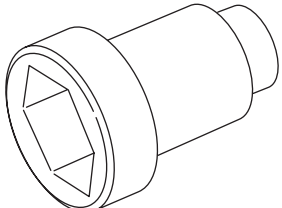
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-899864100</p>	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.
 <p style="text-align: center;">ST-899884100</p>	899884100	HOLDER	Used for tightening lock nut on sleeve.
 <p style="text-align: center;">ST-899904100</p>	899904100	REMOVER	Used for removing and installing straight pin.
 <p style="text-align: center;">ST-899988608</p>	899988608	SOCKET WRENCH (27)	Used for removing and installing drive pinion lock nut.

MT-20

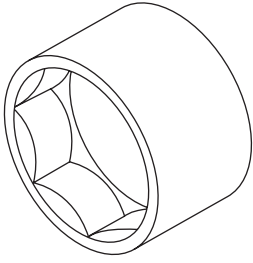
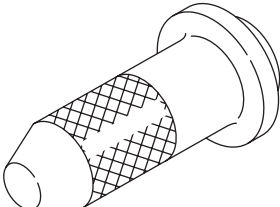
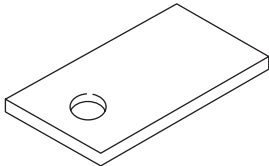
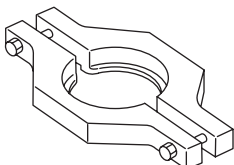
GENERAL DESCRIPTION**MANUAL TRANSMISSION AND DIFFERENTIAL**

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398497701	398497701	ADAPTER	<ul style="list-style-type: none"> Used for installing roller bearing onto differential case. Used with INSTALLER (499277100).
 ST-499587000	499587000	INSTALLER	Used for installing driven gears to driven shaft.
 ST-899824100	899824100	PRESS	Used for installing speedometer shaft oil seal.
 ST-499987100	499987100	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.

MT-21

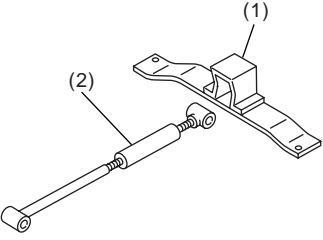
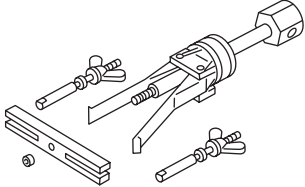
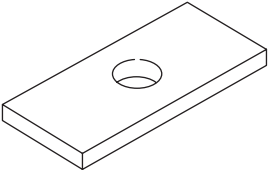
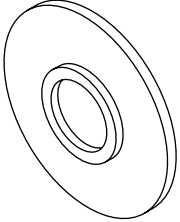
GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-899984103</p>	899984103	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 <p style="text-align: center;">ST-498057300</p>	498057300	INSTALLER	Used for installing extension oil seal.
 <p style="text-align: center;">ST-498255400</p>	498255400	PLATE	Used for measuring backlash.
 <p style="text-align: center;">ST-498077400</p>	498077400	REMOVER	<ul style="list-style-type: none"> • Used for removing synchronizer cone of main shaft. • Used for removing 5th driven gear of drive pinion shaft.

MT-22

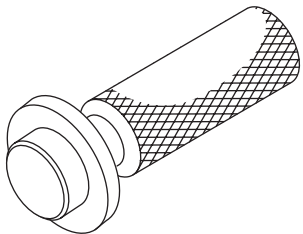
GENERAL DESCRIPTION**MANUAL TRANSMISSION AND DIFFERENTIAL**

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-41099AA000</p>	41099AA000	ENGINE SUPPORT ASSY	Used for supporting engine. (1) ENGINE SUPPORT BRACKET (41099AA010) (2) ENGINE SUPPORT (41099AA020)
 <p>ST-398527700</p>	398527700	PULLER ASSY	<ul style="list-style-type: none"> • Used for removing and extension case roller bearing. • Used for removing front idfferential side retainer bearing cup.
 <p>ST-398643600</p>	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 <p>ST-398177700</p>	398177700	INSTALLER	Used for installing bearing cone of transfer driven gear (transfer case side).

MT-23

GENERAL DESCRIPTION

MANUAL TRANSMISSION AND DIFFERENTIAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p>ST-499797000</p>	499797000	INSTALLER	Used for installing differential side retainer oil seal.

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

MT-24

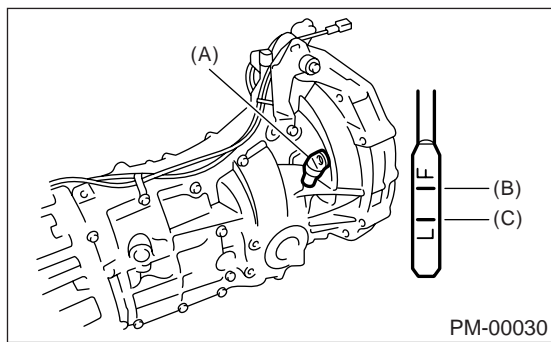
TRANSMISSION GEAR OIL

MANUAL TRANSMISSION AND DIFFERENTIAL

2. Transmission Gear Oil

A: INSPECTION

- 1) Park vehicle on a level surface.
- 2) Turn ignition switch to OFF, and wait until the engine cools.
- 3) Remove oil level gauge and wipe it clean.
- 4) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper direction.
- 5) Pull out the oil level gauge again and check, if the oil level is between lower and upper levels. If it is below the lower level, check oil leakage and add oil through the oil level gauge hole to bring the level up to the position between lower and upper level.



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

B: REPLACEMENT

- 1) Pull out oil level gauge.
- 2) Lift-up the vehicle.
- 3) Drain transmission gear oil completely.

CAUTION:

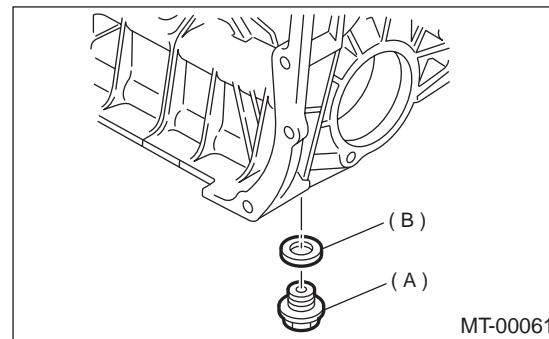
• **Directly after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.**

• **Be careful not to splash transmission gear oil on exhaust pipe; it may cause smoke or fire. If transmission gear oil splashes to exhaust pipes, wipe clean them.**

- 4) Tighten transmission gear oil drain plug with new gasket.

Tightening torque:

44 N·m (4.5 kgf·m, 32.5 ft·lb)



- (A) Drain plug
(B) Gasket

- 5) Lower the vehicle.
- 6) Pour gear oil into the gauge hole.

Recommended gear oil:

Use GL-5 (75W-90) or equivalent.

Gear oil capacity:

3.5 ℓ (3.7 US qt, 3.1 Imp qt)

- 7) Check the level of the transmission gear oil. Check, if the oil is within the range of marks.

NOTE:

When inserting the level gauge into transmission gear, align the protrusion on the side of the top part of the level gauge with the notch in the gauge hole.

MT-25

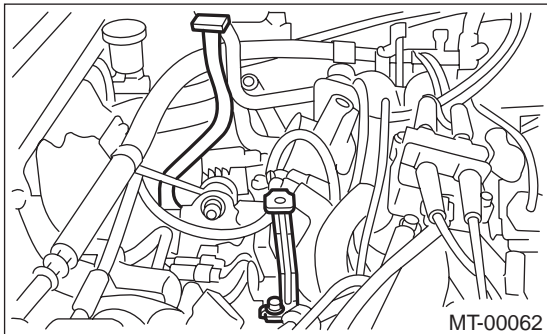
MANUAL TRANSMISSION ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

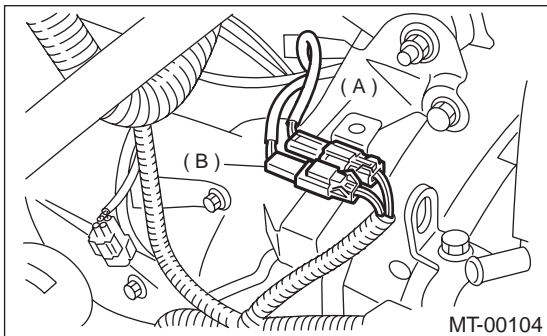
3. Manual Transmission Assembly

A: REMOVAL

- 1) Set vehicle on a lift.
- 2) Open front hood fully, and support with stay.
- 3) Disconnect battery ground cable.
- 4) Move shift lever to "N", and release the parking brake.
- 5) Remove air intake duct.
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
- 6) Remove air cleaner case.
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 7) Remove air cleaner case stay.

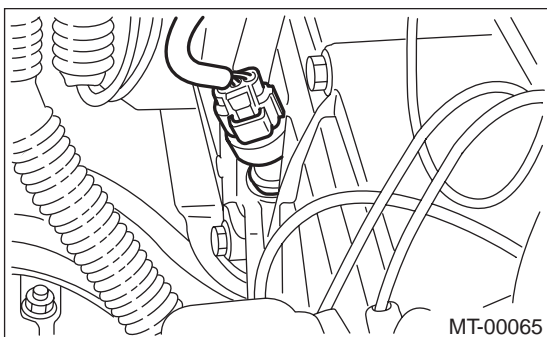


- 8) Disconnect the following connectors.
 - (1) Neutral position switch connector
 - (2) Back-up light switch connector

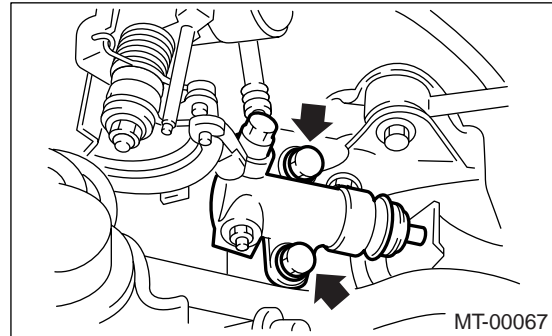


- (A) Neutral switch (Brown)
(B) Back-up light switch (Gray)

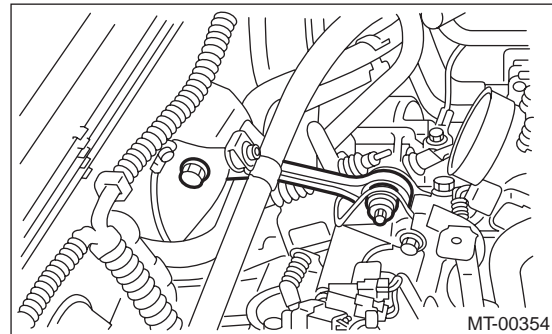
- (3) Vehicle speed sensor



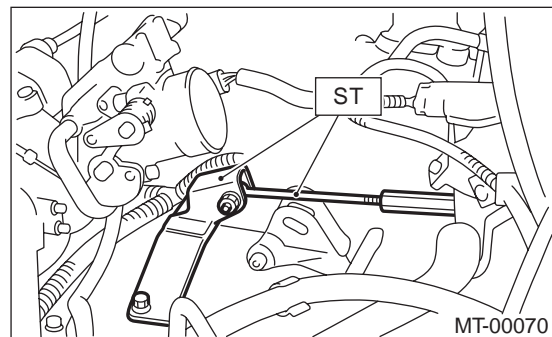
- (4) Transmission ground terminal
- 9) Remove starter.
<Ref. to SC(H4SO)-7, REMOVAL, Starter.>
- 10) Remove operating cylinder from transmission.



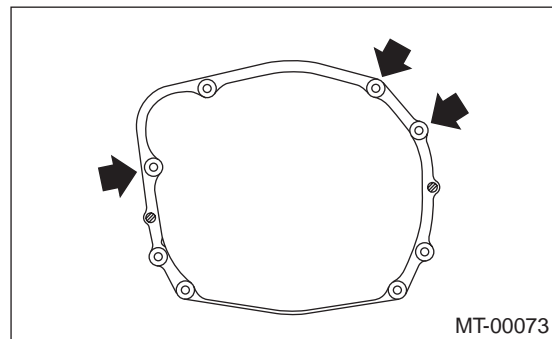
- 11) Remove pitching stopper.



- 12) Set ST.
ST 41099AA000 ENGINE SUPPORT ASSY



- 13) Remove bolt which holds right upper side of transmission to engine.

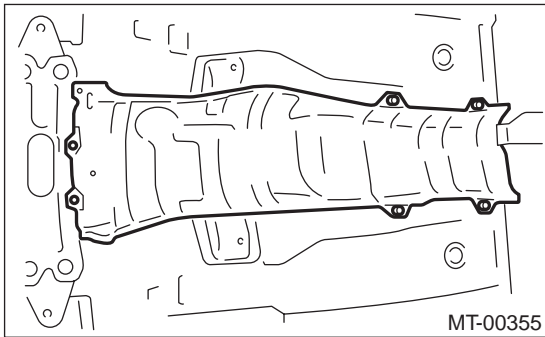


MT-26

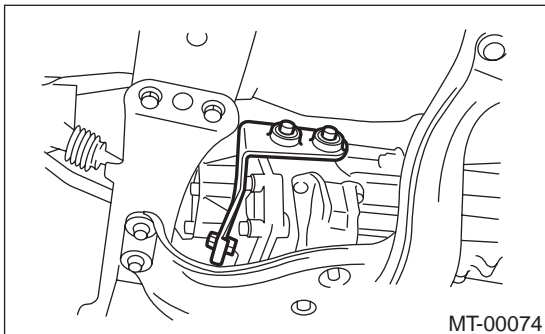
MANUAL TRANSMISSION ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

- 14) Remove under cover.
 15) Remove front and center exhaust pipes.
 <Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>
 16) Remove rear exhaust pipe and muffler.
 <Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
 17) Remove heat shield cover.

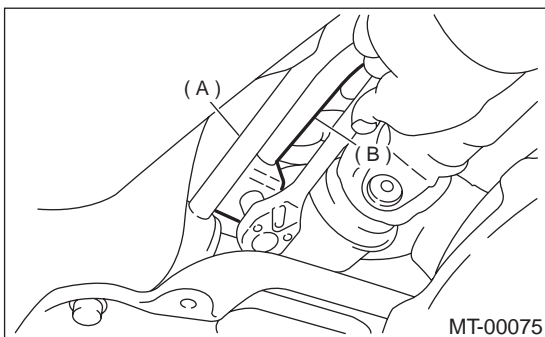


- 18) Remove hanger bracket from right side of transmission.



- 19) Remove propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
 20) Remove gear shift rod and stay from transmission.

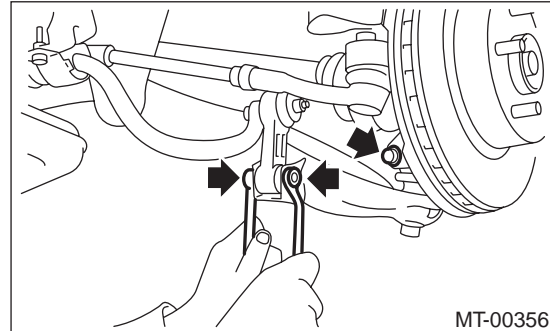
- (1) Disconnect stay from transmission.
- (2) Disconnect rod from transmission.



- (A) Stay
 (B) Rod

- 21) Disconnect stabilizer link from transverse link.

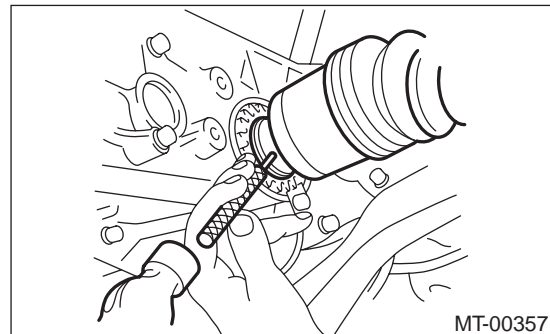
- 22) Remove bolt securing ball joint of transverse link to housing and separate ball joint and transverse link.



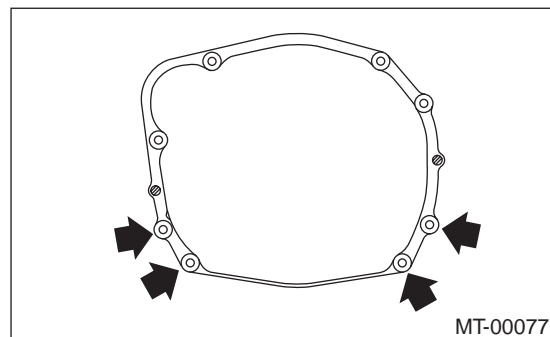
- 23) Remove spring pins and separate front drive shafts from each side of the transmission.

NOTE:

Discard removing spring pin. Replace with a new one.



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



MT-27

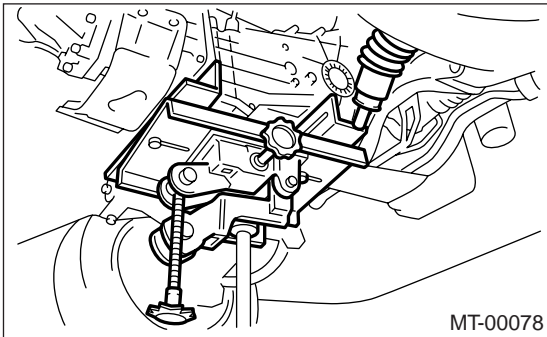
MANUAL TRANSMISSION ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

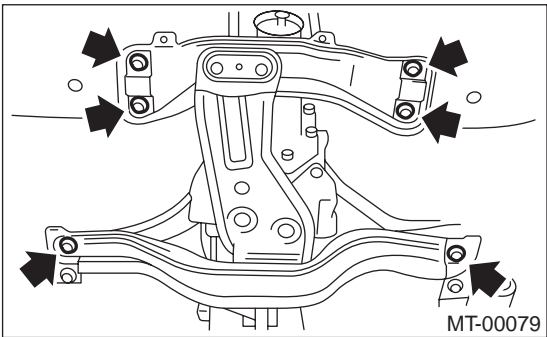
25) Place transmission jack under transmission.

CAUTION:

- Always support transmission case with a transmission jack.
- Fix transmission with a band etc.



26) Remove transmission rear crossmember from vehicle.



27) Move transmission jack toward rear until main shaft is withdrawn from clutch cover.

28) Separate transmission assembly and rear cushion rubber.

B: INSTALLATION

1) Install rear cushion rubber to transmission assembly.

Tightening torque:

35 N·m (3.6 kgf-m, 26 ft-lb)

2) Install transmission onto engine.

- (1) Gradually raise transmission with transmission jack.
- (2) Engage them at splines.

NOTE:

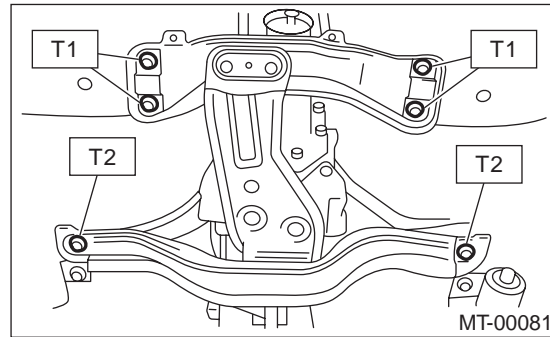
Be careful not to strike main shaft against clutch cover.

3) Install transmission rear crossmember.

Tightening torque:

T1: 75 N·m (7.6 kgf-m, 55 ft-lb)

T2: 140 N·m (14.3 kgf-m, 103 ft-lb)

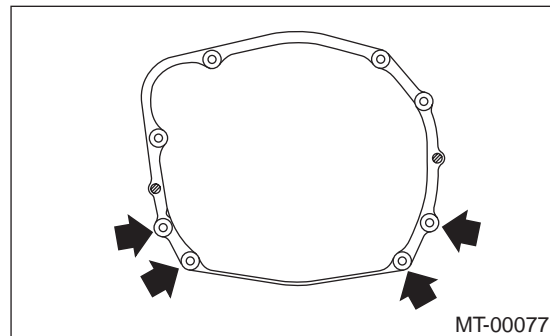


4) Take off transmission jack.

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

Tightening torque:

50 N·m (5.1 kgf-m, 37 ft-lb)



MT-28

MANUAL TRANSMISSION ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

6) Connect engine and transmission.

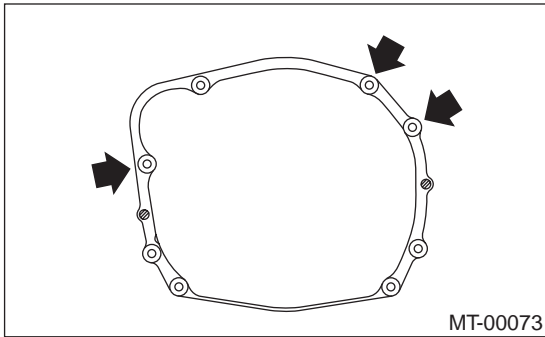
(1) Install starter.

<Ref. to SC(H4SO)-7, INSTALLATION, Starter.>

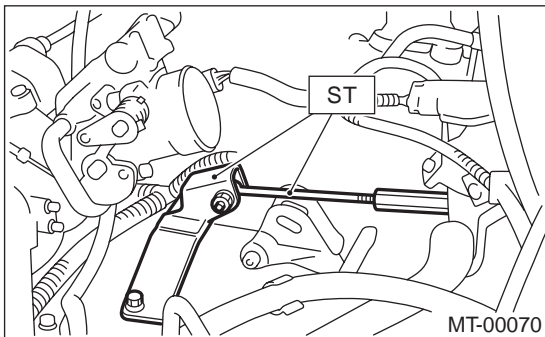
(2) Tighten bolt which holds right upper side of transmission to engine.

Tightening torque:

50 N·m (5.1 kgf-m, 37 ft-lb)



7) Remove ST.

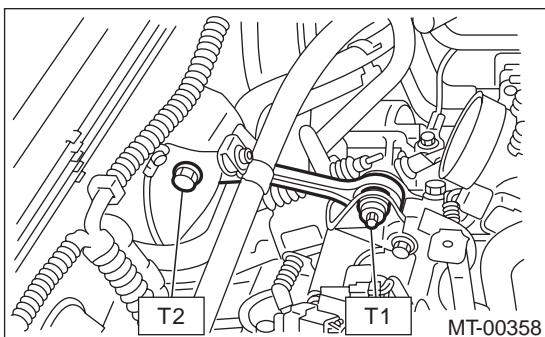


8) Install pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

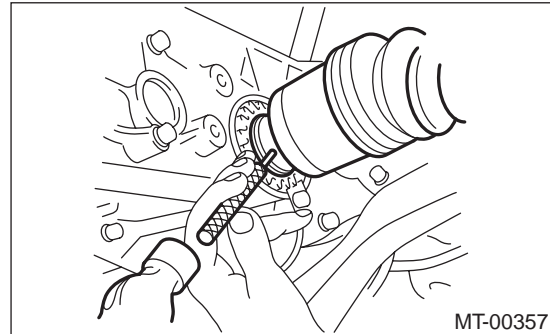
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



9) Lift up the vehicle.

10) Install front drive shafts into transmission.

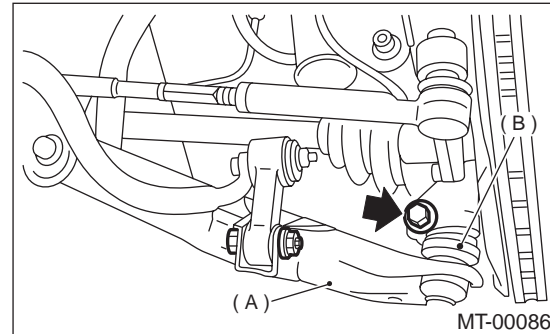
11) New drive spring pin into chamfered hole of drive shaft.



12) Install ball joints of lower arm into knuckle arm of housing, and tighten installing bolts.

Tightening torque:

50 N·m (5.1 kgf-m, 37 ft-lb)



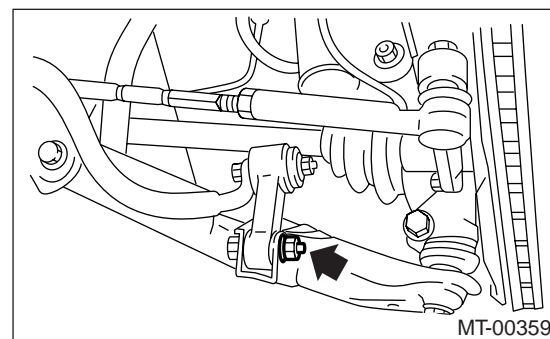
(A) Transverse link

(B) Ball joint

13) Install stabilizer link from transverse link.

Tightening torque:

30 N·m (3.1 kgf-m, 22.1 ft-lb)



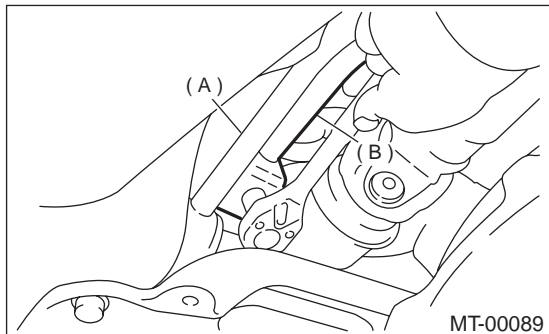
MANUAL TRANSMISSION ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

14) Connect rod to the joint.

Tightening torque:

18 N·m (1.8 kgf·m, 13.0 ft·lb)

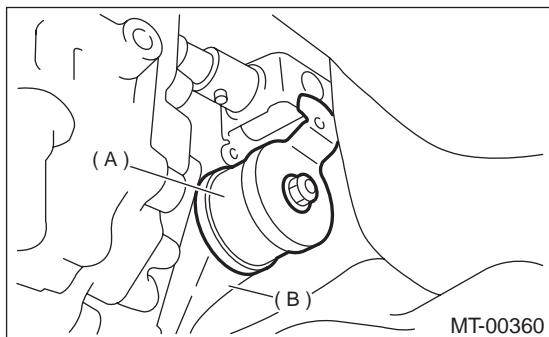


- (A) Joint
(B) Rod

15) Connect stay to transmission bracket.

Tightening torque:

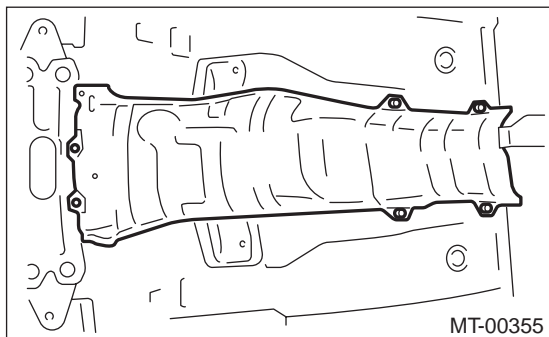
18 N·m (1.8 kgf·m, 13.0 ft·lb)



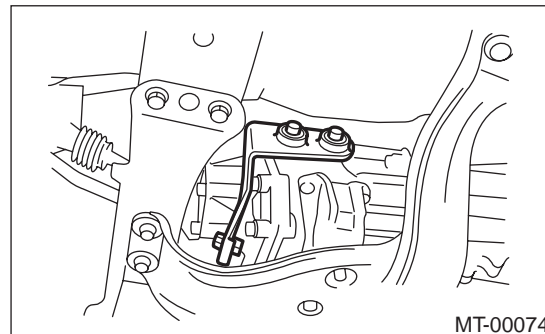
- (A) Stay
(B) Transmission bracket

16) Install propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>

17) Install heat shield cover.



18) Install hanger bracket on right side of transmission.



19) Install front, center, rear, exhaust pipe and muffler.

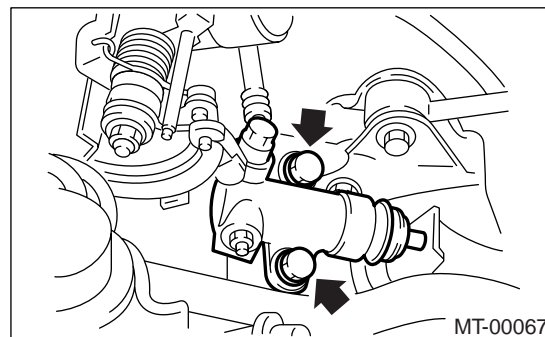
<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

20) Install under cover.

21) Install operating cylinder.

Tightening torque:

37 N·m (3.8 kgf·m, 27.5 ft·lb)



22) Connect the following connectors.

(1) Transmission ground terminal

Tightening torque:

13 N·m (1.3 kgf·m, 9.4 ft·lb)

- (2) Vehicle speed sensor connector
(3) Neutral position switch connector
(4) Back-up light switch connector

23) Install air cleaner case stay.

Tightening torque:

16 N·m (1.6 kgf·m, 11.6 ft·lb)

24) Install air cleaner case and air intake duct.

<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>

25) Connect battery ground cable.

26) Pour gear oil and check the oil level. <Ref. to MT-25, Transmission Gear Oil.>

27) Take off vehicle from lift arms.

MT-30

TRANSMISSION MOUNTING SYSTEM

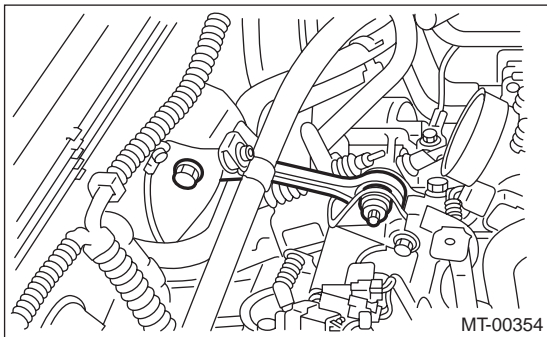
MANUAL TRANSMISSION AND DIFFERENTIAL

4. Transmission Mounting System

A: REMOVAL

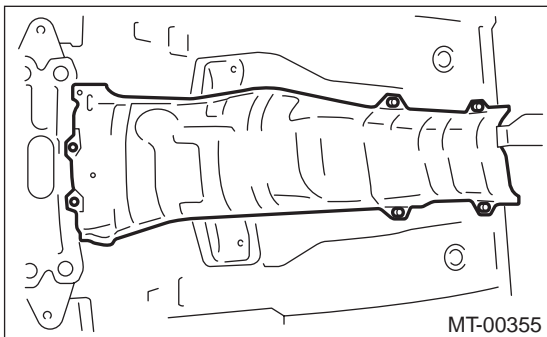
1. PITCHING STOPPER

- 1) Disconnect battery ground cable.
- 2) Remove the air cleaner case.
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 3) Remove the pitching stopper.



2. CROSSMEMBER AND CUSHION RUBBER

- 1) Disconnect battery ground cable.
- 2) Jack-up vehicle and support it with sturdy racks.
- 3) Remove the front, center, rear exhaust pipes and muffler.
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
- 4) Remove the heat shield cover.

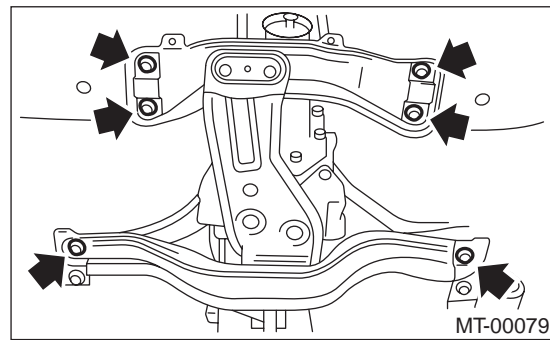


- 5) Set the transmission jack under the transmission body.

CAUTION:

Always support transmission case with a transmission jack.

- 6) Remove the rear crossmember.



- 7) Remove the rear cushion rubber.

TRANSMISSION MOUNTING SYSTEM

MANUAL TRANSMISSION AND DIFFERENTIAL

B: INSTALLATION

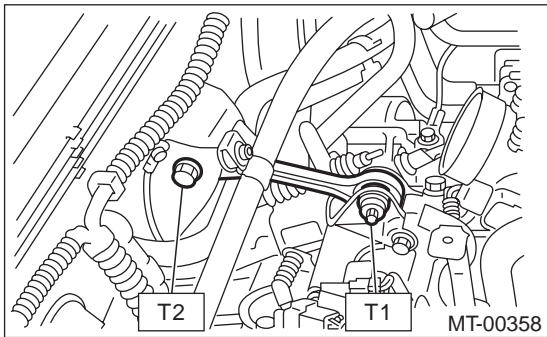
1. PITCHING STOPPER

- 1) Install the pitching stopper.

Tightening torque:

T1: 50 N·m (5.1 kgf-m, 37 ft-lb)

T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



- 2) Install the air cleaner case.
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>.
- 3) Connect battery ground cable.

2. CROSSMEMBER AND CUSHION RUBBER

- 1) Install the rear cushion rubber.

Tightening torque:

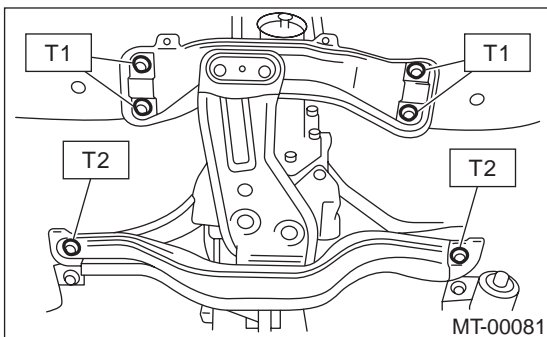
35 N·m (3.6 kgf-m, 26 ft-lb)

- 2) Install the rear crossmember.

Tightening torque:

T1: 75 N·m (7.6 kgf-m, 55 ft-lb)

T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



- 3) Remove the transmission jack.
- 4) Install the heat shield cover.
- 5) Install the front, center, rear exhaust pipes and the muffler.
<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>

C: INSPECTION

Repair or replace parts if the results of the inspection below are not satisfactory.

1. PITCHING STOPPER

Make sure that the pitching stopper is not bent or damaged. Make sure that the rubber is not stiff, cracked, or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

Make sure that the crossmember is not bent or damaged. Make sure that the cushion rubber is not stiff, cracked, or otherwise damaged.

OIL SEAL

MANUAL TRANSMISSION AND DIFFERENTIAL

5. Oil Seal

A: INSPECTION

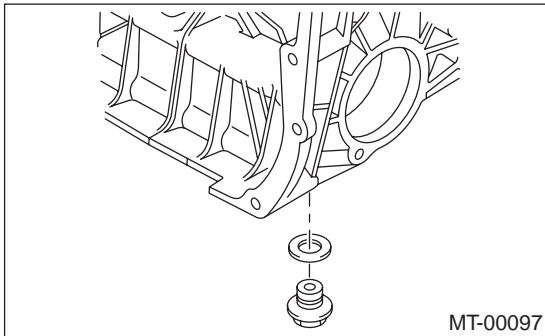
Check oil seal portion for leakage. If leakage is found, replace oil seal with new one.

B: REPLACEMENT

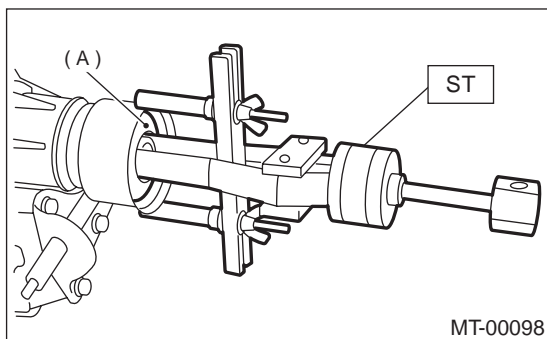
- 1) Clean transmission exterior.
- 2) Drain gear oil completely.
- 3) Tighten drain plug with a new gasket.

Tightening torque:

44 N·m (4.5 kgf·m, 32.5 ft·lb)

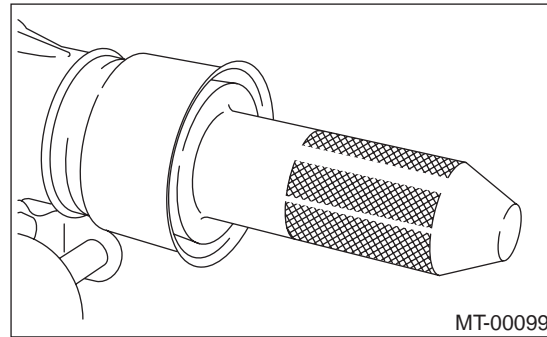


- 4) Remove rear exhaust pipe and muffler. <Ref. to EX(H4SO)-9, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, REMOVAL, Muffler.>
- 5) Remove heat shield cover.
- 6) Remove propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
- 7) Using ST, remove the oil seal.
ST 398527700 PULLER ASSY



(A) Oil seal

- 8) Using ST and hammer, install a new oil seal.
ST 498057300 INSTALLER



- 9) Install the propeller shaft. <Ref. to DS-15, INSTALLATION, Propeller Shaft.>
- 10) Install the heat shield cover.
- 11) Install the rear exhaust pipe and muffler. <Ref. to EX(H4SO)-9, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-10, INSTALLATION, Muffler.>
- 12) Pour gear oil and check the oil level. <Ref. to MT-25, REPLACEMENT, Transmission Gear Oil.>

MT-33

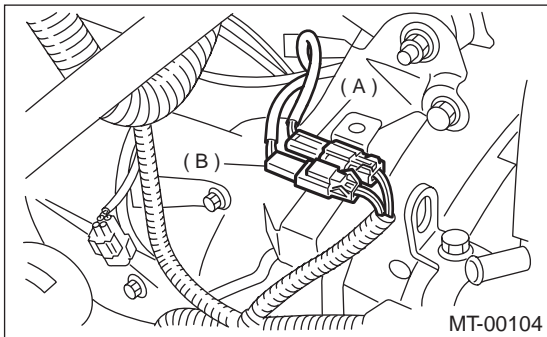
SWITCHES AND HARNESS

MANUAL TRANSMISSION AND DIFFERENTIAL

6. Switches and Harness

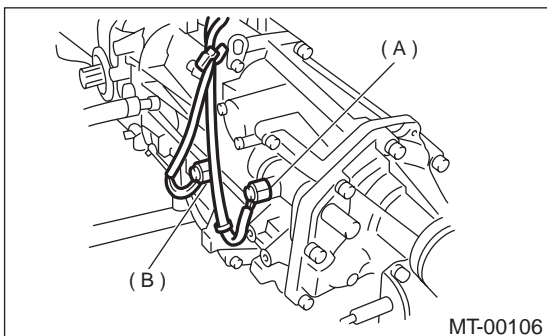
A: REMOVAL

- 1) Disconnect connector battery ground cable.
- 2) Remove air intake duct and cleaner case.
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
- 3) Disconnect connector back-up light switch and neutral position switch.



- (A) Neutral switch (Brown)
(B) Back-up light switch (Gray)

- 4) Lift-up the vehicle.
- 5) Remove back-up light switch and neutral position switch with harness.



- (A) Neutral switch (Brown connector)
(B) Back-up light switch (Gray connector)

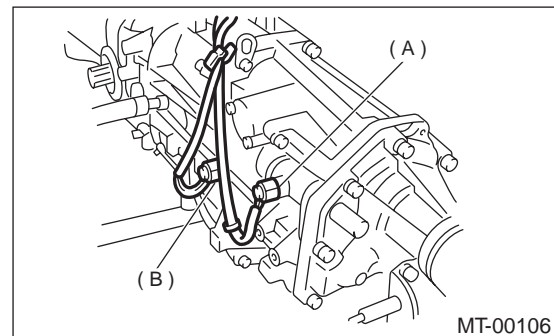
B: INSTALLATION

1. BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH

- 1) Install back-up light switch and neutral position switch with harness.

Tightening torque:

24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



- (A) Neutral switch
(B) Back-up light switch

- 2) Connect connector of back-up light switch and neutral position switch.
- 3) Install air intake duct and cleaner case.
<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
and <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
- 4) Connect battery ground cable.

SWITCHES AND HARNESS

MANUAL TRANSMISSION AND DIFFERENTIAL

C: INSPECTION

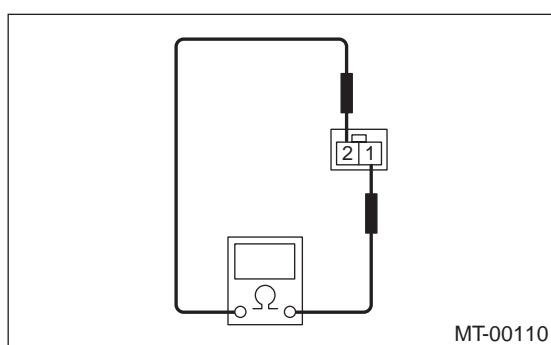
1. BACK-UP LIGHT SWITCH

Inspect the back-up light switch. <Ref. to LI-7, INSPECTION, Back-up Light System.>

2. NEUTRAL POSITION SWITCH

- 1) Turn ignition switch to OFF.
- 2) Disconnect connector neutral position switch.
- 3) Measure resistance between neutral position switch terminals.

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	Less than 1 Ω
Other positions		More than 1 M Ω



- 4) Replace defective parts.

MT-35

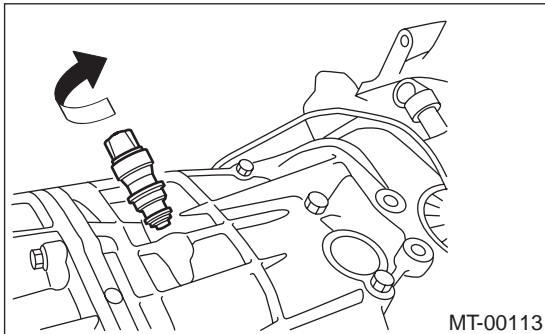
VEHICLE SPEED SENSOR

MANUAL TRANSMISSION AND DIFFERENTIAL

7. Vehicle Speed Sensor

A: REMOVAL

- 1) Disconnect battery ground cable.
- 2) Lift-up the vehicle.
- 3) Remove front, center exhaust pipes.
<Ref. to EX(H4SO)-5, REMOVAL, Front Exhaust Pipe.>
- 4) Disconnect connector from vehicle speed sensor.
- 5) Turn and remove vehicle speed sensor.



B: INSTALLATION

NOTE:

- Discard vehicle speed sensor and after removal, replace with a new one.
 - Ensure sensor mounting hole is clean and free of foreign matter.
 - Align tip end of key with key groove on end of speedometer shaft during installation.
- 1) Hand tighten vehicle speed sensor.
 - 2) Tighten vehicle speed sensor using suitable tool.

Tightening torque:

5.9 N·m (0.6 kgf-m, 4.3 ft-lb)

- 3) Connect connector to vehicle speed sensor.
- 4) Install front, center exhaust pipes.
<Ref. to EX(H4SO)-6, INSTALLATION, Front Exhaust Pipe.>
- 5) Lower the vehicle.
- 6) Connect battery ground cable.

C: INSPECTION

Inspect the vehicle speed sensor. <Ref. to IDI-14, Speedometer.>

MT-36

PREPARATION FOR OVERHAUL

MANUAL TRANSMISSION AND DIFFERENTIAL

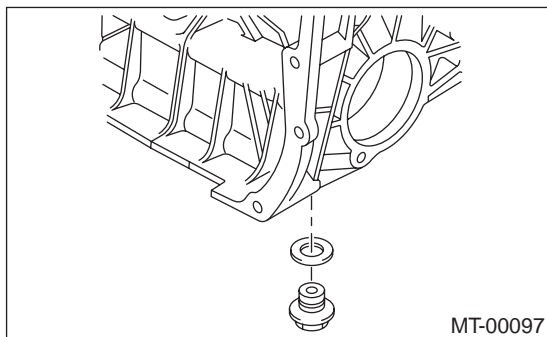
8. Preparation for Overhaul

A: PROCEDURE

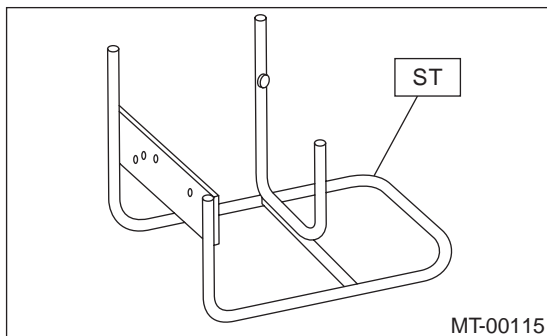
- 1) Clean oil, grease, dirt and dust from transmission.
- 2) Remove drain plug to drain oil.
- 3) Replace gasket with a new one, and tighten drain plug.

Tightening torque:

44 N·m (4.5 kgf·m, 32.5 ft·lb)



- 4) Attach transmission to ST.
ST 499937100 TRANSMISSION STAND SET



- 5) Rotating parts should be coated with oil prior to assembly.
- 6) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
- 7) Gaskets, lock washers and lock nut must be replaced with new ones.
- 8) Liquid gasket should be used where specified to prevent leakage.

MT-37

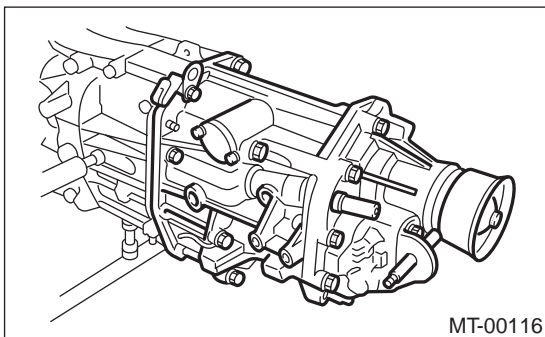
TRANSFER CASE AND EXTENSION CASE ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

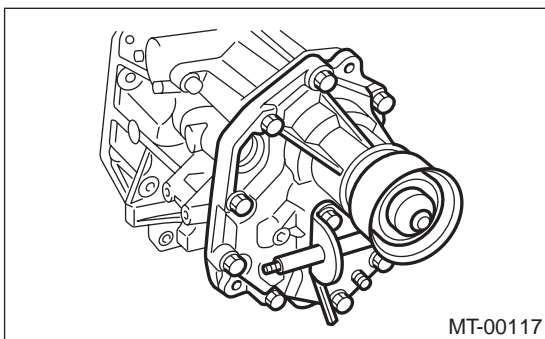
9. Transfer Case and Extension Case Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly.

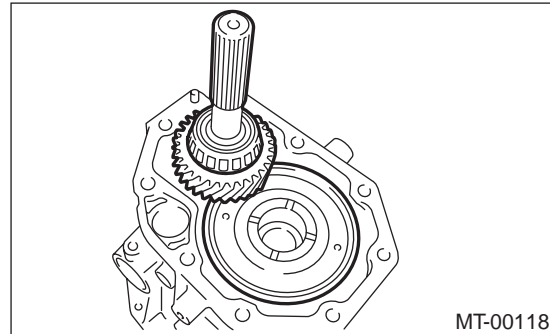


- 4) Remove shifter arm.
- 5) Remove extension case assembly.

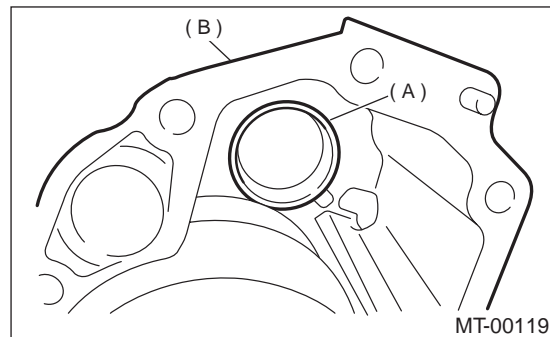


B: INSTALLATION

- 1) Install center differential and transfer driven gear into transfer case.

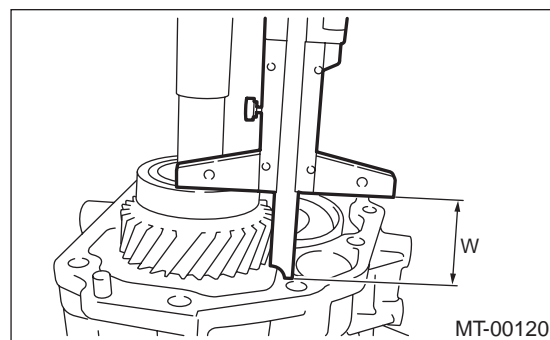


- 2) Remove bearing cone from the extension case assembly, and install to taper roller bearing of the transfer driven gear.



- (A) Bearing cone (Extension case)
- (B) Extension case

- 3) While pressing the bearing cone horizontally, turn the driven shaft ten rotations.
- 4) Measure height "W" between transfer case and taper roller bearing on the transfer driven gear.



MT-38

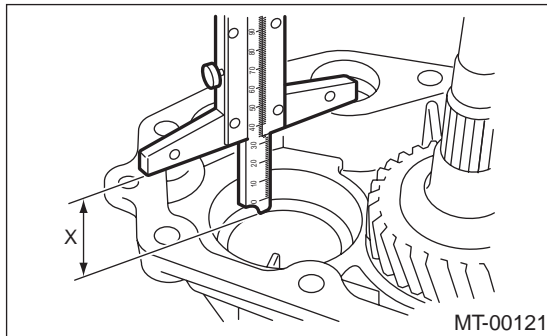
TRANSFER CASE AND EXTENSION CASE ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

5) Measure depth "X".

NOTE:

Measure with bearing cone and thrust washer removed.



6) Calculate space "t" using the following equation:
 $t = X - W + 0.2 \text{ to } 0.3 \text{ mm (0.008 to 0.012 in)}$

7) Select nearest washer in the following table:

Standard clearance between thrust washer and taper roller bearing:

0.2 — 0.3 mm (0.008 — 0.012 in)

NOTE:

Value of clearance must be within the specified range.

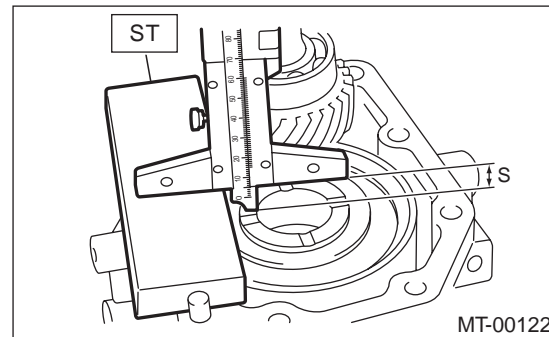
Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

8) Fit thrust washers on transfer drive shaft.

9) Install bearing cone into extension case.

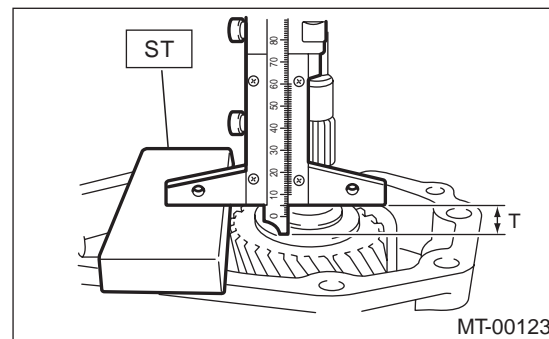
10) Measure depth "S" between transfer case and center differential.

ST 398643600 GAUGE



11) Measure depth "T" between extension case and transfer drive gear.

ST 398643600 GAUGE



12) Calculate space "U" using the following equation:
 $U = S + T - 30 \text{ mm (1.18 in)}$ [Thickness of ST]

13) Select suitable washer in the following table:

Standard clearance:

0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

14) Fit thrust washer on center differential.

MT-39

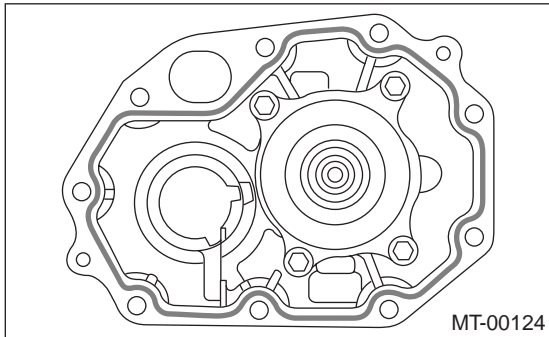
TRANSFER CASE AND EXTENSION CASE ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

15) Apply proper amount of liquid gasket to the transfer case mating surface.

Liquid gasket:

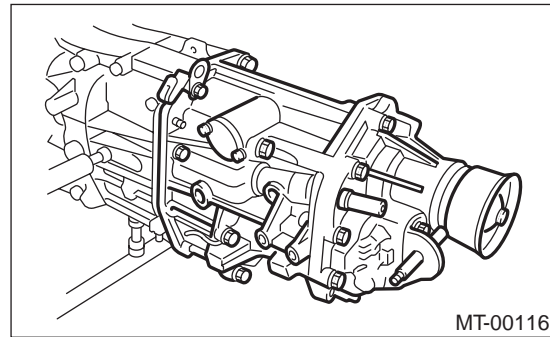
THREE BOND 1215 (Part No. 004403007)



19) Install transfer case with extension case assembly to transmission case.

Tightening torque:

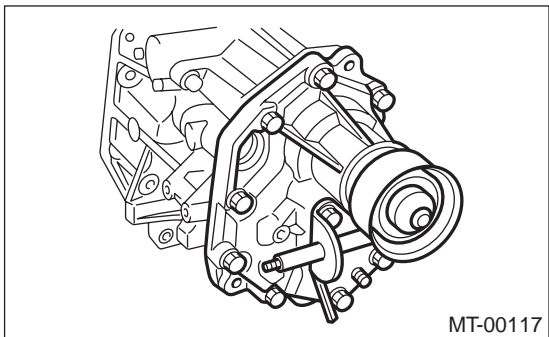
24.5 N·m (2.5 kgf·m, 18.1 ft·lb)



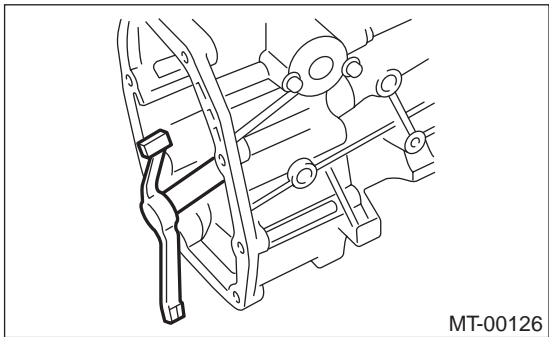
16) Install extension assembly into transfer case.

Tightening torque:

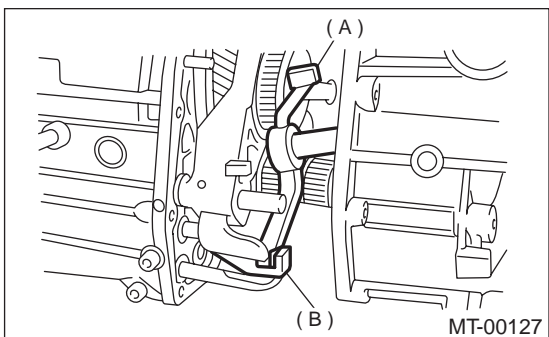
40 N·m (4.1 kgf·m, 29.7 ft·lb)



17) Install shifter arm to transfer case.



18) Hang the shifter arm on the 3rd-4th fork rod.



MT-40

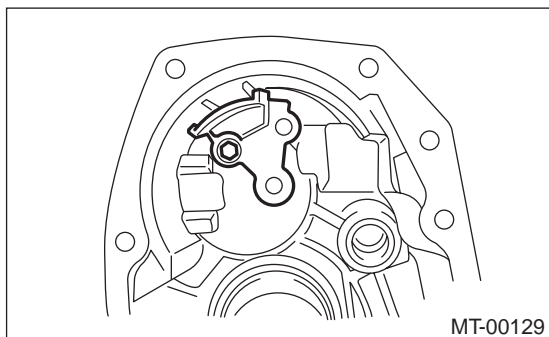
TRANSFER CASE AND EXTENSION CASE ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

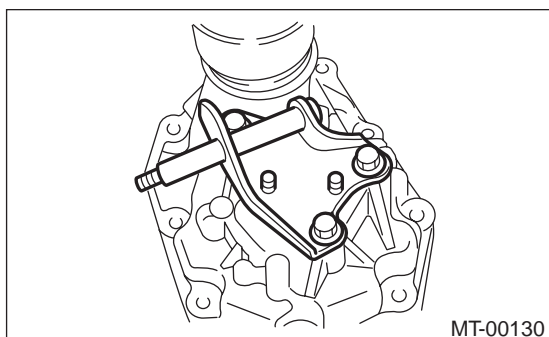
1. TRANSFER CASE

- 1) Remove reverse check assembly. <Ref. to MT-47, REMOVAL, Reverse Check Sleeve.>
- 2) Remove oil guide.



2. EXTENSION CASE

- 1) Remove transfer drive gear assembly. <Ref. to MT-42, REMOVAL, Transfer Drive Gear.>
- 2) Remove shift bracket.



- 3) Remove oil seal from extension case. <Ref. to MT-33, Oil Seal.>

D: ASSEMBLY

1. EXTENSION CASE

- 1) Using ST, install oil seal to extension case. <Ref. to MT-33, Oil Seal.>

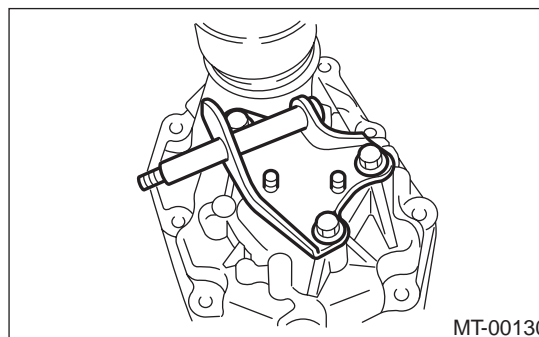
NOTE:

Use new oil seal.

- 2) Install shift bracket to extension case.

Tightening torque:

24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



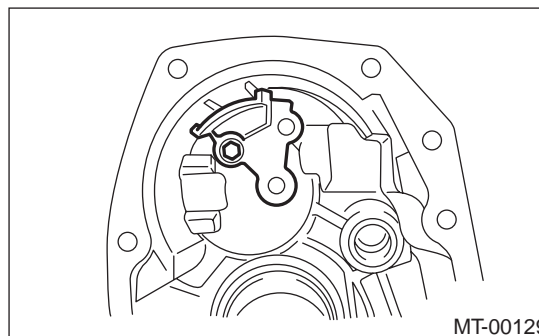
- 3) Install transfer drive gear to extension case. <Ref. to MT-42, INSTALLATION, Transfer Drive Gear.>

2. TRANSFER CASE

- 1) Install oil guide to transfer case.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



- 2) Install reverse check sleeve assembly to transfer case. <Ref. to MT-47, INSTALLATION, Reverse Check Sleeve.>

MT-41

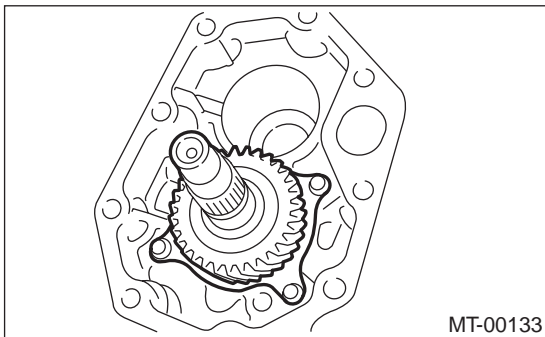
TRANSFER DRIVE GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

10. Transfer Drive Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove extension case assembly.
- 5) Remove transfer driven gear.
- 6) Remove transfer drive gear.

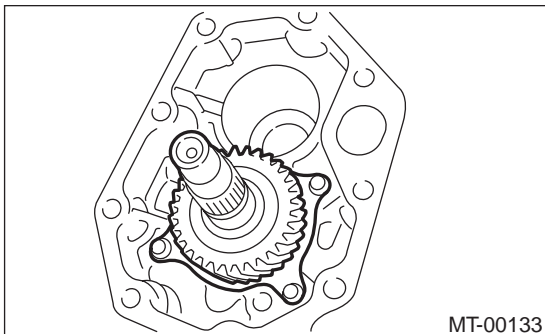


B: INSTALLATION

- 1) Install transfer drive gear.

Tightening torque:

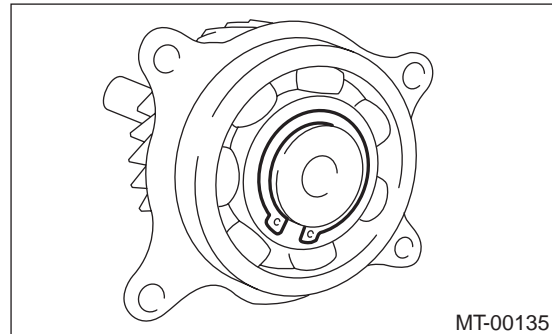
26 N·m (2.7 kgf-m, 20 ft-lb)



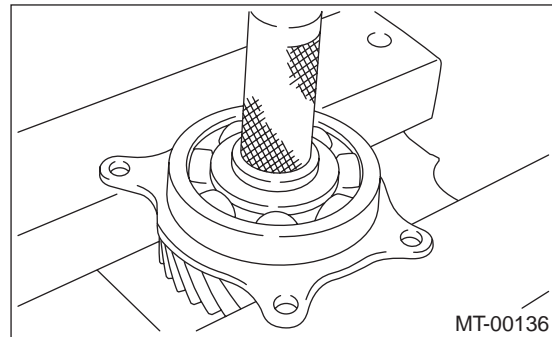
- 2) Install transfer driven gear.
- 3) Install the extension case assembly.
- 4) Install transfer case and extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install back-up light switch and neutral position switch. <Ref. to MT-34, INSTALLATION, Switches and Harness.>
- 6) Install the manual transmission assembly from vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

- 1) Remove snap ring.



- 2) Remove ball bearing.



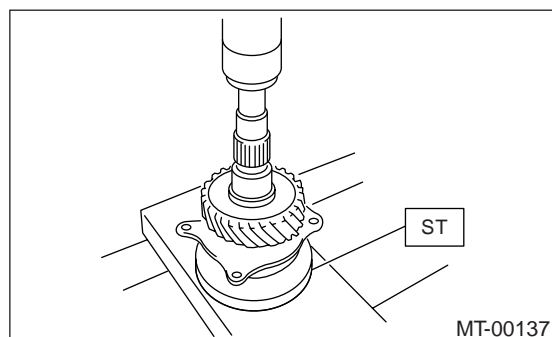
D: ASSEMBLY

- 1) Set ST to inner race of bearing and install to drive shaft.

ST 39817700 INSTALLER

NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



- 2) Install snap ring on transfer drive shaft.
- 3) Inspect clearance between snap ring and inner race of ball bearing. <Ref. to MT-43, INSPECTION, Transfer Drive Gear.>

MT-42

TRANSFER DRIVE GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

E: INSPECTION

1) Bearings

Replace bearings in the following cases:

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Drive gear

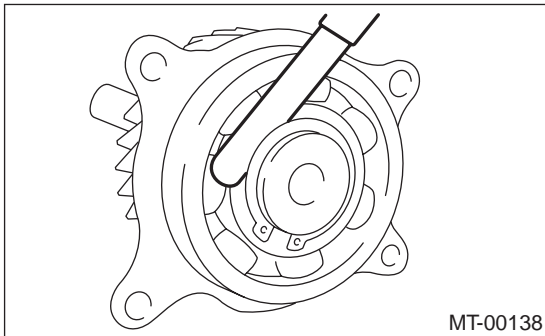
Replace drive gear in the following cases:

- If their tooth surfaces and shaft are excessively broken or damaged.

3) Measure clearance between snap ring and inner race of ball bearing with a thickness gauge.

Clearance:

0.01 — 0.15 mm (0.0004 — 0.0059 in)



If the measurement is not within the specification, select suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.697)

MT-43

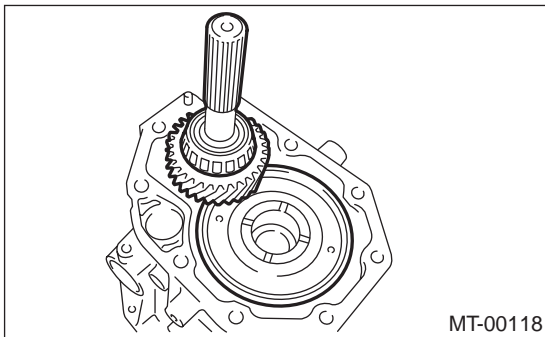
TRANSFER DRIVEN GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

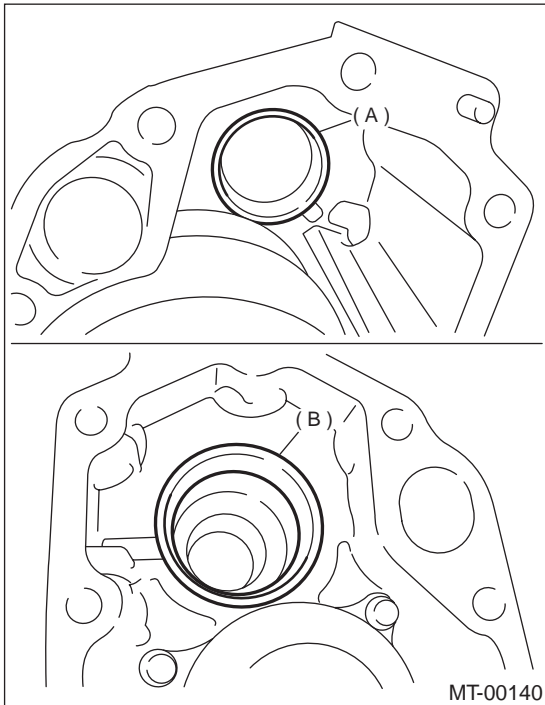
11. Transfer Driven Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove extension case assembly.
- 5) Remove transfer driven gear.



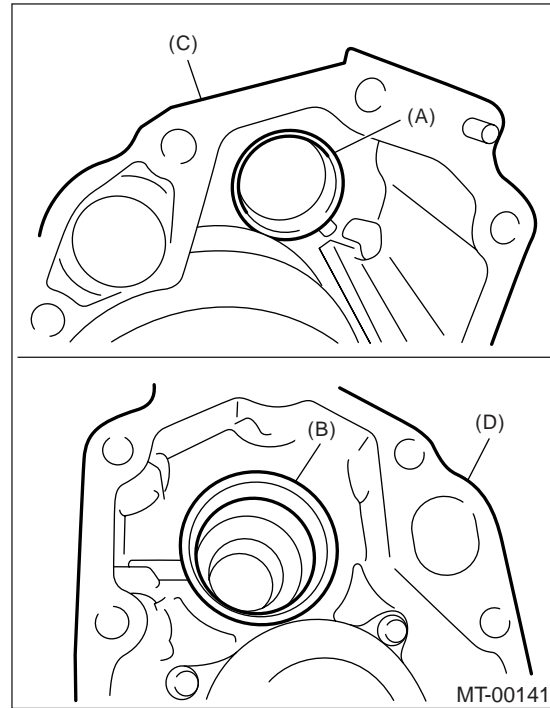
- 6) Remove bearing cup from extension case and transfer case.



- (A) Bearing cup (transfer case)
(B) Bearing cup (extension case)

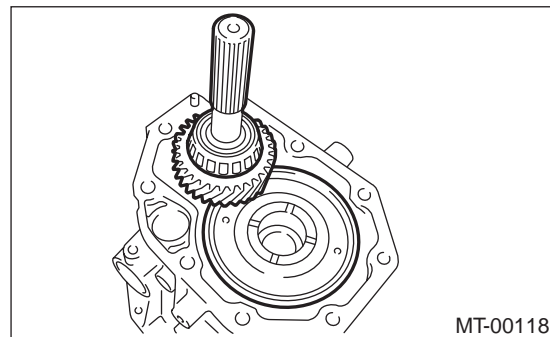
B: INSTALLATION

- 1) Install bearing cup to extension case and transfer case.



- (A) Bearing cup
(B) Bearing cup
(C) Transfer case
(D) Extension case

- 2) Install transfer driven gear.



- 3) Install transfer case and extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install back-up light switch and neutral position switch. <Ref. to MT-34, INSTALLATION, Switches and Harness.>
- 5) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

MT-44

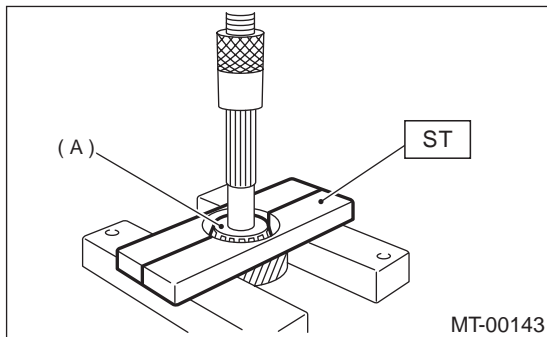
TRANSFER DRIVEN GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1) Using ST, remove roller bearing (extension case side).

ST 498077000 REMOVER

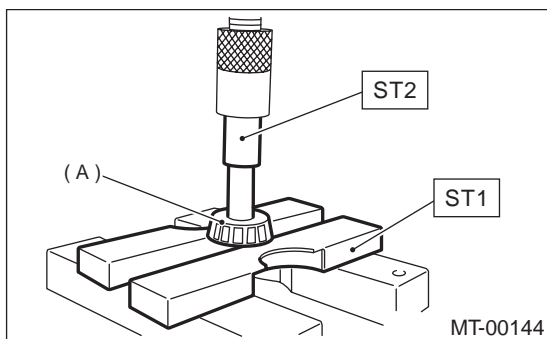


(A) Roller bearing

2) Using ST1 and ST2, remove roller bearing (transfer case side).

ST1 498077000 REMOVER

ST2 899864100 REMOVER



(A) Roller bearing

D: ASSEMBLY

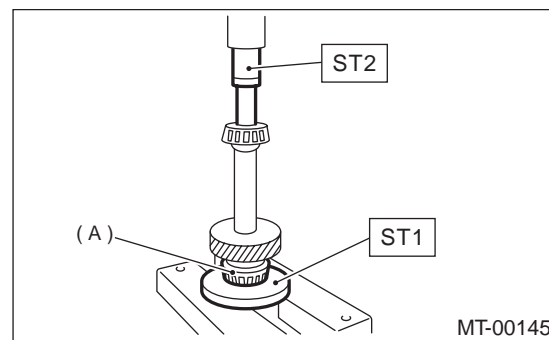
1) Using ST, install roller bearing (extension case side).

ST1 398177700 INSTALLER

ST2 899864100 REMOVER

NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



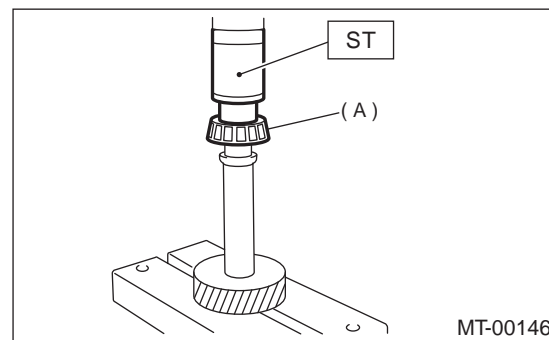
(A) Roller bearing

2) Using ST, install roller bearing (transfer case side).

ST 499757002 INSTALLER

NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



(A) Roller bearing

E: INSPECTION

1) Bearings

Replace bearings in the following cases:

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Driven gear

Replace drive gear in the following cases:

- If their tooth surfaces and shaft are excessively broken or damaged.

MT-45

CENTER DIFFERENTIAL

MANUAL TRANSMISSION AND DIFFERENTIAL

12.Center Differential

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove the extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove the transfer driven gear. <Ref. to MT-44, REMOVAL, Transfer Driven Gear.>
- 5) Remove the center differential.

B: INSTALLATION

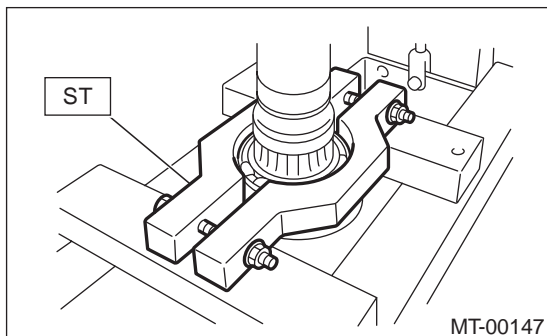
- 1) Install the center differential into transfer case.
- 2) Install the transfer driven gear. <Ref. to MT-44, INSTALLATION, Transfer Driven Gear.>
- 3) Install the extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 4) Install the transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the back-up light switch and neutral position switch. <Ref. to MT-34, INSTALLATION, Switches and Harness.>
- 6) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:

- Do not disassemble center differential because it is a non-disassemble part.
- Remove ball bearing using ST.
- Do not reuse ball bearing.

ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER

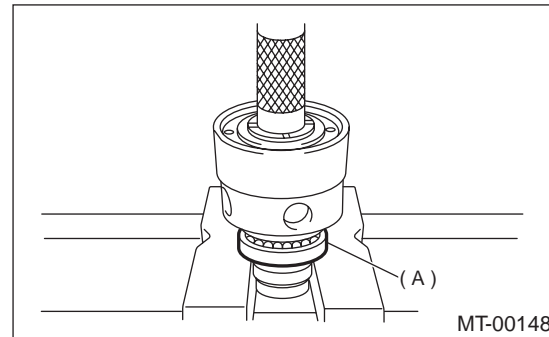


D: ASSEMBLY

Install ball bearing to center differential assembly.

NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Ball bearing

E: INSPECTION

1) Bearings

Replace bearings in the following cases:

- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

2) Center differential

Replace center differential assembly in the following case:

- Worn or damaged

MT-46

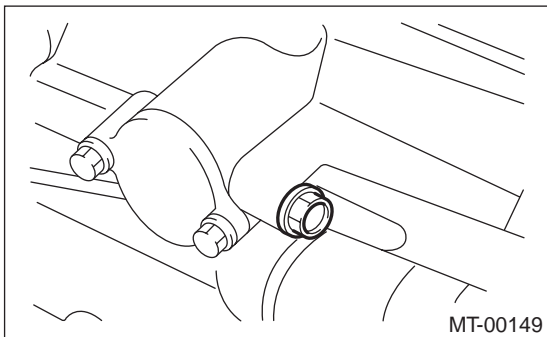
REVERSE CHECK SLEEVE

MANUAL TRANSMISSION AND DIFFERENTIAL

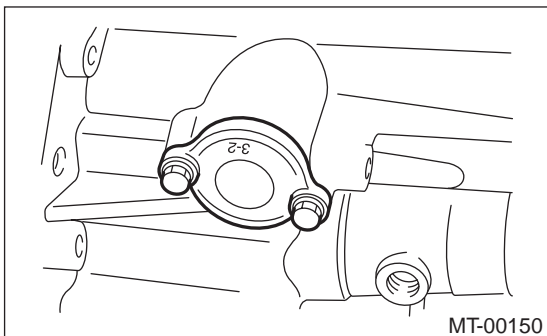
13.Reverse Check Sleeve

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove the transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove shifter arm.
- 4) Remove plug, spring washer and reverse check ball.



- 5) Remove the reverse check sleeve.

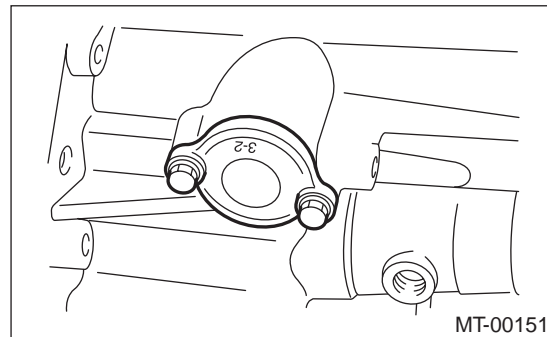


B: INSTALLATION

- 1) Install the reverse check sleeve.

Tightening torque:

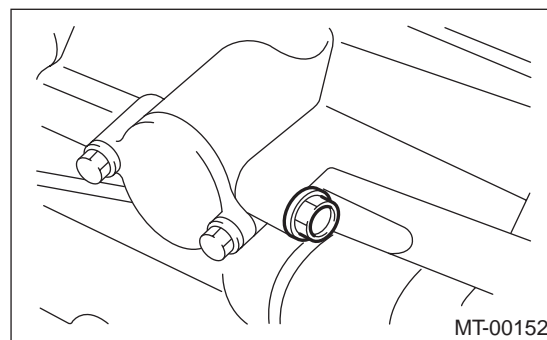
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



- 2) Install ball, spring, washer and plug to transfer case.

Tightening torque:

9.75 N·m (0.994 kgf-m, 7.2 ft-lb)



- 3) Install the shifter arm to transfer case assembly.
- 4) Install the transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 5) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

MT-47

REVERSE CHECK SLEEVE

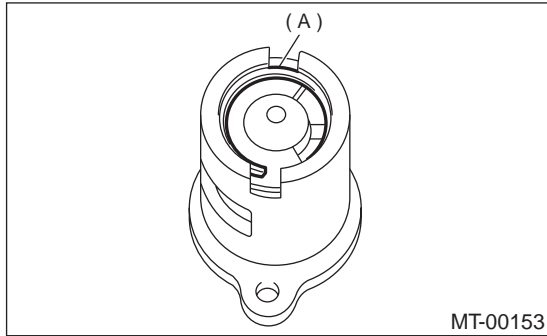
MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

1) Cover the reverse check sleeve with a rag, and remove snap ring using a screwdriver.

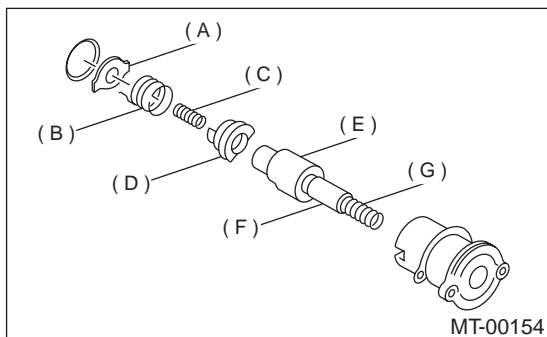
NOTE:

Replace snap ring with a new one if deformed or weakened.



(A) Snap ring

2) Remove reverse check plate, reverse check spring, reverse check cam, return spring (5th-Rev), reverse accent shaft, return spring cap and return spring (1st-2nd).



(A) Reverse check plate
 (B) Reverse check spring
 (C) Return spring (5th-Rev)
 (D) Reverse check cam
 (E) Reverse accent shaft
 (F) Return spring cap
 (G) Return spring (1st-2nd)

3) Remove O-ring.

NOTE:

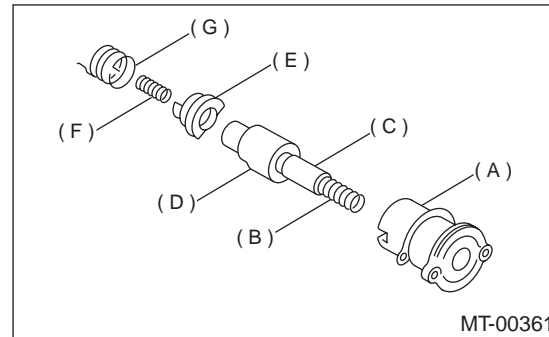
- Reverse check sleeve assembly uses an O-ring which should not be scratched.
- Be careful not to break adjustment shim placed between reverse check sleeve assembly and case.

D: ASSEMBLY

1) Install return spring (1st-2nd), return spring cap, reverse accent shaft, check cam, return spring and check spring onto reverse check sleeve.

NOTE:

Be sure the bent section of reverse check spring is positioned in the groove in check cam.



(A) Reverse check sleeve
 (B) Return spring (1st-2nd)
 (C) Return spring cap
 (D) Reverse accent shaft
 (E) Return spring (5th-Rev)
 (F) Reverse check cam
 (G) Reverse check spring

2) Hook the bent section of reverse check spring over reverse check plate.

3) Rotate cam so that the protrusion of reverse check cam is at the opening in plate.

4) With cam held in that position, install plate onto reverse check sleeve and hold with snap ring.

5) Position new O-ring in groove in sleeve.

MT-48

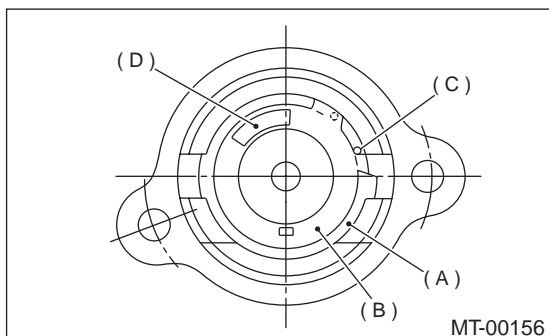
REVERSE CHECK SLEEVE

MANUAL TRANSMISSION AND DIFFERENTIAL

E: INSPECTION

- Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.
- Spin cam by hand for smooth rotation.
- Move cam and shaft all the way toward plate and release.

If cam does not return properly, replace reverse check spring; if shaft does not, check for scratches on the inner surface of sleeve. If sleeve is in good order, replace spring.



- (A) Snap ring
 (B) Reverse check plate
 (C) Check spring
 (D) Check cam

- Select a suitable reverse accent shaft and reverse check plate. <Ref. to MT-49, ADJUSTMENT, Reverse Check Sleeve.>

F: ADJUSTMENT

1. NEUTRAL POSITION ADJUSTMENT

- 1) Shift gear into 3rd gear position.
- 2) Shifter arm turns lightly toward the 1st/2nd gear side but heavily toward the reverse gear side because of the function of the return spring, until arm contacts the stopper.
- 3) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
- 4) To adjust, remove bolts holding reverse check sleeve assembly to the case, move sleeve assembly outward, and place adjustment shim (0 to 1 ea.) between sleeve assembly and case to adjust the clearance.

NOTE:

- Be careful not to break O-ring when placing shim(s).
- When shim is removed, the neutral position will move closer to reverse; when shim is added, the neutral position will move closer to 1st gear.
- If shims alone cannot adjust the clearance, replace reverse accent shaft and re-adjust.

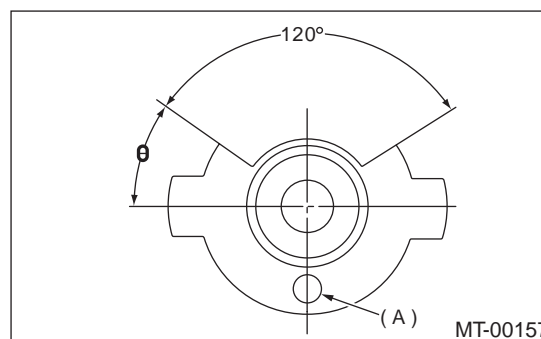
Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	3	Neutral position is closer to 1st gear.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

2. REVERSE CHECK PLATE ADJUSTMENT

- 1) Shift shifter arm to "5th" and then to reverse to see if reverse check mechanism operates properly.
- 2) Also check to see if arm returns to neutral when released from the reverse position. If arm does not return properly, replace reverse check plate.

Reverse check plate			
Part No.	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.



MT-49

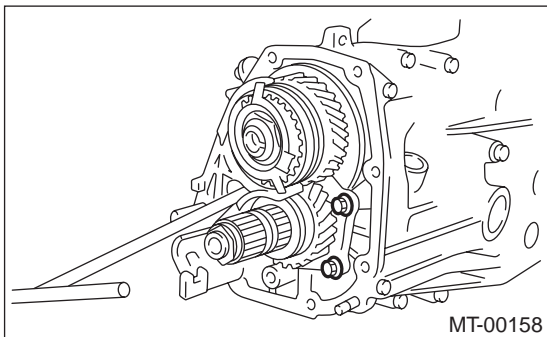
TRANSMISSION CASE

MANUAL TRANSMISSION AND DIFFERENTIAL

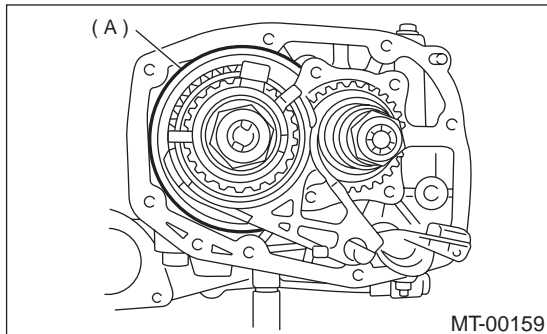
14. Transmission Case

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove clutch release lever. <Ref. to CL-13, REMOVAL, Release Bearing and Lever.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove bearing mounting bolts.

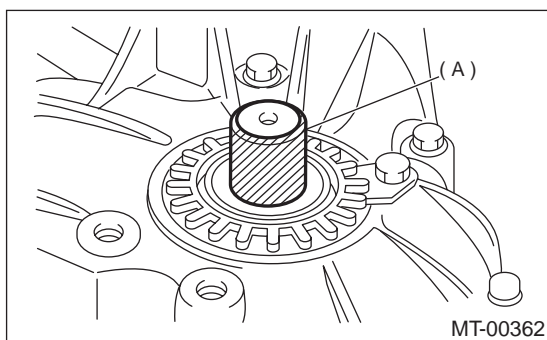


- 5) Remove main shaft rear plate.



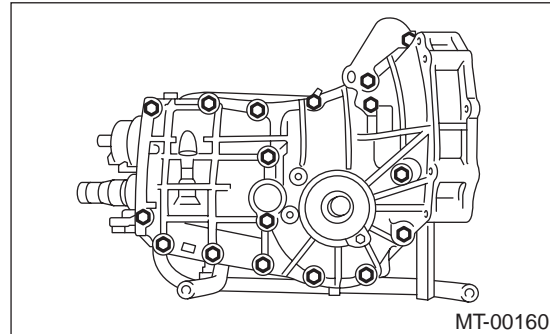
(A) Main shaft rear plate

- 6) Put vinyl tape around splines of right and left axle drive shafts to prevent damage to oil seal.



(A) Vinyl tape

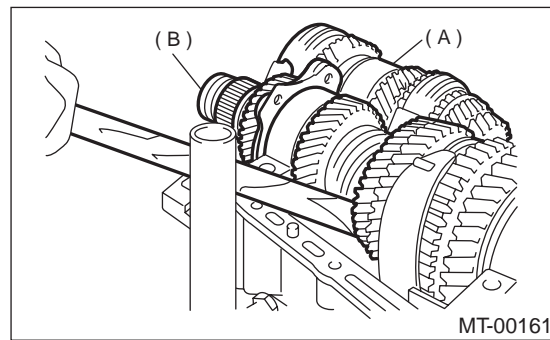
- 7) Separate transmission case into right and left cases by loosening coupling bolts and nuts.



- 8) Remove drive pinion shaft assembly from left side transmission case.

NOTE:

Use a hammer handle, etc. to remove if too tight.

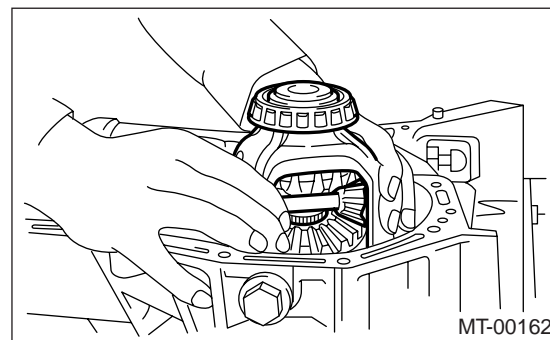


- (A) Main shaft assembly
(B) Drive pinion shaft assembly

- 9) Remove main shaft assembly.
- 10) Remove differential assembly.

NOTE:

- Be careful not to confuse right and left roller bearing outer races.
- Be careful not to damage retainer oil seal.



MT-50

TRANSMISSION CASE

MANUAL TRANSMISSION AND DIFFERENTIAL

B: INSTALLATION

- 1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
- 2) Install the front differential assembly.
- 3) Install the main shaft assembly.
Install needle bearing knock pin hole into transmission case knock pin.
- 4) Install the drive pinion shaft assembly.
Install roller bearing knock pin hole into transmission case knock pin.
- 5) Apply liquid gasket, and then put case right side and left side together.

Liquid gasket:

THREE BOND 1215 (Part No. 004403007) or equivalent

- 6) Tighten 17 bolts with bracket, clip, etc. as shown in the figure.

NOTE:

- Insert bolts from the bottom and tighten nuts at the top.
- Put cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
- Confirm that speedometer gear is meshed.

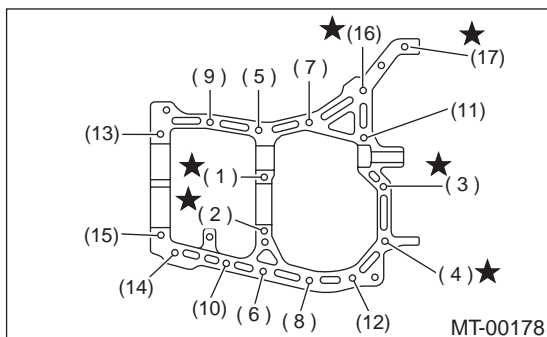
Tightening torque:

8 mm bolt

25 N·m (2.5 kgf-m, 18.1 ft-lb)

★ 10 mm bolt

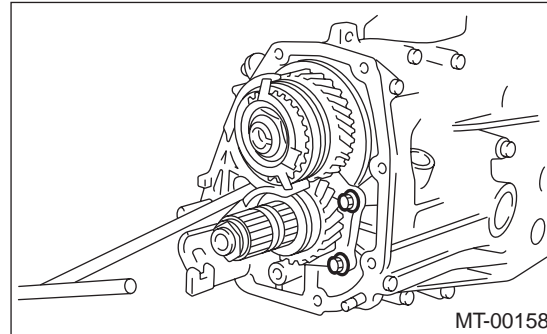
39 N·m (4.0 kgf-m, 28.9 ft-lb)



- 7) Tighten ball bearing attachment bolts.

Tightening torque:

30 N·m (3.1 kgf-m, 22.4 ft-lb)

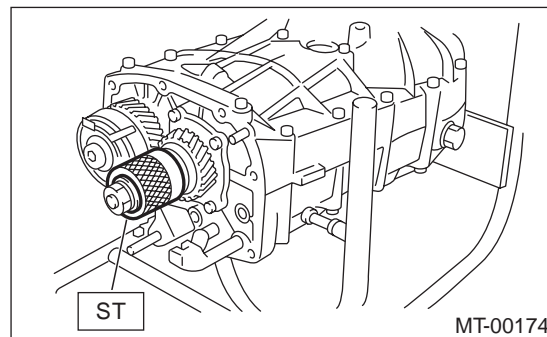


- 8) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

NOTE:

Support drive pinion assembly with ST.

ST 498427100 STOPPER



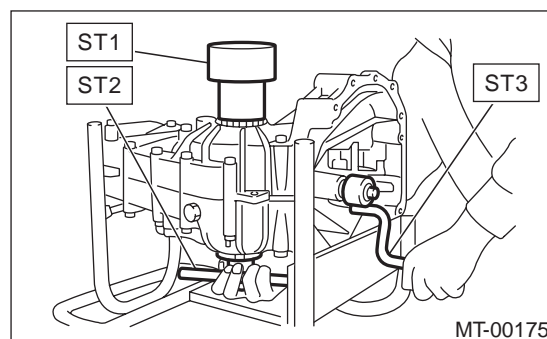
- 9) Place the transmission with case left side facing downward and put ST1 on bearing cup.

10) Screw retainer assembly into left case from the bottom with ST2. Fit ST3 on the transmission main shaft. Shift gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

ST1 399780104 WEIGHT

ST2 499787000 WRENCH ASSY

ST3 499927100 HANDLE



MT-51

TRANSMISSION CASE

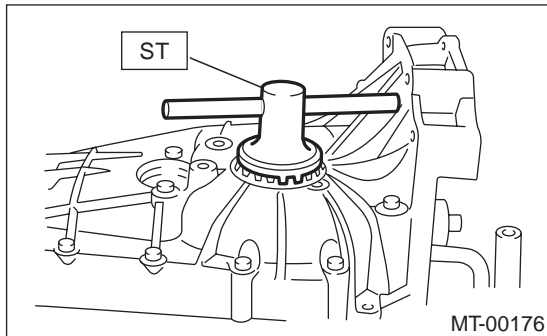
MANUAL TRANSMISSION AND DIFFERENTIAL

11) Remove weight and screw in retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

NOTE:

At this point, the backlash between the hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



12) Fit lock plate. Loosen the retainer on the lower side by 1-1/2 notches of lock plate and turn in the retainer on the upper side by the same amount in order to obtain the backlash.

NOTE:

The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

13) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.

14) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

15) Turn transmission main shaft several times while tapping around retainer lightly with plastic hammer.

16) Inspect and adjust backlash and tooth contact of hypoid gear. <Ref. to MT-71, INSPECTION, Front Differential Assembly.>

17) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen retainer until the O-ring groove appears. Fit O-ring into the groove and tighten retainer into the position where retainer has been tightened in.

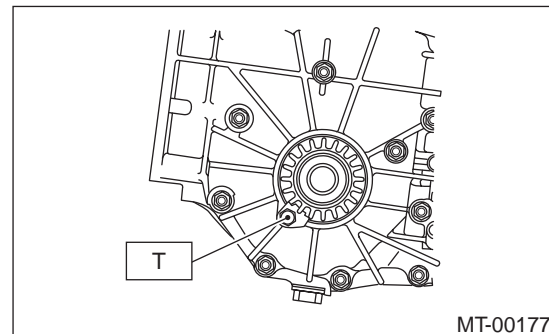
Tighten lock plate.

NOTE:

Carry out this job on both upper and lower retainers.

Tightening torque:

T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



18) Selecting of main shaft rear plate <Ref. to MT-58, ADJUSTMENT, Main Shaft Assembly for Single-Range.>

19) Install clutch release lever and bearing. <Ref. to CL-13, INSTALLATION, Release Bearing and Lever.>

20) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install the manual transmission assembly into the vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

Check the transmission case for cracks, damage, and oil leaks.

MT-52

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

MANUAL TRANSMISSION AND DIFFERENTIAL

15. Main Shaft Assembly for Single-Range

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove drive pinion shaft assembly. <Ref. to MT-59, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove main shaft assembly.

B: INSTALLATION

- 1) Install the needle bearing and oil seal onto the front of transmission main shaft assembly.

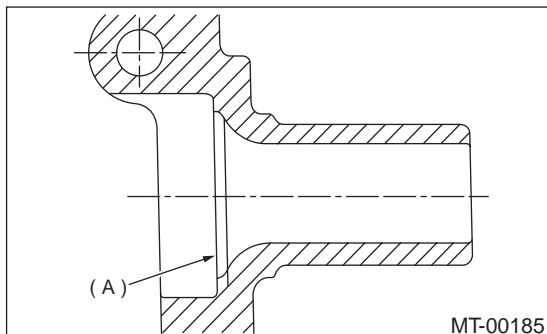
NOTE:

- Wrap clutch splined section with vinyl tape to prevent damage to oil seal.
- Apply grease (Unilube #2 or equivalent) to the sealing lip of oil seal.
- Use a new one.

- 2) Install needle bearing outer race knock pin hole into transmission case knock pin.

NOTE:

Align the end face of seal with surface (A) when installing oil seal.



- 3) Install the drive pinion assembly. <Ref. to MT-59, INSTALLATION, Drive Pinion Shaft Assembly.>
- 4) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>
- 5) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 6) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

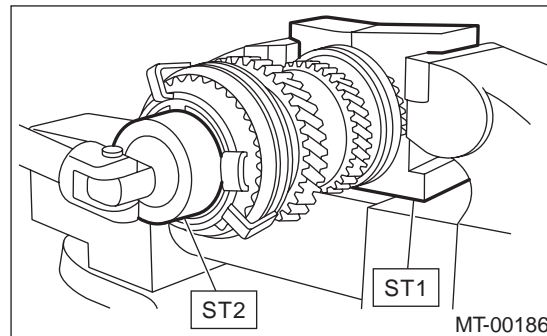
C: DISASSEMBLY

- 1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
- 2) Remove lock nut from transmission main shaft assembly.

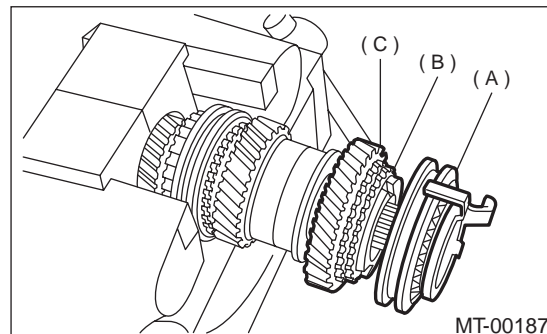
NOTE:

Remove caulking before taking off lock nut.

- | | | |
|-----|-----------|---------------------|
| ST1 | 498937000 | TRANSMISSION HOLDER |
| ST2 | 499987003 | SOCKET WRENCH (35) |

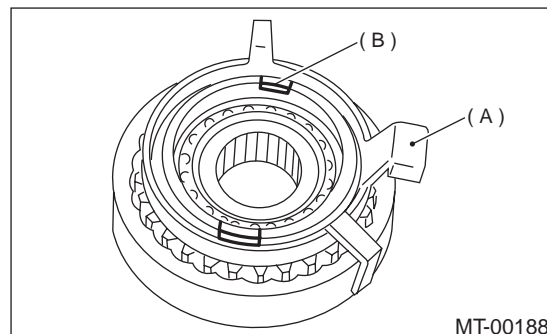


- 3) Remove 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.



- | | |
|-----|-----------------------------|
| (A) | 5th-Rev sleeve and hub ASSY |
| (B) | Baulk ring |
| (C) | 5th drive gear |

- 4) Remove snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.



- | | |
|-----|----------------------|
| (A) | Synchro cone stopper |
| (B) | Snap ring |

MT-53

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

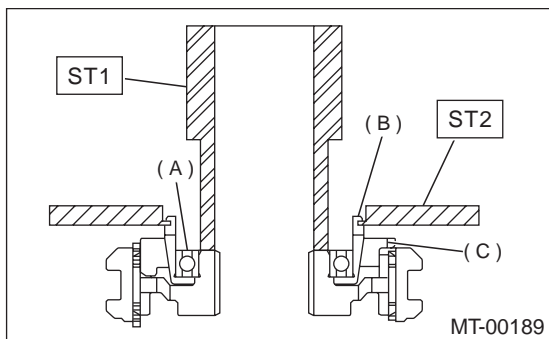
MANUAL TRANSMISSION AND DIFFERENTIAL

5) Using ST1, ST2 and a press, remove ball bearing, synchro cone and baulk ring (Rev).

NOTE:

- Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines beforehand.
- Do not reuse ball bearing.

ST1 499757002 INSTALLER
 ST2 498077400 SYNCHRO CONE REMOVER



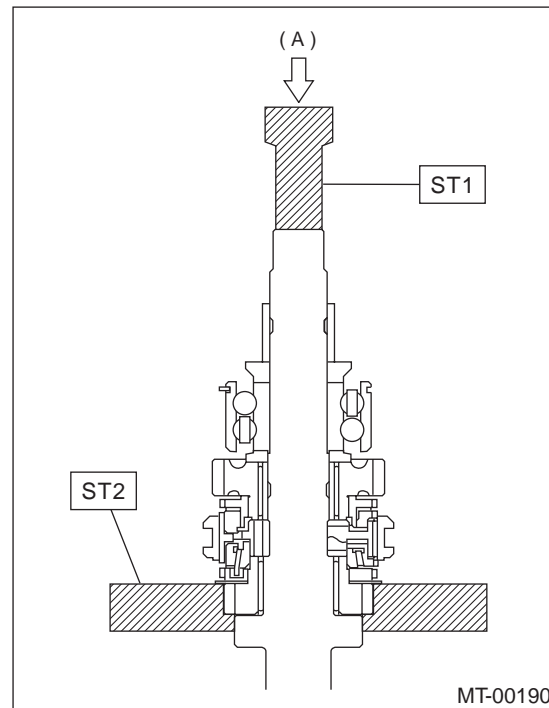
- (A) Ball bearing
 (B) Synchro cone
 (C) Baulk ring

6) Using ST1 and ST2, remove the rest of parts.

NOTE:

Replace sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, marking engagement point on splines beforehand.

ST1 899864100 REMOVER
 ST2 899714110 REMOVER



(A) Press

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

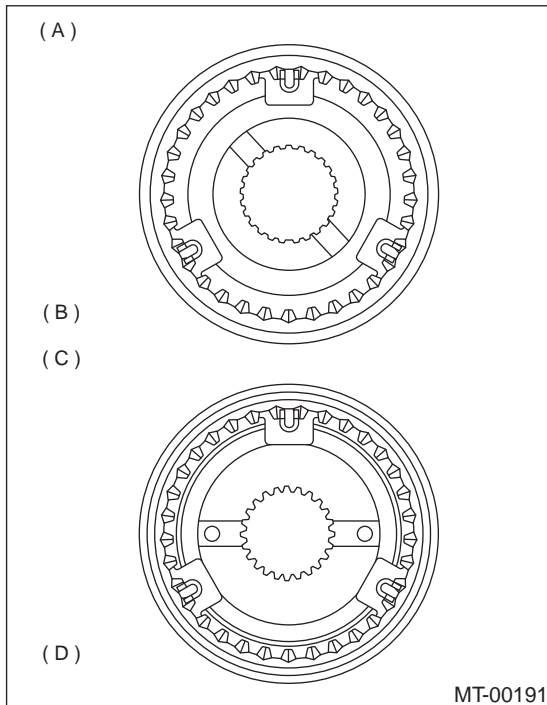
MANUAL TRANSMISSION AND DIFFERENTIAL

D: ASSEMBLY

1) Assemble each sleeve and hub assembly.

NOTE:

Position open ends of spring 120° apart.

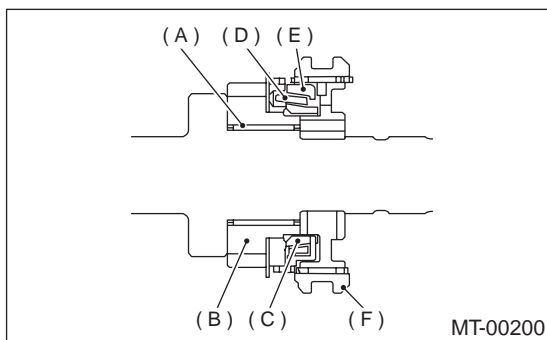


- (A) 3rd-4th hub ASSY
- (B) 3rd gear side
- (C) 5th-Rev hub ASSY
- (D) 3rd gear side

2) Install 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve and hub assembly for 3rd needle bearing on transmission main shaft.

NOTE:

Align groove in baulk ring with shifting insert.



- (A) 3rd needle bearing
- (B) 3rd drive gear
- (C) Inner baulk ring
- (D) Synchro cone
- (E) Outer baulk ring
- (F) Sleeve and hub ASSY

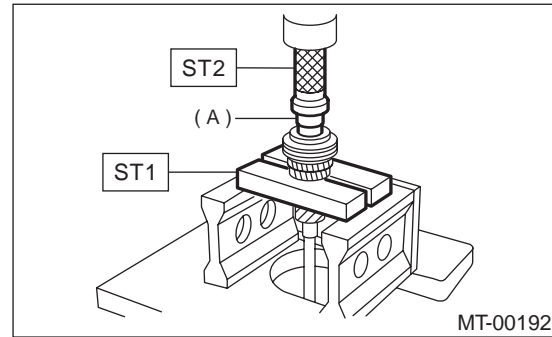
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER

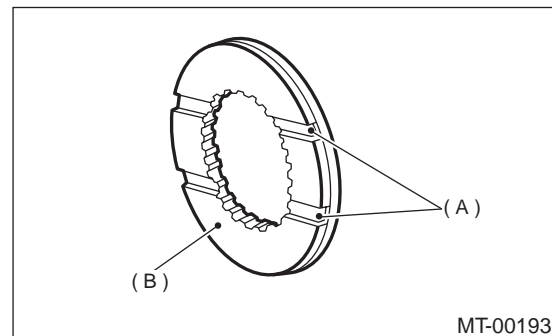


- (A) 4th needle bearing race

4) Install baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:

Align baulk ring and gear & hub assembly with key groove.



- (A) Groove
- (B) 4th gear side

MT-55

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

MANUAL TRANSMISSION AND DIFFERENTIAL

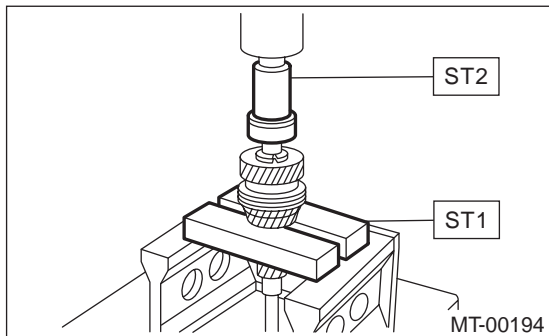
5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



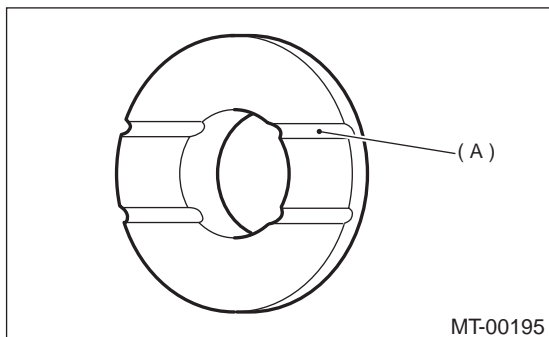
6) Using ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Face thrust washer in the correct direction.

ST1 899714110 REMOVER

ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

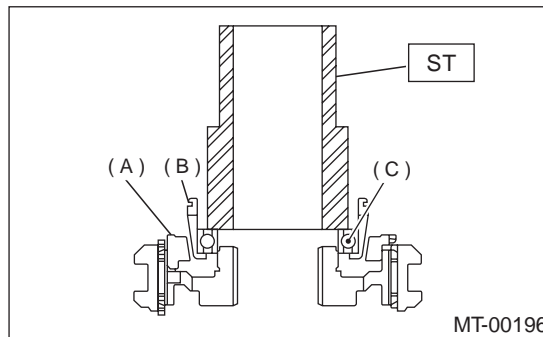
7) Install bearing onto synchro cone.

8) Install baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

NOTE:

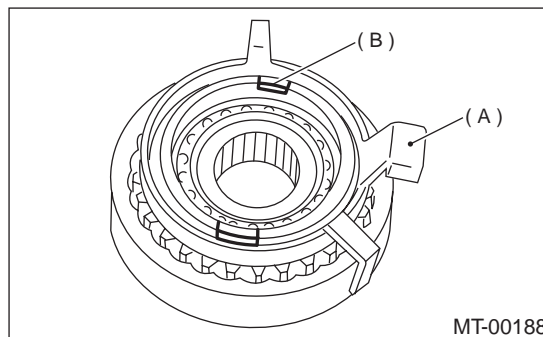
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Use new ball bearing.
- After press fitting, make sure synchro cone rotates freely.

ST 499757002 INSTALLER



- (A) Baulk ring
- (B) Synchro cone
- (C) Ball bearing

9) Install synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.

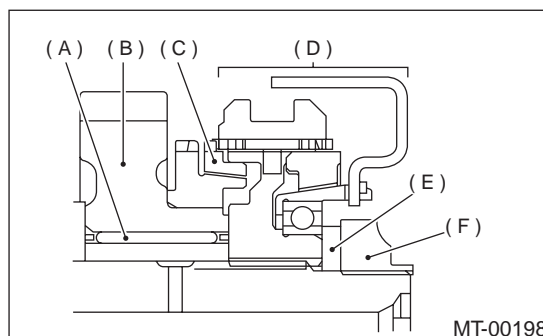


- (A) Synchro cone stopper
- (B) Snap ring

10) Install the rest parts to the rear section of transmission main shaft.

NOTE:

Align groove in baulk ring with shifting insert.



- (A) Needle bearing
- (B) 5th drive gear
- (C) Baulk ring
- (D) 5th-Rev sleeve and hub ASSY
- (E) Lock washer
- (F) Lock nuts

MT-56

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

MANUAL TRANSMISSION AND DIFFERENTIAL

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

NOTE:

Secure lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH

ST2 498937000 TRANSMISSION HOLDER

Tightening torque:

120 N·m (12.2 kgf·m, 88.2 ft·lb)

E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearings

Replace bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

2) Bushing (each gear)

Replace the bushing in the following cases:

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

3) Gears

- Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

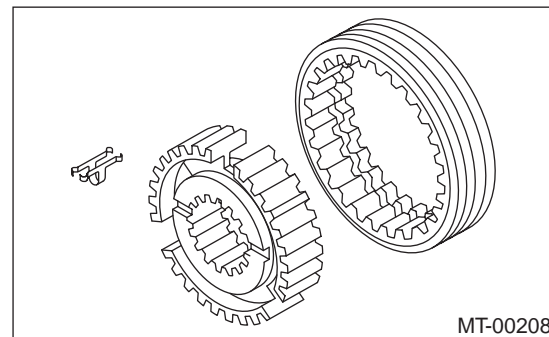
4) Baulk ring

Replace the ring in the following cases:

- When the inner surface and end face are damaged.
- When the ring inner surface is abnormally or partially worn down.
- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

5) Shifting insert key

Replace the insert if deformed, excessively worn, or defective in any way.



6) Oil seal

Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

7) O-ring

Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

8) Gearshift mechanism

Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

MT-57

MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

MANUAL TRANSMISSION AND DIFFERENTIAL

F: ADJUSTMENT

Selection of main shaft rear plate

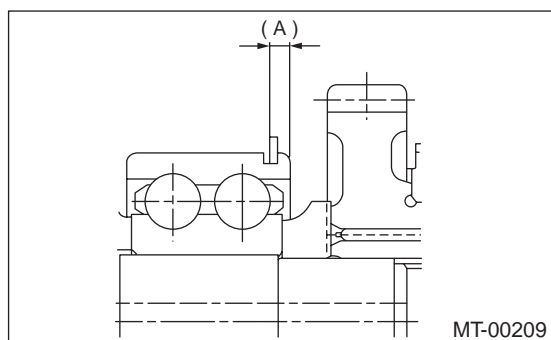
Using ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:

NOTE:

Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and the moving flange of bearing.

ST 498147000 DEPTH GAUGE

Dimension (A) mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2



MT-58

DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

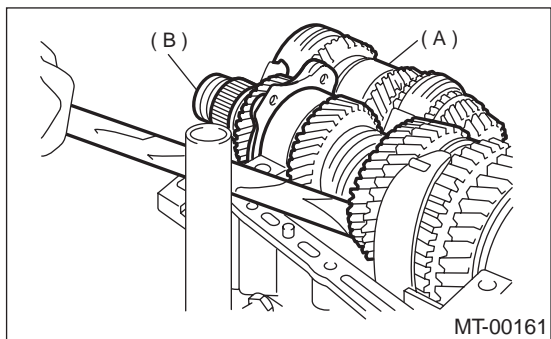
16. Drive Pinion Shaft Assembly

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>
- 4) Remove drive pinion shaft assembly.

NOTE:

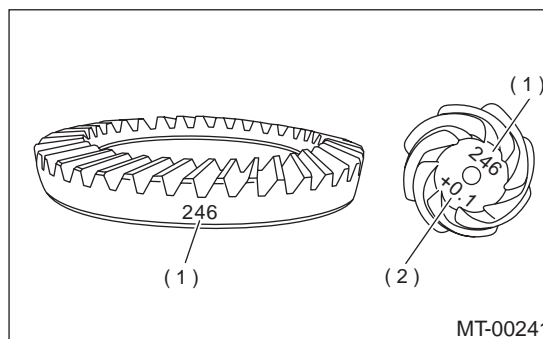
Use a hammer handle, etc. to remove if too tight.



- (A) Main shaft assembly
- (B) Drive pinion shaft assembly

B: INSTALLATION

- 1) Remove differential assembly.
- 2) Alignment marks/numbers on hypoid gear set
The upper number on driven pinion is the match number for combining it with hypoid driven gear. The lower number is for shim adjustment. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with drive pinion.



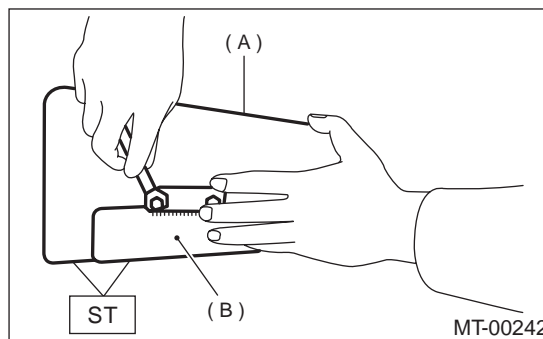
- (A) Alignment number
- (B) Number for shim adjustment

- 3) Place drive pinion shaft assembly on right hand transmission main case without shim and tighten bearing mounting bolts.
- 4) Inspection and adjustment of ST

NOTE:

- Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
- Tighten the two bolts.

ST 499917500 DRIVE PINION GAUGE ASSY



- (A) Plate
- (B) Scale

- 5) Position the ST by inserting the knock pin of ST into the knock hole in the transmission case.

ST 499917500 DRIVE PINION GAUGE ASSY

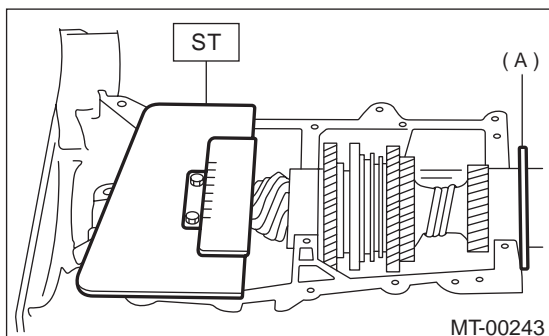
MT-59

DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

6) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.

ST 499917500 DRIVE PINION GAUGE ASSY



(A) Adjust clearance to zero without shim.

7) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on the ST. (Add if the number on drive pinion is prefixed by + and subtract if the number is prefixed by -.)

ST 499917500 DRIVE PINION GAUGE ASSY

8) Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the said value.

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

9) Install differential assembly. <Ref. to MT-67, INSTALLATION, Front Differential Assembly.>

10) Set transmission main shaft assembly and drive pinion assembly in position. (So there is no clearance between the two when moved all the way to the front). Inspect suitable 1st — 2nd, 3rd — 4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms. <Ref. to MT-64, INSPECTION, Drive Pinion Shaft Assembly.>

11) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>

12) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>

13) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

CAUTION:

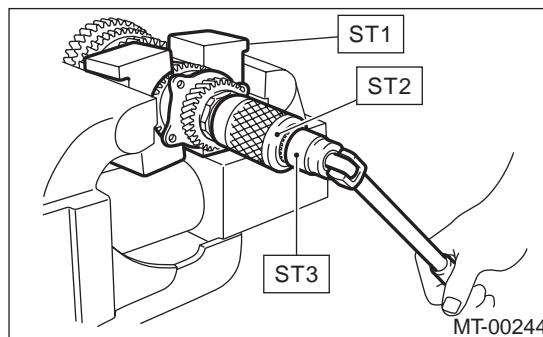
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) during disassembly or reassembly to prevent damage.

1) Straighten lock nut at staked portion. Remove the lock nut using ST1, ST2 and ST3.

ST1 899884100 HOLDER

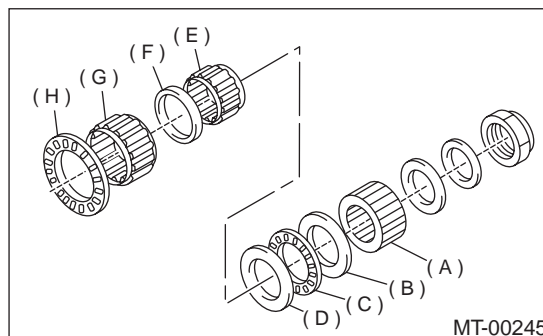
ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH



2) Withdraw drive pinion from driven shaft.

Remove differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing, drive pinion collar, needle bearing and thrust bearing.



- (A) Differential bevel gear sleeve
- (B) Washer No. 1 (25 × 37.5 × t)
- (C) Thrust bearing (25 × 37.5 × 3)
- (D) Washer No. 2 (25 × 37.5 × 4)
- (E) Needle bearing (25 × 30 × 20)
- (F) Drive pinion collar
- (G) Needle bearing (30 × 37 × 23)
- (H) Thrust bearing (33 × 50 × 3)

MT-60

DRIVE PINION SHAFT ASSEMBLY

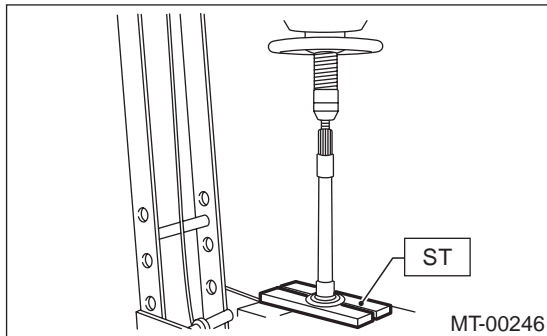
MANUAL TRANSMISSION AND DIFFERENTIAL

3) Remove roller bearing and washer using ST and press.

NOTE:

Do not reuse roller bearing.

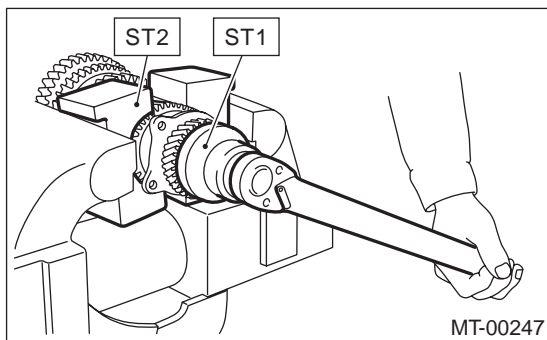
ST 498077000 REMOVER



4) Straighten lock nut at staked portion. Remove the lock nut using ST1 and ST2.

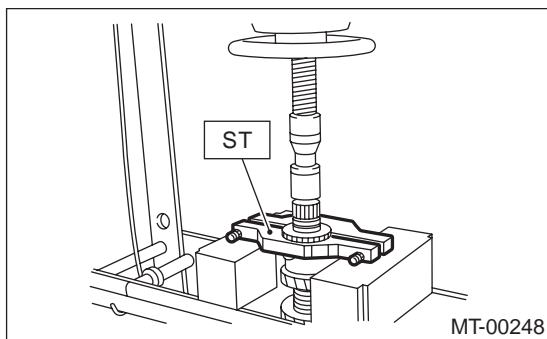
ST1 499987300 SOCKET WRENCH (50)

ST2 899884100 HOLDER



5) Remove 5th driven gear using ST.

ST 499857000 5TH DRIVEN GEAR REMOVER

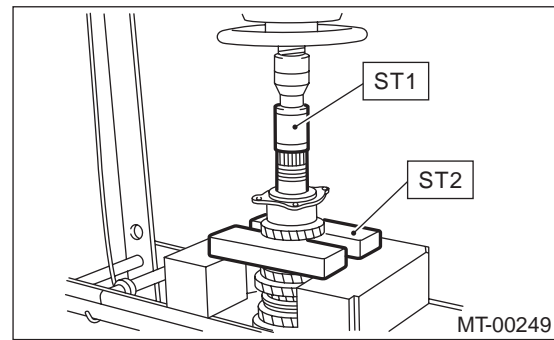


6) Remove woodruff key.

7) Remove roller bearing, 3rd-4th driven gear using ST1 and ST2.

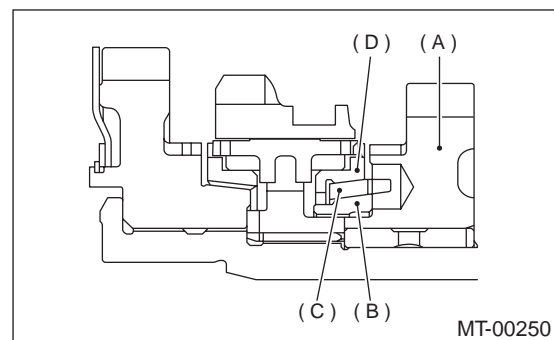
ST1 499757002 INSTALLER

ST2 899714110 REMOVER



8) Remove the key.

9) Remove 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.



(A) 2nd driven gear

(B) Inner baulk ring

(C) Synchro cone

(D) Outer baulk ring

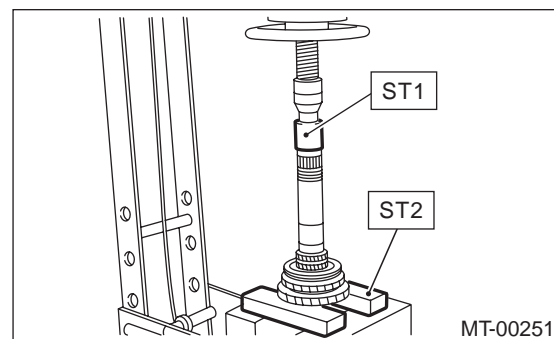
10) Remove 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.

NOTE:

Replace gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they have to be disassembled, mark the engaging point beforehand.

ST1 499757002 INSTALLER

ST2 899714110 REMOVER



11) Remove sub gear for 1st driven gear.

MT-61

DRIVE PINION SHAFT ASSEMBLY

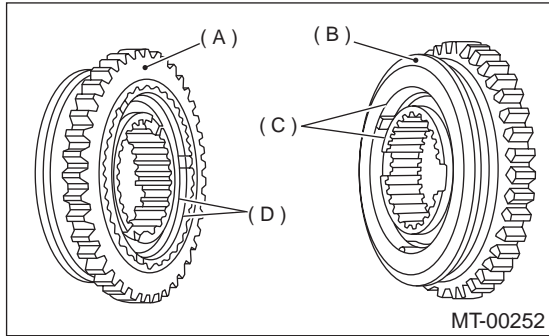
MANUAL TRANSMISSION AND DIFFERENTIAL

D: ASSEMBLY

1) Install sleeve and assembly by matching alignment marks.

NOTE:

- Use new gear and hub assembly, if gear or hub have been replaced.



- (A) 1st gear side
- (B) 2nd gear side
- (C) Flush surface
- (D) Stepped surface

2) Install washer, snap ring and sub gear to 1st driven gear.

3) Install 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

NOTE:

- Take care to install gear and hub assembly in proper direction.
- Align baulk ring and gear & hub assembly with key groove.

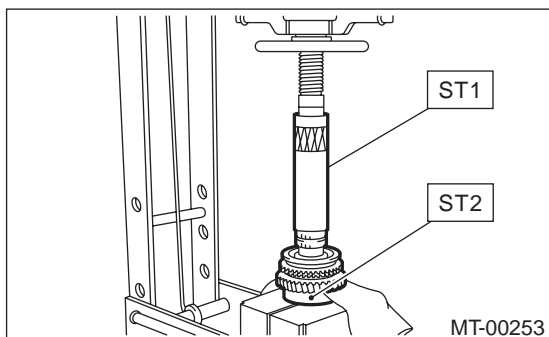
4) Install 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

NOTE:

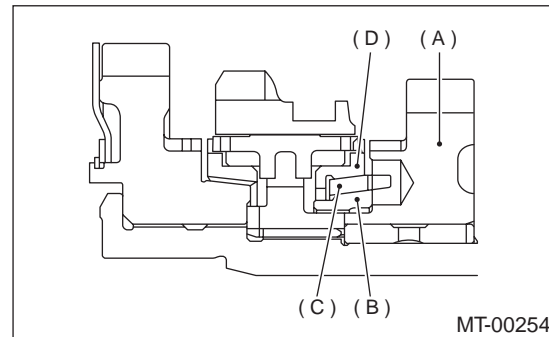
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Attach a cloth to the end of driven shaft to prevent damage.
- When press fitting, align oil holes of shaft and bush.

ST1 499277200 INSTALLER

ST2 499587000 INSTALLER



5) Install 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft.



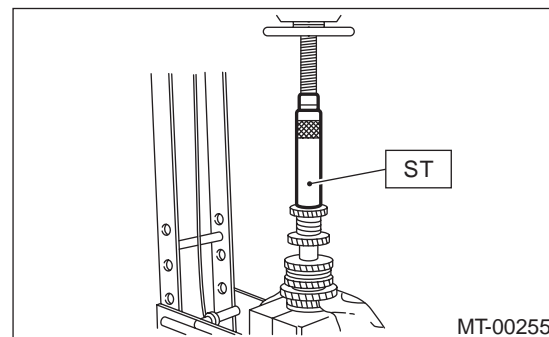
- (A) 2nd driven gear
- (B) Inner baulk ring
- (C) Synchro cone
- (D) Outer baulk ring

6) After installing key on driven shaft, install 3rd-4th driven gear using ST and press.

NOTE:

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Align groove in baulk ring with insert.

ST 499277200 INSTALLER

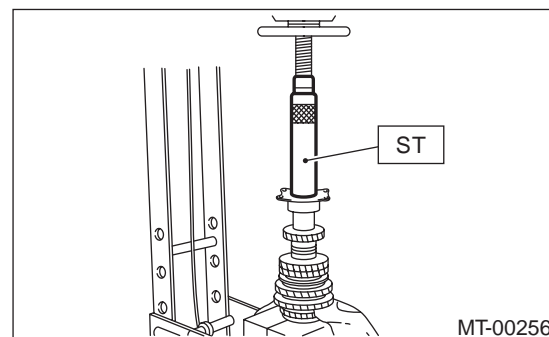


7) Install a set of roller bearings onto the driven shaft using ST and press.

NOTE:

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER



MT-62

DRIVE PINION SHAFT ASSEMBLY

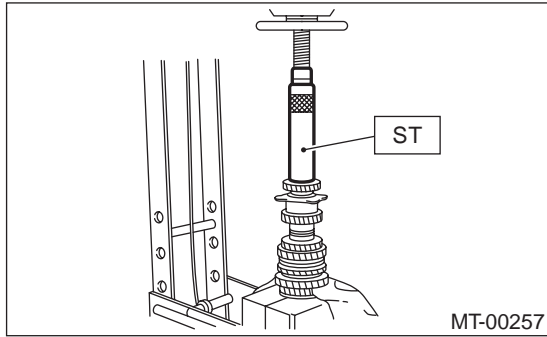
MANUAL TRANSMISSION AND DIFFERENTIAL

8) Position woodruff key in groove on the rear of driven shaft. Install 5th driven gear onto drive shaft using ST and press.

NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST 499277200 INSTALLER

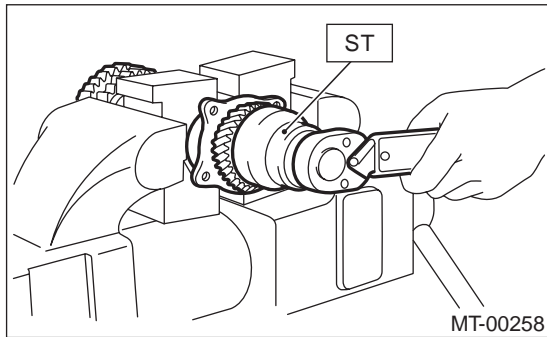


9) Install lock washer. Install lock nut and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

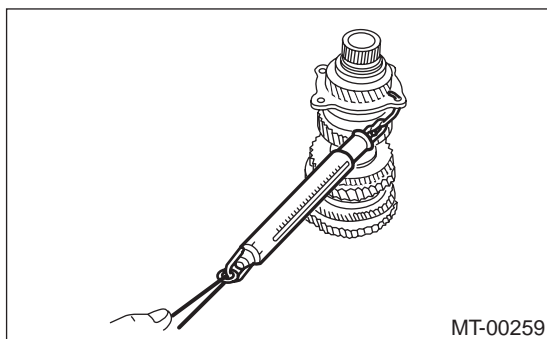
Tightening torque:

265 N·m (27 kgf·m, 195 ft·lb)



10) Stake lock nut at two points.

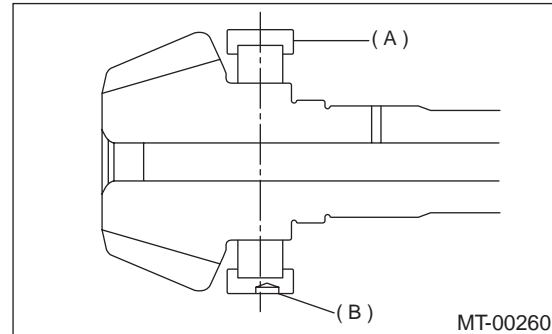
11) Using spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.33ft).



12) Install roller bearing onto drive pinion.

NOTE:

When installing roller bearing, note its directions (front and rear) because knock pin hole in outer race is offset.



- (A) Roller bearing
- (B) Knock pin hole

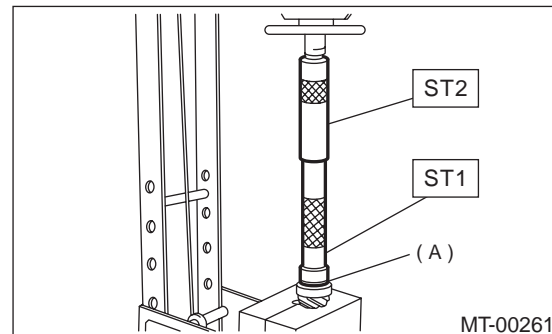
13) Install washer using ST1, ST2 and press.

NOTE:

Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

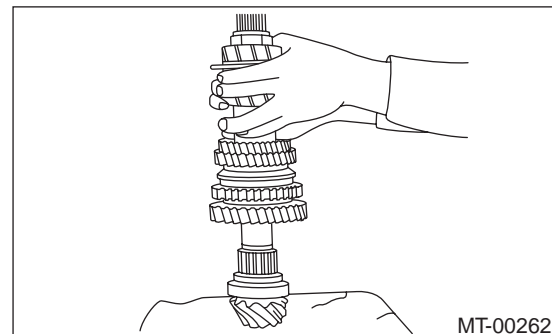
ST1 499277100 BUSH 1-2 INSTALLER

ST2 499277200 INSTALLER



- (A) Washer

14) Install thrust bearing and needle bearing. Install driven shaft assembly.



MT-63

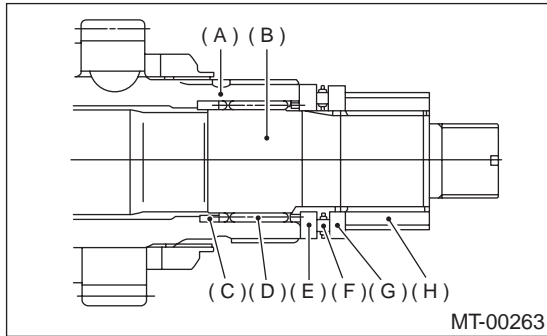
DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

15) Install drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in that order.

NOTE:

Be careful because spacer must be installed in proper direction.



- (A) Driven shaft
- (B) Drive shaft
- (C) Drive pinion collar
- (D) Needle bearing (25 × 30 × 20)
- (E) Washer No. 2 (25 × 36 × 4)
- (F) Thrust bearing (25 × 37.5 × 3)
- (G) Washer No. 1 (25 × 36 × t)
- (H) Differential bevel gear sleeve

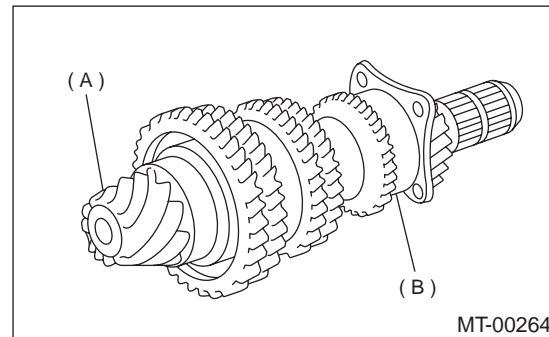
E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearings

Replace bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike the other bearings.



- (A) Drive pinion shaft
- (B) Ball bearing

- Bearings having other defects

2) Bushing (each gear)

Replace the bushing in the following cases:

- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

3) Gears

- Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

4) Baulk ring

Replace the ring in the following cases:

- When the inner surface and end face are damaged.
- When the ring inner surface is abnormally or partially worn down.
- If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

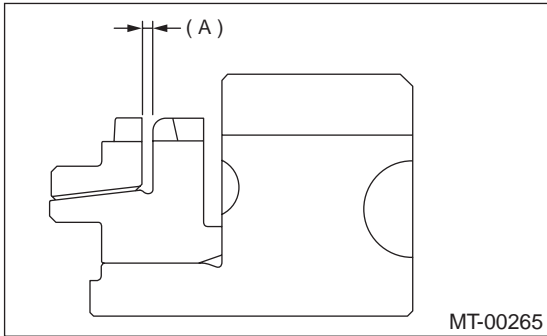
MT-64

DRIVE PINION SHAFT ASSEMBLY

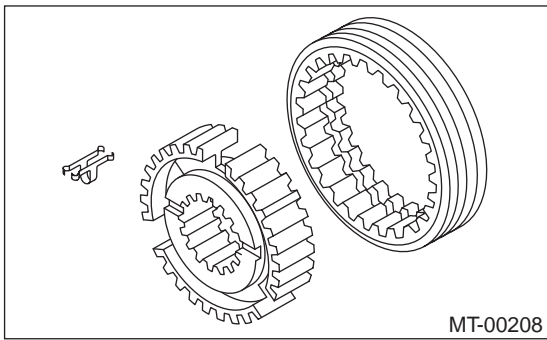
MANUAL TRANSMISSION AND DIFFERENTIAL

Clearance (A):

0.5 — 1.0 mm (0.020 — 0.040 in)



- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
- 5) Shifting insert key
Replace the insert if deformed, excessively worn, or defective in any way.



6) Oil seal

Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

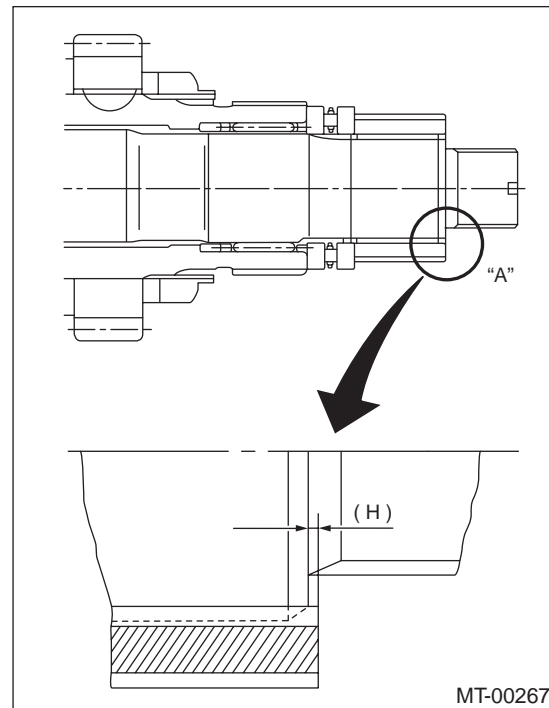
7) O-ring

Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

F: ADJUSTMENT

1. THRUST BEARING PRELOAD

1) After completing the preceding steps 1) through 3), select adjusting washer No. 1 so that dimension (H) is zero through visual check. Position washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install lock nut (18 × 13.5).



2) Using ST1, ST2 and ST3, tighten lock nut to the specified torque.

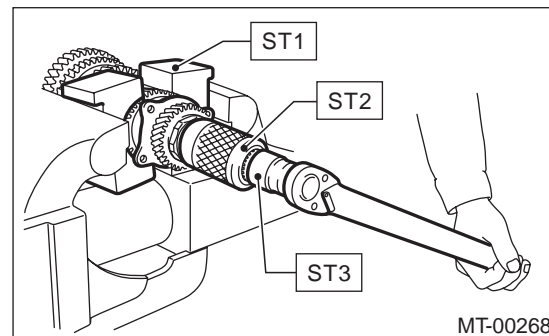
ST1 899884100 HOLDER

ST2 498427100 STOPPER

ST3 899988608 SOCKET WRENCH (27)

Tightening torque:

118 N·m (12 kgf·m, 86.8 ft·lb)



MT-65

DRIVE PINION SHAFT ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

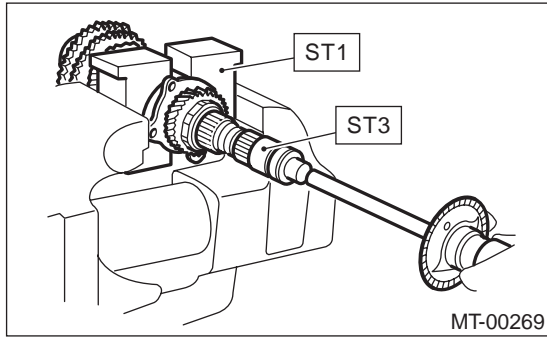
3) After removing ST2, measure starting torque using torque driver.

ST1 899884100 HOLDER

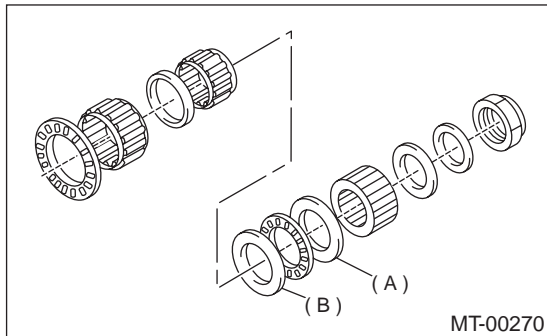
ST3 899988608 SOCKET WRENCH (27)

Starting torque:

0.3 — 0.8 N·m (0.03 — 0.08 kgf·m, 0.2 — 0.6 ft·lb)



4) If starting torque is not within specified limit, select new adjusting washer No. 1 and recheck starting torque.

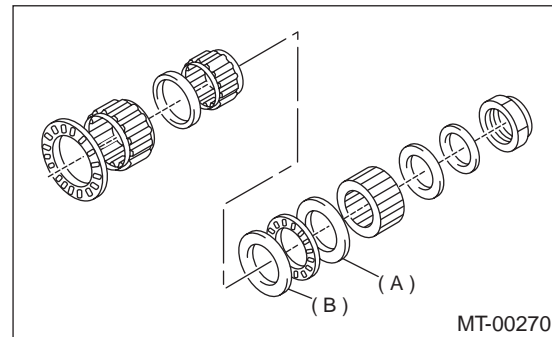


(A) Adjusting washer No.1

(B) Adjusting washer No.2

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

5) If specified starting torque range cannot be obtained when a No. 1 adjusting washer is used, then select a suitable No. 2 adjusting washer from those listed in the following table. Repeat steps 1) through 4) to adjust starting torque.



(A) Adjusting washer No. 1

(B) Adjusting washer No. 2

Starting torque	Dimension H	Washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

6) Recheck that starting torque is within specified range, then clinch lock nut at four positions.

FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

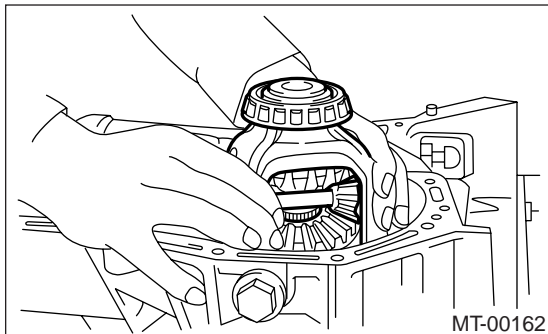
17. Front Differential Assembly

A: REMOVAL

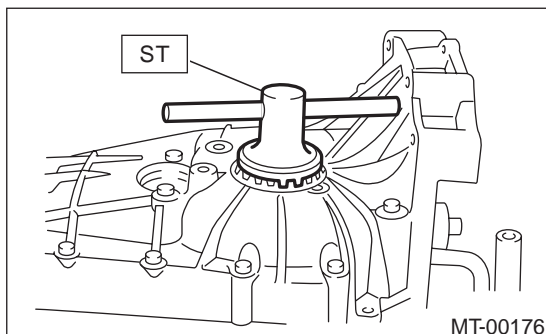
- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 3) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>
- 4) Remove drive pinion shaft assembly. Remove transfer case with extension case assembly. <Ref. to MT-59, REMOVAL, Drive Pinion Shaft Assembly.>
- 5) Remove main shaft assembly.
Single-range model:
<Ref. to MT-53, REMOVAL, Main Shaft Assembly for Single-Range.>
- 6) Remove differential assembly.

NOTE:

- Be careful not to confuse right and left roller bearing outer races.
- Be careful not to damage retainer oil seal.



- 7) Remove differential side retainers using ST.
ST 499787000 WRENCH ASSY

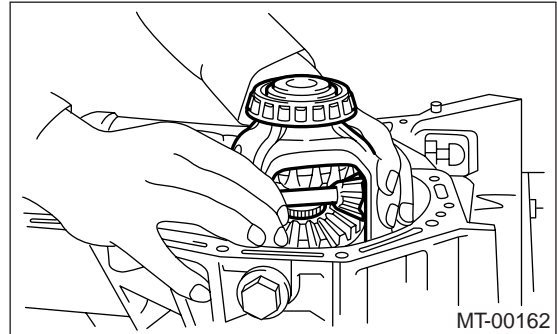


- 8) Remove bearing outer race from transmission case.

B: INSTALLATION

- 1) Install bearing outer race into transmission case.
- 2) Install differential side retainers using ST.
ST 499787000 WRENCH ASSY
- 3) Install differential assembly.
Wrap the left and right splines sections of axle shaft with vinyl tape to prevent scratches.

Be careful not to fold the sealing lip of oil seal.



- 4) Install main shaft assembly.

Single-range model:

- <Ref. to MT-53, INSTALLATION, Main Shaft Assembly for Single-Range.>
- 5) Install drive pinion assembly. <Ref. to MT-59, INSTALLATION, Drive Pinion Shaft Assembly.>
 - 6) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>
 - 7) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
 - 8) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

C: DISASSEMBLY

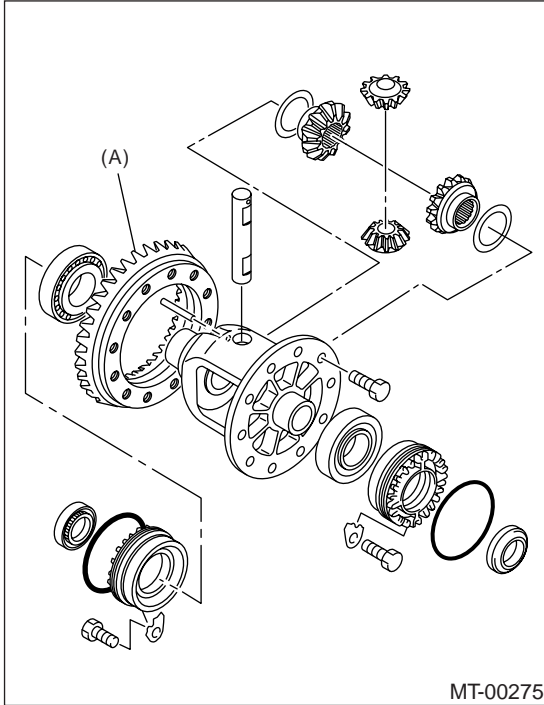
1. DIFFERENTIAL CASE ASSEMBLY

1) Remove right and left snap rings from differential, and then remove two axle drive shafts.

NOTE:

During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

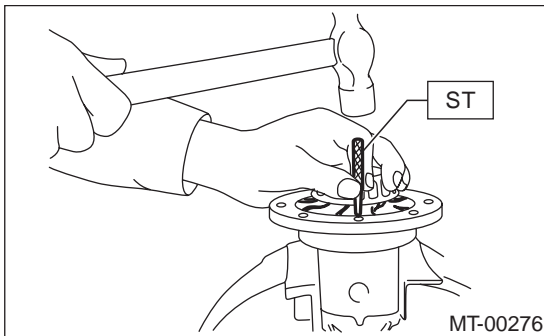
2) Loosen twelve bolts and remove hypoid driven gear.



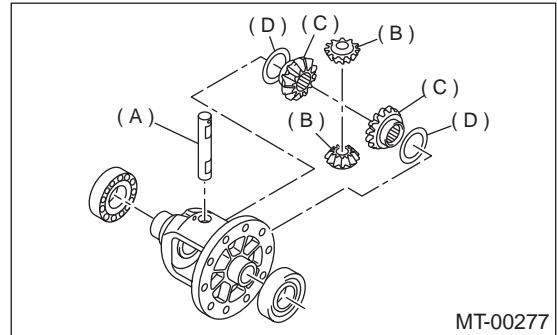
(A) Hypoid driven gear

3) Drive out straight pin from differential assembly toward hypoid driven gear.

ST 899904100 REMOVER

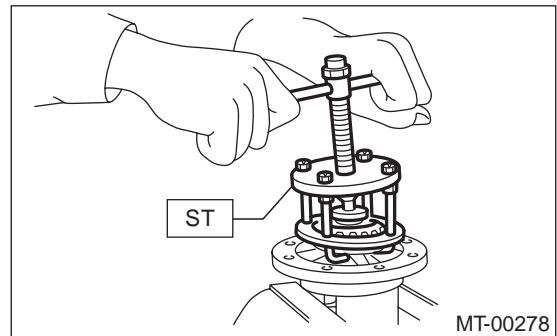


4) Pull out pinion shaft, and remove differential bevel pinion and gear and washer.



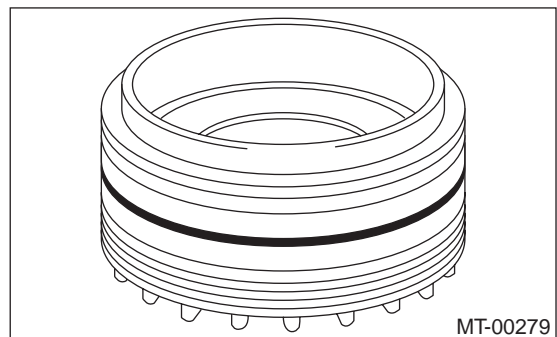
- (A) Pinion shaft
- (B) Bevel pinion
- (C) Bevel gear
- (D) Washer

5) Remove roller bearing using ST.
ST 899524100 PULLER SET



2. SIDE RETAINER

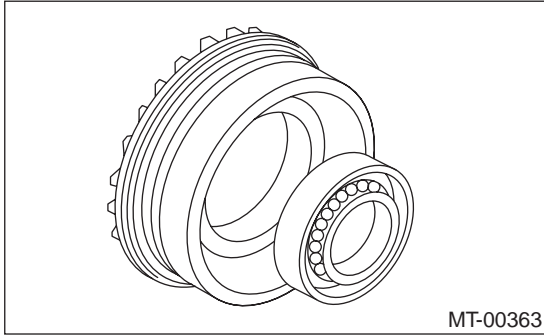
1) Remove O-ring.



FRONT DIFFERENTIAL ASSEMBLY

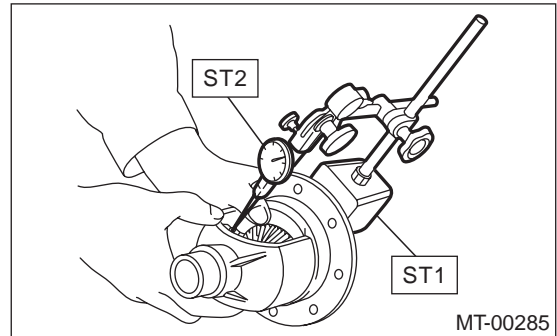
MANUAL TRANSMISSION AND DIFFERENTIAL

2) Remove oil seal.



Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



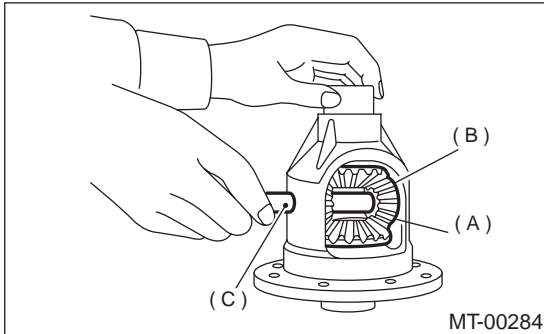
D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install bevel gear and bevel pinion together with washers, and insert pinion shaft.

NOTE:

Face the chamfered side of washer toward gear.



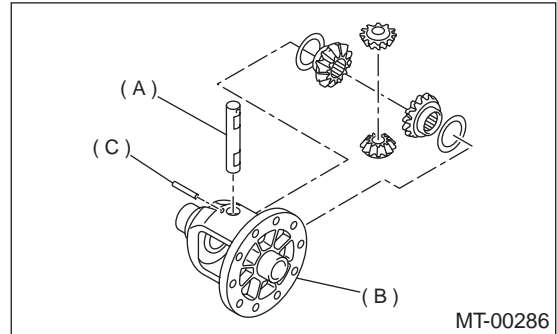
- (A) Bevel pinion
- (B) Bevel gear
- (C) Pinion shaft

3) Align pinion shaft and differential case at their holes, and drive straight pin into holes from the hypoid driven gear side, using ST.

NOTE:

Lock straight pin after installing.

ST 899904100 REMOVER



- (A) Pinion shaft
- (B) Differential case
- (C) Straight pin

2) Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. <Ref. to MT-72, ADJUSTMENT, Front Differential Assembly.>

NOTE:

Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

4) Install roller bearing to differential case.

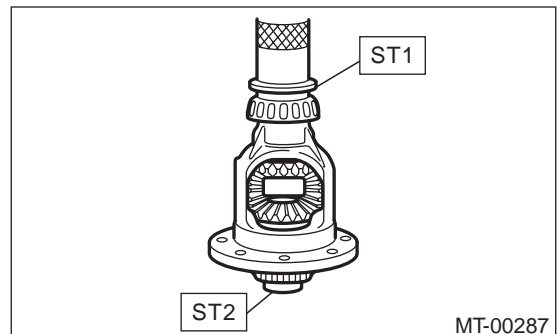
NOTE:

- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

- Be careful because roller bearing outer races are used as a set.

ST1 499277100 BUSHING 1-2 INSTALLER

ST2 398497701 ADAPTER



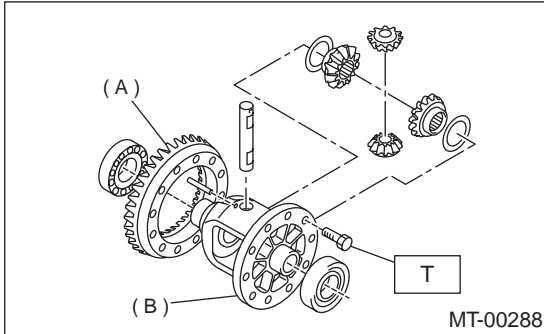
FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

5) Install hypoid driven gear to differential case using twelve bolts.

Tightening torque:

T: 62 N·m (6.3 kgf·m, 45.6 ft·lb)



- (A) Hypoid driven gear
- (B) Differential case

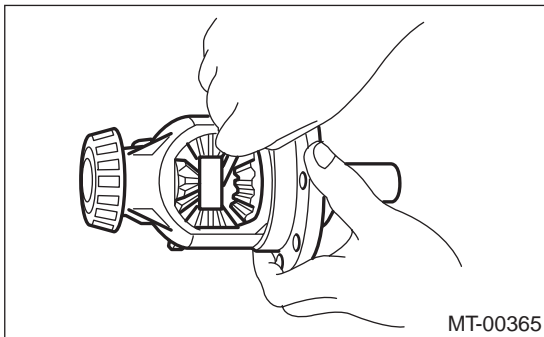
6) Position drive axle shaft in differential case and hold it outer snap ring (289). Using a thickness gauge, confirm whether clearance between the shaft and case is within specifications.

NOTE:

If it is not within specifications, replace snap ring with a suitable one.

Clearance:

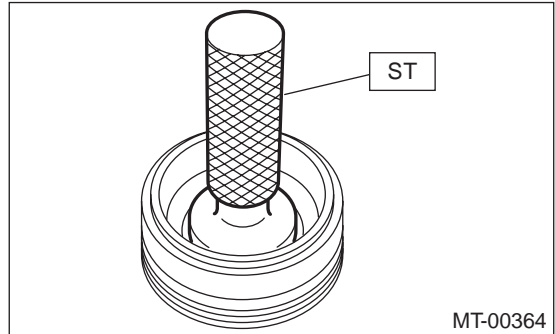
0 — 0.25 mm (0 — 0.0098 in)



2. SIDE RETAINER

1) Install new oil seal.

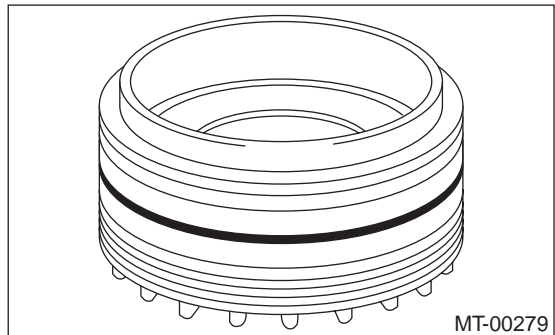
ST 49979700 INSTALLER



2) Install new O-ring.

NOTE:

Do not stretch or damage O-ring.



Snap ring (Outer-28)	
Part No.	Thickness mm (in)
805028011	1.05 (0.0413)
804018012	1.20 (0.0472)

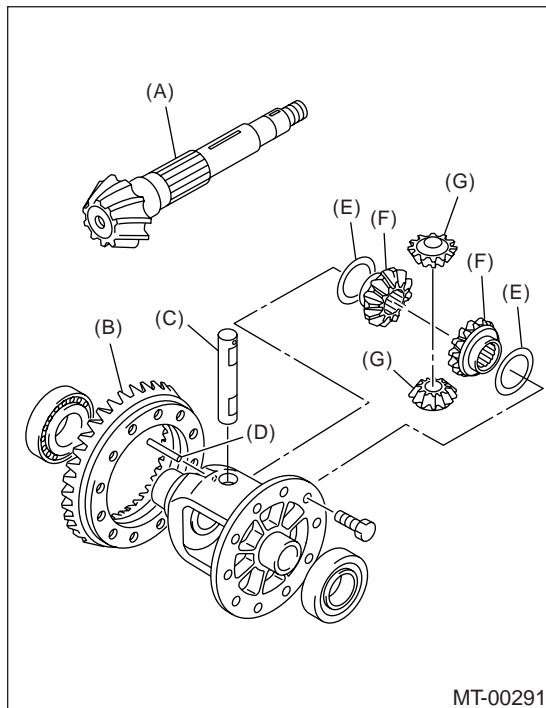
FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

E: INSPECTION

Repair or replace the differential gear in the following cases:

- The hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn, or seized.
- The roller bearing on the drive pinion shaft has a worn or damaged roller path.
- There is damage, wear, or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft, and straight pin.
- The differential case has worn or damaged sliding surfaces.



- (A) Drive pinion shaft
- (B) Hypoid driven gear
- (C) Pinion shaft
- (D) Straight pin
- (E) Washer
- (F) Differential bevel gear
- (G) Differential bevel pinion
- (H) Snap ring
- (I) Roller bearing
- (J) Differential case

1. BEVEL PINION GEAR BACKLASH

Measure backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it.

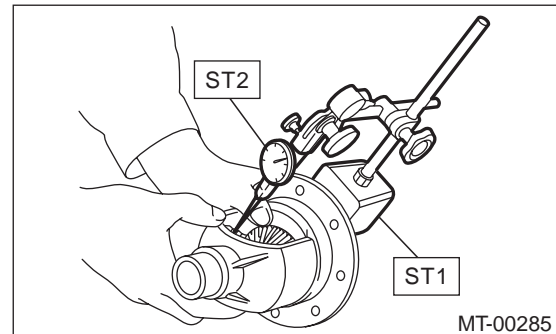
NOTE:

Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

- ST1 498247001 MAGNET BASE
- ST2 498247100 DIAL GAUGE

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



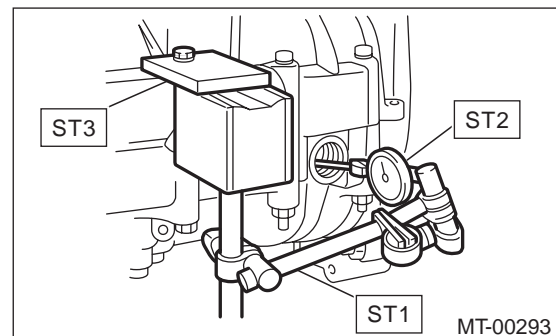
2. HYPOID GEAR BACKLASH

Set ST1, ST2 and ST3. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface at a right angle and check the backlash.

- ST1 498247001 MAGNET BASE
- ST2 498247100 DIAL GAUGE
- ST3 498255400 PLATE

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)



NOTE:

If backlash is outside specified range, adjust it by turning holder in right side case.

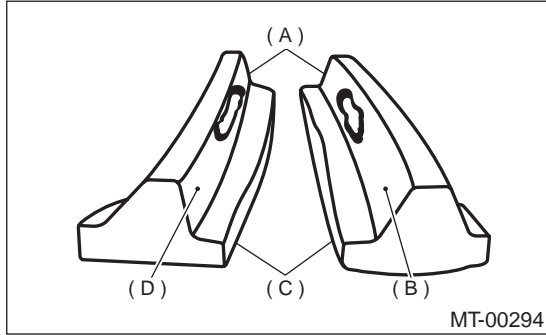
3. TOOTH CONTACT OF HYPOID GEAR

Check tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether face contact is correct. If it is inaccurate, make adjustment. <Ref. to MT-72, ADJUSTMENT, Front Differential Assembly.>

FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

- Tooth contact is correct.



- (A) Toe
- (B) Coast side
- (C) Heel
- (D) Drive side

F: ADJUSTMENT

1. BEVEL PINION GEAR BACKLASH

- 1) Disassemble the front differential. <Ref. to MT-67, REMOVAL, Front Differential Assembly.>
- 2) Select a different washer from the table and install.

Washer	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

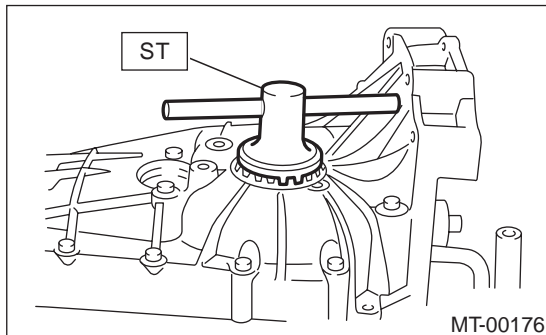
- 3) Adjust until the specified value is obtained.

Standard backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

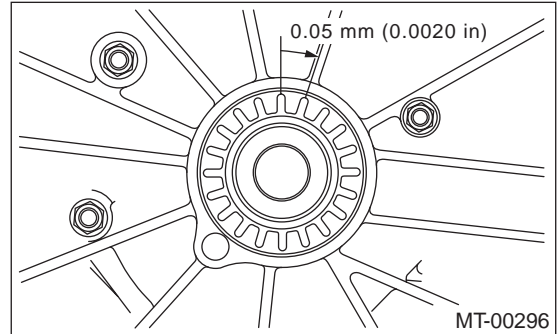
2. HYPOID GEAR BACKLASH

Adjust backlash by turning holder in right side case.
ST 499787000 WRENCH ASSY



NOTE:

Each time holder rotates one tooth, backlash changes by 0.05 mm (0.020 in).

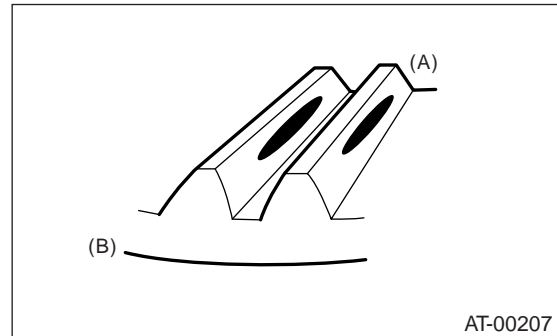


3. TOOTH CONTACT OF HYPOID GEAR

- 1) Adjust until the teeth contact is correct.
- 2) Check and adjust the teeth contact with the following:

- Tooth contact

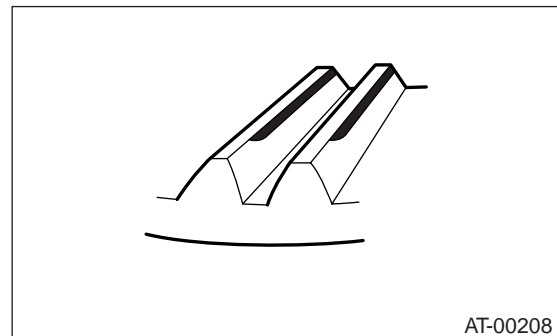
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]



- (A) Toe side
- (B) Heel side

- Face contact

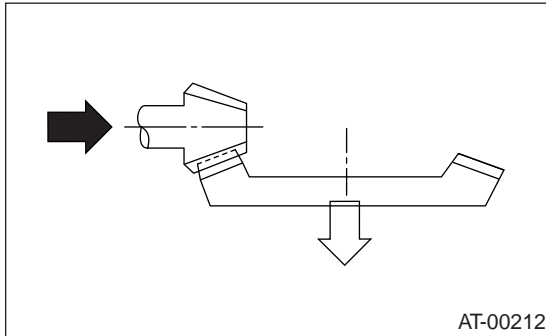
Checking item: Backlash is too large.
Contact pattern



FRONT DIFFERENTIAL ASSEMBLY

MANUAL TRANSMISSION AND DIFFERENTIAL

Corrective action: Decrease thickness of drive pinion shim in order to bring drive pinion close to crown gear.

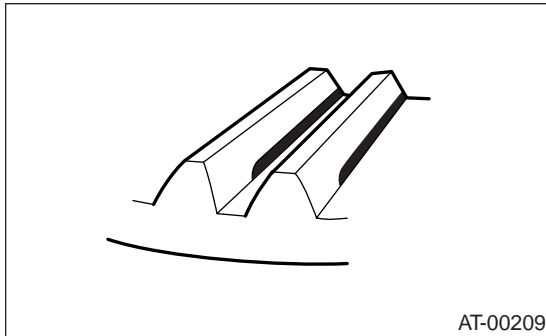


AT-00212

- Flank contact

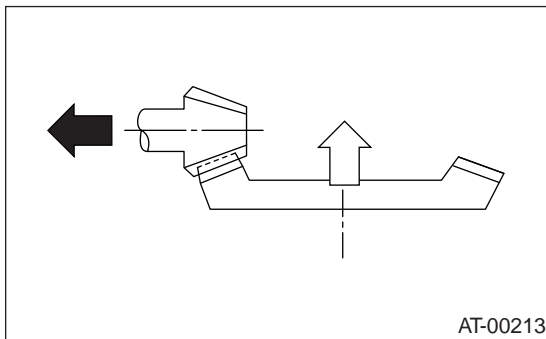
Checking item: Backlash is too small.

Contact pattern



AT-00209

Corrective action: Increase thickness of drive pinion shim in order to move drive pinion away from crown gear.

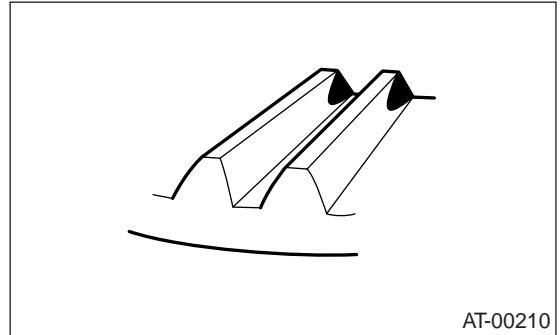


AT-00213

- Toe contact (Inside end contact)

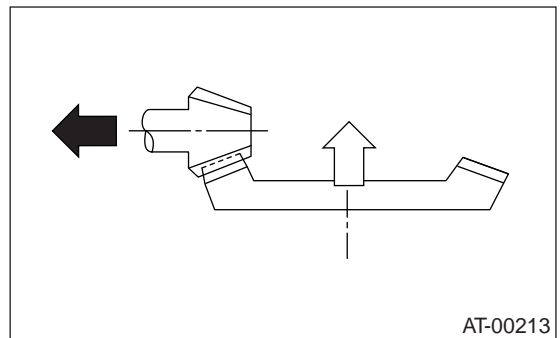
Checking item: Contact areas is small.

Contact pattern



AT-00210

Corrective action: Increase thickness of drive pinion shim in order to bring drive pin-ion close to crown gear.

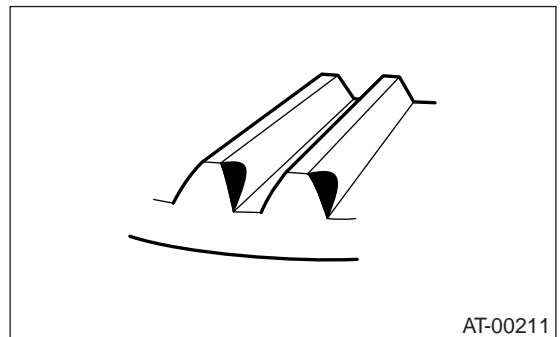


AT-00213

- Heel contact (Outside end contact)

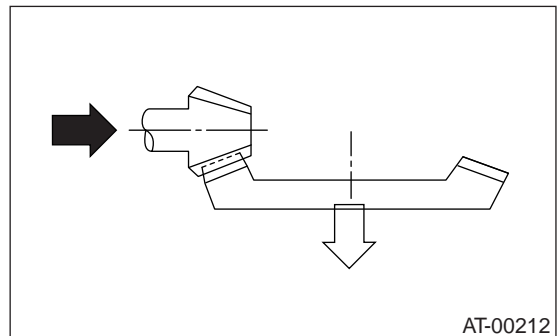
Checking item: Contact areas is small.

Contact pattern



AT-00211

Corrective action: Reduce thickness of drive pinion shim in order to move drive pinion away from crown gear.



AT-00212

SPEEDOMETER GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

18.Speedometer Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>
- 5) Remove vehicle speed sensor. <Ref. to MT-36, REMOVAL, Vehicle Speed Sensor.>
- 6) Remove outer snap ring and pull out speedometer driven gear. Next, remove oil seal, speedometer shaft and washer.

4) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>

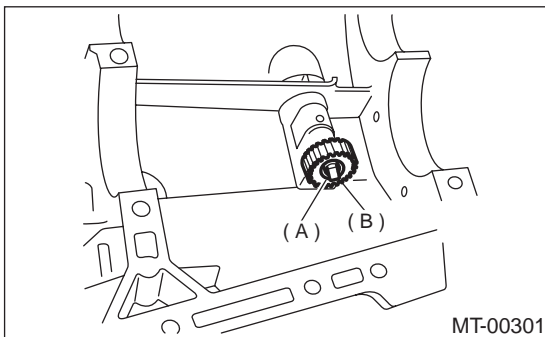
5) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>

6) Install back-up light switch and neutral position switch. <Ref. to MT-34, INSTALLATION, Switches and Harness.>

7) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

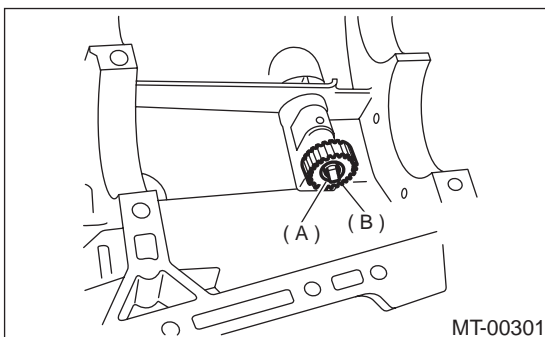
Check the speedometer gear, oil seal and speedometer shaft for damage. Replace if damaged.



- (A) Outer snap ring
(B) Speedometer driven gear

B: INSTALLATION

- 1) Install washer and speedometer shaft, and press fit new oil seal with ST.
ST 899824100 or 499827000PRESS
- 2) Install vehicle speed sensor. <Ref. to MT-36, INSTALLATION, Vehicle Speed Sensor.>
- 3) Install speedometer driven gear and new snap ring.



- (A) Outer snap ring
(B) Speedometer driven gear

MT-74

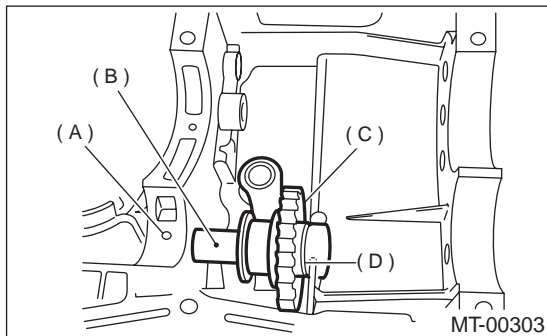
REVERSE IDLER GEAR

MANUAL TRANSMISSION AND DIFFERENTIAL

19.Reverse Idler Gear

A: REMOVAL

- 1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>
- 2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>
- 3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>
- 4) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>
- 5) Remove drive pinion shaft assembly. <Ref. to MT-59, REMOVAL, Drive Pinion Shaft Assembly.>
- 6) Remove main shaft assembly. <Ref. to MT-53, REMOVAL, Main Shaft Assembly for Single-Range.>
- 7) Remove differential assembly. <Ref. to MT-67, REMOVAL, Front Differential Assembly.>
- 8) Remove shifter forks and rods. <Ref. to MT-77, REMOVAL, Shifter Fork and Rod.>
- 9) Pull out straight pin, and remove idler gear shaft, reverse idler gear and washer.



- (A) Straight pin
- (B) Idler gear shaft
- (C) Idler gear
- (D) Washer

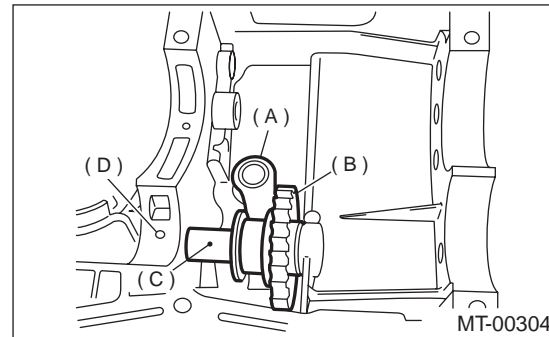
- 10) Remove reverse shifter lever.

B: INSTALLATION

- 1) Install reverse shifter lever, reverse idler gear and reverse idler gear shaft, and secure with straight pin.

NOTE:

Be sure to install reverse idler shaft from the rear side.



- (A) Reverse shifter lever
- (B) Reverse idler gear
- (C) Reverse idler gear shaft
- (D) Straight pin

- 2) Inspect and adjust clearance between reverse idler gear and transmission case wall. <Ref. to MT-75, INSTALLATION, Reverse Idler Gear.> and <Ref. to MT-76, ADJUSTMENT, Reverse Idler Gear.>
- 3) Install shifter forks and rods. <Ref. to MT-78, INSTALLATION, Shifter Fork and Rod.>
- 4) Install differential assembly. <Ref. to MT-67, INSTALLATION, Front Differential Assembly.>
- 5) Install main shaft assembly. <Ref. to MT-53, INSTALLATION, Main Shaft Assembly for Single-Range.>
- 6) Install drive pinion shaft assembly. <Ref. to MT-59, INSTALLATION, Drive Pinion Shaft Assembly.>
- 7) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>
- 8) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>
- 9) Install back-up light switch and neutral position switch. <Ref. to MT-34, INSTALLATION, Switches and Harness.>
- 10) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

MT-75

REVERSE IDLER GEAR

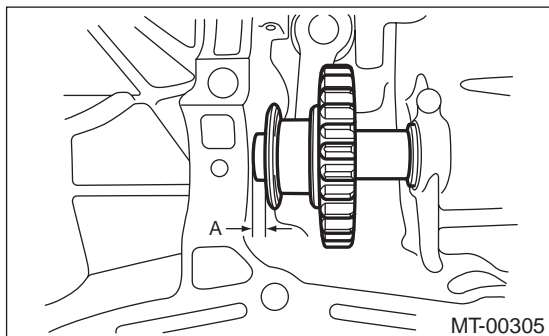
MANUAL TRANSMISSION AND DIFFERENTIAL

C: INSPECTION

1) Move the reverse shifter rod toward the reverse side. Inspect clearance between reverse idler gear and transmission case wall. If out of specification, select the appropriate reverse shifter lever and adjust.

Clearance A:

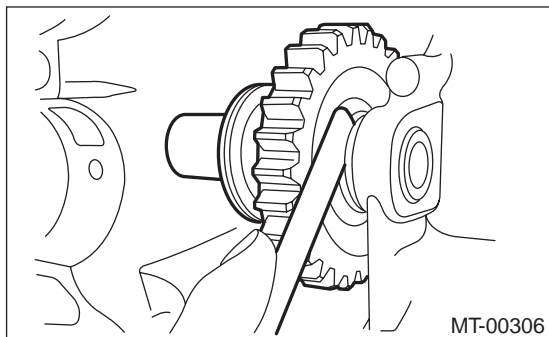
6.0 — 7.5 mm (0.236 — 0.295 in)



2) After installing a suitable reverse shifter lever, shift into neutral. Inspect clearance between reverse idler gear and transmission case wall. If out of specification, select the appropriate washer and adjust.

Clearance:

0 — 0.5 mm (0 — 0.020 in)



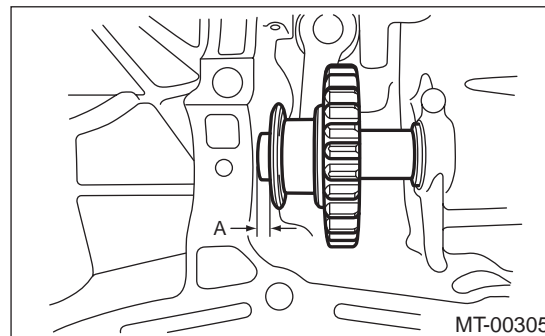
3) Check the reverse idler gear and shaft for damage. Replace if damaged.

D: ADJUSTMENT

1) Select the appropriate reverse shifter lever from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

Clearance A:

6.0 — 7.5 mm (0.236 — 0.295 in)

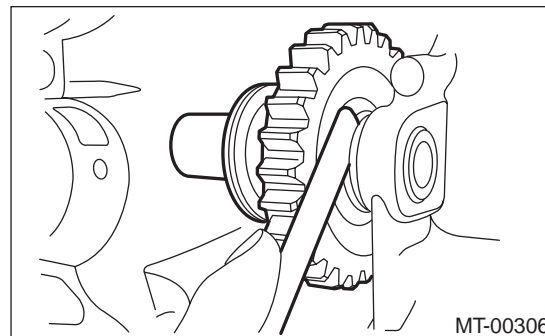


Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

2) Select the appropriate washer from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

Clearance:

0 — 0.5 mm (0 — 0.020 in)



Washer	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

MT-76

SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

20. Shifter Fork and Rod

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>

2) Remove back-up light switch and neutral position switch. <Ref. to MT-34, REMOVAL, Switches and Harness.>

3) Remove transfer case with extension case assembly. <Ref. to MT-38, REMOVAL, Transfer Case and Extension Case Assembly.>

4) Remove transmission case. <Ref. to MT-50, REMOVAL, Transmission Case.>

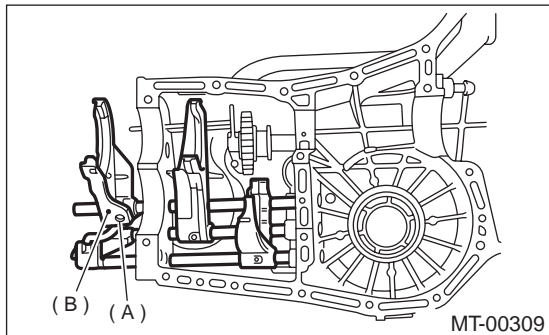
5) Remove drive pinion shaft assembly. <Ref. to MT-59, REMOVAL, Drive Pinion Shaft Assembly.>

6) Remove main shaft assembly. <Ref. to MT-53, REMOVAL, Main Shaft Assembly for Single-Range.>

7) Remove differential assembly. <Ref. to MT-67, REMOVAL, Front Differential Assembly.>

8) Drive out straight pin with ST, and 5th shifter fork.

ST 398791700 STRAIGHT PIN REMOVER



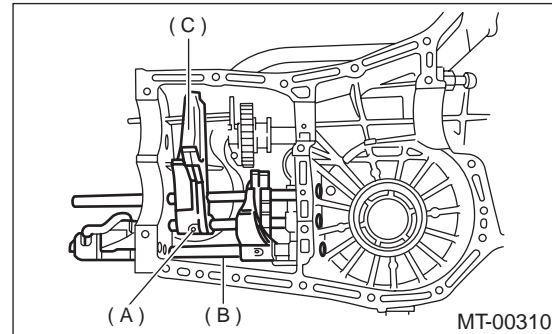
- (A) Straight pin
- (B) 5th shifter fork

9) Remove plugs, springs and checking balls.

10) Drive out straight pin, and pull out 3-4 fork rod and shifter fork.

NOTE:

When removing rod, keep other rods in neutral. Also, when pulling out straight pin, remove it toward the inside of the case so that it does not hit against the case.



- (A) Straight pin
- (B) 3-4 fork rod
- (C) Shifter fork

11) Drive out straight pin, and pull out 1-2 fork rod and shifter fork.

12) Remove outer snap ring, and pull out reverse shifter rod arm from reverse fork rod. Then take out ball, spring and interlock plunger from rod. And then remove rod.

NOTE:

When pulling out reverse shifter rod arm, be careful not to let ball pop out of arm.

13) Remove reverse shifter lever.

MT-77

SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

B: INSTALLATION

1) Install reverse arm fork spring, ball and interlock plunger to reverse fork rod arm. Insert reverse fork rod into hole in reverse fork rod arm, and hold it with outer snap ring using ST.

NOTE:

Apply grease to plunger to prevent it from falling.

ST 399411700 ACCENT BALL INSTALLER

2) Position ball, spring and new gasket in reverse shifter rod hole, on left side transmission case, and tighten checking ball plug.

3) Install 1-2 fork rod into 1-2 shifter fork via the hole on the rear of the transmission case.

4) Align the holes in rod and fork, and new drive straight pin into these holes using ST.

NOTE:

- Set other rods to neutral.
- Make sure interlock plunger is on the 3-4 fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

5) Install interlock plunger onto 3-4 fork rod.

NOTE:

Apply a coat of grease to plunger to prevent it from falling.

6) Install 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.

7) Align the holes in rod and fork, and new drive straight pin into these holes.

NOTE:

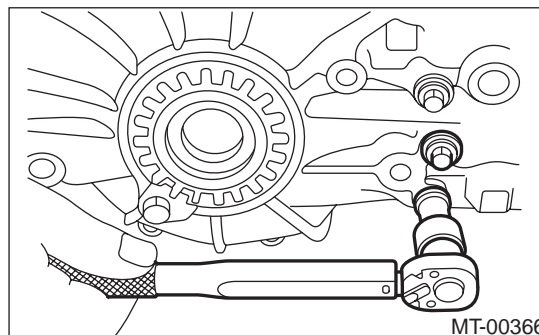
- Set reverse fork rod to neutral.
- Make sure interlock plunger (installing before) is on the reverse fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

8) Install 5th shifter fork onto the rear of reverse fork rod. Align holes in the two parts and new drive straight pin into place.

ST 398791700 STRAIGHT PIN REMOVER

9) Position balls, checking ball springs and new gaskets into 3-4 and 1-2 rod holes, and install plugs.



10) Install differential assembly. <Ref. to MT-67, INSTALLATION, Front Differential Assembly.>

11) Install main shaft assembly.

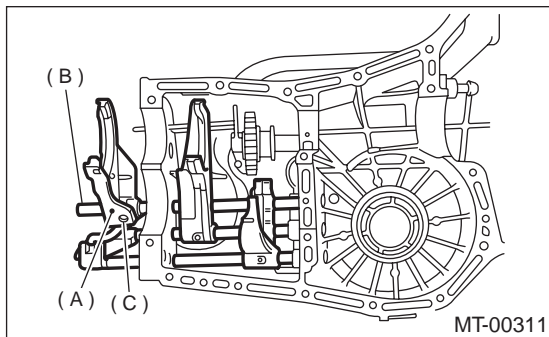
12) Install drive pinion shaft assembly. <Ref. to MT-59, INSTALLATION, Drive Pinion Shaft Assembly.>

13) Install transmission case. <Ref. to MT-51, INSTALLATION, Transmission Case.>

14) Install transfer case with extension case assembly. <Ref. to MT-38, INSTALLATION, Transfer Case and Extension Case Assembly.>

15) Install back-up light switch and neutral position switch. <Ref. to MT-34, INSTALLATION, Switches and Harness.>

16) Install the manual transmission assembly to vehicle. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>



- (A) 5th shifter fork
- (B) Reverse fork rod
- (C) Straight pin

MT-78

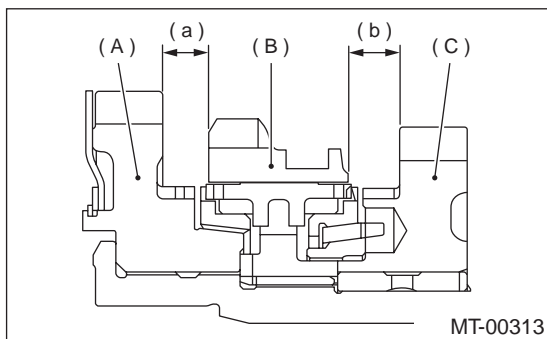
SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

C: INSPECTION

- 1) Check the shift shaft and shift rod for damage. Replace if damaged.
- 2) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.
- 3) Inspect clearance between 1st, 2nd driven gear and reverse driven gear. If any clearance is not within specifications, replace shifter fork as required.

Clearance (a) and (b):
9.5 mm (0.374 in)

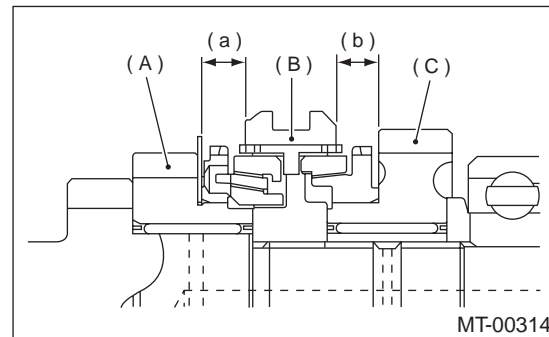


- (A) 1st driven gear
- (B) Reverse driven gear
- (C) 2nd driven gear

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).
32804AA070	—	Standard
32804AA080	3	Become distant from 2nd gear by 0.2 mm (0.008 in).

- 4) Inspect clearance between 3rd, 4th drive gear and coupling sleeve. If any clearance is not within specifications, replace shifter fork as required.

Clearance (a) and (b):
9.3 mm (0.366 in)

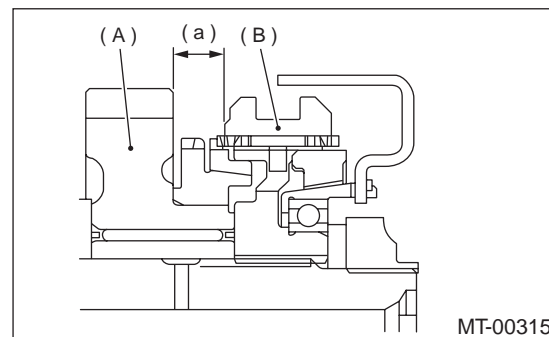


- (A) 3rd drive gear
- (B) Coupling sleeve
- (C) 4th drive gear

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in).
32810AA071	—	Standard
32810AA101	3	Become distant from 3rd gear by 0.2 mm (0.008 in).

- 5) Inspect clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace shifter fork as required.

Clearance (a):
9.3 mm (0.366 in)



- (A) 5th drive gear
- (B) Coupling sleeve

MT-79

SHIFTER FORK AND ROD

MANUAL TRANSMISSION AND DIFFERENTIAL

5th shifter fork		
Part No.	Mark	Remarks
32812AA201	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	—	Standard
32812AA221	9	Become distant from 5th gear by 0.2 mm (0.008 in).

6) Inspect rod end clearances (A) and (B). If any clearance is not within specifications, replace rod or fork as required.

Clearance (A):

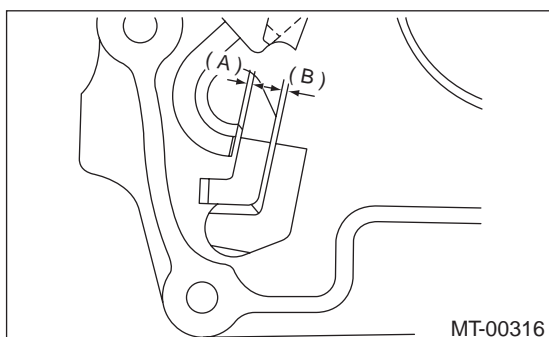
3rd — 4th to 5th:

0.5 — 1.3 mm (0.020 — 0.051 in)

Clearance (B):

1st — 2nd to 3rd — 4th:

0.4 — 1.4 mm (0.016 — 0.055 in)



MT-80

GENERAL DIAGNOSTIC

MANUAL TRANSMISSION AND DIFFERENTIAL

21. General Diagnostic**A: INSPECTION****1. MANUAL TRANSMISSION**

Symptom	Possible cause	Remedy
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: one is malfunction of the gear shift system and the other is malfunction of the transmission. However, if the operation is heavy and engagement of the gears is difficult, defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of spline of gears	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact between synchronizer ring and gear cone or wear	Correct or replace.
2. Gear slips out. • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper or loose bolt	Replace or tighten.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear, needle bearing and race	Replace.
	(h) Worn 2nd driven gear, needle bearing and race	Replace.
	(i) Worn 3rd drive gear and bushing	Replace.
	(j) Worn 4th drive gear and bushing	Replace.
3. Unusual noise comes from transmission. NOTE: If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(k) Worn reverse idler gear and bushing	Replace.
	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

MT-81

GENERAL DIAGNOSTIC

MANUAL TRANSMISSION AND DIFFERENTIAL

2. DIFFERENTIAL

Symptom	Possible cause	Remedy
1. Broken differential (case, gear, bearing, etc.) NOTE: Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.	(a) Insufficient or improper oil	Disassemble differential and replace broken components and at the same time check other components for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Readjust bearing preload and backlash and face contact of gears.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
	(e) Excessive backlash due to worn differential side gear, washer or differential pinion vehicle under severe operating conditions.	Add recommended oil to specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises. <ul style="list-style-type: none"> • Gear noise when driving: If noise increases as vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc. • Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment • Bearing noise when driving or when coasting: Cracked, broken or damaged bearings • Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc. 	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust bearing preload.
	(d) Loose roller bearing	Readjust hypoid driven gear to drive pinion backlash and check tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn washer and differential pinion shaft	Replace.

MT-82

GENERAL DESCRIPTION

CLUTCH SYSTEM

1. General Description

A: SPECIFICATIONS

Item		Designation	
Clutch cover	Type	Push type	
	Diaphragm set load	580 (1,276) kg (lb)	
Clutch disc	Facing material	Woven (Non asbestos)	
	O.D. × I.D. × thickness	225 × 150 × 3.5 (8.86 × 5.91 × 0.138) mm (in)	
	Spline O.D.	25.2 (0.992), (No. of teeth: 24) mm (in)	
Clutch release lever ratio		1.6	
Release bearing		Grease-packed self-aligning	
Clutch pedal	Full stroke	130 — 135 (5.12 — 5.31) mm (in)	
	Free play	4 — 13 (0.16 — 0.51) mm (in)	
Clutch disc	Depth of rivet head mm (in)	Standard	1.65 — 2.25 (0.065 — 0.089)
		Limit of sinking	0.3 (0.012)
	Limit for deflection	0.8 (0.031) at R = 107 (4.21) mm (in)	

I.D.: Inner diameter

O.D.: Outer diameter

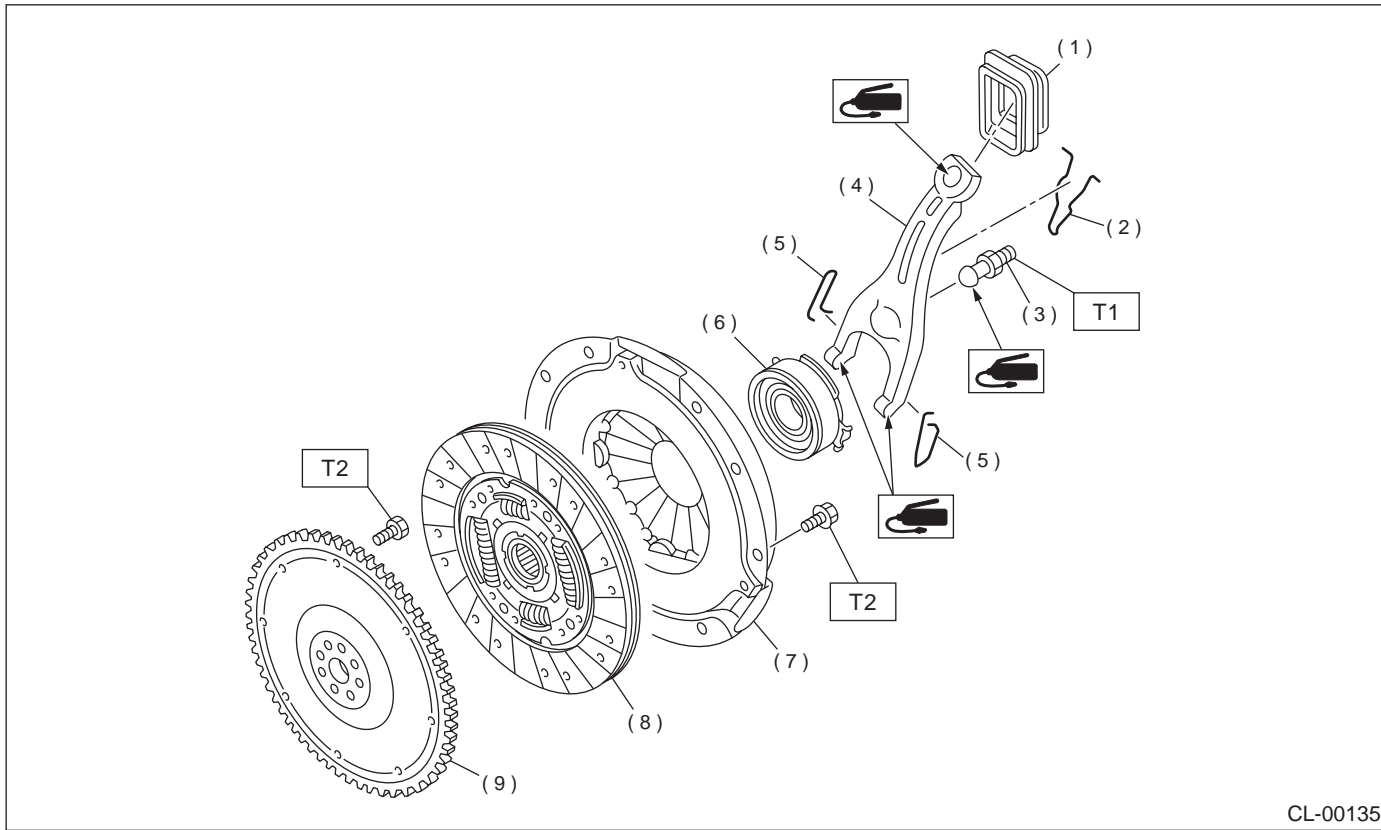
CL-2

GENERAL DESCRIPTION

CLUTCH SYSTEM

B: COMPONENT

1. CLUTCH ASSEMBLY



- | | |
|-------------------------------------|----------------------------|
| (1) Clutch release lever dust cover | (6) Clutch release bearing |
| (2) Retainer spring | (7) Clutch cover |
| (3) Pivot | (8) Clutch disc |
| (4) Clutch release lever | (9) Flywheel |
| (5) Clip | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 15.7 (1.6, 11.6)

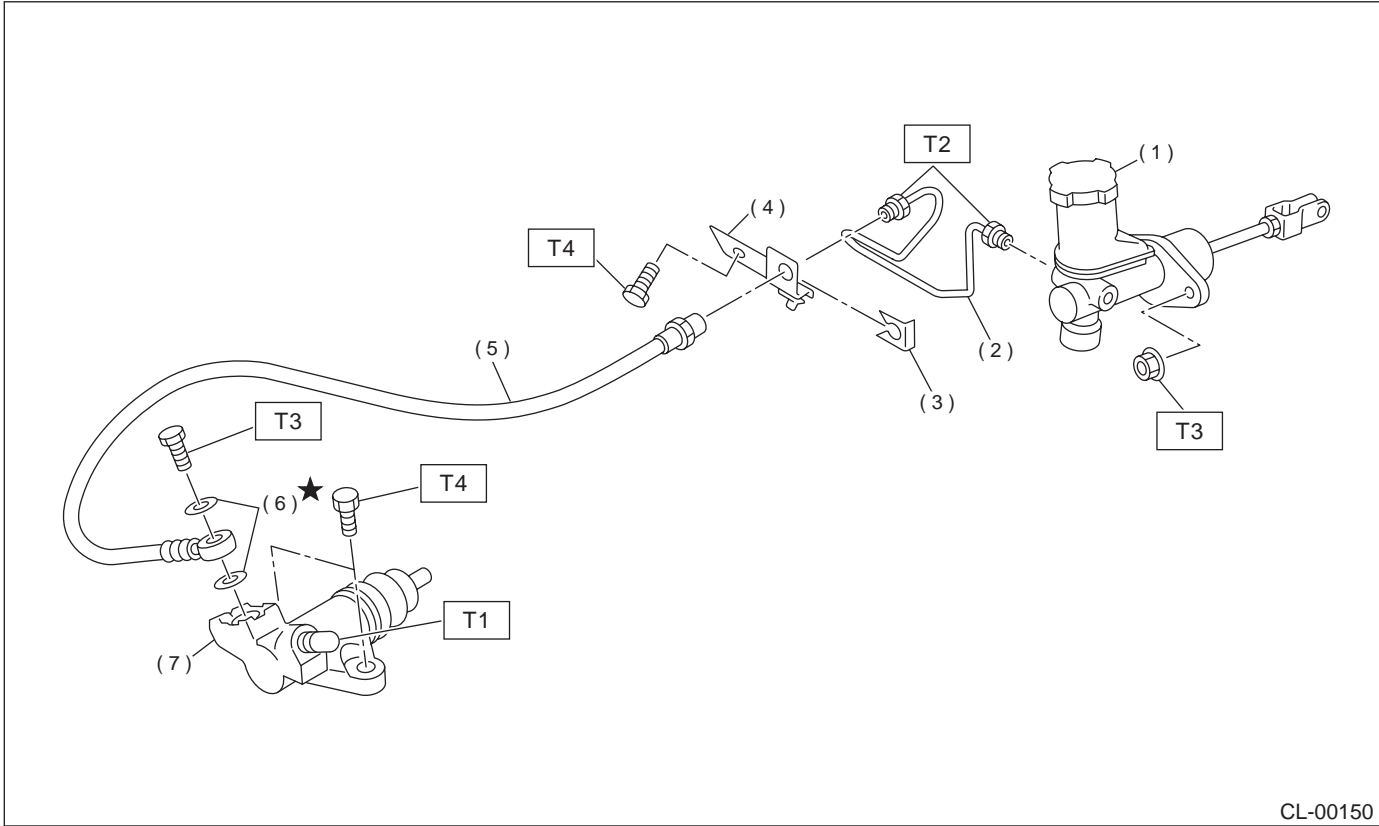
T2: 72 (7.3, 52.8)

CL-3

GENERAL DESCRIPTION

CLUTCH SYSTEM

2. CLUTCH PIPE AND HOSE



- | | |
|--------------------------|------------------------|
| (1) Master cylinder ASSY | (6) Washer |
| (2) Clutch pipe | (7) Operating cylinder |
| (3) Clip | |
| (4) Bracket | |
| (5) Clutch hose | |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.8, 5.8)

T2: 15 (1.5, 10.8)

T3: 18 (1.8, 13.0)

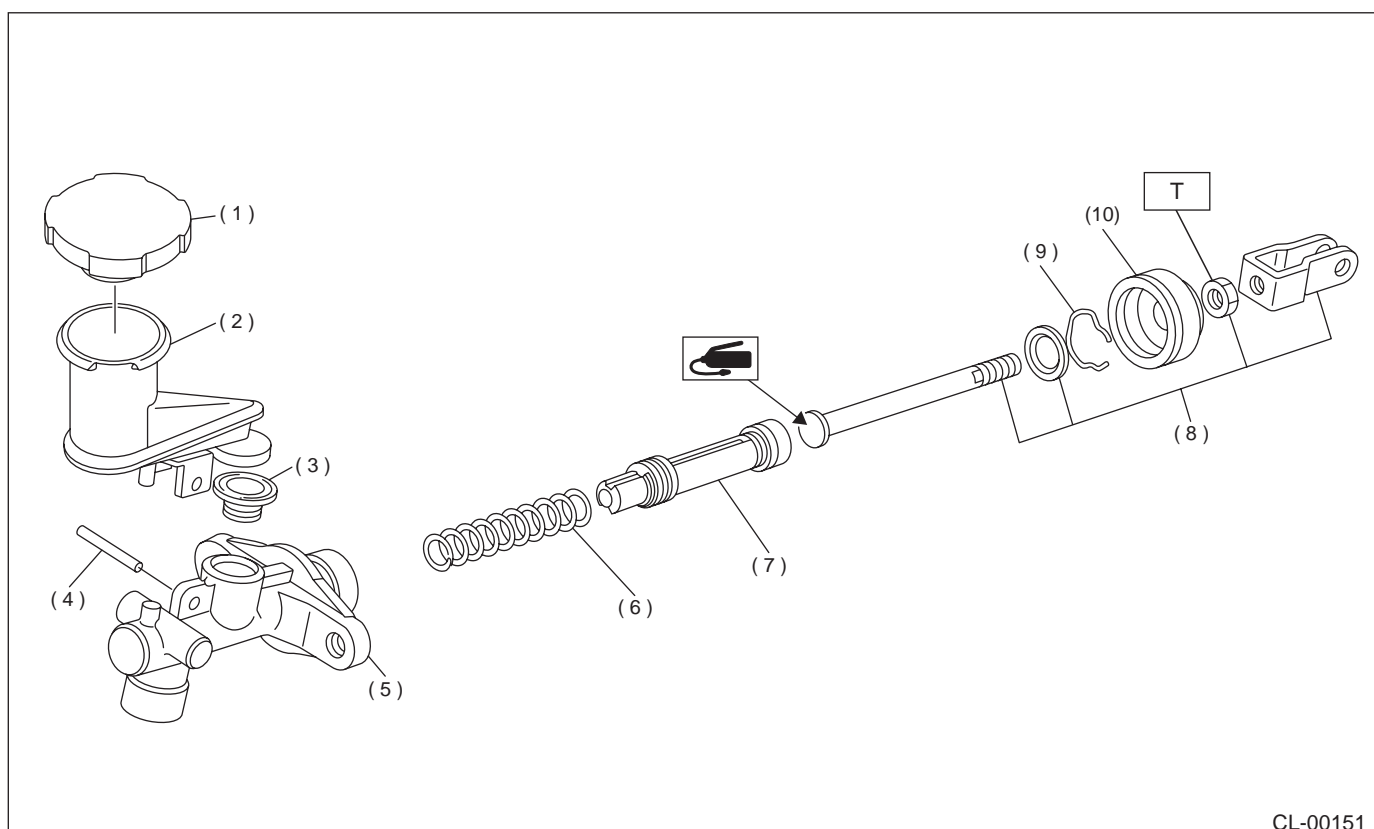
T4: 37 (3.8, 27.5)

CL-4

GENERAL DESCRIPTION

CLUTCH SYSTEM

3. MASTER CYLINDER



- | | |
|---------------------|----------------------|
| (1) Reservoir cap | (6) Return spring |
| (2) Reservoir tank | (7) Piston |
| (3) Oil seal | (8) Push rod |
| (4) Straight pin | (9) Piston stop ring |
| (5) Master cylinder | (10) Cylinder boot |

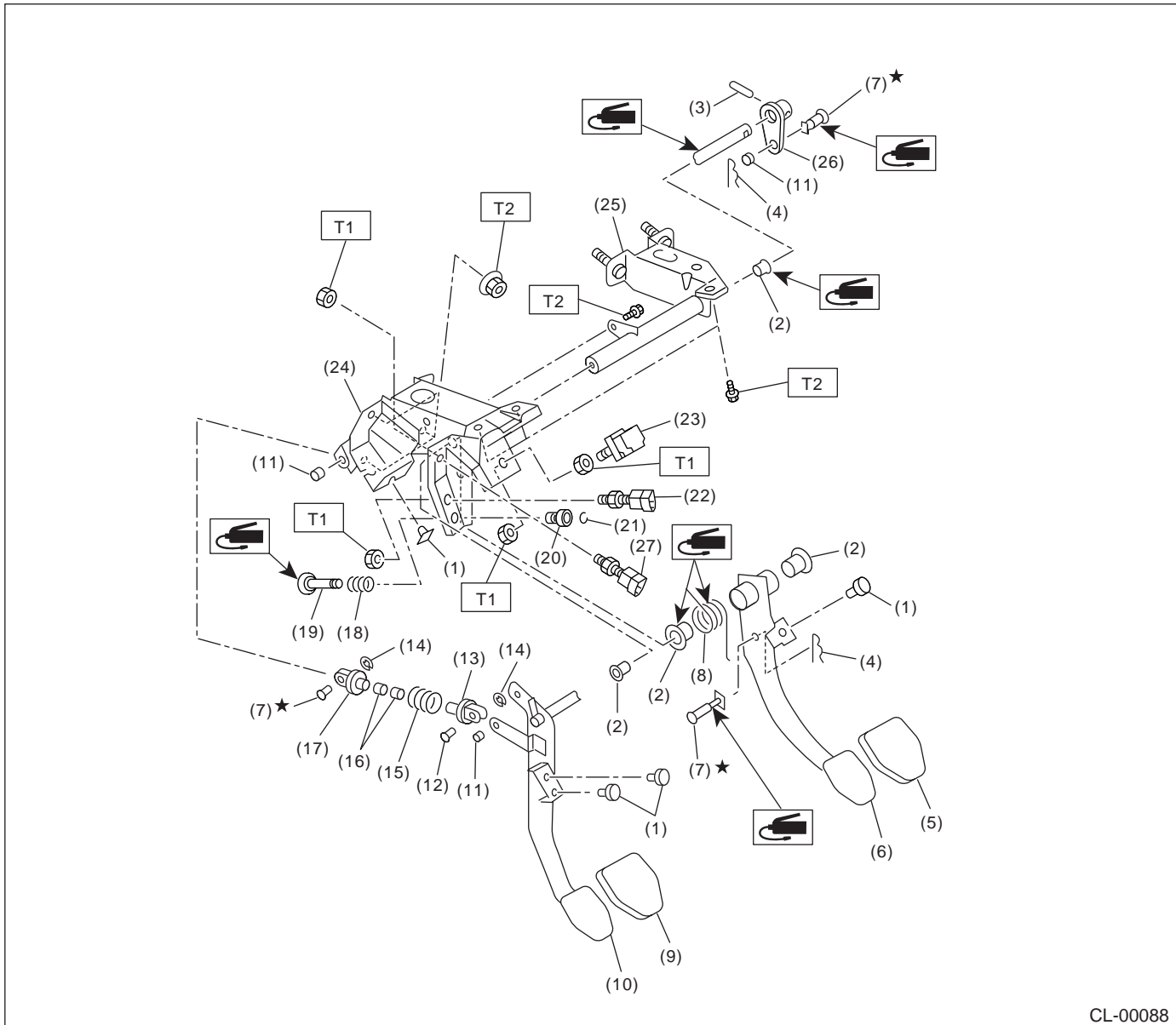
Tightening torque: N·m (kgf·m, ft·lb)
T: 10 (1.0, 7)

CL-5

GENERAL DESCRIPTION

CLUTCH SYSTEM

4. CLUTCH PEDAL



CL-00088

- | | | |
|------------------------|--|--|
| (1) Stopper | (12) Clutch clevis pin | (23) Stop light switch |
| (2) Bushing | (13) Assist rod A | (24) Pedal bracket |
| (3) Spring pin | (14) Clip | (25) Clutch master cylinder bracket |
| (4) Snap pin | (15) Assist spring | (26) Lever |
| (5) Brake pedal pad | (16) Assist bushing | (27) Clutch switch (Starter interlock) |
| (6) Brake pedal | (17) Assist rod B | |
| (7) Clevis pin | (18) Spring S | |
| (8) Brake pedal spring | (19) Rod S | |
| (9) Clutch pedal pad | (20) Bushing S | |
| (10) Clutch pedal | (21) Clip | |
| (11) Bushing C | (22) Clutch switch (With cruise control) | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 8 (0.8, 5.8)

T2: 18 (01.8, 13.0)

CL-6

GENERAL DESCRIPTION

CLUTCH SYSTEM

C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn your hands, because each part on the vehicle is hot after running.
- Use SUBARU genuine fluid, grease etc. or the equivalent. Do not mix fluid, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or safety stands at the specified points.
- Apply grease onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Keep fluid away from the vehicle body. If any fluid contacts the vehicle body, immediately flush the area with water.

CL-7

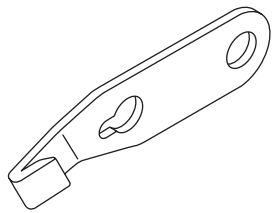
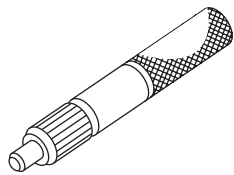
Vehicle-id:
SIE-id::C:Caution

GENERAL DESCRIPTION

CLUTCH SYSTEM

D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 <p style="text-align: center;">ST-498497100</p>	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening tightening bolt, etc.
 <p style="text-align: center;">ST-499747100</p>	499747100	CLUTCH DISC GUIDE	Used when installing clutch disc to flywheel.

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Dial Gauge	Used for measuring clutch disk run-out.

CL-8

CLUTCH DISC AND COVER

CLUTCH SYSTEM

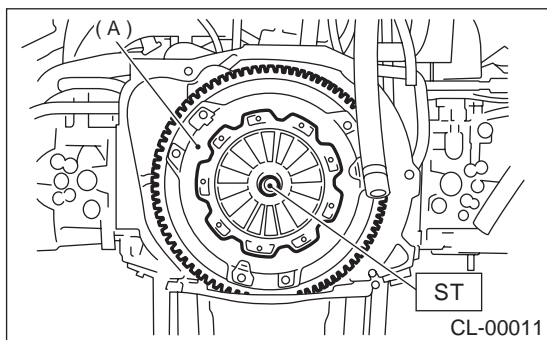
2. Clutch Disc and Cover

A: REMOVAL

1) Remove the transmission assembly from vehicle body. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>

2) Install the ST on flywheel.

ST 499747100 CRANKSHAFT STOPPER



(A) Clutch cover

3) Remove the clutch cover and clutch disc.

NOTE:

- Take care not to allow oil on the clutch disc facing.
- Do not disassemble either the clutch cover or clutch disc.

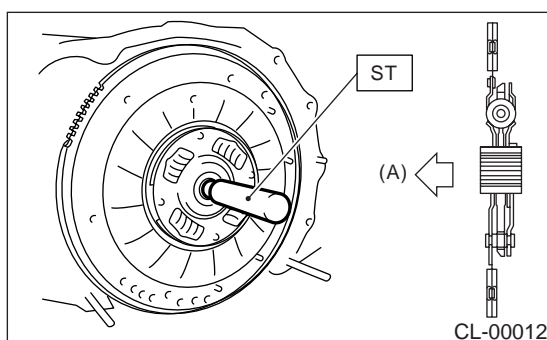
B: INSTALLATION

1) Insert the ST into clutch disc and install them on the flywheel by inserting the ST end into pilot bearing.

NOTE:

When installing the clutch disc, be careful to its direction.

ST 499747100 CLUTCH DISC GUIDE



(A) Flywheel side

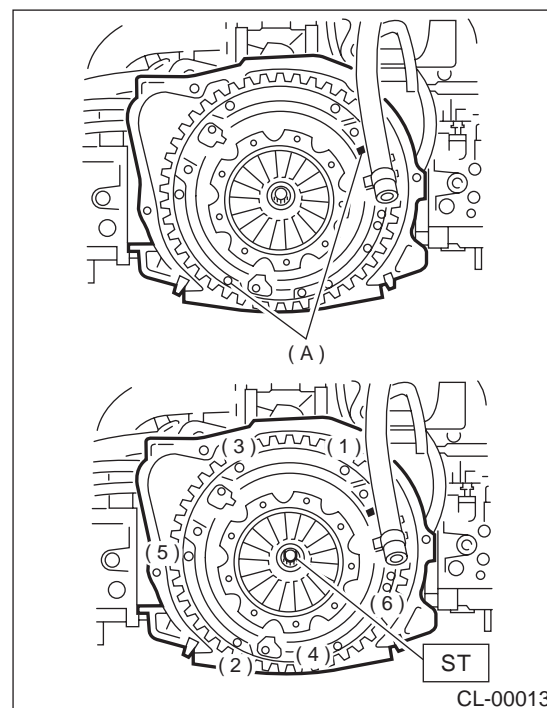
2) Position "0" marks on clutch cover and flywheel 120° apart, and then tighten the clutch cover installation bolts diagonally.

NOTE:

- "0" marks indicate the directions of residual unbalance.
- Temporarily tighten the bolts by hand. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:

15.7 N·m (1.6 kgf·m, 11.6 ft·lb)



(A) "0" marks

3) Remove the ST.

ST 499747100 CLUTCH DISC GUIDE

4) Install the transmission assembly. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

CL-9

CLUTCH DISC AND COVER

CLUTCH SYSTEM

C: INSPECTION

1. CLUTCH DISC

1) Facing wear

Measure the depth of rivet head from the surface of facing. Replace if facings are worn locally or worn down to less than the specified value.

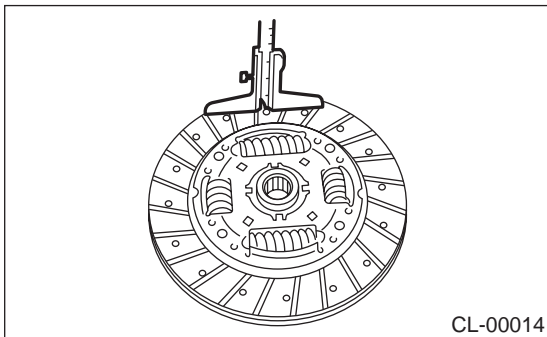
Depth of rivet head:

Limit of sinking

0.3 mm (0.012 in)

NOTE:

Do not wash the clutch disc with any cleaning fluid.

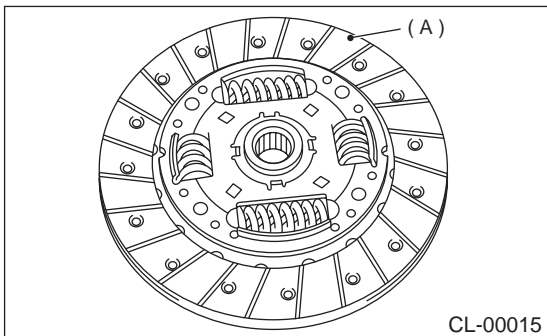


2) Hardened facing

Correct by using emery paper or replace.

3) Oil soakage on facing

Replace the clutch disc (A) and inspect the transmission front oil seal, transmission case mating surface, engine rear oil seal and other points for oil leakage.



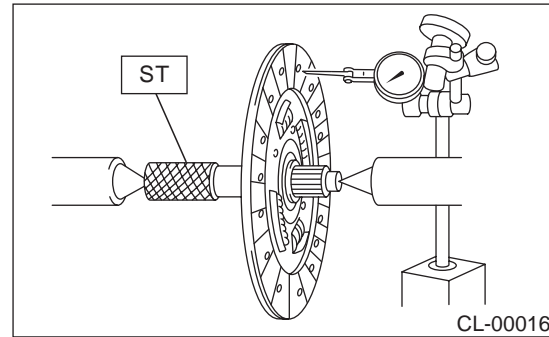
4) Deflection on facing

If deflection exceeds the specified value at the outer circumference of facing, repair or replace.

ST 499747100 CLUTCH DISC GUIDE

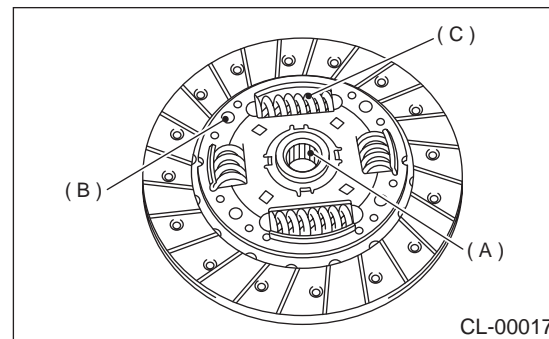
Limit for deflection:

0.8 mm (0.031 in) at R = 107 mm (4.21 in)



5) Worn spline, loose rivets and torsion spring failure

Replace defective parts.



- (A) Spline
- (B) Rivet
- (C) Torsion spring

CLUTCH DISC AND COVER

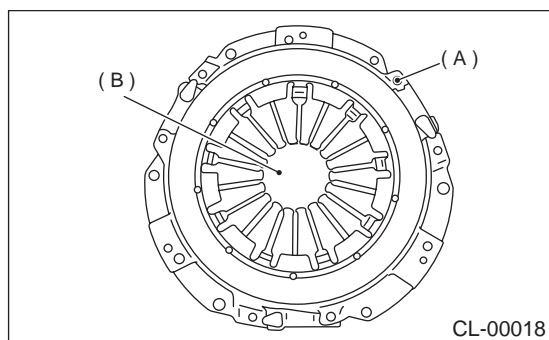
CLUTCH SYSTEM

2. CLUTCH COVER

NOTE:

Visually check for the following items without disassembling, and replace or repair if defective.

- 1) Loose thrust rivet.
- 2) Damaged or worn bearing contact area at center of diaphragm spring.



- (A) Thrust rivet
(B) Diaphragm spring

CL-11

FLYWHEEL

CLUTCH SYSTEM

3. Flywheel

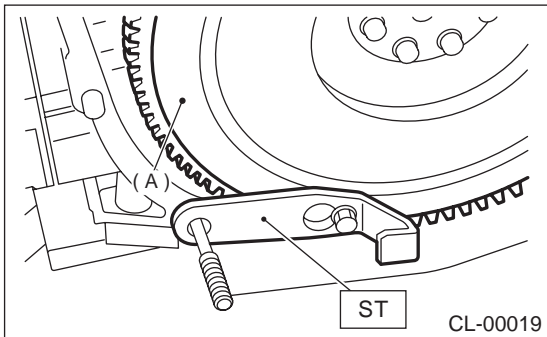
A: REMOVAL

1) Remove the transmission assembly. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>

2) Remove the clutch cover and clutch disc. <Ref. to CL-9, REMOVAL, Clutch Disc and Cover.>

3) Using the ST, remove the flywheel.

ST 498497100 CRANKSHAFT STOPPER

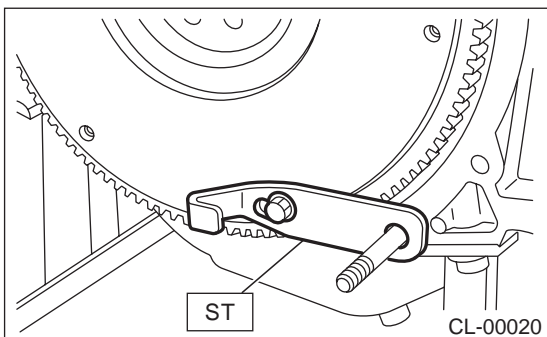


(A) Flywheel

B: INSTALLATION

1) Install the flywheel and ST.

ST 498497100 CRANKSHAFT STOPPER



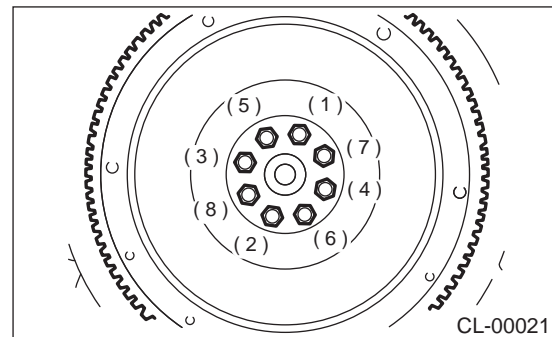
2) Tighten the flywheel attaching bolts to the specified torque.

NOTE:

Tighten the flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:

72 N·m (7.3 kgf·m, 52.8 ft·lb)



3) Install the clutch disc and cover. <Ref. to CL-9, INSTALLATION, Clutch Disc and Cover.>

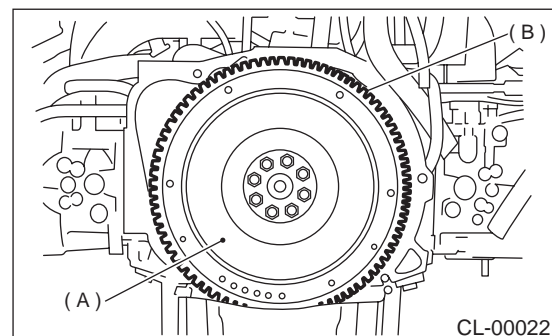
4) Install the transmission assembly. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

CAUTION:

Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent.

1) Damage of facing and ring gear
If defective, replace the flywheel.



(A) Flywheel

(B) Ring gear

2) Smoothness of rotation

Rotate the ball bearing applying pressure in thrust direction.

3) If noise or excessive play is noted, replace the flywheel.

CL-12

RELEASE BEARING AND LEVER

CLUTCH SYSTEM

4. Release Bearing and Lever

A: REMOVAL

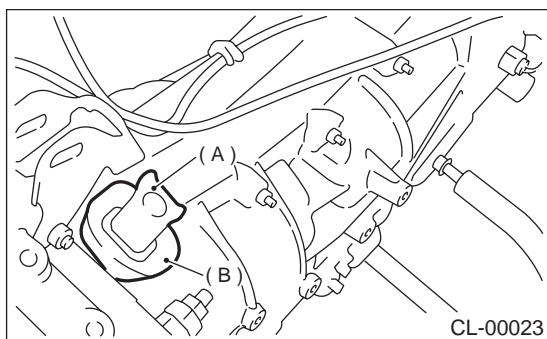
1) Remove the transmission assembly from vehicle body. <Ref. to MT-26, REMOVAL, Manual Transmission Assembly.>

2) Remove the two clips from clutch release lever and remove the release bearing.

CAUTION:

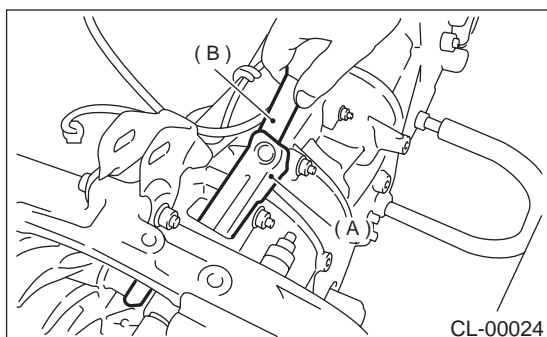
Be careful not to deform clips.

3) Remove the release lever seal.



(A) Clutch release lever
(B) Release lever seal

4) Remove the release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove the release lever.



(A) Clutch release lever
(B) Screwdriver

B: INSTALLATION

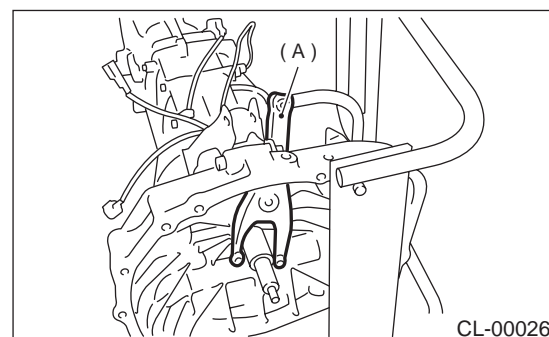
1) Before assembly, lubricate the following points with a coat of grease.

- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulphide.)
- Contact surface of lever and operating cylinder

2) While pushing the fork to pivot and twisting it to both sides, fit the retainer spring onto the constricted portion of pivot.

Apply grease (SUNLIGHT 2: P/N 003602010) to the contact point of release lever and operating cylinder.

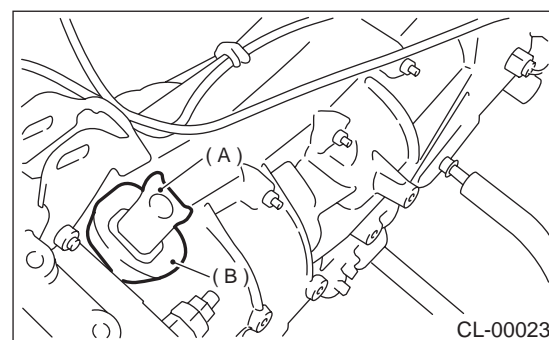
3) Confirm that the retainer spring is securely fitted by observing it through the main case hole.



(A) Release lever

4) Install the release bearing and fasten it with two clips.

5) Install the release lever seal.



(A) Release lever
(B) Release lever seal

6) Verify that the bearing moves smoothly with operating release fork.

7) Install the transmission assembly. <Ref. to MT-28, INSTALLATION, Manual Transmission Assembly.>

CL-13

RELEASE BEARING AND LEVER

CLUTCH SYSTEM

C: INSPECTION

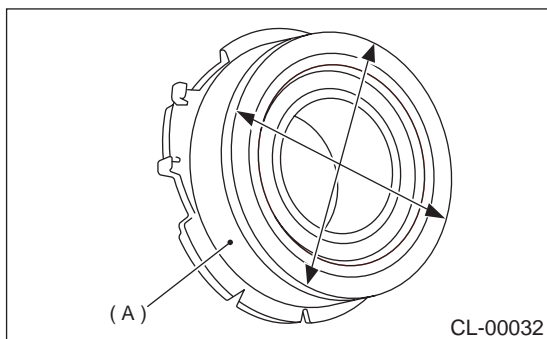
1. RELEASE BEARING

NOTE:

Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent when servicing the clutch.

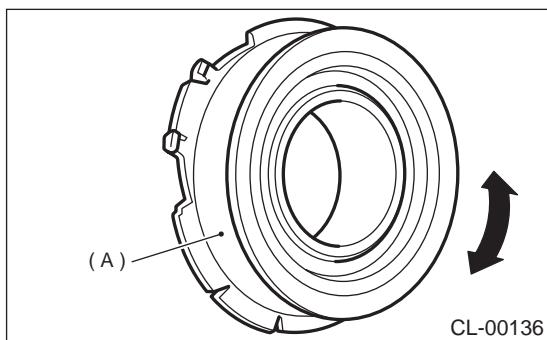
1) Check the bearing for smooth movement by applying force in the radial direction.

Radial direction stroke:
1.6 mm (0.063 in)



(A) Bearing case

2) Check the bearing for smooth rotation by applying pressure in the thrust direction.

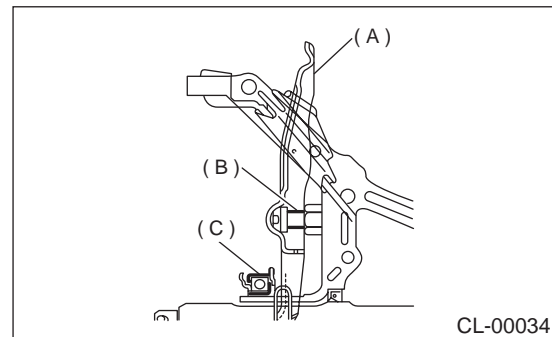


(A) Bearing case

3) Check wear and damage of the bearing case surface contacting with lever.

2. RELEASE LEVER

1) Check the lever pivot portion and the point of contact with release bearing case for wear.



- (A) Clutch release lever
- (B) Pivot
- (C) Clutch release bearing

OPERATING CYLINDER

CLUTCH SYSTEM

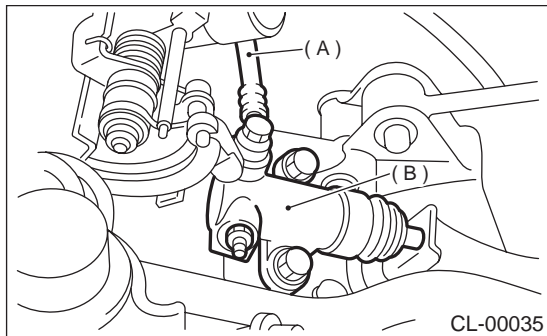
5. Operating Cylinder

A: REMOVAL

- 1) Remove the air cleaner case and air intake duct. (2.5 L model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
- 2) Remove the air intake chamber and air intake duct. (3.0 L model) <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.> and <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
- 3) Remove the clutch hose from operating cylinder.

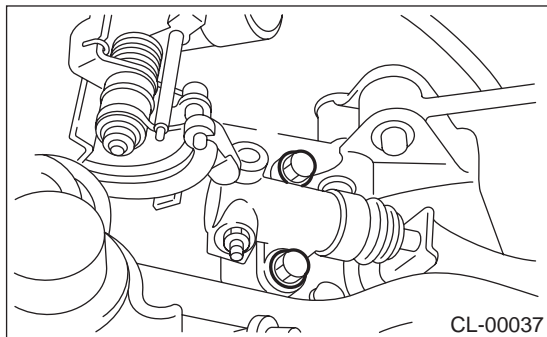
NOTE:

Cover the hose joint to prevent clutch fluid from flowing out.



- (A) Clutch hose
(B) Operating cylinder

- 4) Remove the operating cylinder from transmission.



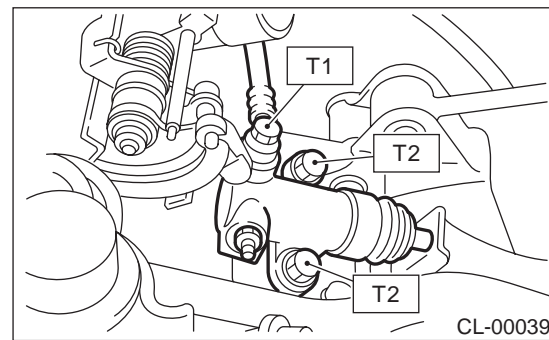
B: INSTALLATION

- 1) Apply grease (SUNLIGHT 2: P/N 003602010) to the contact point of the release lever and operating cylinder.
 - 2) Install in the reverse order of removal.
- Before installing the operating cylinder, apply grease (SUNLIGHT 2: P/N 003602010) to contact point of the release lever and operating cylinder.

Tightening torque:

T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)

T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)



- 3) After bleeding air from the operating cylinder, ensure that clutch operates properly. <Ref. to CL-20, Clutch Fluid Air Bleeding.>

C: INSPECTION

- 1) Check the operating cylinder for damage. If operating cylinder is damaged, replace it.
- 2) Check the operating cylinder for fluid leakage or damage on boot. If any leakage or damage is found, replace the operating cylinder.

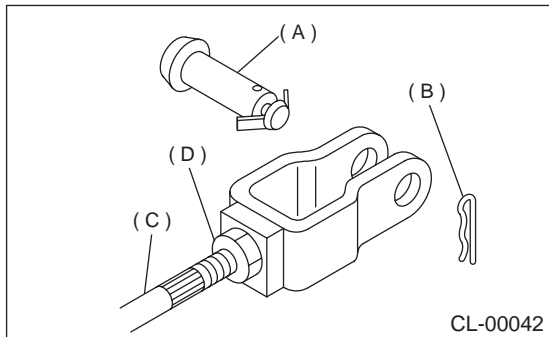
MASTER CYLINDER

CLUTCH SYSTEM

6. Master Cylinder

A: REMOVAL

- 1) Thoroughly drain the brake fluid from reservoir tank.
- 2) Remove the snap pin, clevis pin and separate the push rod of master cylinder from clutch pedal.

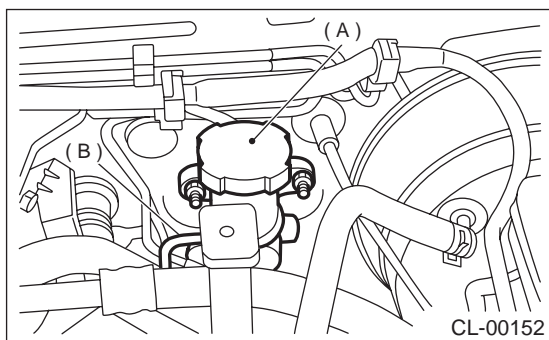


- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Lock nut

- 3) Remove the air cleaner case and air intake duct. (2.5 L model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
- 4) Remove the air intake chamber and air intake duct. (3.0 L model) <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.> and <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
- 5) Remove the clutch pipe from master cylinder.
- 6) Remove the master cylinder with reservoir tank.

CAUTION:

Be extremely careful not to spill brake fluid. Brake fluid spill on the vehicle body will harm the paint surface; immediately flush it away with water, and then wipe it off if spilt.



- (A) Master cylinder
- (B) Clutch pipe

B: INSTALLATION

- 1) Install the master cylinder to body, and install the clutch pipe to master cylinder.

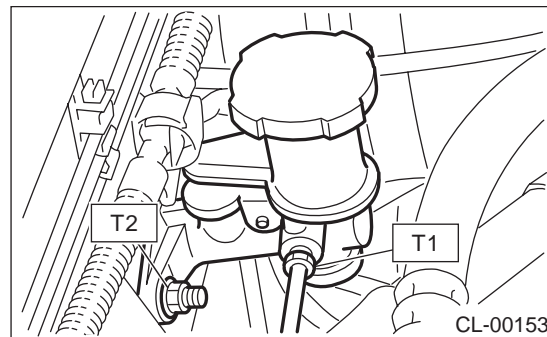
NOTE:

Check that the pipe is routed properly.

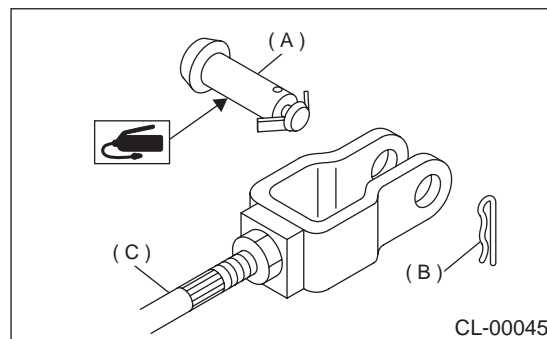
Tightening torque:

T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



- 2) Apply a coat of grease to the clevis pin.
- 3) Connect the push rod of master cylinder to clutch pedal, and install the new clevis pin and snap pin.



- (A) Clevis pin
- (B) Snap pin
- (C) Push rod

- 4) After bleeding air from the system, ensure that clutch operates properly. <Ref. to CL-20, Clutch Fluid Air Bleeding.>
- 5) Install the air cleaner case and air intake duct. (2.5 L model) <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
- 6) Install the air intake chamber and air intake duct. (3.0 L model) <Ref. to IN(H6DO)-6, INSTALLATION, Air Intake Chamber.> and <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Duct.>

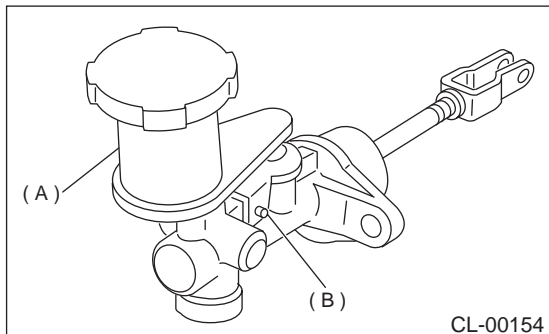
CL-16

MASTER CYLINDER

CLUTCH SYSTEM

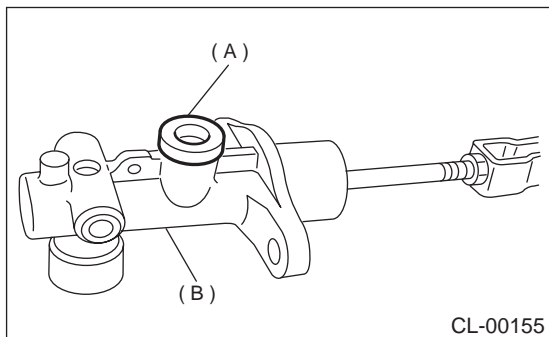
C: DISASSEMBLY

1) Remove the straight pin and reservoir tank.



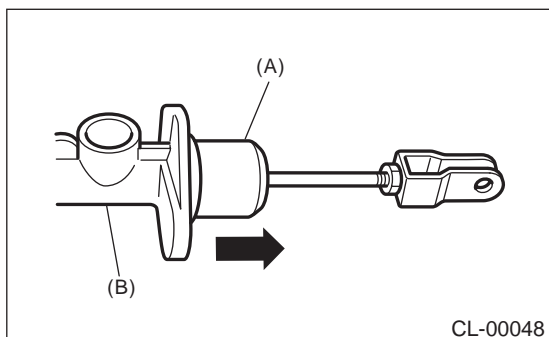
- (A) Reservoir tank
- (B) Straight pin

2) Remove the oil seal.



- (A) Oil seal
- (B) Master cylinder

3) Move the cylinder boot backward.



- (A) Cylinder boot
- (B) Master cylinder

4) Remove the stop ring.

CAUTION:

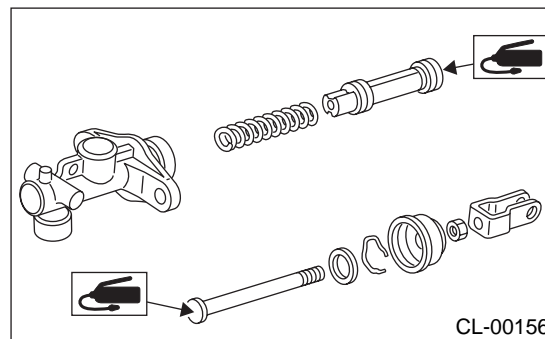
Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

D: ASSEMBLY

- 1) Install the clutch damper.
- 2) Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

Grease:

SILICONE GREASE G40M (Part No. 004404003)



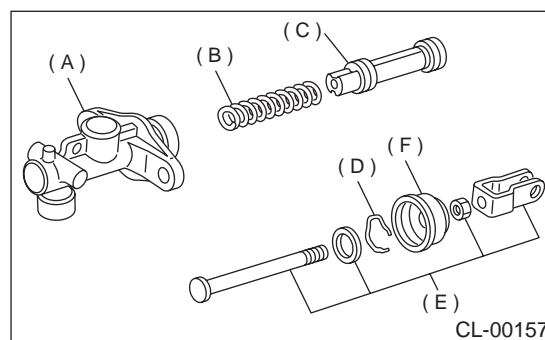
3) To assemble the master cylinder, reverse the sequence of disassembly procedure.

Tightening torque:

10 N·m (1.0 kgf·m, 7 ft·lb)

E: INSPECTION

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring, gasket, cylinder boot and hose replace the faulty part.



- (A) Master cylinder body
- (B) Return spring
- (C) Piston
- (D) Stop ring
- (E) Rod ASSY
- (F) Cylinder boot

CL-17

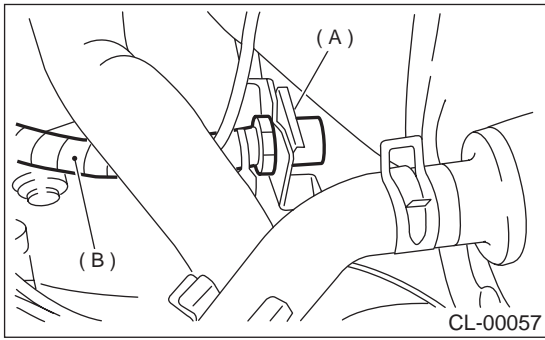
CLUTCH PIPE AND HOSE

CLUTCH SYSTEM

7. Clutch Pipe and Hose

A: REMOVAL

- 1) Remove the air cleaner case and air intake duct. (2.5 L model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
- 2) Remove the air intake chamber and air intake duct. (3.0 L model) <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.> and <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
- 3) Drain the clutch fluid. <Ref. to CL-19, REPLACEMENT, Clutch Fluid.>
- 4) Remove the clutch pipe from the clutch hose and master cylinder.
- 5) Pull out the clamp, then remove the clutch hose from bracket.



- (A) Clamp
(B) Clutch hose

- 6) Remove the hose from operating cylinder.
- 7) Remove the bracket.

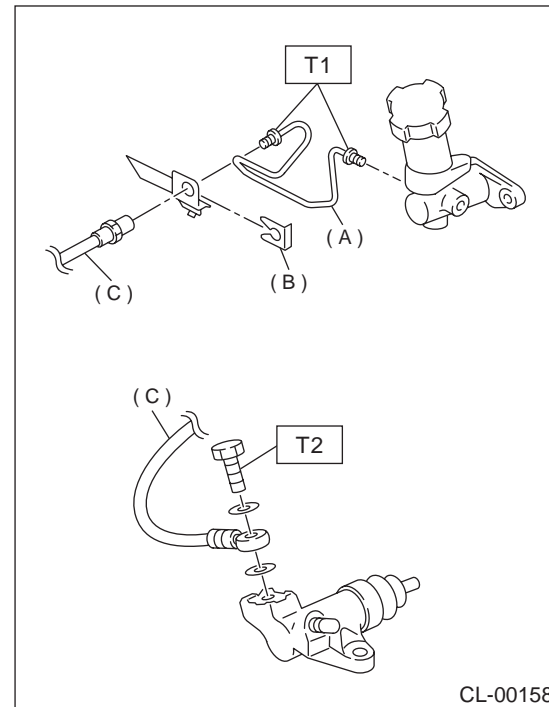
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:

T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



- (A) Clutch pipe
(B) Clip
(C) Clutch hose

C: INSPECTION

Check the pipes and hoses for cracks, breakage, or damage. Check the joints for fluid leakage. If any cracks, breakage, damage, or leakage is found, repair or replace the applicable pipe or hose.

CL-18

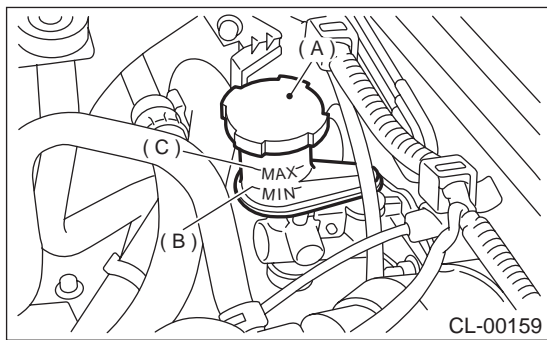
CLUTCH FLUID

CLUTCH SYSTEM

8. Clutch Fluid

A: INSPECTION

- 1) Park the vehicle on a level surface.
- 2) Inspect the fluid level using scale on the outside of the reservoir tank. If the level is below "MIN", add fluid to bring it up to "MAX", and also inspect for leakage.



- (A) Reservoir tank
(B) Min. level
(C) Max. level

B: REPLACEMENT

CAUTION:

- The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
- Cover the bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
- Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
- Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:

- For convenience and safety, it is advisable to have two men working.
- 1) Remove the air cleaner case and air duct.
 - 2) Draw out the brake fluid from reservoir tank with syringe.
 - 3) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:

FMVSS No. 116, fresh DOT3 or 4 brake fluid

- 4) Drain fluid in the same method as air bleeding.
- 5) Refill the brake fluid before reservoir tank becomes empty, and drain contaminated fluid again.
- 6) Repeat the above procedure until the contaminated fluid is completely drained.

CL-19

CLUTCH FLUID AIR BLEEDING

CLUTCH SYSTEM

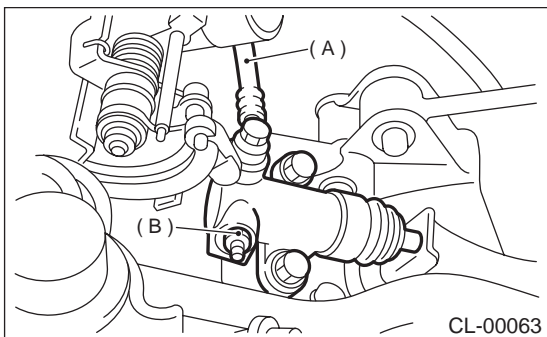
9. Clutch Fluid Air Bleeding

A: PROCEDURE

NOTE:

Bleed air from the oil line with help of co-worker.

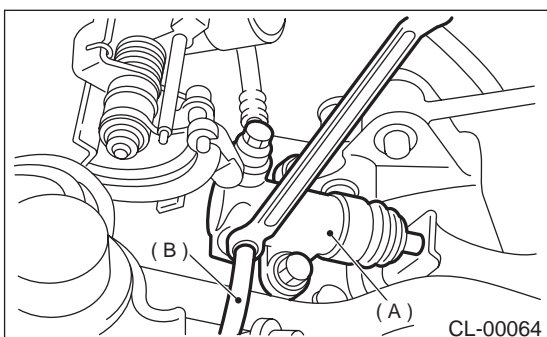
- 1) Remove the air cleaner case and air intake duct. (2.5 L model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
- 2) Remove the air intake chamber and air intake duct. (3.0 L model) <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.> and <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
- 3) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.



- (A) Clutch hose
(B) Air bleeder

- 4) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.

Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.



- (A) Operating cylinder
(B) Vinyl tube

- 5) Repeat these steps until there are no more air bubbles in the vinyl tube.

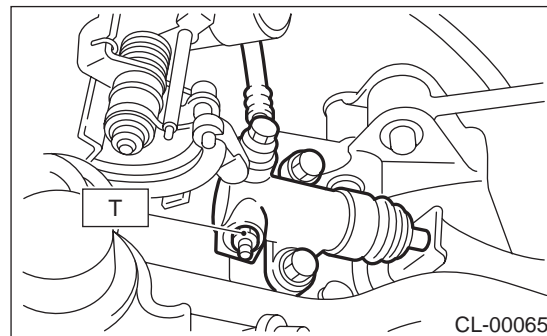
CAUTION:

Cover the bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

- 6) Tighten the air bleeder.

Tightening torque:

T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



- 7) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.
- 8) After bleeding air from the system, ensure that clutch operates properly.

CL-20

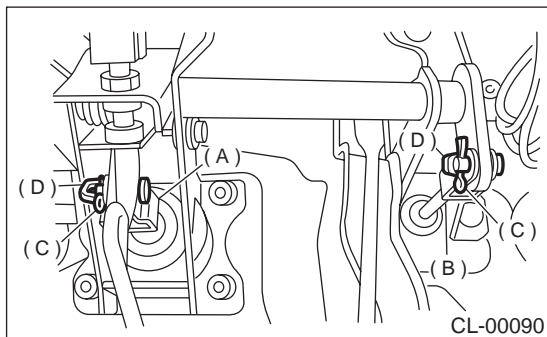
CLUTCH PEDAL

CLUTCH SYSTEM

10. Clutch Pedal

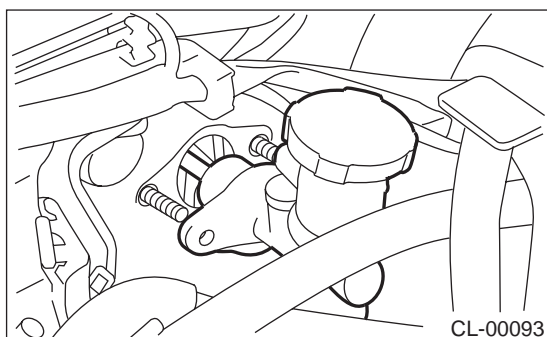
A: REMOVAL

- 1) Remove the steering column. <Ref. to PS-21, REMOVAL, Tilt Steering Column.>
- 2) Disconnect the connectors from stop light and clutch switches.
- 3) Remove the snap pins which secure lever to push rod and operating rod.
- 4) Remove the clevis pins which secure lever to push rod and operating rod.



- (A) Operating rod
(B) Push rod
(C) Snap pin
(D) Clevis pin

- 5) Remove the accelerator pedal.
2.5 L model <Ref. to SP(H4SO)-3, REMOVAL, Accelerator Pedal.>
3.0 L model <Ref. to SP(H6DO)-4, REMOVAL, Accelerator Pedal.>
- 6) Remove the air intake chamber and air intake duct. (3.0 L model) <Ref. to IN(H6DO)-6, REMOVAL, Air Intake Chamber.> and <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Duct.>
- 7) Remove the air cleaner case and intake duct. (2.5 L model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
- 8) Remove the nut which secures clutch master cylinder.



- 9) Remove the bolts and nuts which secure brake and clutch pedals, and remove the pedal assembly.

B: INSTALLATION

- 1) Install in the reverse order of removal.

Tightening torque:

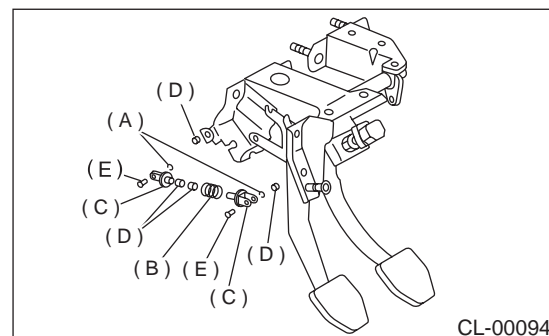
18 N·m (1.8 kgf·m, 13.0 ft·lb)

NOTE:

- Be careful not to kink the accelerator cable.
 - Always use new clevis pins.
- 2) Adjust the clutch pedal after installation. <Ref. to CL-22, ADJUSTMENT, Clutch Pedal.>
 - 3) Adjust the clutch switch (starter interlock). <Ref. to CL-26, ADJUSTMENT, Clutch Switch.>

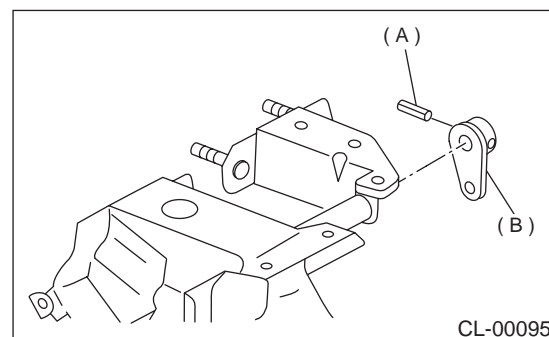
C: DISASSEMBLY

- 1) Remove the clips, assist spring, rod and bushing.



- (A) Clip
(B) Assist spring
(C) Assist rod
(D) Bushing
(E) Clevis pin

- 2) Remove the spring pin and lever.



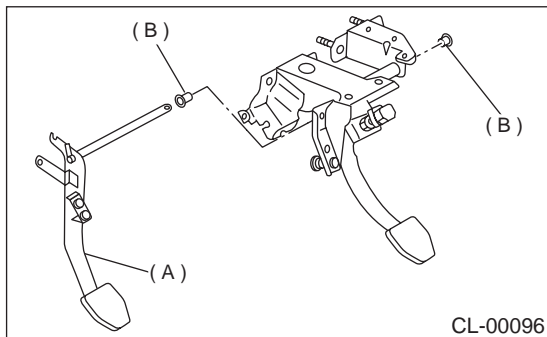
- (A) Pin
(B) Lever

CL-21

CLUTCH PEDAL

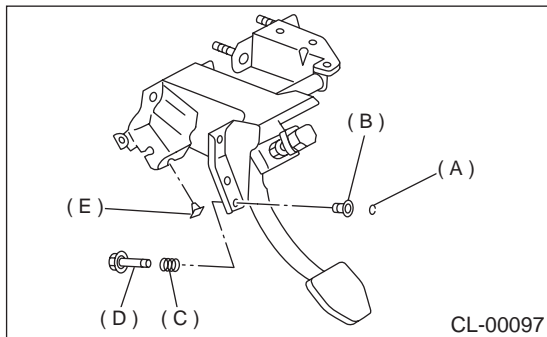
CLUTCH SYSTEM

3) Remove the clutch pedal and bushings.



- (A) Clutch pedal
(B) Bushing

4) Remove the stopper, clip, rod S, and then remove the spring and bushing S.



- (A) Clip
(B) Bushing S
(C) Spring S
(D) Rod S
(E) Stopper

5) Remove the stoppers from clutch pedal.

6) Remove the clutch pedal pad.

D: ASSEMBLY

1) Attach the stopper, etc. to pedal bracket temporarily.

2) Clean inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.

Grease:

SUNLIGHT No.2 (Part No. 003602010) or equivalent

3) Align bores of pedal bracket, clutch pedal and brake pedal, attach the brake pedal return spring, assist rods, spring, and bushing.

NOTE:

Clean up inside of bushings and apply grease before installing the spacer.

E: INSPECTION

1. CLUTCH PEDAL

Move the clutch pedal pads in the lateral direction with a force of approx. 10 N (1 kgf, 2 lb) to ensure pedal deflection is in specified range.

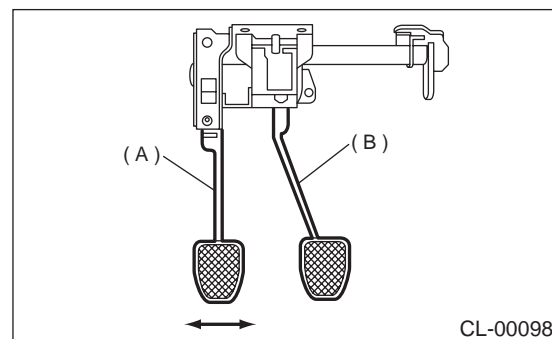
NOTE:

If excessive deflection is noted, replace the bushings with new ones.

Deflection of clutch pedal:

Service limit

5.0 mm (0.197 in) or less



- (A) Clutch pedal
(B) Brake pedal

F: ADJUSTMENT

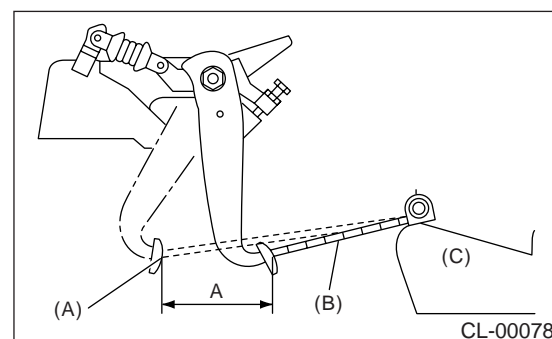
1) Measure the full stroke amount of clutch pedal.

NOTE:

- Measure the length between seat cushion front end and center portion of clutch pedal.
- Slide the seat at seventh notch from first notch.

Specified clutch pedal full stroke: A

130 — 135 mm (5.12 — 5.31 in)



- (A) Clutch (Full stroke condition)
(B) Scale
(C) Seat

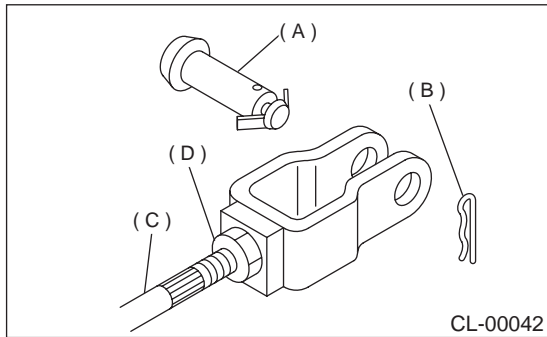
CLUTCH PEDAL

CLUTCH SYSTEM

2) If not as specified, loosen the clutch stopper nut to adjust it.

Tightening torque (Clutch stopper nut):
8 N·m (0.8 kgf·m, 5.8 ft·lb)

3) Loosen the push rod lock nut.

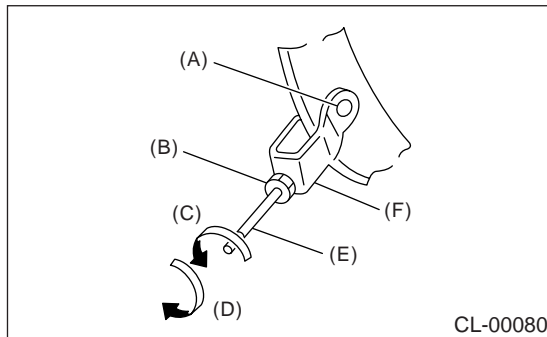


- (A) Clevis pin
- (B) Snap pin
- (C) Push rod
- (D) Push rod lock nut

4) Turn the push rod to adjust.

(1) Ensure that the clutch pedal contacts stopper bolt, when releasing the clutch pedal.

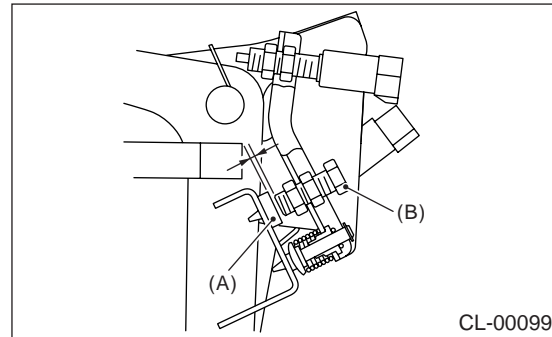
(2) Ensure that the clutch pedal contacts clutch pedal bracket stopper, when fully depressing the clutch pedal.



- (A) Clevis hole
- (B) Push rod lock nut
- (C) Lengthening direction
- (D) Shortening direction
- (E) Push rod
- (F) U shaped bracket

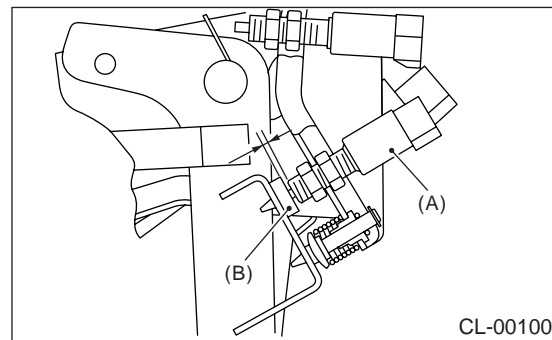
5) Turn the push rod clockwise to shorten until clearance is made at stopper bolt or clutch switch.

- Without cruise control



- (A) Stopper
- (B) Stopper bolt

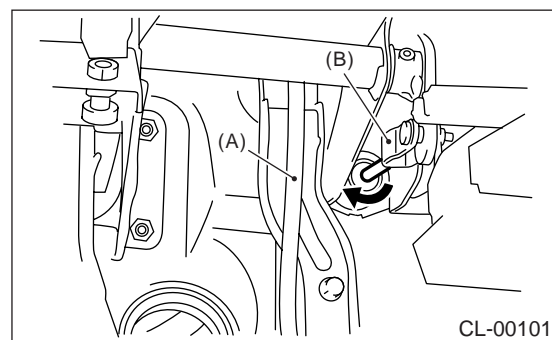
- With cruise control



- (A) Clutch switch
- (B) Stopper

6) Turn the push rod counter clockwise to lengthen until clutch pedal contacts to stopper bolt.

7) Turn the push rod further 270° counterclockwise to lengthen (arrow direction as shown in the figure).



- (A) Accelerator pedal
- (B) Clevis

8) Move the clevis pin in lateral direction to ensure it moves smoothly.

CL-23

CLUTCH PEDAL

CLUTCH SYSTEM

9) Tighten the push rod lock nut.

Tightening torque :

10 N·m (1.0 kgf-m, 7.2 ft-lb)

10) Measure the full stroke amount of clutch pedal again.

Specified clutch pedal full stroke: A

130 — 135 mm (5.12 — 5.31 in)

11) Install the clutch start switch. <Ref. to CL-25, INSTALLATION, Clutch Switch.>

CL-24

Vehicle-id:
SIE-id::F:Adjustment
~

CLUTCH SWITCH

CLUTCH SYSTEM

11. Clutch Switch

A: REMOVAL

- 1) Disconnect the ground cable from battery.
- 2) Remove the instrument panel lower cover.
- 3) Disconnect the connector from clutch switch.
- 4) Remove the clutch switch.

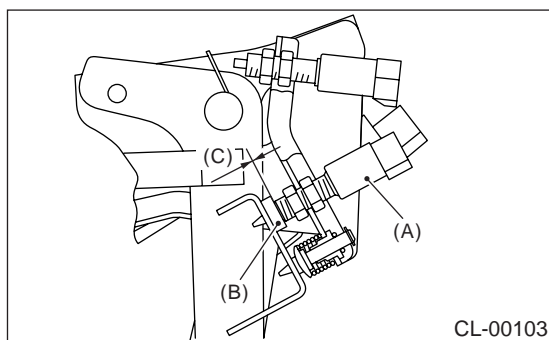
B: INSTALLATION

1. CLUTCH SWITCH (WITH CRUISE CONTROL)

- 1) Install the clutch switch and clutch pedal stopper so that the gap between them is 0 mm (0 in).

Tightening torque:

8 N·m (0.8 kgf·m, 5.8 ft·lb)

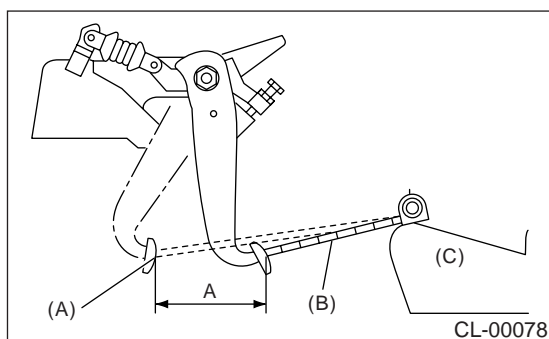


- (A) Clutch switch
(B) Stopper
(C) 0 mm (0 in)

- 2) Measure stroke of clutch pedal.

Specified clutch pedal full stroke: A

130 — 135 mm (5.12 — 5.31 in)



- (A) Clutch (Full stroke condition)
(B) Scale
(C) Seat

- 3) If the clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-22, ADJUSTMENT, Clutch Pedal.>

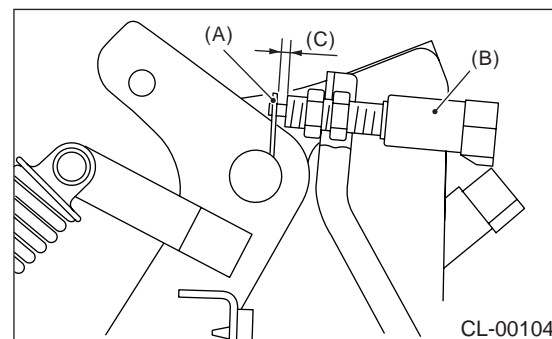
- 4) Connect clutch switch connector.

2. CLUTCH SWITCH (STARTER INTER-LOCK)

- 1) Fully depress the clutch pedal.
- 2) Install the clutch pedal plate and clutch pedal so that the gap between them is 3 — 3.5 mm (0.12 — 0.14 in), and then tighten the lock nut.

Tightening torque:

8 N·m (0.8 kgf·m, 13.0 ft·lb)



- (A) Plate
(B) Clutch pedal
(C) 3 — 3.5 mm (0.12 — 0.14 in)

- 3) Connect the clutch switch connector.
- 4) Confirm that the engine does not start when the clutch pedal is released.
- 5) Confirm that the engine starts when the clutch pedal is fully depressed.

CL-25

CLUTCH SWITCH

CLUTCH SYSTEM

C: INSPECTION

- 1) Confirm that the engine does not start when the clutch pedal is released. If the engine starts, adjust the clutch switch and inspect the starter interlock circuit.
- 2) Confirm that the engine starts when the clutch pedal is fully depressed. If the engine does not start, adjust the clutch switch and inspect the starter interlock circuit.
- 3) Check the clutch switch continuity. If continuity is not as specified, replace the switch.
 - (1) Disconnect the clutch switch connector.
 - (2) Measure the resistance between 1 and 2 of switch terminal.

Terminals/Specified resistance

When clutch pedal depressed:

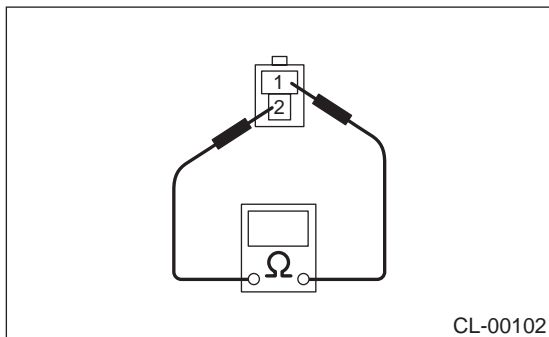
1 — 2/Less than 1 Ω

Terminals/Specified resistance

When clutch pedal not depressed:

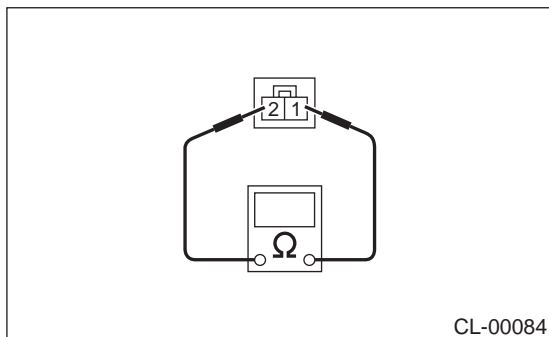
1 — 2/More than 1 M Ω

Clutch switch (Starter interlock)



CL-00102

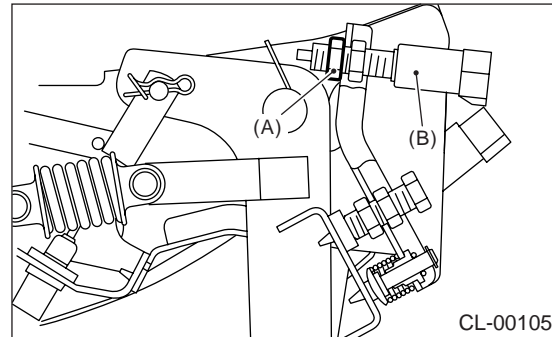
Clutch switch (With cruise control)



CL-00084

D: ADJUSTMENT

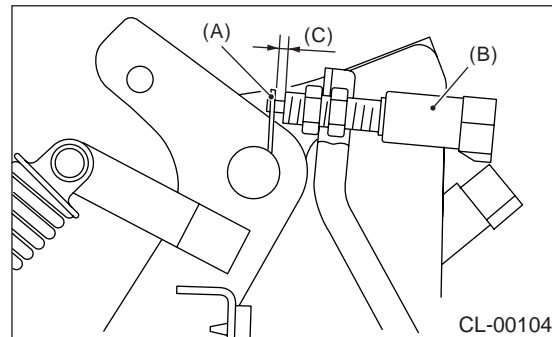
- 1) Loosen the clutch switch mounting lock nut (Starter interlock).



CL-00105

- (A) Lock nut
(B) Clutch switch (Starter interlock)

- 2) Fully depress the clutch pedal.
- 3) Adjust the clutch pedal plate and clutch switch so that the gap between them is 3 — 3.5 mm (0.12 — 0.14 in).



CL-00104

- (A) Plate
(B) Clutch switch (Starter interlock)
(C) 3 — 3.5 mm (0.12 — 0.14 in)

- 4) Tighten the lock nut.

Tightening torque (Clutch stopper nut):
8 N·m (0.8 kgf·m, 13.0 ft·lb)

GENERAL DIAGNOSTIC TABLE

CLUTCH SYSTEM

12.General Diagnostic Table

A: INSPECTION

1. CLUTCH

Symptom	Possible cause	Corrective
1. Clutch slippage. It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms <ul style="list-style-type: none"> • Engine speed up when shifting. • High speed driving is impossible; especially rapid acceleration impossible and vehicle speed does not increase in proportion to an increase in engine speed. • Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing. • Method of testing: Put the vehicle in stationary condition with parking brake fully applied. Disengage the clutch and shift the transmission gear into the first. Gradually allow the clutch to engage while gradually increasing the engine speed. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not start off and the engine does not stall. 	(a) Clutch facing smeared by oil	Replace.
	(b) Worn clutch facing	Replace.
	(c) Deteriorated diaphragm spring	Replace.
	(d) Distorted pressure plate or flywheel	Correct or replace.
	(e) Defective release bearing holder	Correct or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise develops and control becomes quite difficult when shifting gears. The symptom becomes more apparent when shifting into the first gear. However, because much trouble of this sort is due to defective synchronization mechanism, carry out the test as described after. <ul style="list-style-type: none"> • Method of testing: <Ref. to CL-28, DIAGNOSTIC DIAGRAM OF CLUTCH DRAG, INSPECTION, General Diagnostic Table.> It may be judged as insufficient disengagement of clutch if any noise occurs during this test.	(a) Worn or rusty clutch disc hub spline	Replace the clutch disc.
	(b) Excessive deflection of clutch disc facing	Replace.
	(c) Malfunction of crankshaft pilot bearing	Replace.
	(d) Cracked clutch disc facing	Replace.
	(e) Sticked clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole body when the vehicle is just started with clutch partially engaged.	(a) Adhesion of oil on the facing	Replace the clutch disc.
	(b) Weak or broken torsion spring	Replace the clutch disc.
	(c) Defective facing contact or excessive disc worn	Replace the clutch disc deflection.
	(d) Warped pressure plate or flywheel	Correct or replace.
	(e) Loose disc rivets	Replace the clutch disc.
	(f) Loose engine mounting	Retighten or replace the mounting.
	(g) Improper adjustment of pitching stopper	Adjustment.
4. Noisy clutch Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or unlubricated release bearing	Replace the release bearing.
	(b) Insufficient lubrication of pilot bearing	Replace the clutch disc.
	(c) Loose clutch disc hub	Replace the clutch disc.
	(d) Loose torsion spring retainer	Replace the clutch disc.
	(e) Deteriorated or broken torsion spring	Replace the clutch disc.

CL-27

GENERAL DIAGNOSTIC TABLE

CLUTCH SYSTEM

Symptom	Possible cause	Corrective
5. Clutch grabs. When starting the vehicle with the clutch partially engaged, the clutch engages suddenly and the vehicle jumps instead of making a smooth start.	(a) Grease or oil on facing	Replace the clutch disc.
	(b) Deteriorated cushioning spring	Replace the clutch disc.
	(c) Worn or rusted spline of clutch disc or main shaft	Take off rust, apply grease or replace the clutch disc or main shaft.
	(d) Deteriorated or broken torsion spring	Replace the clutch disc.
	(e) Loose engine mounting	Retighten or replace the mounting.
	(f) Deteriorated diaphragm spring	Replace.

2. CLUTCH PEDAL

Trouble	Corrective action
Insufficient pedal play	Adjust pedal play.
Clutch pedal free play insufficient	Adjust pedal free play.
Excessively worn and damaged pedal shaft and/or bushing	Replace the bushing and/or shaft with a new one.

3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG

Step	Value	Yes	No
1 CHECK GEAR NOISE. 1) Start the engine. 2) Disengage the clutch and shift quickly from neutral to reverse in idling condition. Is there any abnormal noise from the transmission gear?	There is abnormal noise from transmission gear.	Go to step 2.	Clutch is normal.
2 CHECK GEAR NOISE. Disengage the clutch at idle and shift from neutral to reverse within 0.5 — 1.0 seconds. Is there any abnormal noise from the transmission gear?	There is abnormal noise from transmission gear.	Go to step 3.	Defective transmission or excessive clutch drag torque. Inspect the pilot bearing, clutch disc, transmission and clutch disc hub spline.
3 CHECK GEAR NOISE. 1) Disengage the clutch at idle and shift from neutral to reverse within 0.5 — 1.0 seconds. 2) With the clutch disengaged, shift from N to R, R to N several times. Is there any abnormal noise from the transmission gear?	There is abnormal noise from transmission gear.	Defect in clutch disengaging. Inspect the clutch disc, clutch cover, clutch release, and clutch pedal free play.	Clutch and fly-wheel seizure. Inspect the clutch disc, spline of clutch disc hub.