TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
MANUAL TRANSMISSION AND DIFFERENTIAL	6MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G1860GE4

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CONTROL SYSTEMS

CS

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1. General Description

A: SPECIFICATIONS

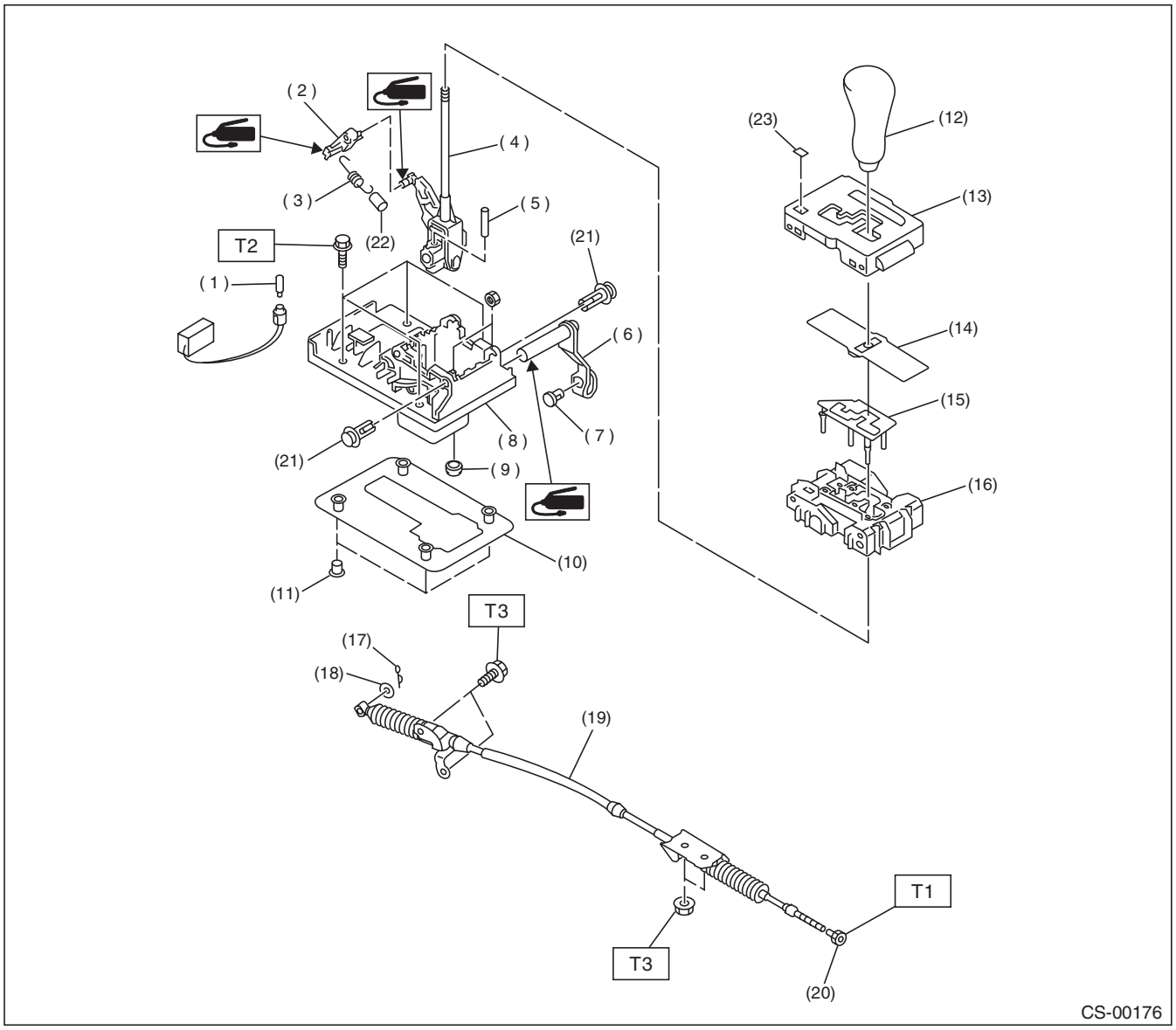
Item		Specification
Swing torque of rod against lever	N (kgf, lb)	3.7 (0.38, 0.84) or less

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B: COMPONENT

1. AT SELECT LEVER

• EXCEPT SPORT SHIFT MODEL

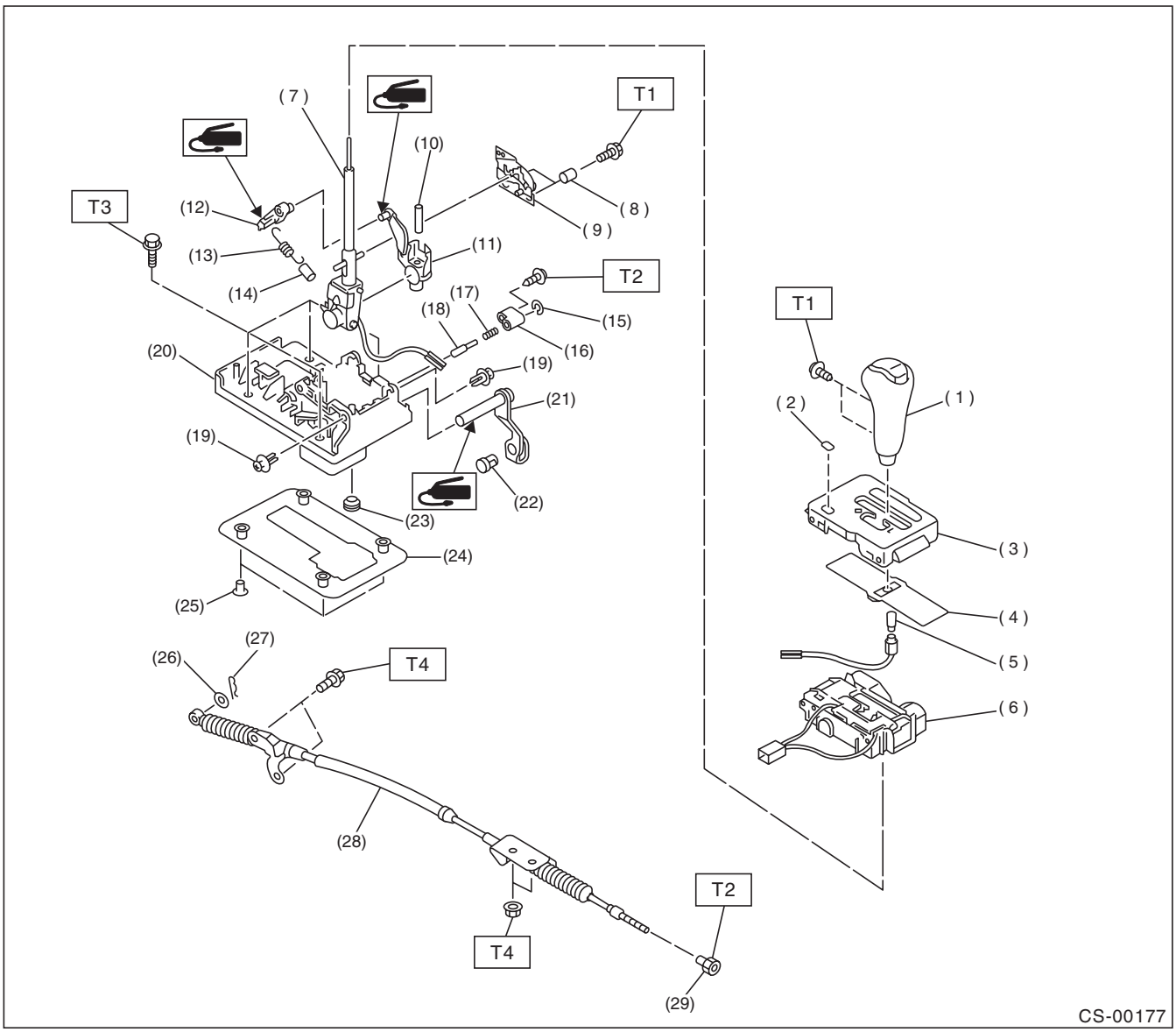


(1) Bulb
(2) Detent arm
(3) Detent spring
(4) Select lever ASSY
(5) Spring pin
(6) Arm ASSY
(7) Bushing
(8) Plate
(9) Grommet
(10) Packing
(11) Spacer
(12) Grip
(13) Indicator cover
(14) Blind
(15) Cushion plate
(16) Guide plate
(17) Snap pin
(18) Washer
(19) Selector cable
(20) Nut A
(21) Clip
(22) Tube
(23) Cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 13 (1.3, 9.4)
T3: 18 (1.8, 13.0)

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• SPORT SHIFT MODEL

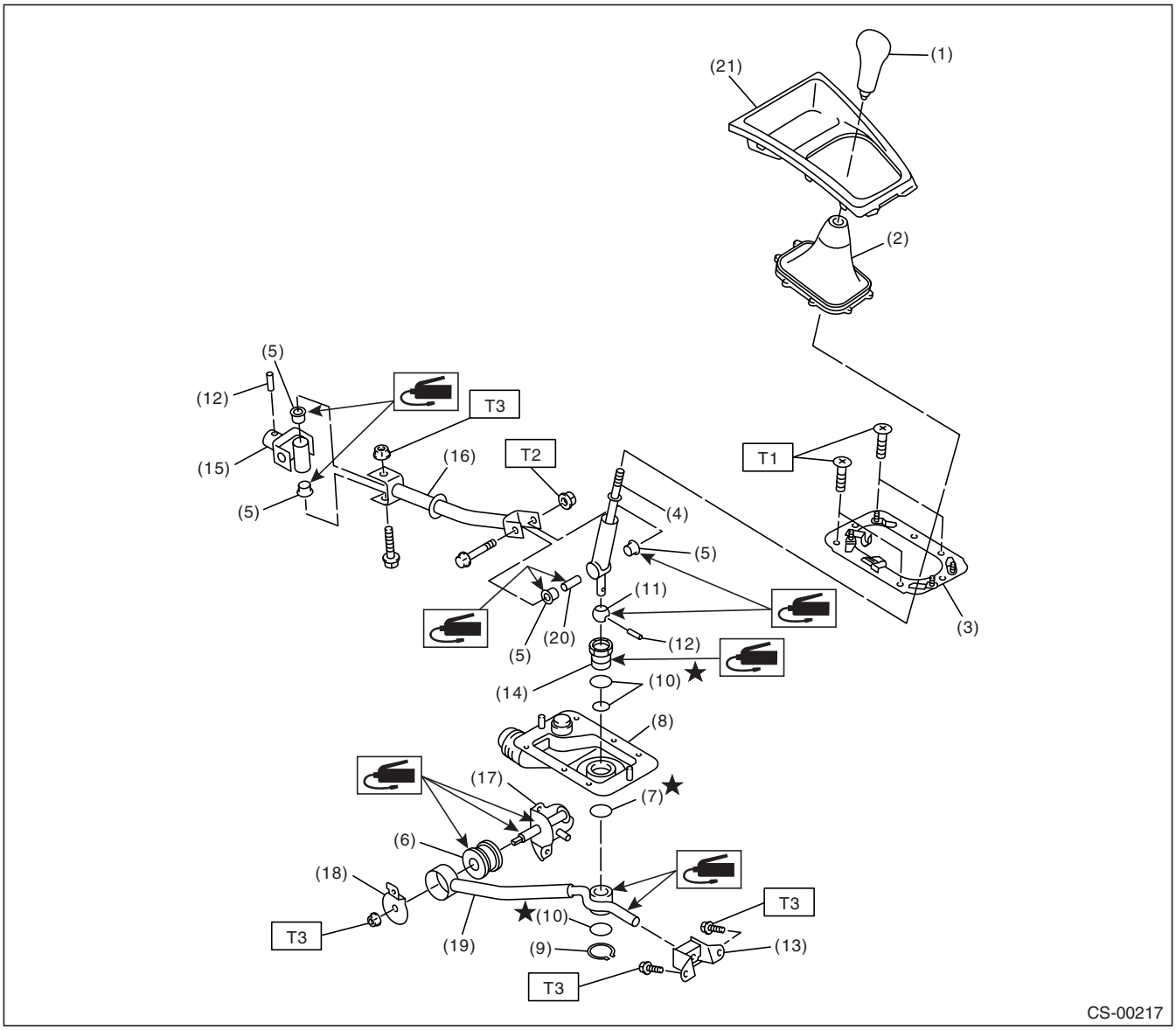


(1) Grip
(2) Cover
(3) Indicator cover
(4) Blind
(5) Bulb
(6) Guide plate
(7) Lever
(8) Spacer
(9) Bracket guide
(10) Spring pin
(11) Arm bracket
(12) Detent arm
(13) Detent spring
(14) Tube
(15) Clip
(16) Bushing
(17) Spring
(18) Rod
(19) Clip
(20) Base plate
(21) Arm
(22) Bushing
(23) Grommet
(24) Packing
(25) Spacer
(26) Washer
(27) Snap pin
(28) Select cable
(29) Nut A

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)

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2. 5MT GEAR SHIFT LEVER

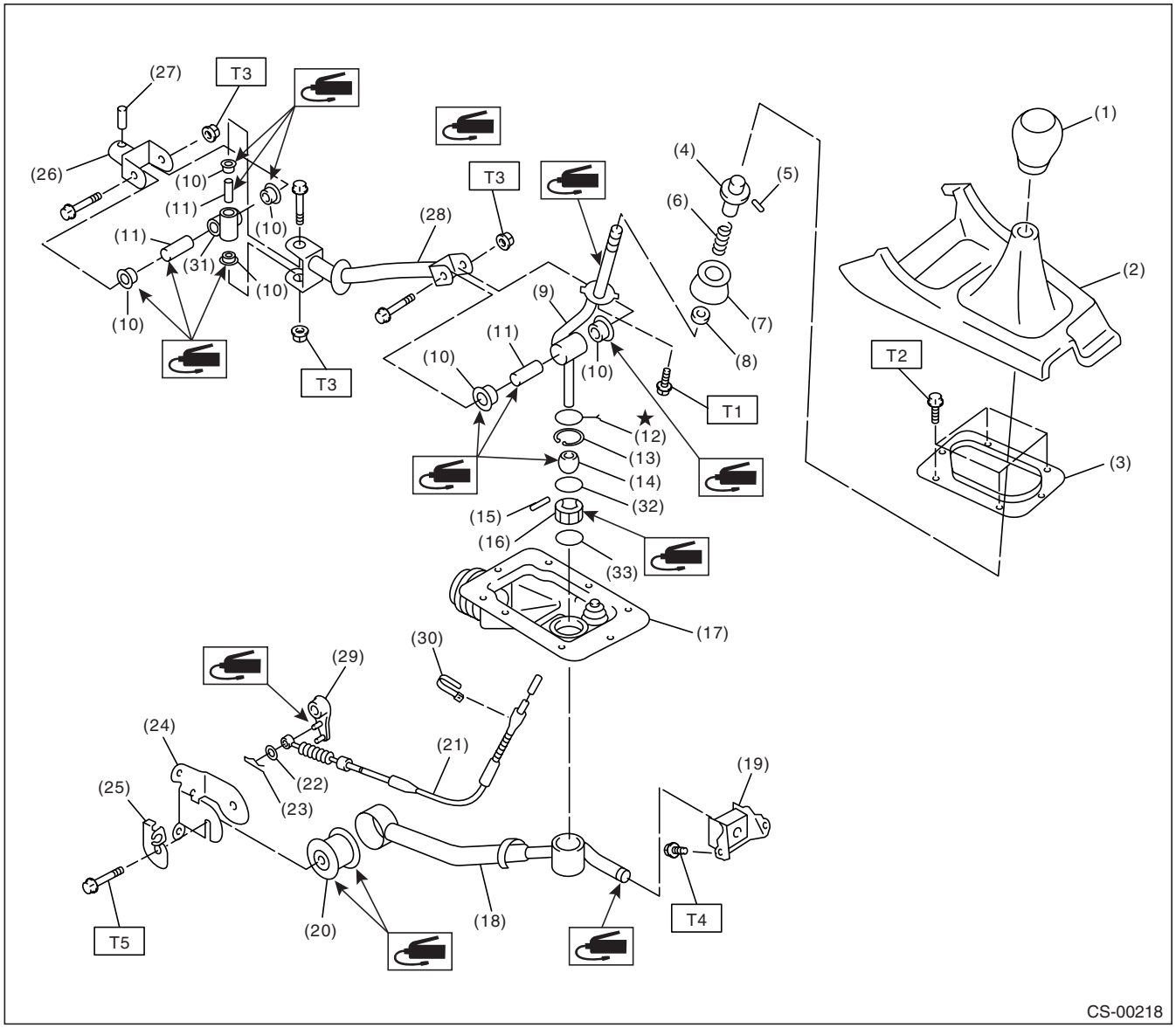


(1) Gear shift knob
(2) Console boot
(3) Plate ASSY
(4) Lever
(5) Bushing
(6) Bushing
(7) Lock wire
(8) Boot
(9) Snap ring
(10) O-ring
(11) Bushing A
(12) Spring pin
(13) Cushion rubber
(14) Bushing B
(15) Joint
(16) Rod
(17) Bracket
(18) Washer
(19) Stay
(20) Spacer
(21) Front cover

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)

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3. 6MT GEAR SHIFT LEVER

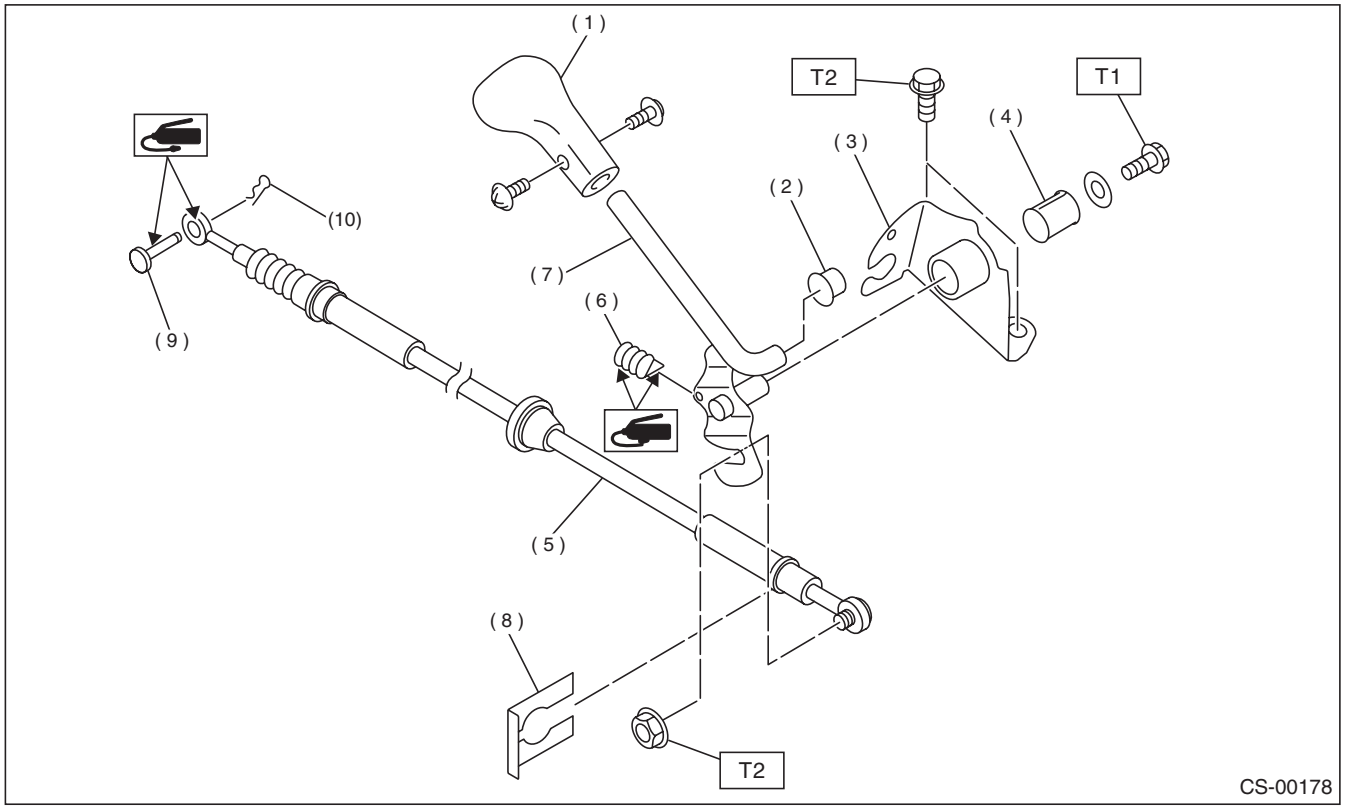


(1) Gear shift knob
(2) Console box front
(3) Plate
(4) Slider
(5) Spring pin
(6) Spring
(7) Holder
(8) Seat cushion
(9) Lever
(10) Bush
(11) Spacer
(12) Lock wire
(13) Snap ring
(14) Bush
(15) Spring pin
(16) Bush
(17) Boot
(18) Stay
(19) Cushion rubber
(20) Bush
(21) Reverse check cable
(22) Washer
(23) Snap pin
(24) Bracket
(25) Cable plate
(26) Joint
(27) Spring pin
(28) Rod
(29) Reverse check lever
(30) Band clip
(31) Boss
(32) O-ring
(33) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.3 (0.13, 0.96)
T2: 7.5 (0.76, 5.5)
T3: 11.8 (1.2, 8.7)
T4: 18 (1.8, 13.0)
T5: 32 (3.3, 23.6)

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4. DRIVE SELECT LEVER



(1) Knob
(2) Cushion
(3) Plate ASSY
(4) Bushing
(5) Cable
(6) Spring
(7) Lever ASSY
(8) Clip
(9) Clevis pin
(10) Snap pin

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.6 (0.16, 1.2)
T2: 18 (1.8, 13.0)

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C: CAUTION

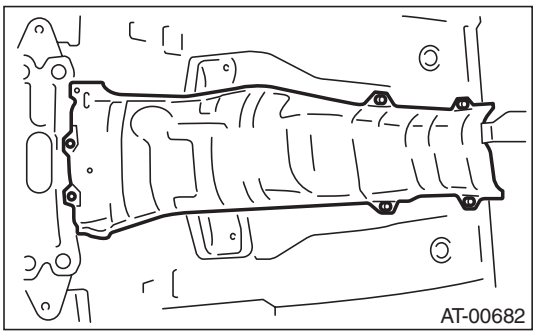
• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation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

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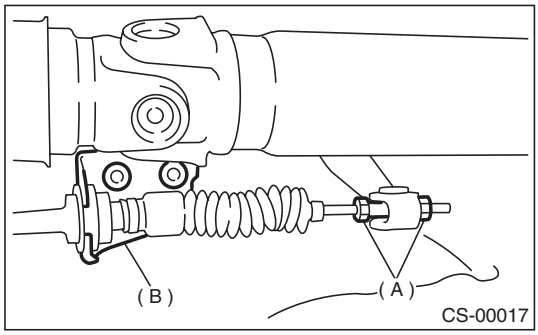
2. Select Lever

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect negative cable from battery.
3) Set the select lever to the “N” range.
4) Lift-up the vehicle.
5) Remove rear exhaust pipe and muffler.
SOHC model
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
SOHC without OBD model
<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>
DOHC turbo model
<Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
6) Remove heat shield cover. (If equipped)

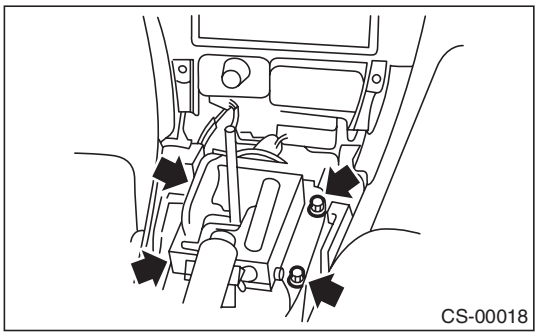


7) Disconnect cable from select lever, and then remove the cable bracket.



(A) Adjusting nuts
(B) Cable bracket

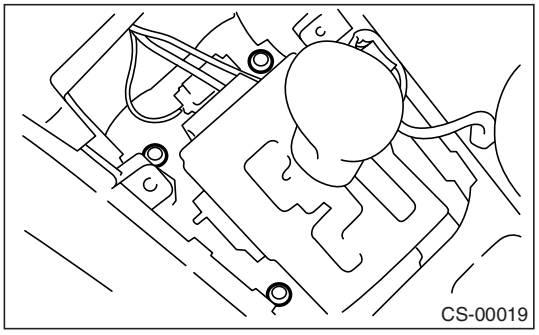
8) Lower the vehicle.
9) Remove console box. <Ref. to EI-42, REMOVAL, Console Box.>
10) Disconnect the connectors, then remove the four bolts to take out the select lever assembly from the body.



B: INSTALLATION

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

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



3) Install console box. <Ref. to EI-42, INSTALLATION, Console Box.>
4) Set location of select lever at “N” range.
5) Lift-up the vehicle.
6) Set location of range select lever to “N” range.
7) Insert the thread portion of the other inner cable and into the connector hole of the select lever, and fix the other outer cable end to the bracket.

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

8) Adjust the select cable position. <Ref. to CS-15, 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)

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11) Install rear exhaust pipe and muffler.
SOHC model
<Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
SOHC without OBD model
<Ref. to EX(H4SOw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, INSTALLATION, Muffler.>
DOHC turbo model
<Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, INSTALLATION, Muffler.>
12) Inspect the following items. If the following inspection reveals problems, adjust the select cable and inhibitor switch. <Ref. to CS-15, ADJUSTMENT, Select Cable.> and <Ref. to 4AT-49, ADJUSTMENT, Inhibitor Switch.>

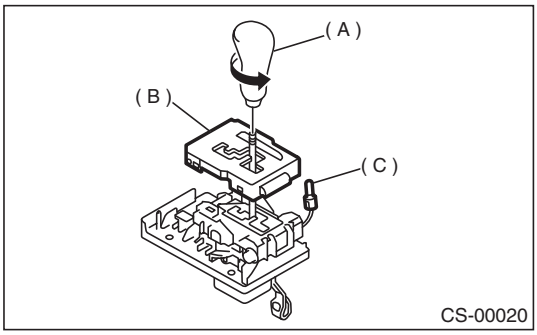
(1) The engine starts operating when select lever is in range “P” and “N”, but not in other positions.
(2) The back-up light is lit when the select lever is in range “R”, but not in other ranges.
(3) Select lever and indicator ranges are matched.

C: DISASSEMBLY

1. EXCEPT SPORT SHIFT MODEL

1) Remove the grip.
2) Remove the bulb, and then remove the indicator cover.

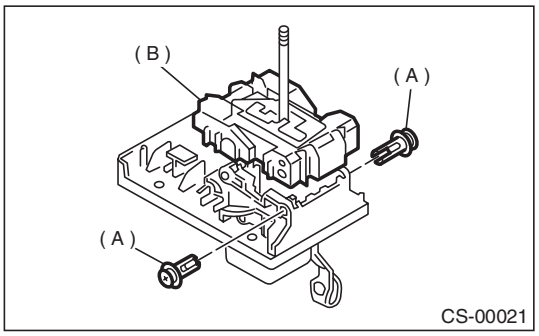
NOTE:
Be careful not to break the bulb during removal.



(A) Grip
(B) Indicator cover
(C) Bulb

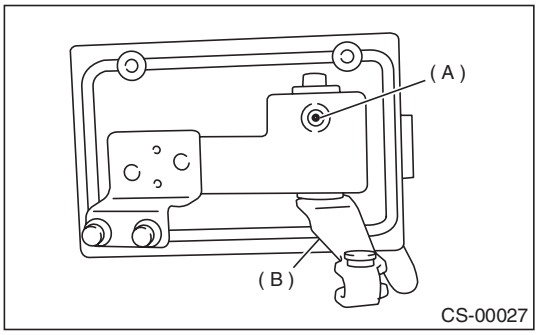
3) Remove blind.

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



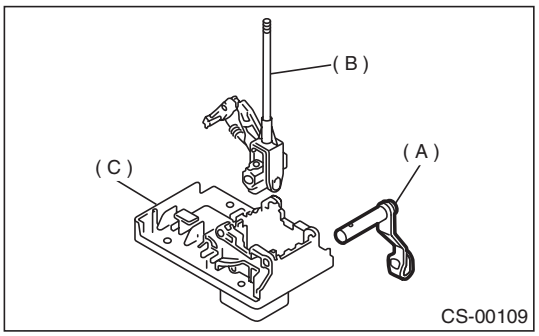
(A) Clips
(B) Guide plate

5) Remove the cap, and then the extract spring pin.



(A) Spring pin
(B) Arm ASSY

6) Remove the arm assembly, and then take away the lever from base plate.

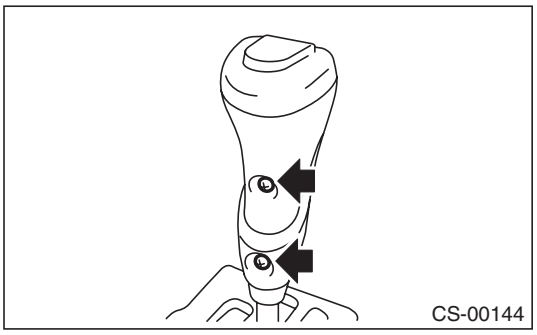


(A) Arm ASSY
(B) Lever
(C) Base plate

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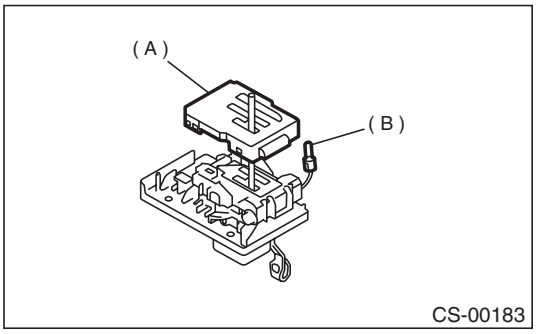
2. SPORT SHIFT MODEL

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



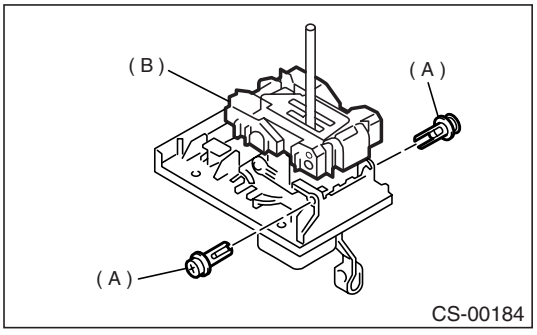
3) Remove the bulb, and then remove the indicator cover.

NOTE:
Be careful not to break the bulb during removal.



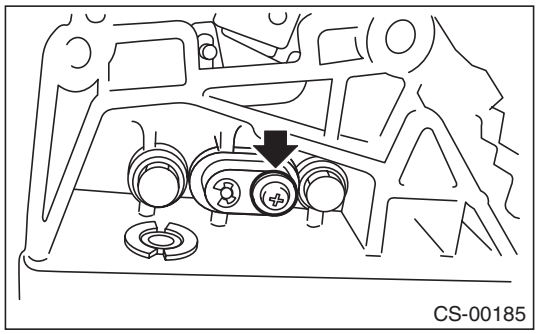
(A) Indicator cover
(B) Bulb

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

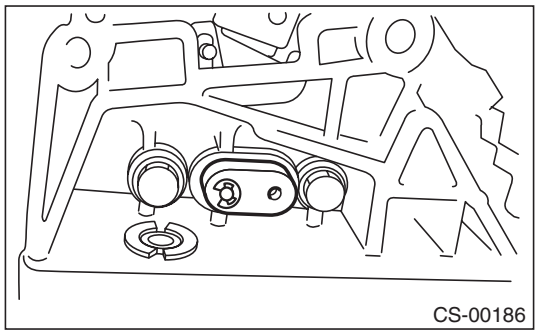


(A) Clips
(B) Guide plate

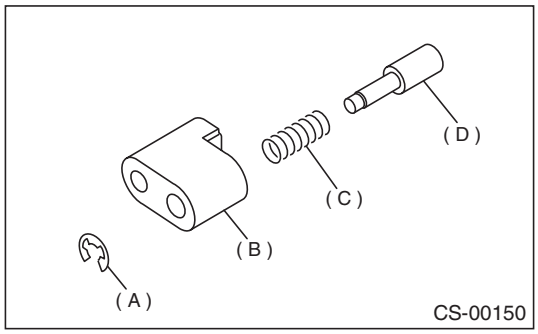
6) Remove the screw.



7) Remove the bushing.

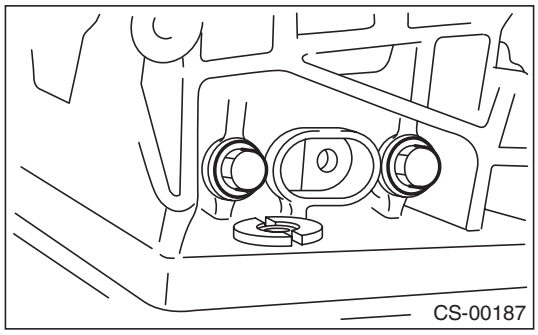


8) Remove the clip, and then remove the rod and the spring.



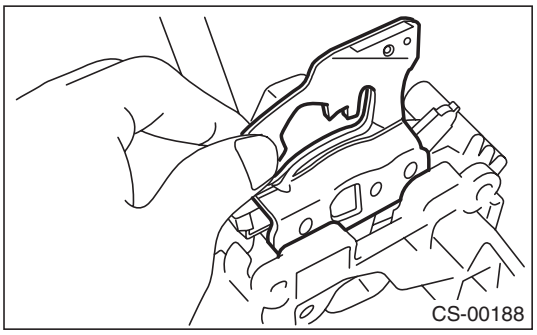
(A) Clip
(B) Bushing
(C) Spring
(D) Rod

9) Remove the bolt.

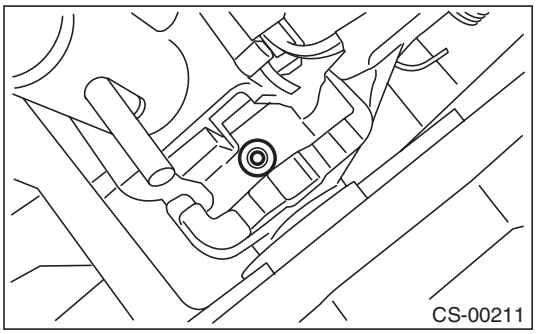


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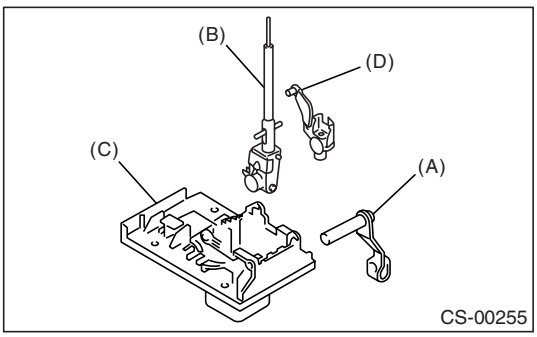
10) Remove the bracket guide assembly.



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



12) Remove the arm assembly and then take away the lever and arm bracket from base plate.



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

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

D: ASSEMBLY

1) Clean all parts before assembly.
2) Apply grease [KOPR-KOTE (Part No. 003603001) or equivalent] to each parts. <Ref. to CS-3, AT SELECT LEVER, 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

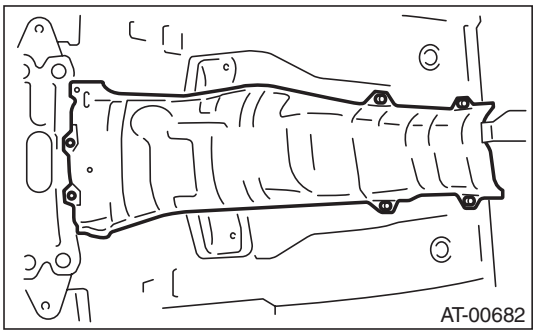
1) Inspect the removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
2) Confirm the following parts for operating condition before assembly. Moving condition of the select lever assembly, it should move smoothly.

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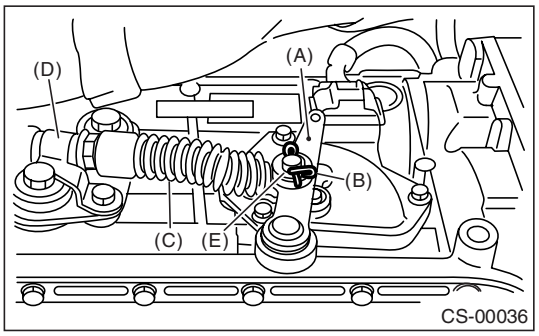
3. Select Cable

A: REMOVAL

1) Set the vehicle on a lift.
2) Set the select lever to “N” range.
3) Disconnect negative cable from battery.
4) Lift-up the vehicle.
5) Remove front, center, rear exhaust pipe and muffler. (Non-turbo model)
SOHC model
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
SOHC without OBD model
<Ref. to EX(H4SOw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SOw/oOBD)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>
6) Remove the center and rear exhaust pipes and muffler. (DOHC turbo model)
<Ref. to EX(H4DOTC)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
7) Remove the heat shield cover. (If equipped)

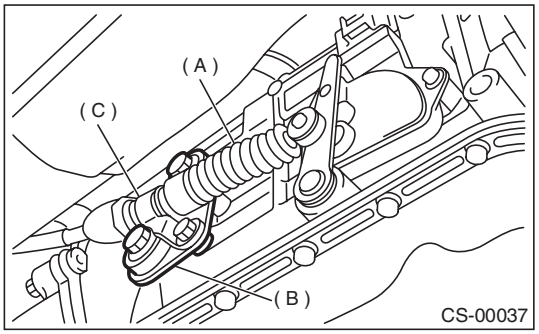


8) Remove the snap pin and washer from range select lever.



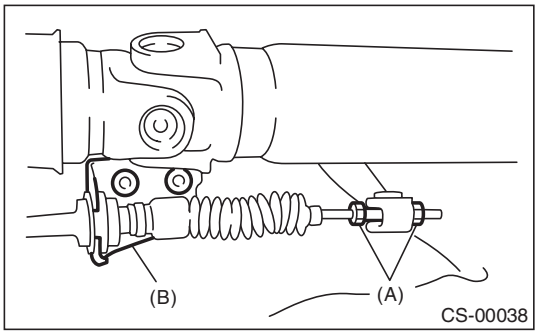
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Clamp
(E) Washer

9) Remove the plate assembly from transmission case.



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

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



(A) Adjusting nuts
(B) Cable bracket

11) Remove the select cable from plate assembly.

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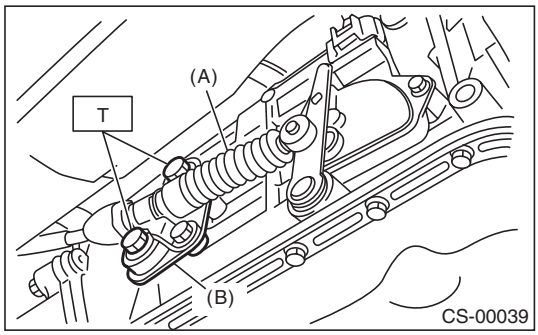
B: INSTALLATION

1) Install the select cable to plate assembly.

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

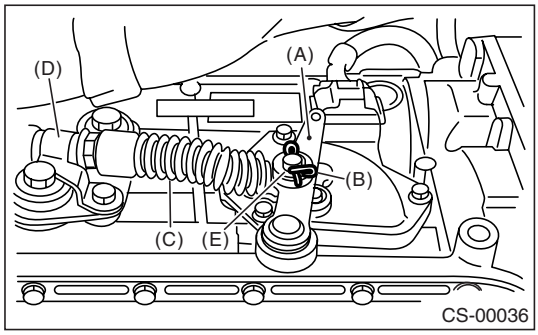
2) Install the select cable to range select lever.
3) Install the plate assembly to transmission.

Tightening torque:
T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Select cable
(B) Plate ASSY

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



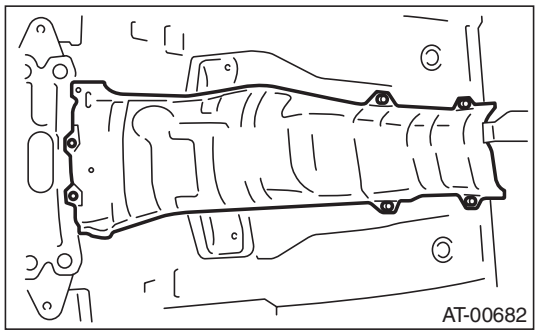
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Clamp
(E) Washer

5) Insert the thread portion of other inner cable and into connector hole of select lever, and fix the other outer cable end to the bracket.

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

6) Move the select lever to “N” range, and then adjust the select cable position. <Ref. to CS-15, ADJUSTMENT, Select Cable.>

7) Install the heat shield cover.



8) Install the front, center, rear exhaust pipe and muffler. (Non-turbo model)
SOHC model
<Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
SOHC without OBD model
<Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SOw/oOBD)-9, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(H4SOw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, INSTALLATION, Muffler.>
9) Install center and rear exhaust pipes and muffler. (DOHC turbo model)
<Ref. to EX(H4DOTC)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, INSTALLATION, Muffler.>

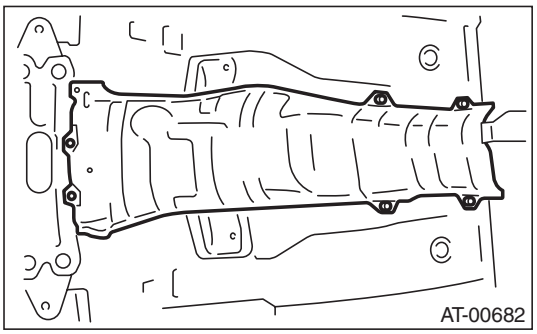
C: INSPECTION

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” range to “1” range. You should be able to feel the detents in each position. If the detents cannot be felt or the position pointer is improperly aligned, adjust the cable.

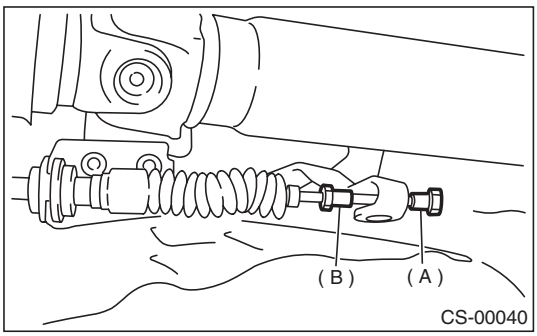
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D: ADJUSTMENT

1) Set the select lever to “N” range.
2) Remove rear exhaust pipe and muffler.
SOHC model
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
SOHC without OBD model
<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>
DOHC turbo model
<Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
3) Remove heat shield cover. (If equipped)

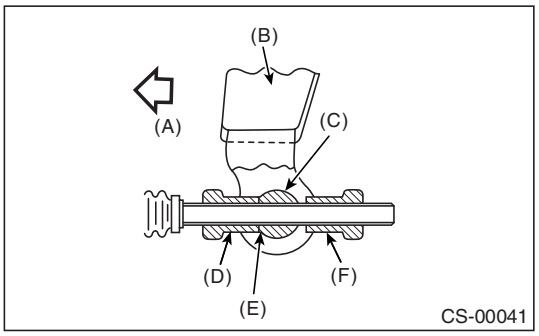


4) Loosen the adjusting nut on each side.



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

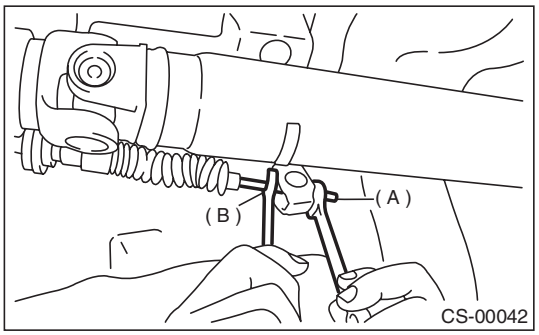
5) Turn the adjusting nut B until it lightly touches the connector.



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

6) 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

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

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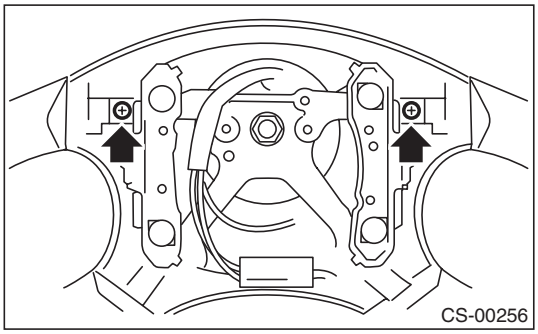
4. AT Steering Shift Switch

A: REMOVAL

1) Remove the ground cable from battery.
2) Position the wheels in a straight-ahead position.
3) Remove the airbag module. <Ref. to AB-12, REMOVAL, Driver's Airbag Module.>

WARNING:
When the airbag is equipped, the airbag module should be repaired by referring to "Airbag System". <Ref. to AB-12, REMOVAL, Driver's Airbag Module.>

4) Remove the RH and LH screws retaining the AT steering shift switch.



5) Remove the AT steering shift switch.

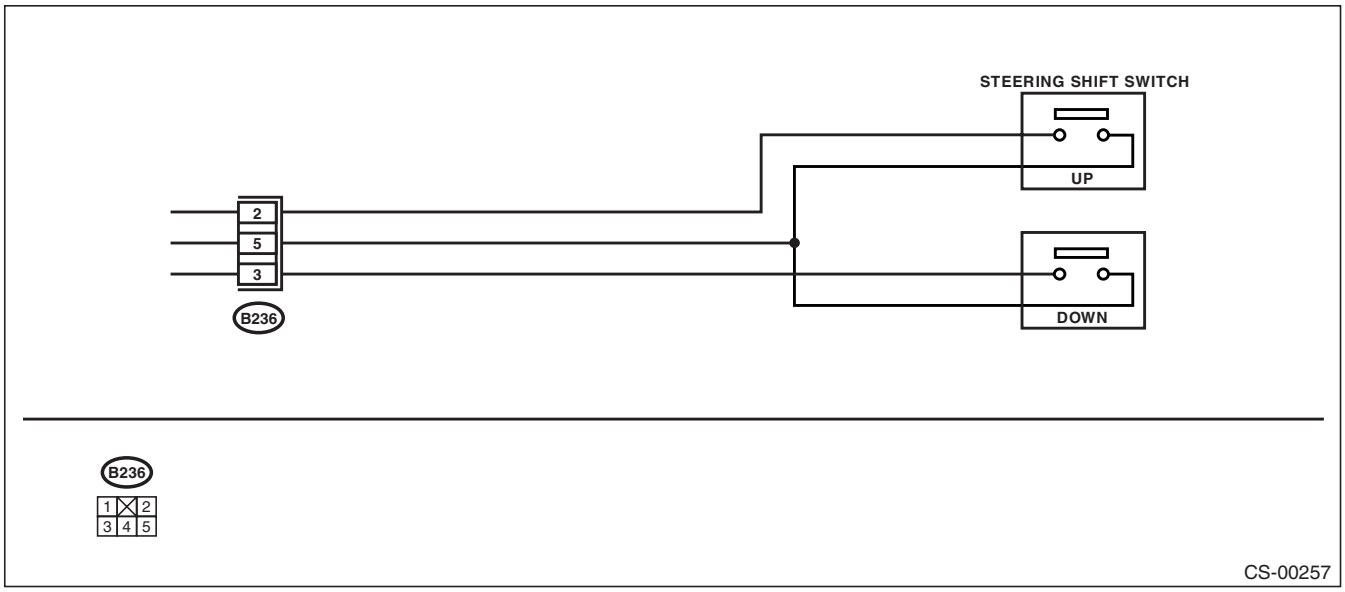
B: INSTALLATION

1) Clean all the parts before installation.
2) Install in the reverse order of removal.
3) Shift the select lever to the sport shift position after installation, and then check the sport shift mode "1" range illuminates in the combination meter.

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C: INSPECTION

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CONTINUITY OF SHIFT-UP SWITCH.** 1)Press UPSHIFT of shift switch. 2)Measure the resistance between terminals of shift switch connector (B236). ***Connector & terminal*** ***(B236) No. 2 — No. 5:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the steering shift switch.
2	**CHECK CONTINUITY OF SHIFT-DOWN SWITCH.** 1)Press DOWNSHIFT of shift switch. 2) Measure the resistance between terminals of shift switch connector (B236). ***Connector & terminal*** ***(B236) No. 3 — No. 5:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the steering shift switch.
3	**CHECK DISCONTINUITY OF SHIFT SWITCH.** 1)Do not operate the shift switch. 2)Measure the resistance between terminals of shift switch connector (B236). ***Connector & terminal*** ***(B236) No. 2 — No. 5:*** ***(B236) No. 3 — No. 5:***	Is the resistance ∞ Ω?	Steering shift switch is normal.	Replace the steering shift switch.

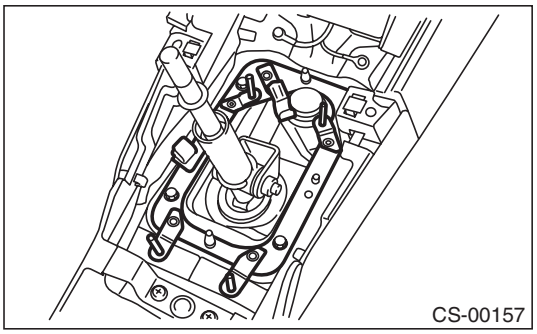
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5. MT Gear Shift Lever

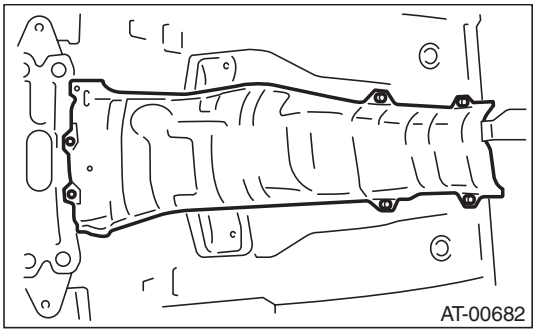
A: REMOVAL

1. 5MT

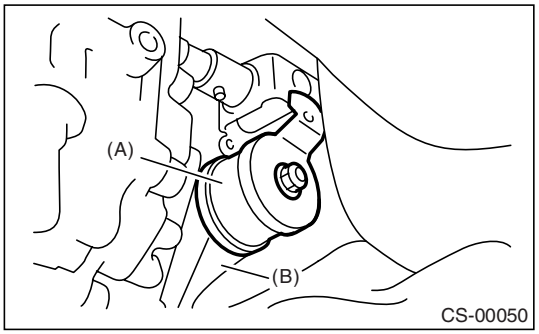
1) Set the vehicle on a lift.
2) Disconnect the negative cable from battery.
3) Remove the gear shift knob.
4) Remove the console box. <Ref. to EI-42, REMOVAL, Console Box.>
5) Remove the drive select cable. (Dual-range model)
<Ref. to CS-38, REMOVAL, Drive Select Cable.>
6) Remove the plate assembly from body.


CS-00157

7) Lift-up the vehicle.
8) Remove the rear exhaust pipe and muffler.
SOHC model
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
SOHC without OBD model
<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>
DOHC turbo model
<Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
9) Remove the heat shield cover. (If equipped)


AT-00682

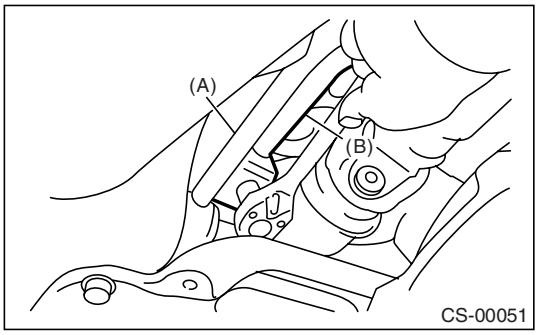
10) Remove the stay from transmission bracket.



CS-00050

(A) Stay
(B) Transmission bracket

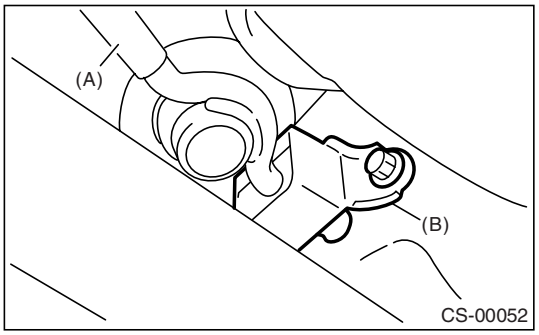
11) Remove the rod from joint.



CS-00051

(A) Stay
(B) Rod

12) Remove the cushion rubber from body.

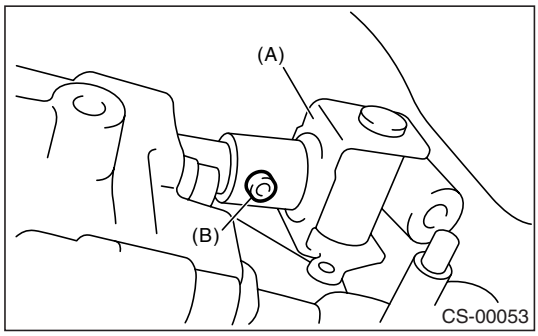


CS-00052

(A) Stay
(B) Cushion rubber

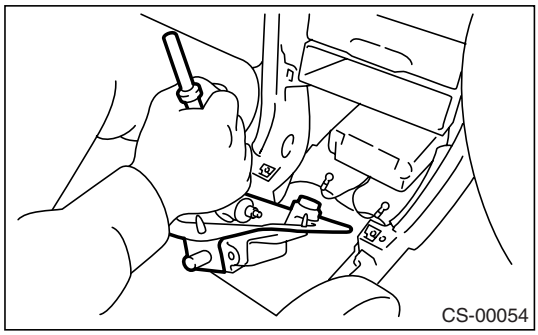
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13) Remove the joint, and then extract the spring pin.



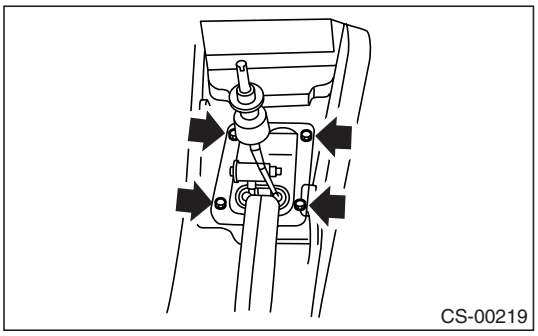
(A) Joint
(B) Spring pin

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

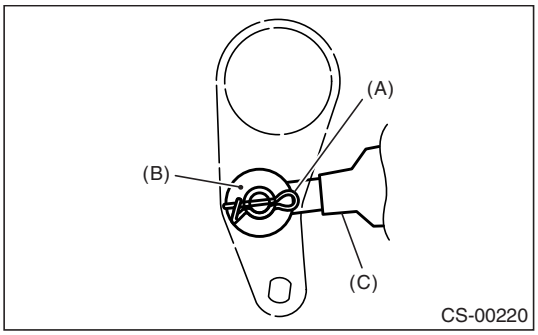


2. 6MT

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the gear shift knob.
4) Remove the console box front. <Ref. to EI-42, REMOVAL, Console Box.>
5) Remove the boot plate from body.



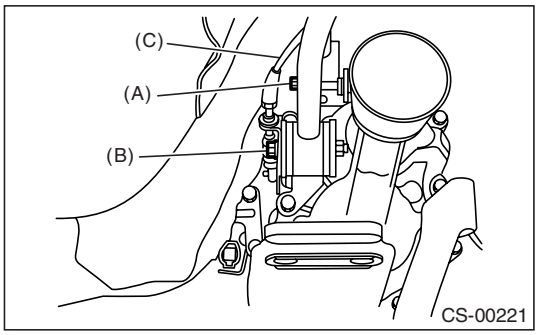
6) Lift-up the vehicle.
7) Remove the under cover.
8) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
9) Remove the crossmember. <Ref. to 6MT-35, REMOVAL, Transmission Mounting System.>
10) Remove the snap pin and washer, and then remove the reverse check cable from reverse check lever.



(A) Snap pin
(B) Washer
(C) Reverse check cable

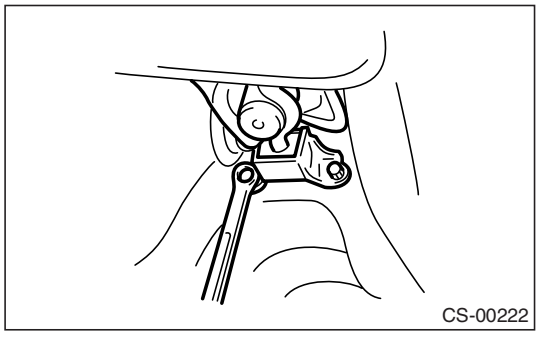
11) Move the transmission to right side, and then remove the joint COMPL, stay bolt and reverse check cable.

NOTE:
If the transmission is not moved, the joint COMPL and stay bolt will contact body and damage may occur.



(A) Joint COMPL bolt
(B) Stay bolt
(C) Reverse check cable

12) Remove the cushion rubber from body.



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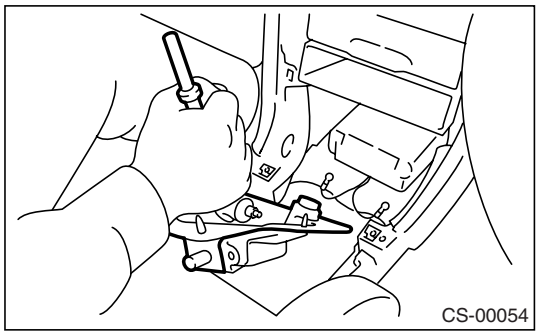
13) Lower the vehicle.
14) Remove the gear shift lever.

B: INSTALLATION

1. 5MT

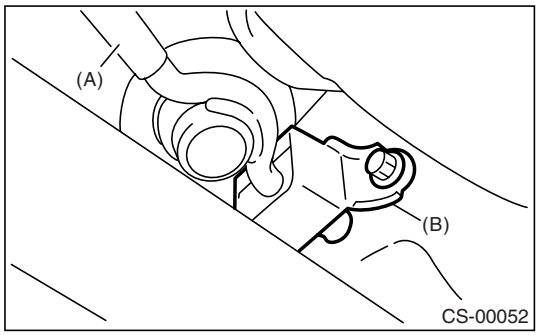
1) Install the joint to the transmission and secure with the spring pin.
2) Insert gear shift lever from room side.

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



3) Lift-up the vehicle.
4) Mount the cushion rubber on body.

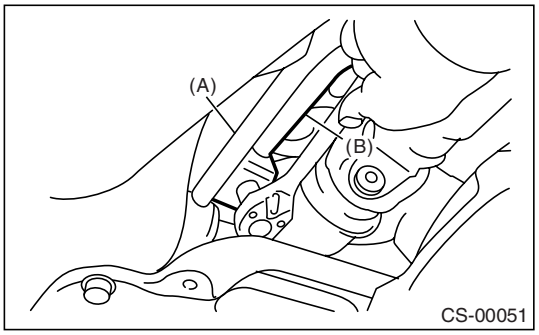
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Stay
(B) Cushion rubber

5) Connect the rod to the joint.

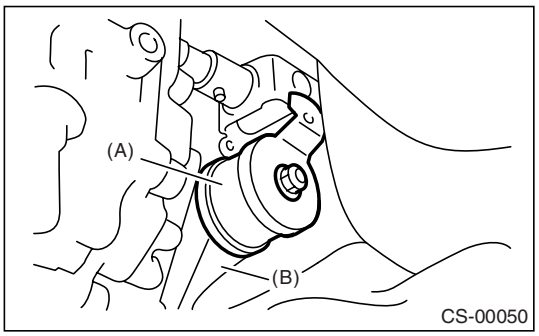
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Stay
(B) Rod

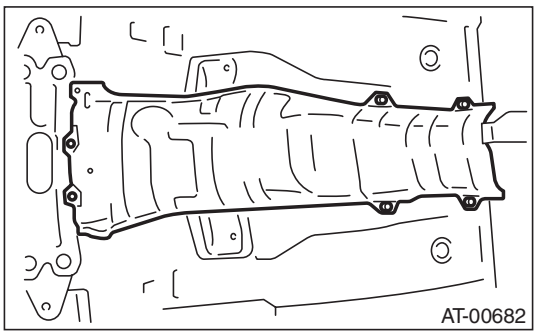
6) Connect the stay to transmission bracket.

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



(A) Stay
(B) Transmission bracket

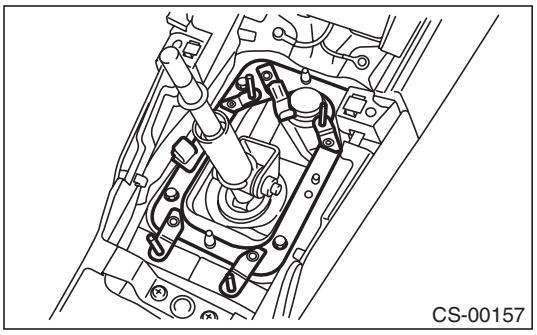
7) Install the heat shield cover. (If equipped)



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8) Install rear exhaust pipe and muffler.
SOHC model
<Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
SOHC without OBD model
<Ref. to EX(H4SOw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, INSTALLATION, Muffler.>
DOHC turbo model
<Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, INSTALLATION, Muffler.>
9) Install the plate assembly to body.

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


CS-00157

10) Install the drive select cable. (Dual-range model) <Ref. to CS-38, INSTALLATION, Drive Select Cable.>
11) Install console box. <Ref. to EI-42, INSTALLATION, Console Box.>

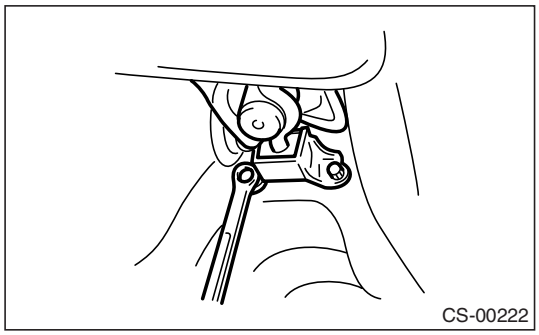
2. 6MT

1) Insert the gear shift lever from room side.

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

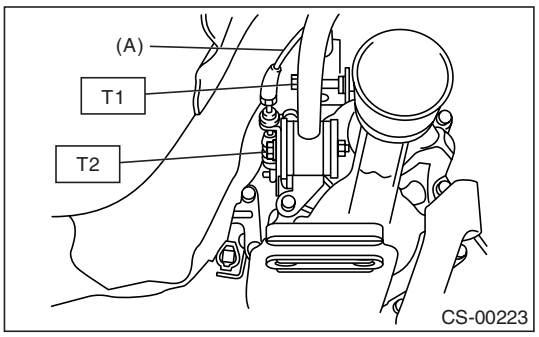
2) Mount the cushion rubber on body.

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


CS-00222

3) Move the transmission to right side, and then install the joint COMPL and stay.

Tightening torque:
T1: 11.8 N·m (1.2 kgf-m, 8.7 ft-lb)
T2: 32 N·m (3.3 kgf-m, 23.6 ft-lb)



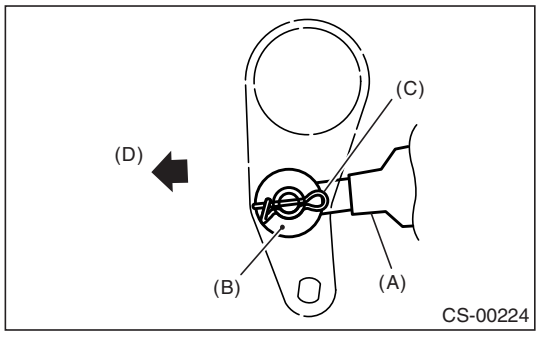
(A) Reverse check cable

4) Install the crossmember. <Ref. to 6MT-35, INSTALLATION, Transmission Mounting System.>
5) Install the reverse check cable end, washer and snap pin to reverse check lever.

NOTE:
• Take care to install the snap pin in proper direction.

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• Conduct the adjustment of reverse check cable before installation. <Ref. to CS-34, ADJUSTMENT, Reverse Check Cable.>

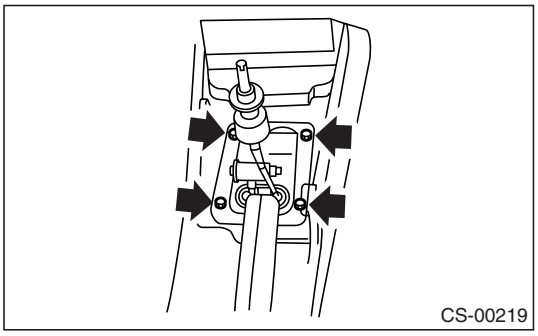


(A) Reverse check cable
(B) Washer
(C) Snap pin
(D) Front side

6) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, INSTALLATION, Muffler.>
7) Install the under cover.
8) Install the boot plate.

NOTE:
Install the inner boot without any twist.

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

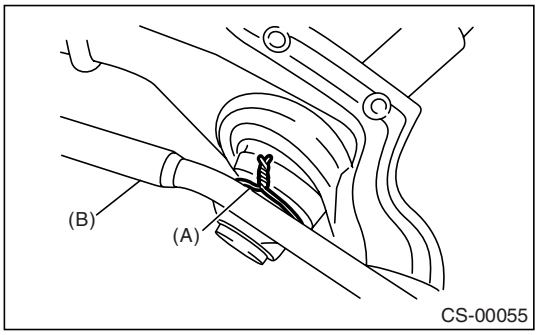


9) Install the console box. <Ref. to EI-42, INSTALLATION, Console Box.>
10) Check that the gear shift is correctly shifted to each gear.

C: DISASSEMBLY

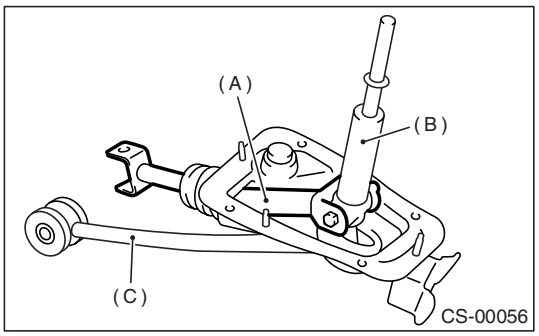
1. 5MT

1) Disassemble the lock wire.



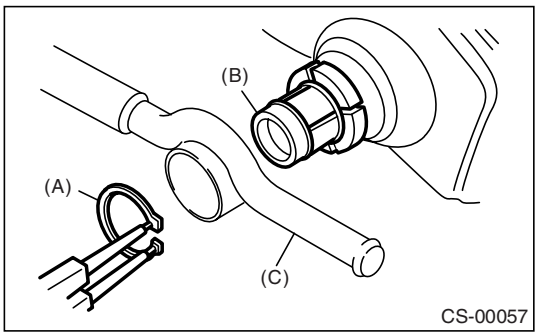
(A) Lock wire
(B) Stay

2) Remove the rod from lever.



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

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

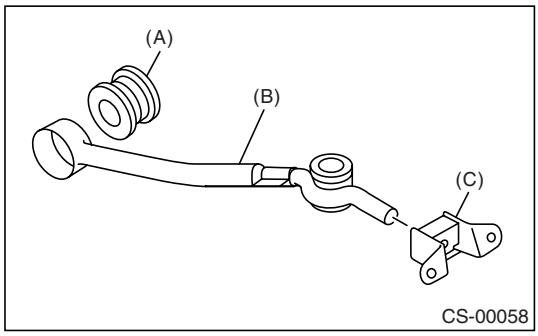


(A) Snap ring
(B) Bushing B
(C) Stay

4) Remove the boot from gear shift lever.

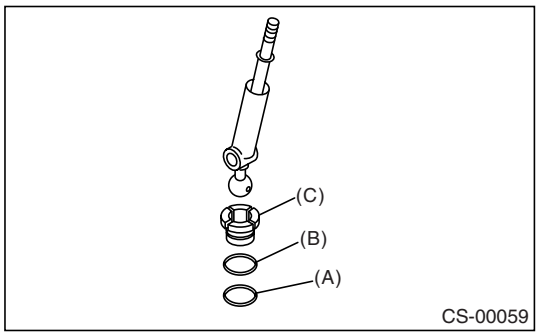
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5) Remove the bushing and cushion rubber from stay.



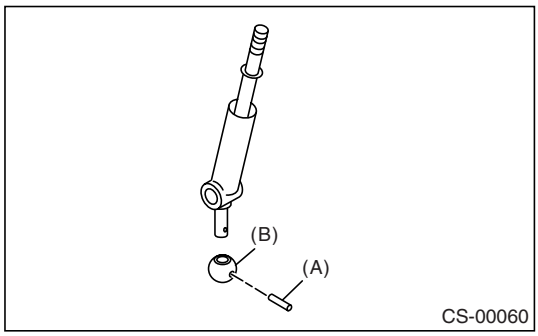
(A) Bushing
(B) Stay
(C) Cushion rubber

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



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

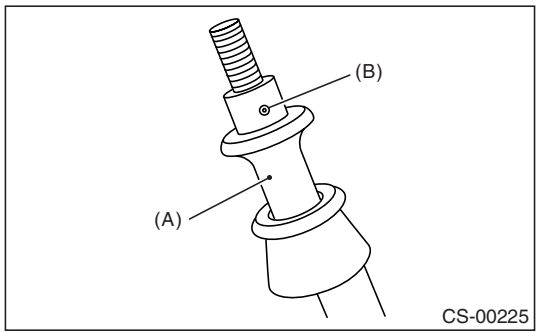
7) Draw out the spring pin, and then remove the bushing A from gear shift lever.



(A) Spring pin
(B) Bushing A

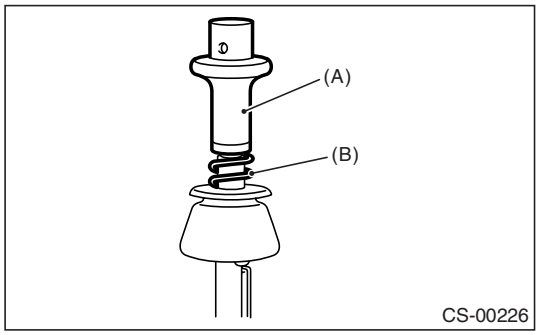
2. 6MT

1) Remove the spring pin from slider.



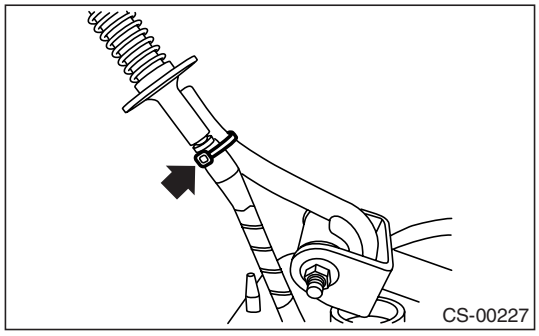
(A) Slider
(B) Spring pin

2) Remove the slider and spring.



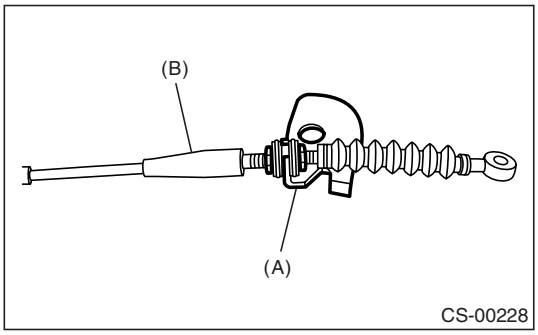
(A) Slider
(B) Spring

3) Cut the band clip.



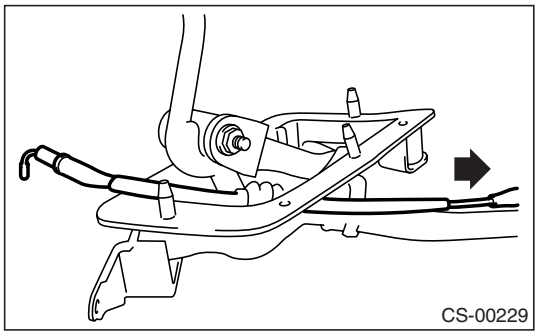
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4) Remove the reverse check cable from cable plate.

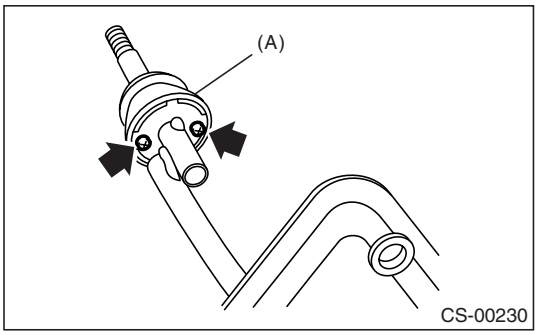


(A) Cable plate
(B) Reverse check cable

5) Remove the reverse check cable from gear shift assembly.



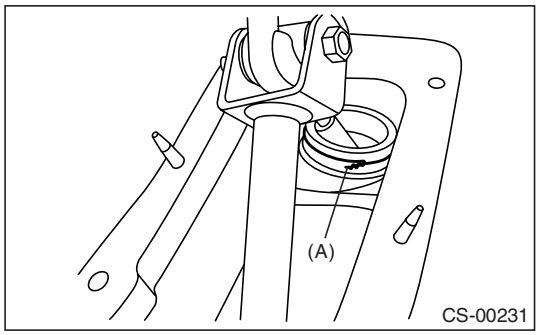
6) Remove the holder and spring seat.



(A) Holder

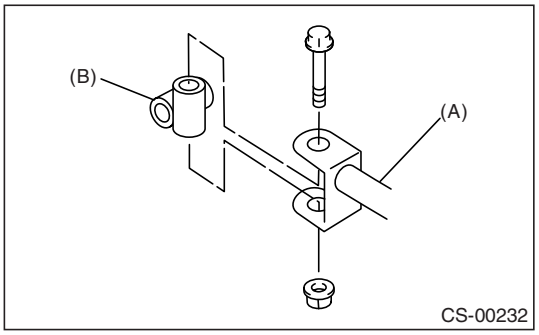
7) Disassemble the lock wire.

NOTE:
Do not reuse the lock wire.



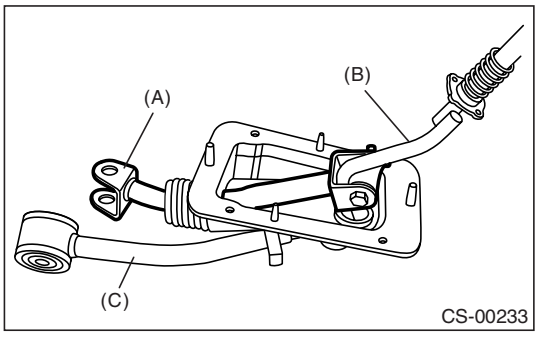
(A) Lock wire

8) Remove the boss from rod.



(A) Rod
(B) Boss

9) Remove the rod from lever.

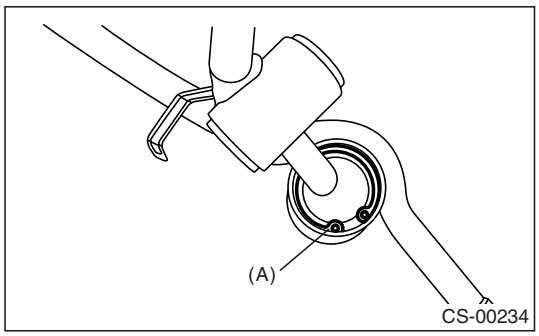


(A) Rod
(B) Lever
(C) Stay

10) Separate the rod and inner boot.

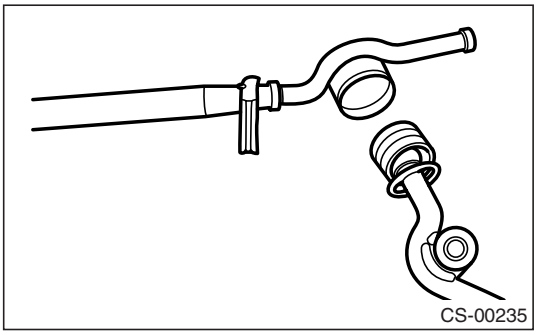
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11) Remove the snap ring from stay.

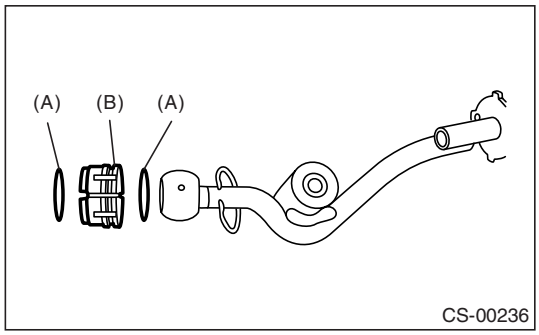


(A) Snap ring

12) Separate the gear shift lever and stay.

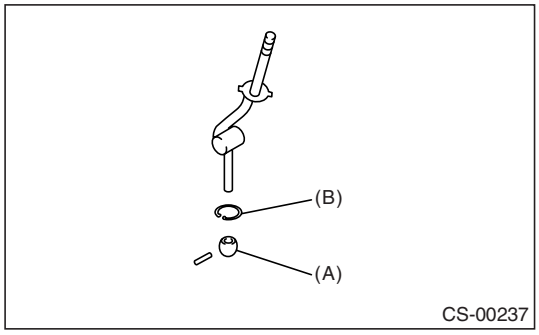


13) Remove the boot and bush from gear shift lever.



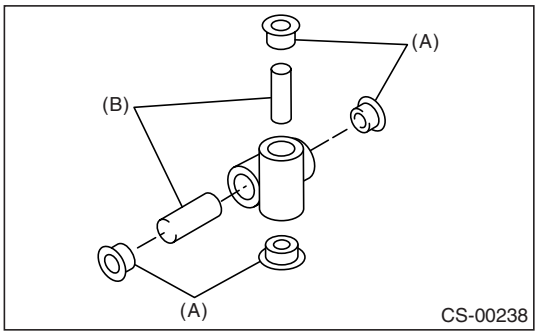
(A) O-ring
(B) Bush

14) Remove the spring pin, and then remove the bush and snap ring.



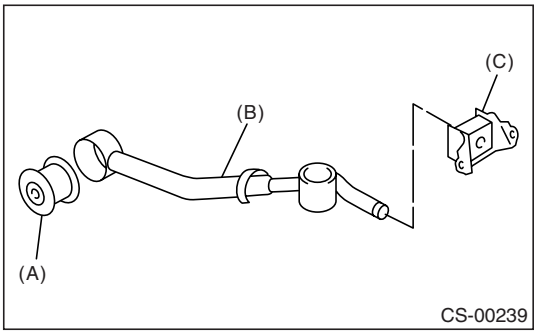
(A) Bush
(B) Snap ring

15) Remove the bush and spacer from boss.



(A) Bush
(B) Spacer

16) Remove the bush and cushion rubber from stay.



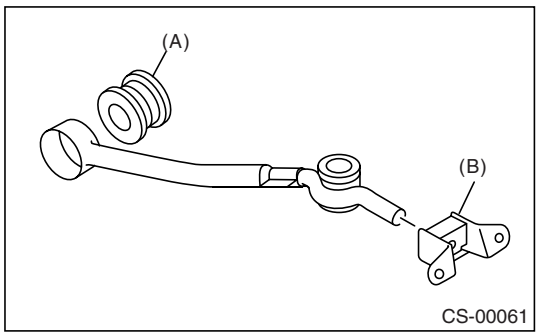
(A) Bush
(B) Stay
(C) Cushion rubber

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D: ASSEMBLY

1. 5MT

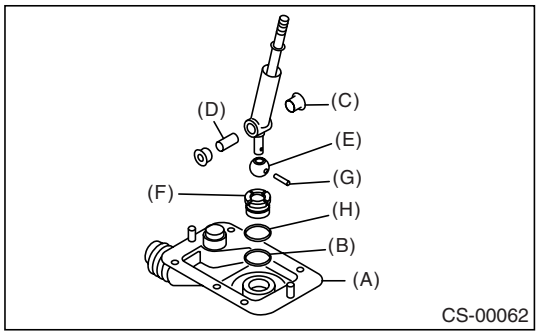
1) Clean all parts before assembly.
2) Mount the bushing and cushion rubber on the stay.



(A) Bushing
(B) Cushion rubber

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

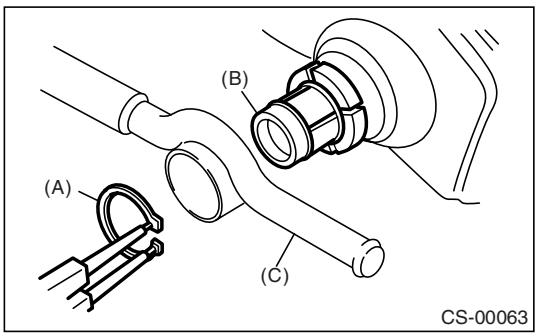
NOTE:
• Always use new O-rings.
• Apply grease [KOPR-KOTE (Part No. 003603001) or equivalent] to the inner and side surfaces of the bushing when installing the spacer.



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

4) Insert the gear shift lever into the boot hole.

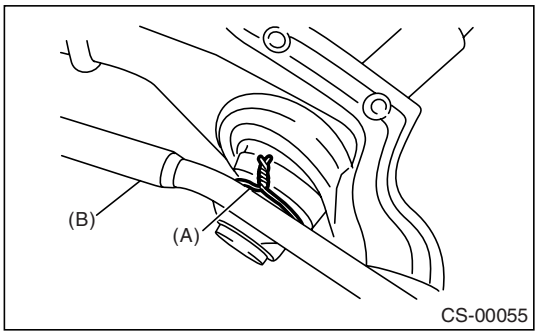
5) Install the snap ring and stay to bushing B.



(A) Snap ring
(B) Bushing B
(C) Stay

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

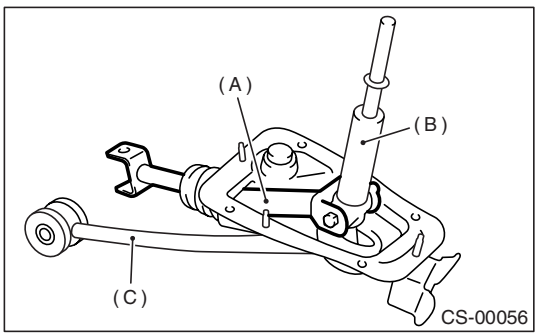
NOTE:
Always use new lock wire.



(A) Lock wire
(B) Stay

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

Tightening torque:
11.8 N·m (1.2 kgf-m, 8.7 ft-lb)



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

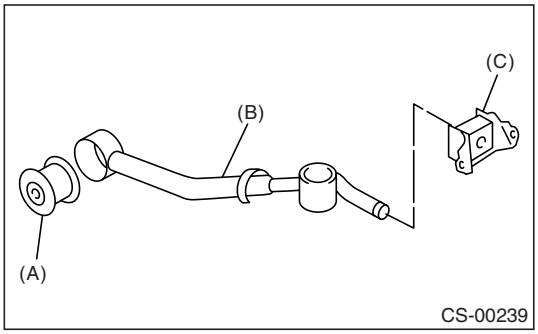
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9) Check the swing torque of rod in relation to the gear shift lever.
10) Check that there is no excessive play and that parts move smoothly.

2. 6MT

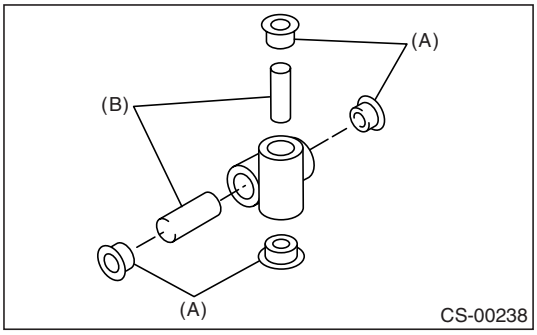
NOTE:
• Clean all parts before assembly.
• Apply NIGTIGHT LYW No.2 grease or equivalent to each parts.

1) Mount the bush and cushion rubber on the stay.



(A) Bush
(B) Stay
(C) Cushion rubber

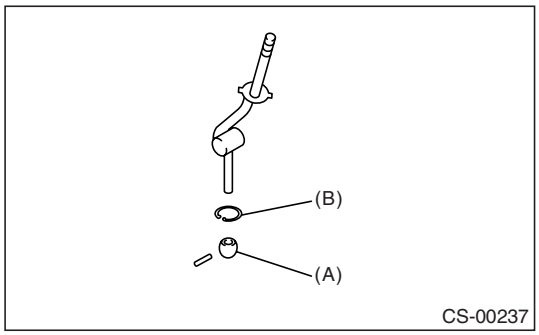
2) Install the bush and spacer to boss.



(A) Bush
(B) Spacer

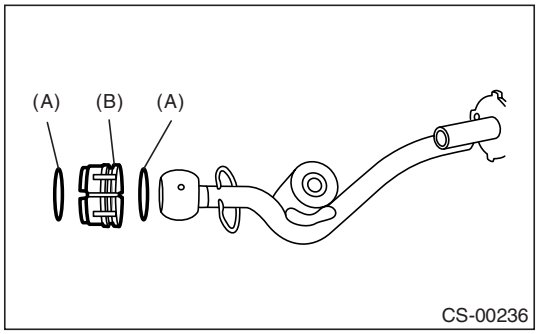
3) Install the snap ring to gear shift lever, and then install the bush.

NOTE:
Apply grease to the bush.



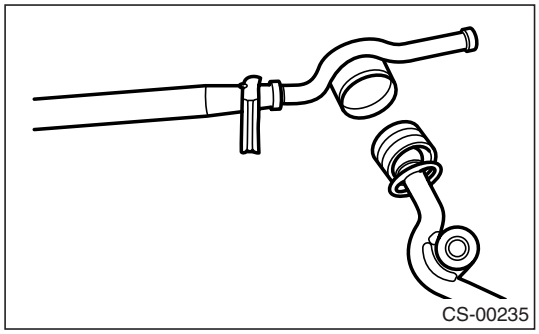
(A) Bush
(B) Snap ring

4) Apply grease to the bush and O-ring, and then install to the gear shift lever.



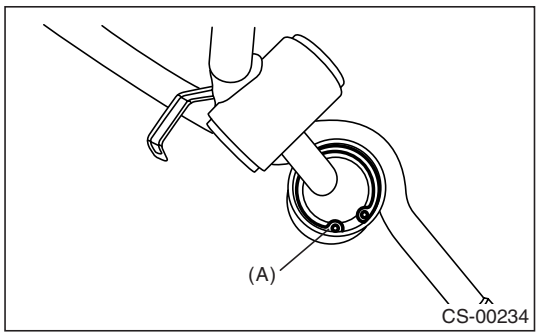
(A) O-ring
(B) Bush

5) Apply sufficient grease into the boss, and then install the gear shift lever to stay.



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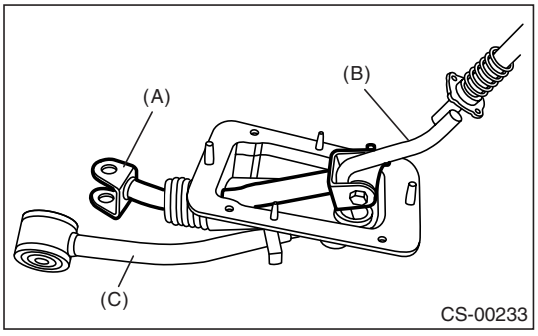
6) Install the washer and snap ring.



(A) Snap ring

7) Insert the gear shift lever and rod into boot hole.
8) Install the rod.

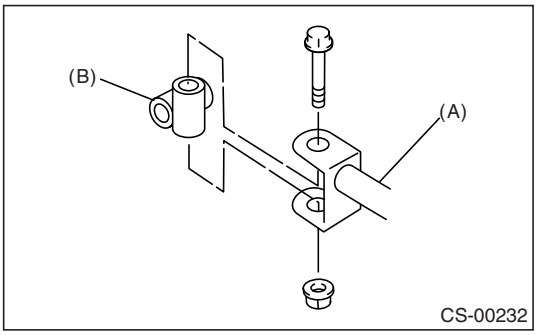
Tightening torque:
11.8 N·m (1.2 kgf-m, 8.7 ft-lb)



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

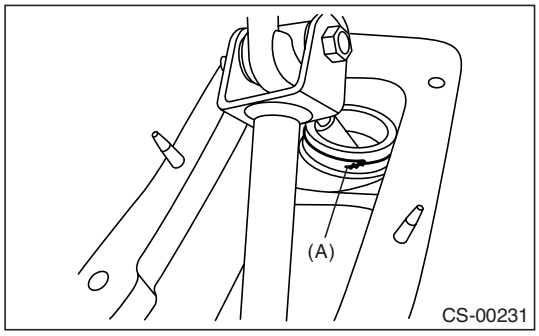
9) Install the boss to rod.

Tightening torque:
11.8 N·m (1.2 kgf-m, 8.7 ft-lb)



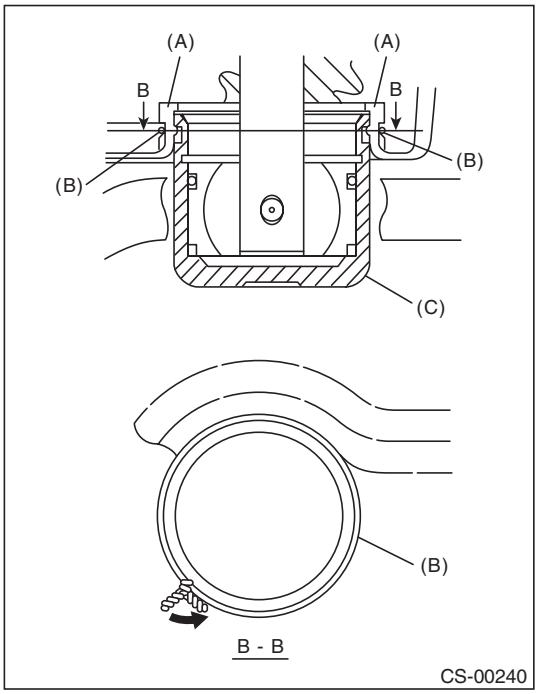
(A) Rod
(B) Boss

10) Install a new lock wire.



(A) Lock wire

NOTE:
• Install the lock wire to the stay groove.
• Bend the extra wire to same direction of lock wire winding.

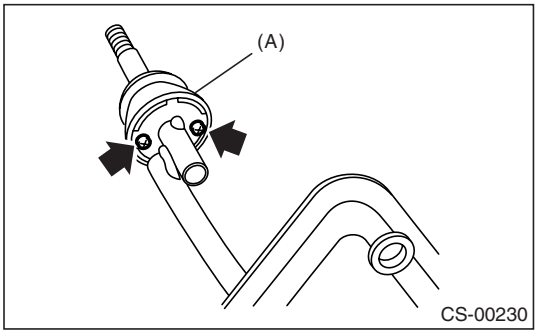


(A) Inner boot
(B) Lock wire
(C) Stay

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11) Install the holder.

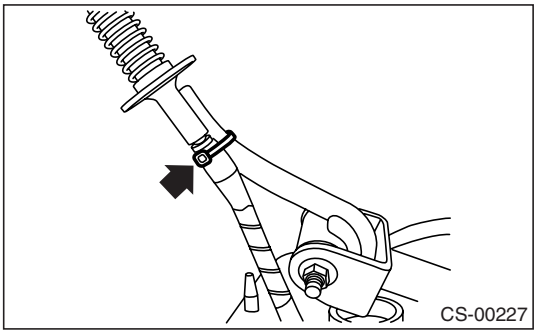
Tightening torque:
1.3 N·m (0.13 kgf-m, 0.96 ft-lb)



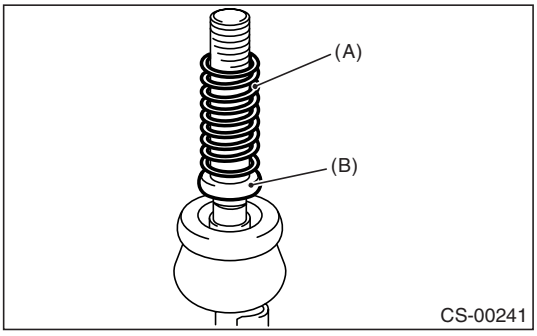
(A) Holder

12) Insert the reverse check cable into boot hole.
13) Insert the reverse check cable into gear shift assembly, and fix with band clip.

NOTE:
- Cut off the extra band clip.
- Make sure that the reverse check cable is inserted into gear shift lever assembly without any clearance.



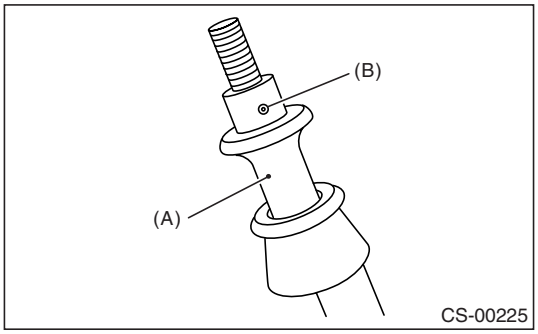
14) Install the seat cushion and spring.



(A) Spring
(B) Seat cushion

15) Fix the slider and reverse check cable end with spring pin.

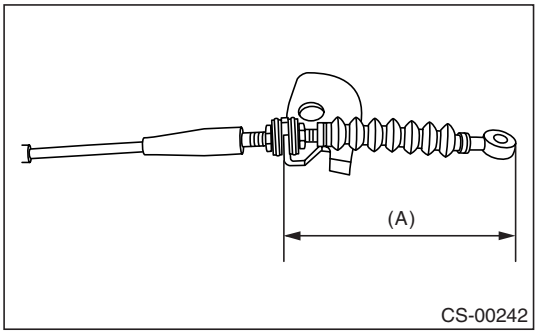
NOTE:
Apply grease to the sliding part of slider.



(A) Slider
(B) Spring pin

16) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in) with cable pulled (with slider lowered), and then tighten the lock nut.

Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)

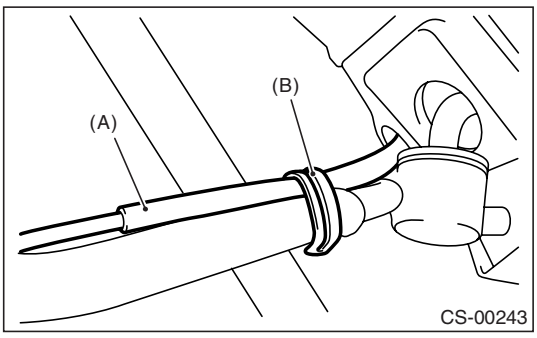


(A) 84 mm (3.31 in)

17) Fix the reverse check cable to clip of stay.

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NOTE:
Install the reverse check cable to upper side of stay.

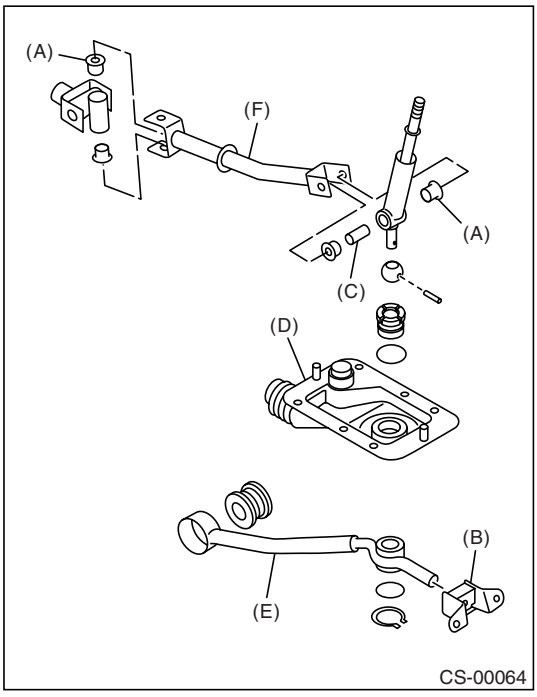


(A) Reverse check cable
(B) Clip

E: INSPECTION

1. 5MT

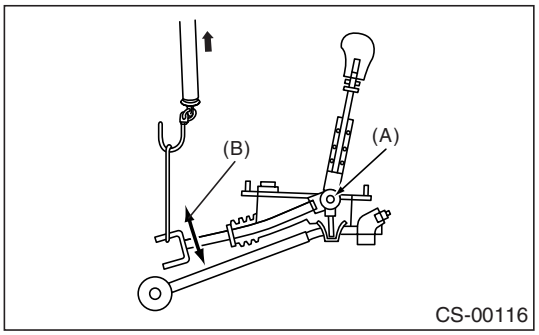
1) Check each part (bushing, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. Repair or replace any defective part. Determine defective parts by comparing with new parts.



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

2) Check the swing torque of the rod in relation of the gear shift lever.
If the torque exceeds the specification, replace the bushing or retighten the nuts.

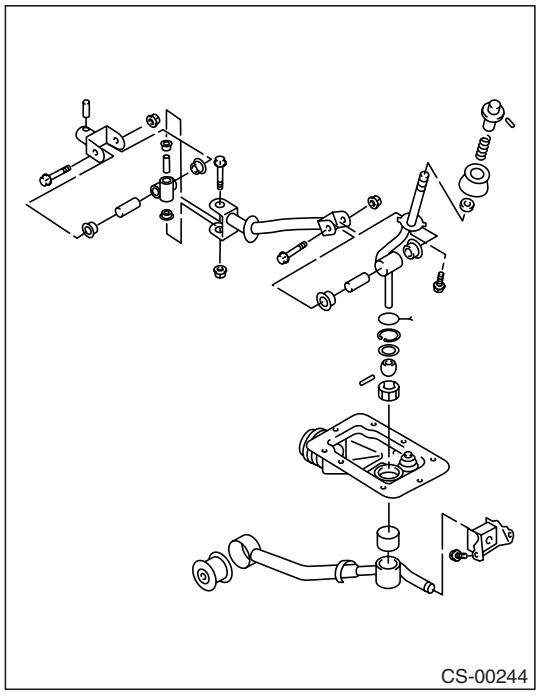
Swing torque:
3.7 N (0.38 kgf, 0.84 lb) or less



(A) Center of rotation
(B) Swing torque

2. 6MT

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.

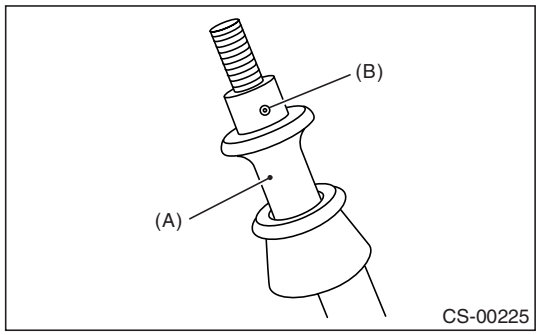


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6. Reverse Check Cable

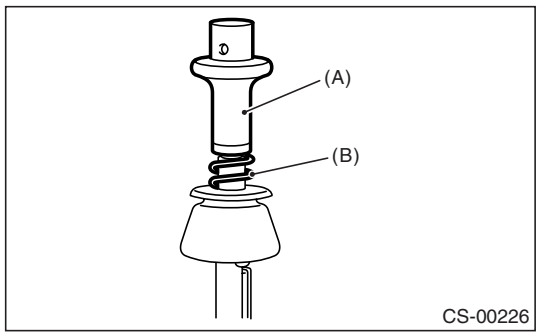
A: REMOVAL

1) Set the vehicle on a lift.
2) Remove the gear shift knob.
3) Remove the console box front. <Ref. to EI-42, REMOVAL, Console Box.>
4) Remove the spring pin from slider.



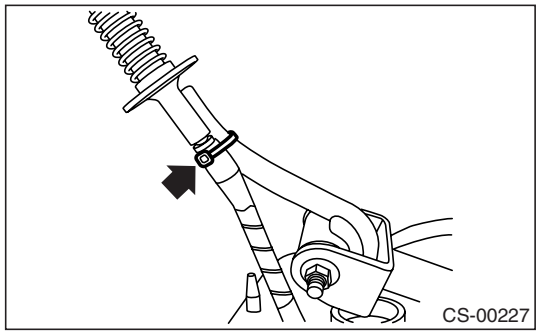
(A) Slider
(B) Spring pin

5) Remove the slider and spring.

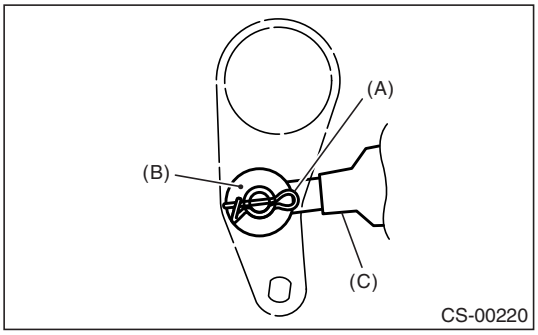


(A) Slider
(B) Spring

6) Cut the band clip, and then separate the reverse check cable from gear shift lever.



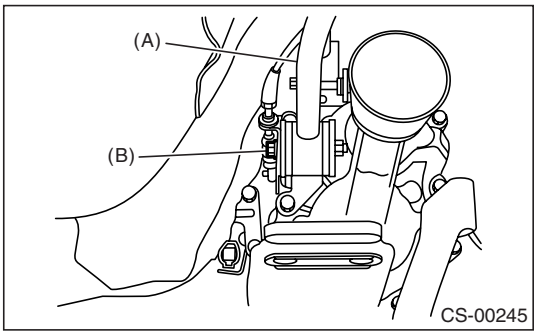
7) Lift-up the vehicle.
8) Remove the under cover.
9) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
10) Remove the crossmember. <Ref. to 6MT-35, REMOVAL, Transmission Mounting System.>
11) Remove the snap pin and washer, and then separate the reverse check cable from reverse check lever.



(A) Snap pin
(B) Washer
(C) Reverse check cable

12) Move the transmission to right side, and then remove the stay bolt and reverse check cable.

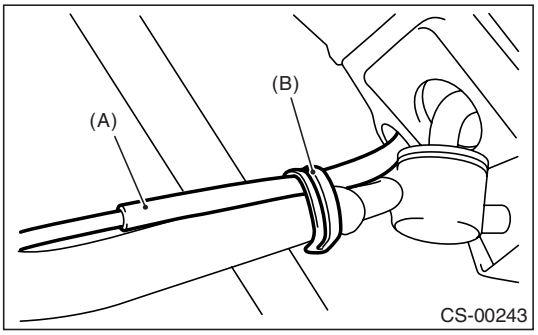
NOTE:
If the transmission is not moved, the stay bolt will contact body and damage may occur.



(A) Stay
(B) Stay bolt

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13) Raise the clip of stay, and then separate the stay and reverse check cable.

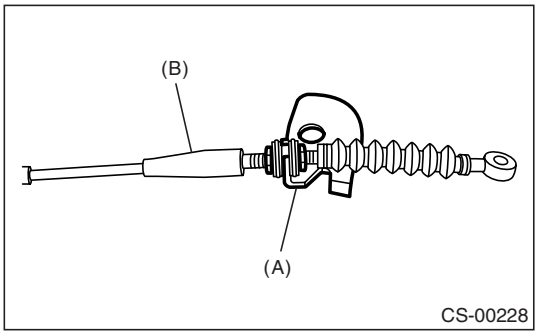


(A) Reverse check cable
(B) Clip

14) Remove the reverse check cable by pulling from underneath the vehicle.

NOTE:
Take care not to damage the inner boot.

15) Loosen the lock nut, then remove the reverse check cable from cable plate.

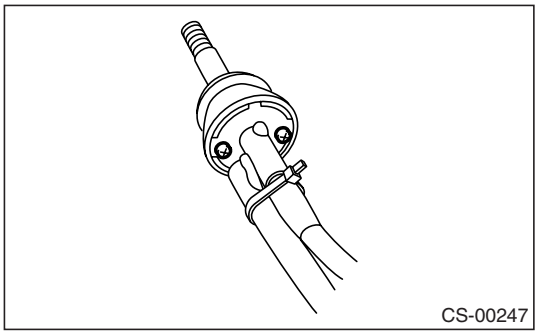


(A) Cable plate
(B) Reverse check cable

B: INSTALLATION

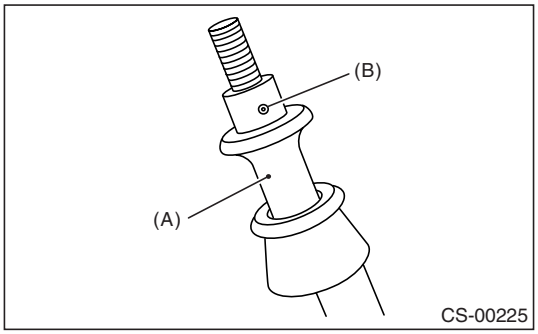
1) Insert the reverse check cable to the hole of inner boots from underneath the vehicle.
2) Insert the reverse check cable to the gear shift lever assembly, then fix with the band clip.

NOTE:
- Cut off the extra band clip.
- Make sure that the reverse check cable is inserted into gear shift lever assembly without any clearance.



3) Fix the slider and reverse check cable end with spring pin.

NOTE:
Apply grease to the sliding part of slider.



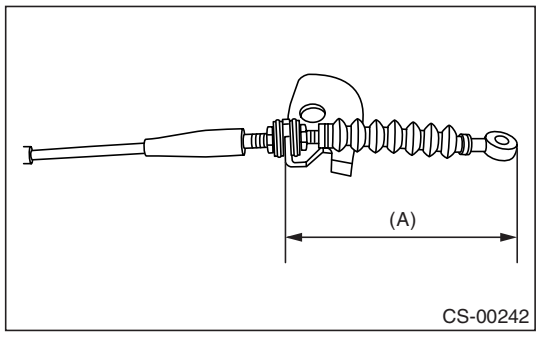
(A) Slider
(B) Spring pin

4) Lift-up the vehicle.

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5) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in) with cable pulled (with slider lowered), and then tighten the lock nut.

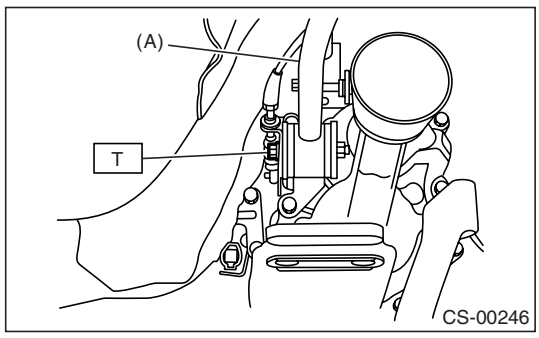
Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



(A) 84 mm (3.31 in)

6) Move the transmission to right side, and then install the stay.

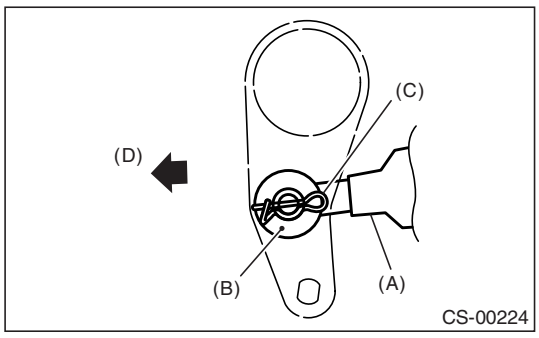
Tightening torque:
T: 32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Stay

7) Install the reverse check cable end, washer and snap pin to reverse check lever.

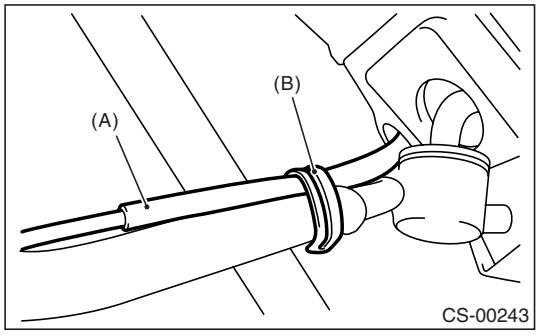
NOTE:
Take care to install the snap pin in proper direction.



(A) Reverse check cable
(B) Washer
(C) Snap pin
(D) Front side

8) Fix the reverse check cable to clip of stay.

NOTE:
Install the reverse check cable to upper side of stay.



(A) Reverse check cable
(B) Clip

9) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, INSTALLATION, Muffler.>
10) Lower the vehicle.
11) Install the console box. <Ref. to EI-42, INSTALLATION, Console Box.>

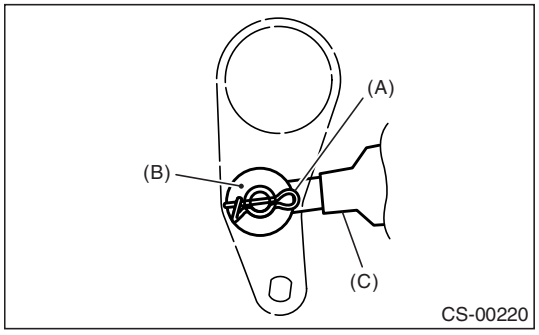
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C: INSPECTION

1) Verify whether the slider moves smoothly. If not, adjust the reverse check cable or check damage of slider. <Ref. to CS-34, ADJUSTMENT, Reverse Check Cable.>
2) Check that the gear can be shift to reverse, when the slider is pulled up. If the gear can not be shift to reverse, adjust the reverse check cable. <Ref. to CS-34, ADJUSTMENT, Reverse Check Cable.>
3) Check that the gear can not be shift to reverse, when the slider is not pulled up. If the gear can be shift to reverse, adjust or replace the reverse check cable. <Ref. to CS-34, ADJUSTMENT, Reverse Check Cable.>

D: ADJUSTMENT

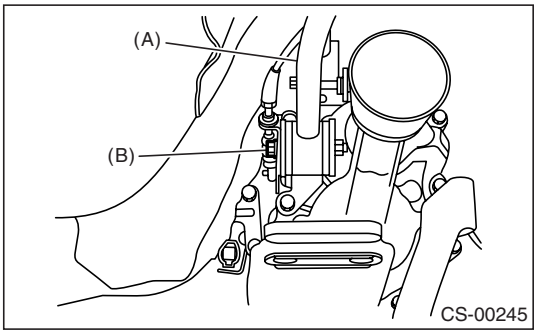
1) Set the vehicle on a lift.
2) Remove the under cover.
3) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
4) Remove the crossmember. <Ref. to 6MT-35, REMOVAL, Transmission Mounting System.>
5) Remove the snap pin and washer, and then separate the reverse check cable from reverse check lever.



(A) Snap pin
(B) Washer
(C) Reverse check cable

6) Move the transmission to right side, and then remove the stay bolt and reverse check cable.

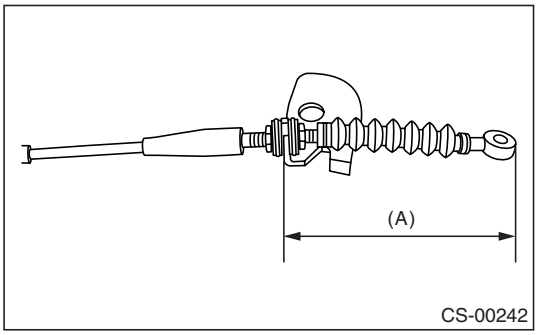
NOTE:
If the transmission is not moved, the stay bolt will contact body and damage may occur.



(A) Stay
(B) Stay bolt

7) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in) with cable pulled (with slider lowered), and then tighten the lock nut.

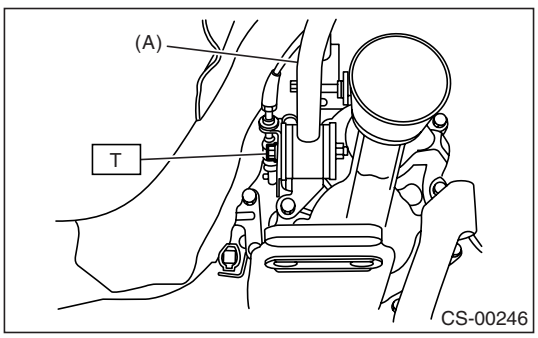
Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



(A) 84 mm (3.31 in)

8) Move the transmission to right side, and then install the stay.

Tightening torque:
T: 32 N·m (3.3 kgf-m, 23.6 ft-lb)

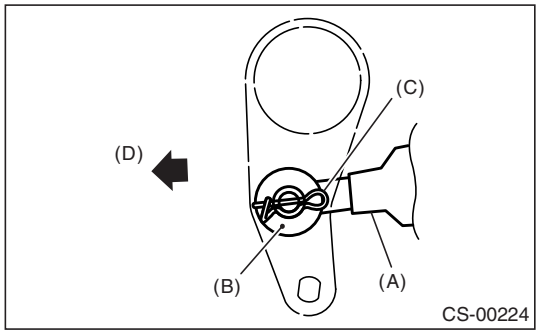


(A) Stay

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9) Install the crossmember. <Ref. to 6MT-35, INSTALLATION, Transmission Mounting System.>
10) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, INSTALLATION, Muffler.>
11) Install the reverse check cable end, washer and snap pin to reverse check lever.

NOTE:
Take care to install the snap pin in proper direction.



(A) Reverse check cable
(B) Washer
(C) Snap pin
(D) Front side

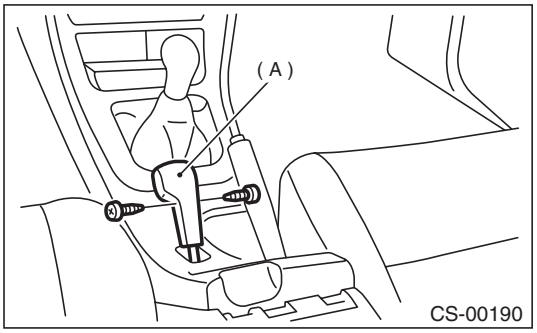
12) Install the under cover.

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7. MT Drive Select Lever

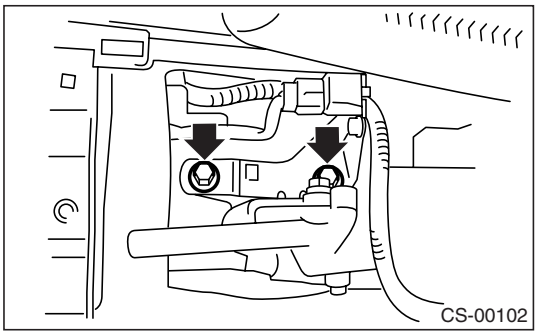
A: REMOVAL

1) Set the drive select lever to HI position.
2) Remove the knob.

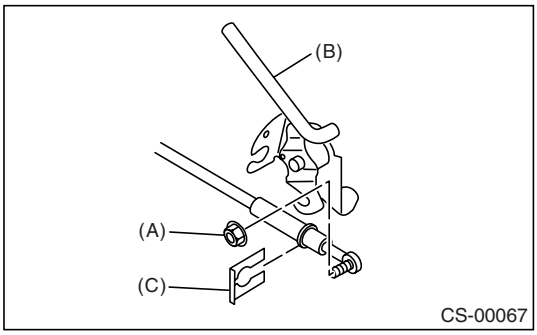


(A) Drive select lever knob

3) Remove the console box. <Ref. to EI-42, REMOVAL, Console Box.>
4) Remove the bolt installing drive select lever assembly on body.



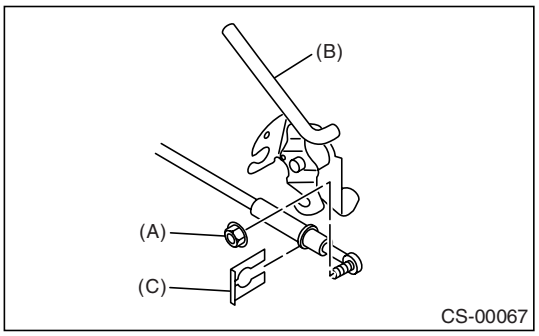
5) Remove the flange nut, clip and then disconnect the cable from lever assembly.



(A) Flange nut
(B) Lever ASSY
(C) Clip

B: INSTALLATION

1) Attach the drive select cable to the lever assembly and secure with the clamp.

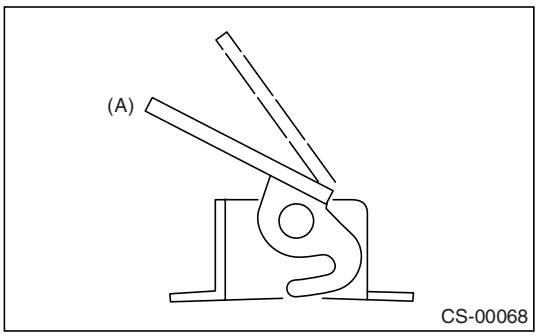


(A) Flange nut
(B) Lever ASSY
(C) Clip

2) Install the drive select lever.

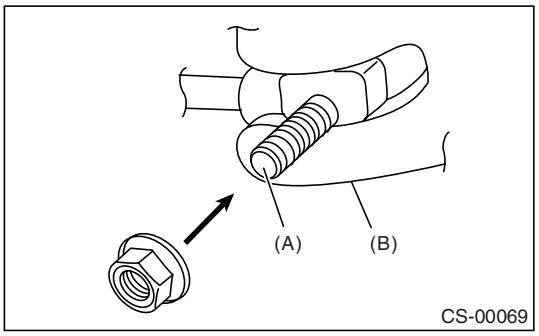
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

3) Set the drive select lever to HI position.



(A) HI position

4) Be sure to insert the cable end bolt into lever arm slit.



(A) Cable end bolt
(B) Lever arm

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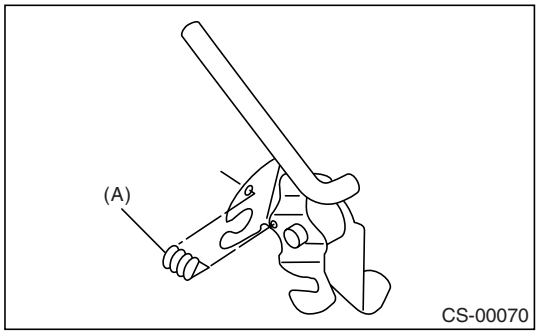
5) Tighten the nut where cable end bolt comes to a stop.

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

6) Install in the reverse order of removal.

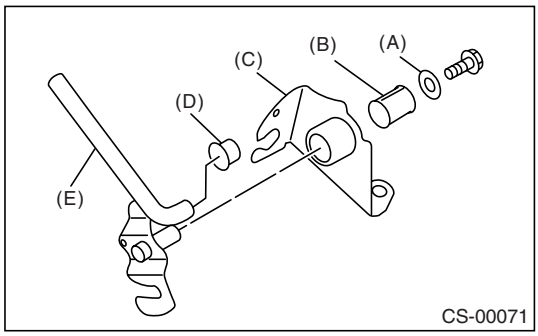
C: DISASSEMBLY

1) Remove the spring.



(A) Spring

2) Remove the lever, cap and bushing.



(A) Washer
(B) Bushing
(C) Plate ASSY
(D) Cushion
(E) Lever ASSY

D: ASSEMBLY

1) Assemble in the reverse order of disassembly.

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

2) Make sure the select lever moves smoothly.

E: INSPECTION

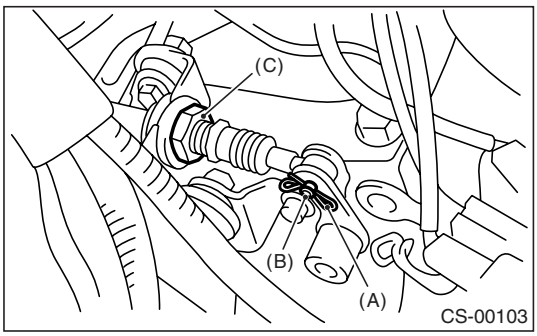
1) Make sure the select lever moves smoothly. If it does not move smoothly, repair or replace it.
2) Make sure the drive select lever is not damaged. If it is damaged, repair or replace it.

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8. Drive Select Cable

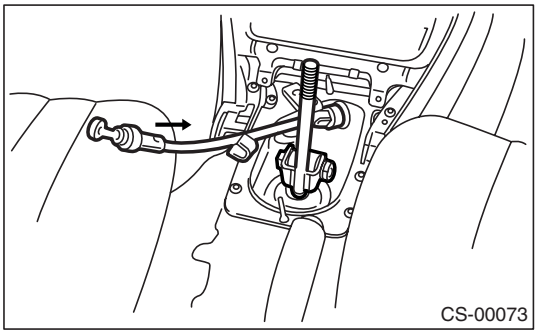
A: REMOVAL

1) Remove the drive select lever. <Ref. to CS-36, REMOVAL, MT Drive Select Lever.>
2) Remove the air cleaner case or air intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Remove the snap pin and clevis pin.



(A) Snap pin
(B) Clevis pin
(C) Nut

4) Loosen the nut, and then disconnect the cable from cable bracket.
5) Remove the cable from transmission clamp.
6) Remove the console box. <Ref. to EI-42, REMOVAL, Console Box.>
7) Remove cable from the under side of vehicle.



B: INSTALLATION

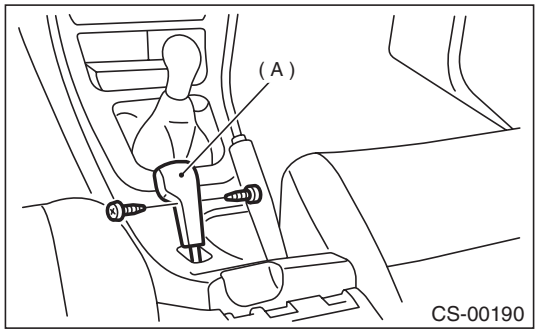
1) Install in the reverse order of removal.
2) Make sure the drive select lever operates properly.

C: INSPECTION

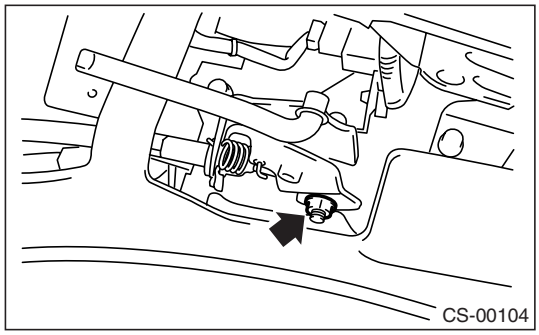
1) Make sure to move the transmission to HI or LO position by moving the drive select lever. If it doesn't, adjust the cable. <Ref. to CS-38, ADJUSTMENT, Drive Select Cable.>
2) Make sure the cable operates smoothly. If it catches or fails to work properly, repair or replace it.
3) Check the cable for damage.

D: ADJUSTMENT

1) Set the drive select lever to HI position.
2) Remove the knob.

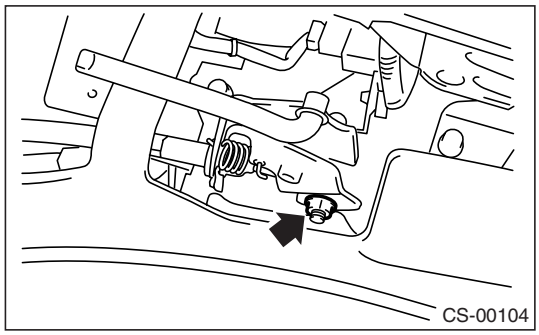


3) Remove the console box. <Ref. to EI-42, REMOVAL, Console Box.>
4) Loosen the nut.



5) Make sure the transmission is in HI position. If isn't, pull on the cable to put transmission in HI position.
6) Tighten the nut in location where the cable end bolt stops naturally.

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



7) Make sure to move the transmission to HI or LO position by moving the drive select lever. If it doesn't, readjust cable.

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9. General Diagnostic Table

A: INSPECTION

Symptom	Possible cause	Remedy
1. Select lever	Starter does not run.	Adjust select cable and inhibitor switch. Or inspect circuit.
	Back-up light does not light up.	Adjust select cable and inhibitor switch, or inspect circuit.
2. MT gear shift lever (6MT)	Shift into reverse is impossible.	Adjust reverse check cable.
	Shift into reverse is possible without pulling up slider.	Adjust or replace reverse check cable.
	Slider cannot be pulled up. Or slider is pulled up being stuck.	• Inspect reverse check system of transmission. • Adjust or replace reverse check cable.

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AUTOMATIC TRANSMISSION

4AT

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1. General Description

A: SPECIFICATIONS

1. TORQUE CONVERTER CLUTCH

Model	1.6 L	2.0 L Non-turbo	2.5 L	2.0 L Turbo
Type	Symmetric, 3 element, single stage, 2 phase torque converter			
Stall torque ratio	2.2 — 2.4	2.0 — 2.2	1.85 — 2.15	2.05 — 2.35
Nominal diameter	236 mm (9.29 in)		246 mm (9.69 in)	
Stall speed (at sea level)	2,400 — 3,000 rpm	2,200 — 2,700 rpm	2,100 — 2,600 rpm	2,900 — 3,500 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

	Gear ratio
1st	2.785
2nd	1.545
3rd	1.000
4th	0.694
Rev	2.272

5. PLANETARY GEAR AND PLATE

Model	1.6 L	2.0 L Non-turbo	2.5 L	2.0 L Turbo
Tooth number of front sun gear	33			
Tooth number of front pinion	21			
Tooth number of front internal gear	75			
Tooth number of rear sun gear	42			
Tooth number of rear pinion	17			
Tooth number of rear internal gear	75			
Drive & driven plate number of high clutch	3	4		5
Drive & driven plate number of low clutch	4		6	7
Drive & driven plate number of reverse clutch	1	2		
Drive & driven plate number of 2-4 brake	2	3		4
Drive & driven plate number of low & reverse brake	4		6	7

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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)	Automatic gear change 1st ←→ 2nd ← 3rd ← 4th
1 (1st)	1st gear locked (Deceleration possible 1st ← 2nd ← 3rd ← 4th)
Control method	Hydraulic remote control

7. HYDRAULIC CONTROL AND LUBRICATION

Type		Electronic/hydraulic control [Four forward speed changes by electrical signals of vehicle speed and accelerator (throttle) opening]
Fluid		Dexron III type
Fluid capacity	1.6 L FWD model	8.0 — 8.3 ℓ (8.5 — 8.8 US qt, 7.0 — 7.3 Imp qt)
	1.6 L AWD and 2.0 L Non-turbo model	8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)
	2.5 L and 2.0 L Turbo model	9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)
Lubrication system		Forced feed lubrication with oil pump
Oil		Automatic transmission fluid (above mentioned)

8. COOLING AND HARNESS

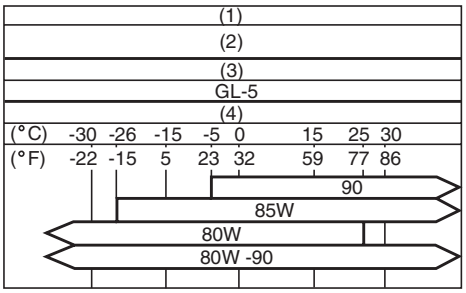
Cooling system	Liquid-cooled cooler incorporated in radiator
Inhibitor switch	12 poles
Transmission harness	20 poles

9. TRANSFER

Model	1.6 L and 2.0 L Non-turbo	2.5 L	2.0 L Turbo
Transfer type	Multi-plate transfer (MPT)		Variable torque distribution (VTD)
Drive & driven plate number of transfer clutch	4	5	3
Control method	Electronic, hydraulic type		
Lubricant	The same Automatic transmission fluid used in automatic transmission		
1st reduction gear ratio	1.000 (53/53)		

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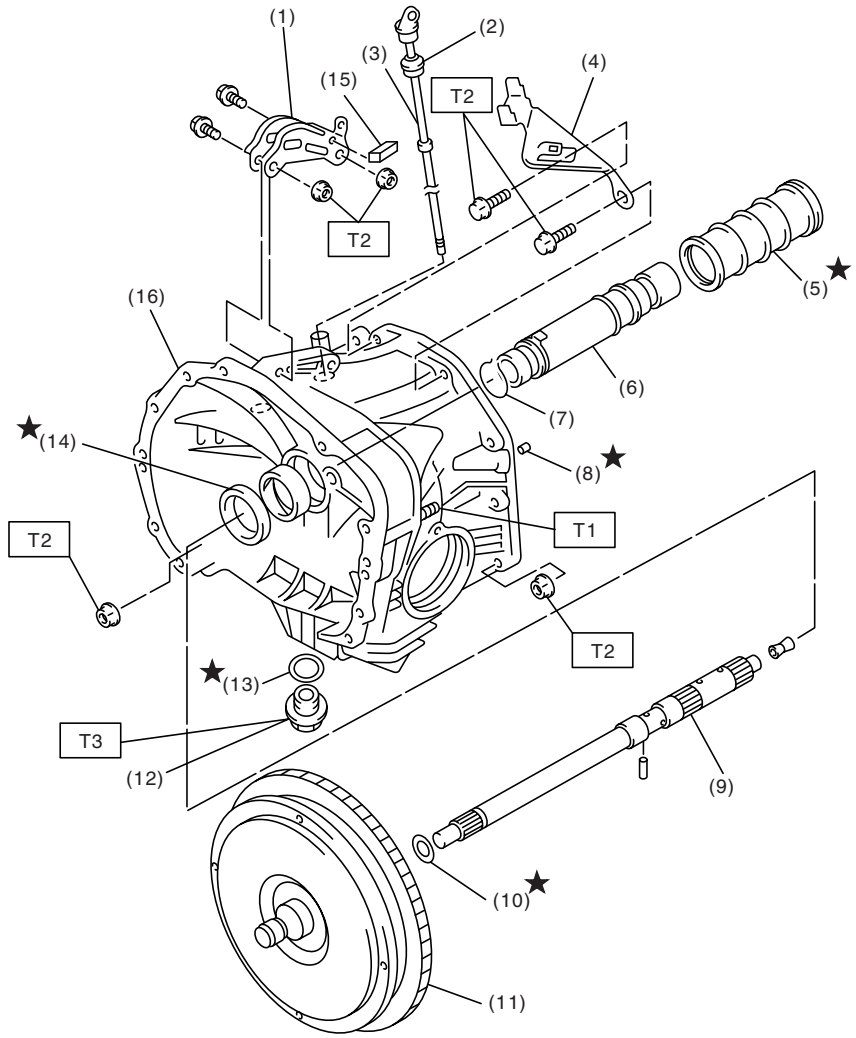
10.FINAL REDUCTION

Model	EXCEPT 1.6 L	1.6 L
Front final gear ratio	4.111 (37/9)	4.444 (40/9)
Lubrication oil	 AT-00001 (1) Item (2) Front differential gear oil (3) API classification (4) SAE viscosity No. and applicable temperature	
Front differential oil capacity	1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)	

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B: COMPONENT

1. TORQUE CONVERTER CLUTCH AND CASE

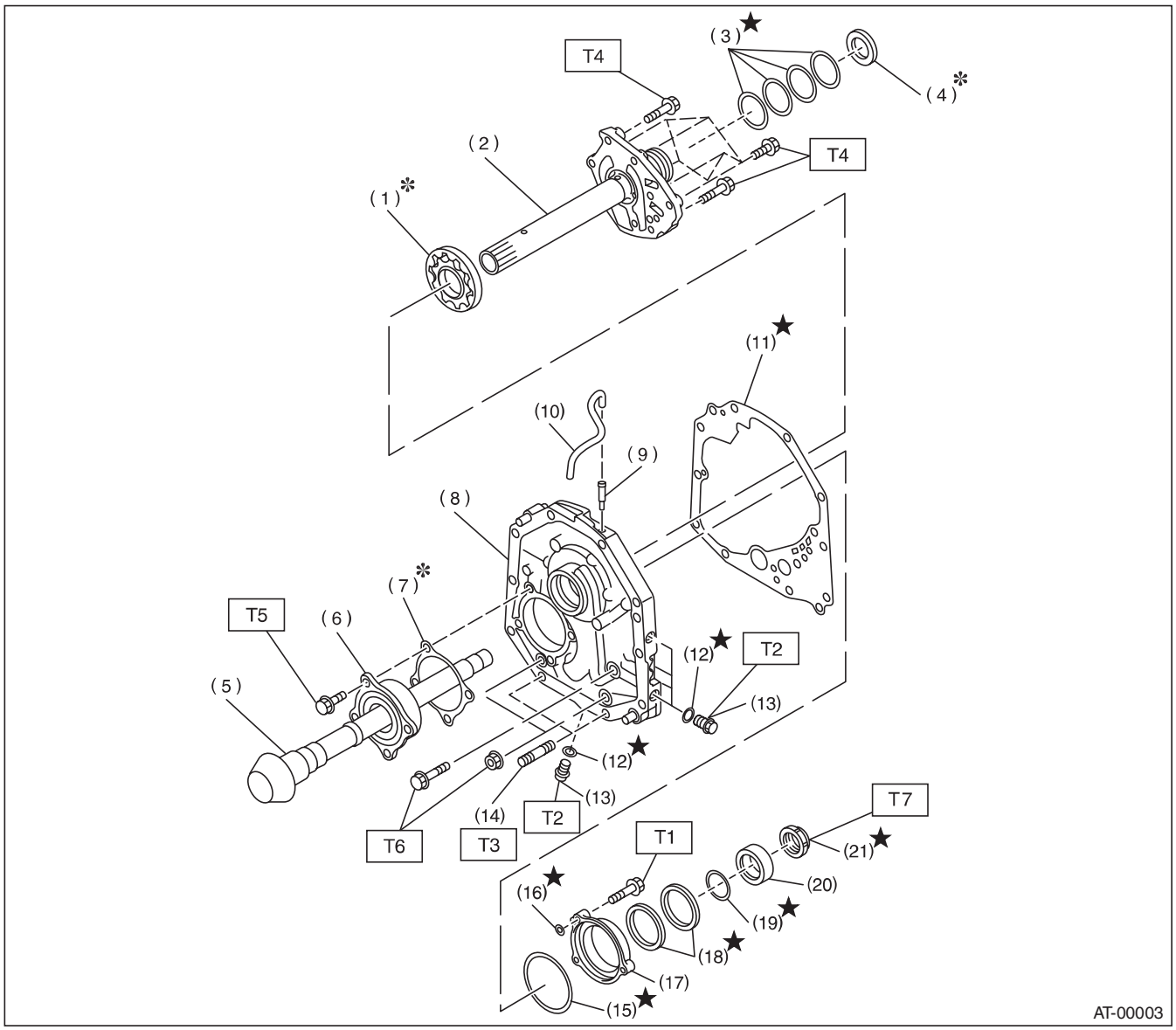


(1) Pitching stopper bracket
(2) O-ring
(3) Differential oil level gauge
(4) Stay
(5) Seal pipe
(6) Oil pump shaft
(7) Clip
(8) Oil drain pipe
(9) Input shaft
(10) O-ring
(11) Torque converter clutch ASSY
(12) Drain plug
(13) Gasket
(14) Oil seal
(15) Clip (Turbo model)
(16) Torque converter clutch case

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)

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2. OIL PUMP

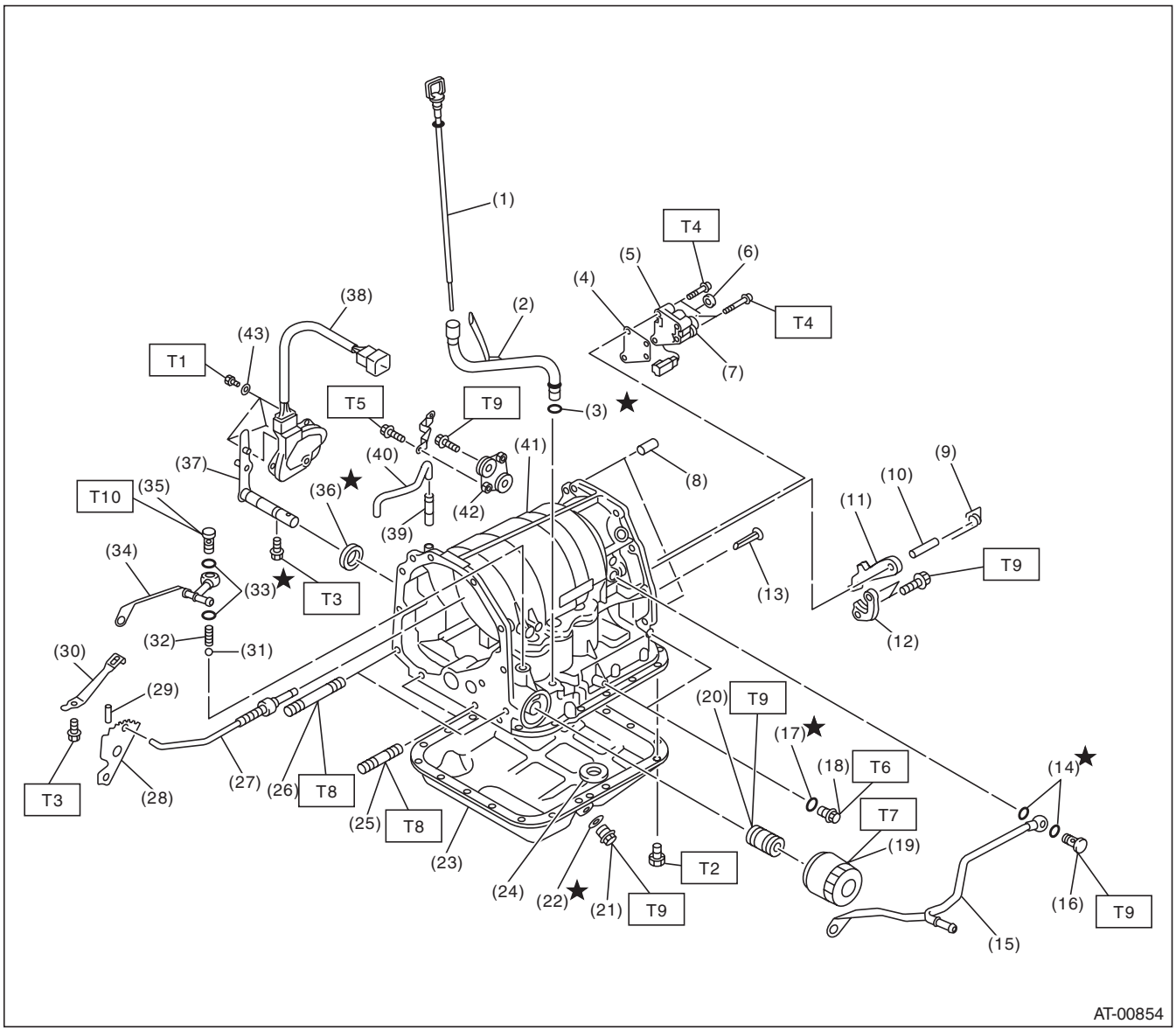


(1) Oil pump rotor
(2) Oil pump cover
(3) Seal ring
(4) Thrust needle bearing
(5) Drive pinion shaft
(6) Roller bearing
(7) Shim
(8) Oil pump housing
(9) Nipple
(10) Air breather hose
(11) Gasket
(12) O-ring
(13) Test plug
(14) Stud bolt
(15) O-ring
(16) O-ring
(17) Oil seal retainer
(18) Oil seal
(19)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

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)

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3. TRANSMISSION CASE AND CONTROL DEVICE



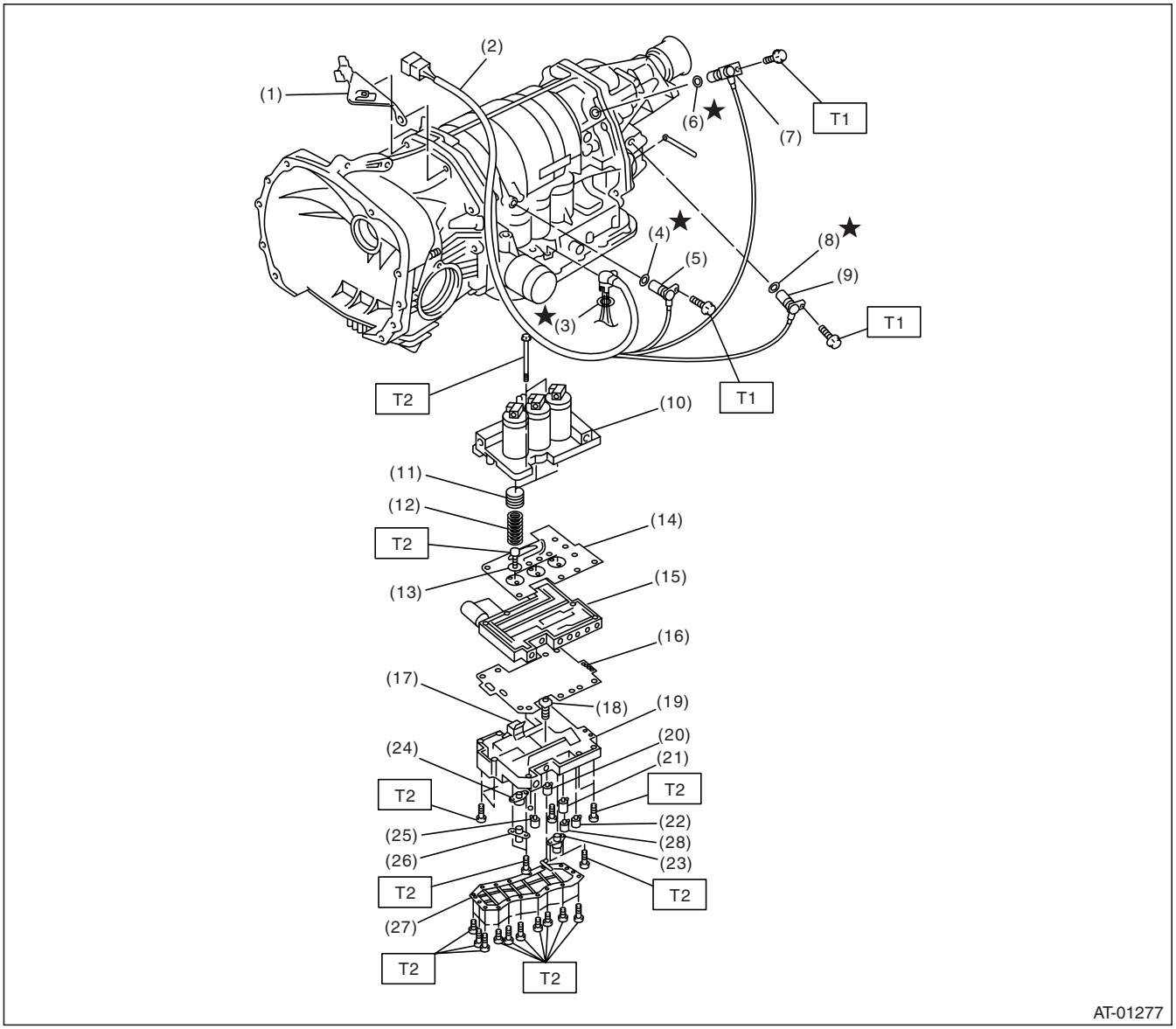
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(1) ATF level gauge
(2) ATF charger pipe
(3) O-ring
(4) Transfer valve plate
(5) Transfer valve ASSY
(6) Transfer clutch seal
(7) Transfer duty solenoid
(8) Straight pin
(9) Return spring
(10) Shaft
(11) Parking pawl
(12) Parking support
(13) Inlet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

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	***3.5 (0.36, 2.6)***
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:	***45 (4.6, 33)***

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4. CONTROL VALVE AND HARNESS ROUTING

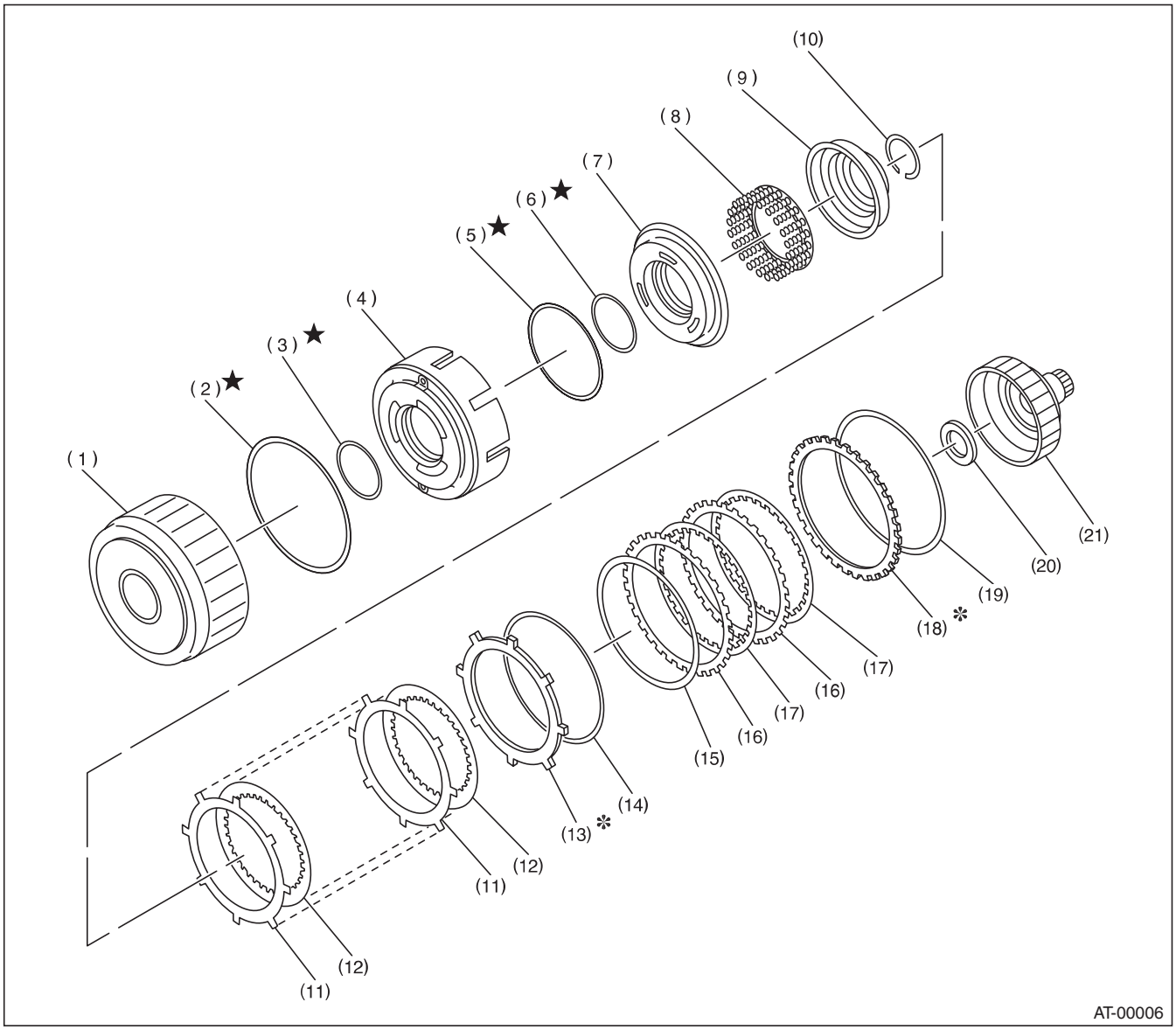


(1) Stay
(2) Transmission harness
(3) O-ring
(4) O-ring
(5) Torque converter turbine speed sensor
(6) O-ring
(7) Front vehicle speed sensor
(8) O-ring
(9) Rear vehicle speed sensor
(10) Upper valve body
(11) Accumulator piston
(12) Accumulator spring
(13) Side plate
(14) Separate plate
(15) Middle valve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

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7 (0.7, 5.1)
T2: 8 (0.8, 5.8)

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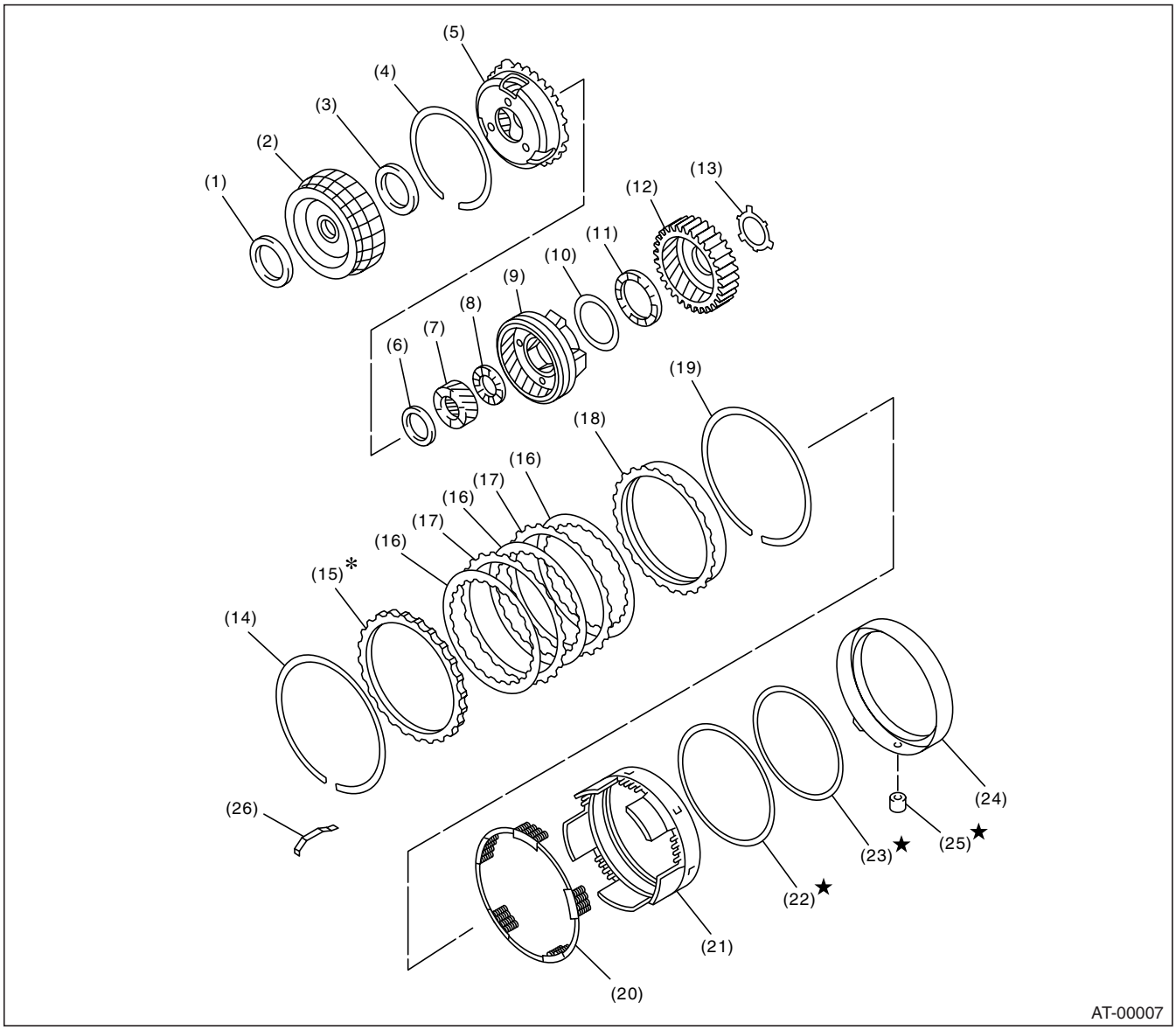
5. HIGH CLUTCH AND REVERSE CLUTCH



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

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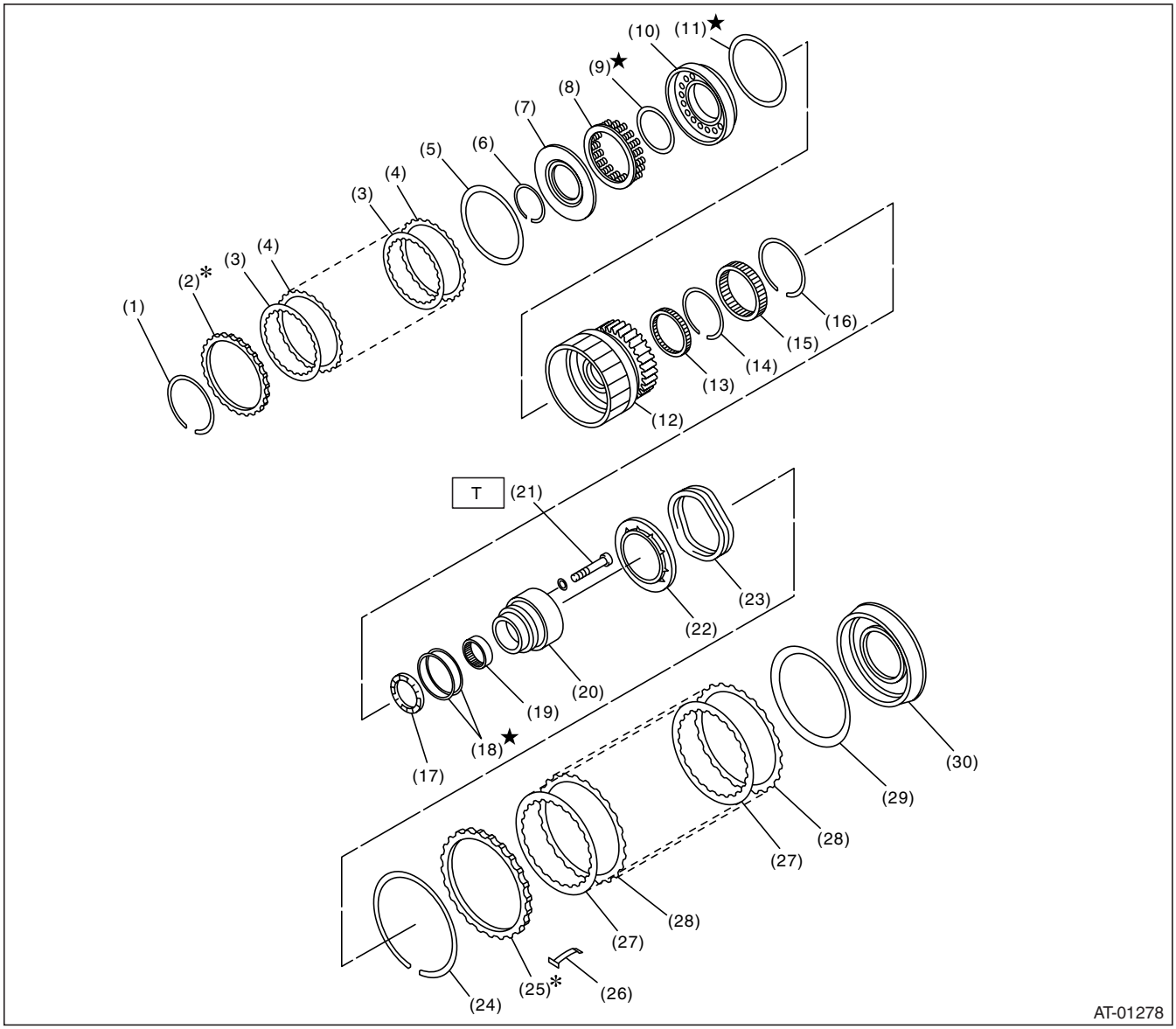
6. PLANETARY GEAR AND 2-4 BRAKE



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

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7. LOW CLUTCH AND LOW & REVERSE BRAKE

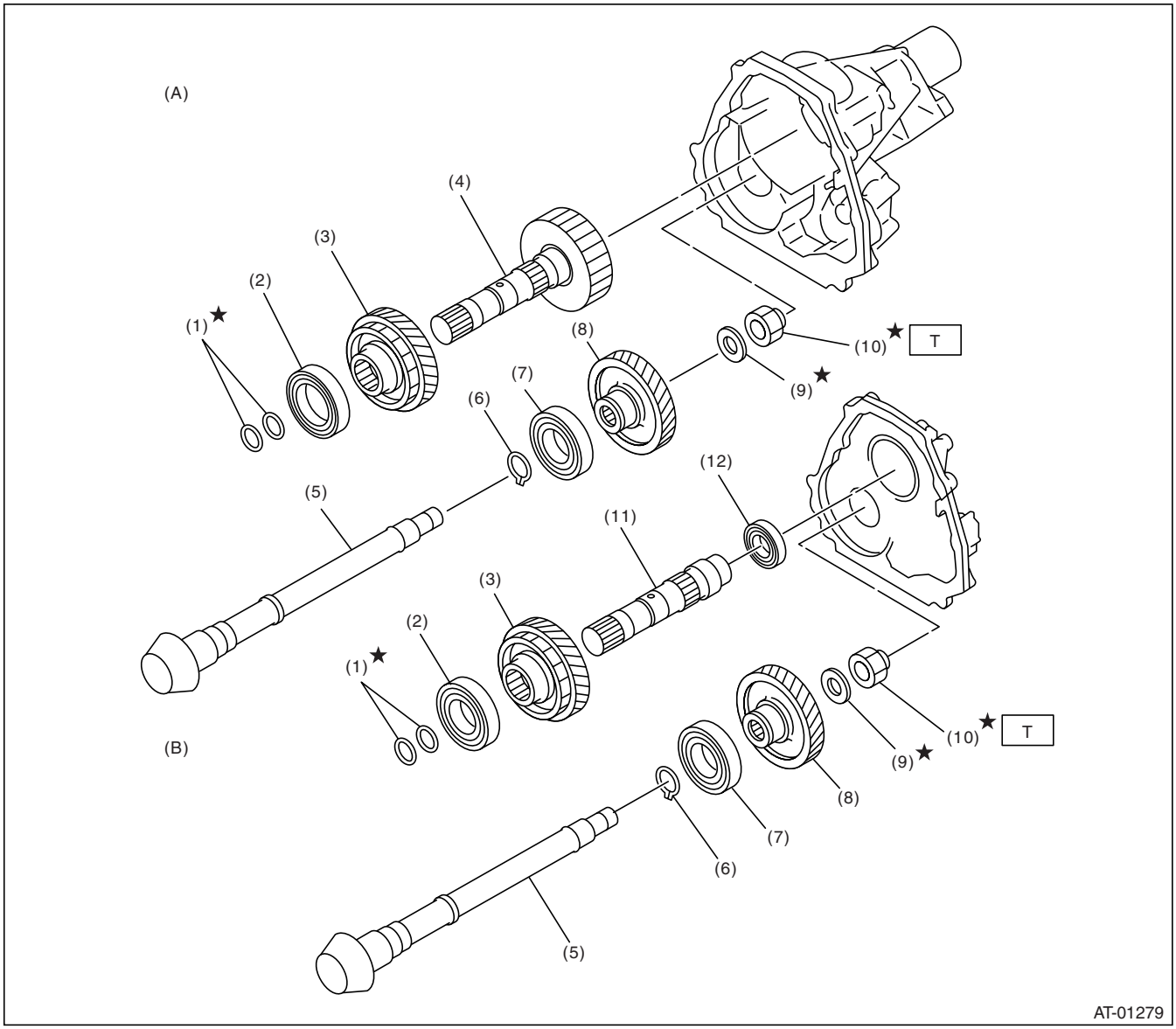


(1) Snap ring
(2) Retaining plate
(3) Drive plate
(4) Driven plate
(5) Dish plate
(6) Snap ring
(7) Cover
(8) Spring retainer
(9) D-ring
(10) Low clutch piston
(11) D-ring
(12) Low clutch drum
(13) Needle bearing
(14) Snap ring
(15) One-way clutch
(16) Snap ring
(17) Thrust needle bearing
(18) Seal ring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

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

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8. REDUCTION GEAR WITH MPT



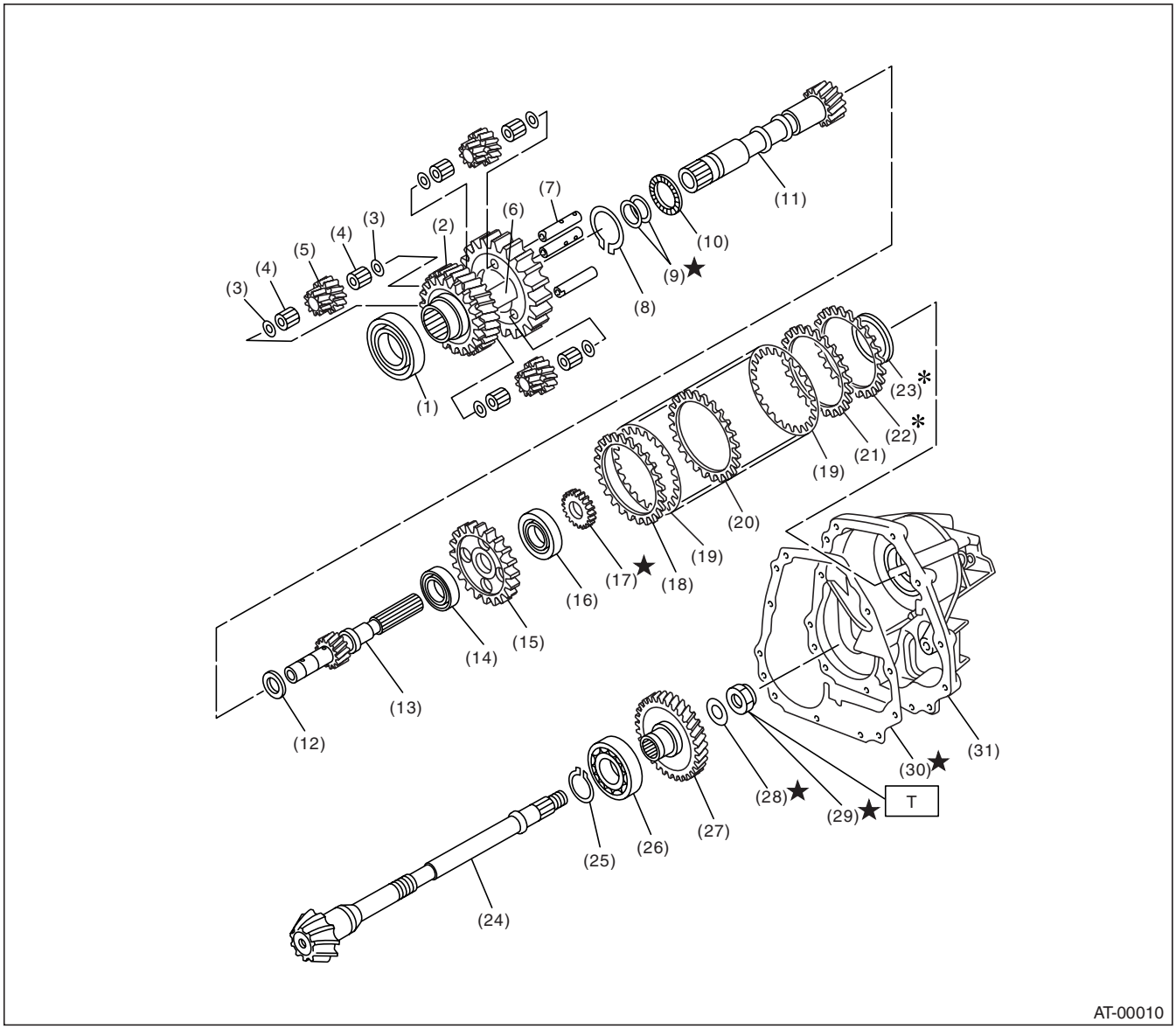
(A) AWD
(B) FWD

(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) Washer
(10) Lock nut
(11) Reduction drive shaft
(12) Ball bearing

Tightening torque: N·m (kgf-m, ft-lb)
T: 100 (10.2, 73.8)

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9. REDUCTION GEAR WITH VTD

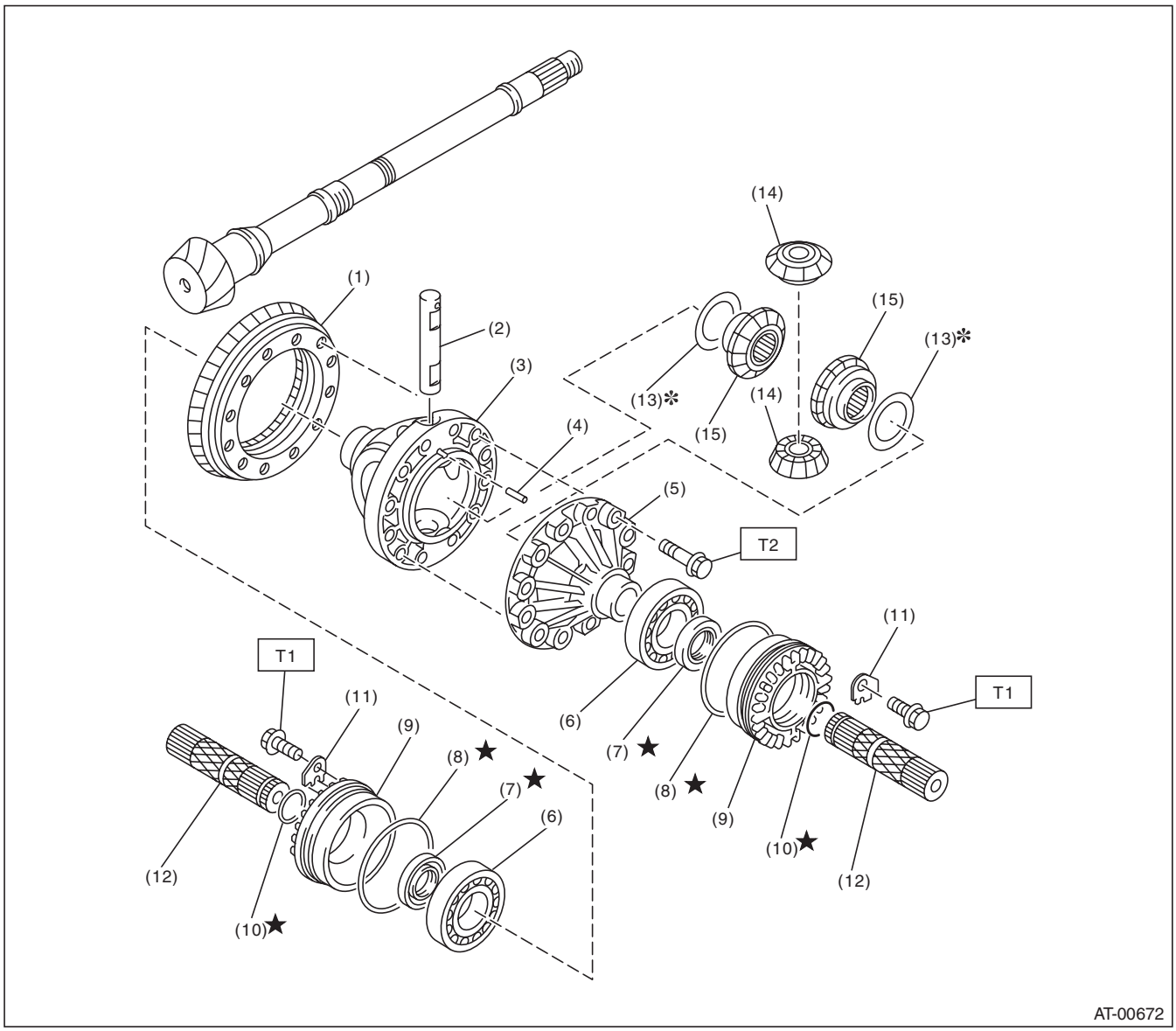


(1) Ball bearing
(2) Reduction drive gear
(3) Washer
(4) Needle bearing
(5) Pinion gear
(6) Carrier
(7) Planetary pinion shaft
(8) Snap ring
(9) Seal ring
(10) Thrust needle bearing
(11) Intermediate shaft
(12) Thrust washer
(13) Rear drive shaft
(14) Ball bearing
(15) Multi-plate clutch (LSD) hub
(16)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

Tightening torque: N·m (kgf-m, ft-lb)
T: 100 (10.2, 73.8)

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10.DIFFERENTIAL GEAR

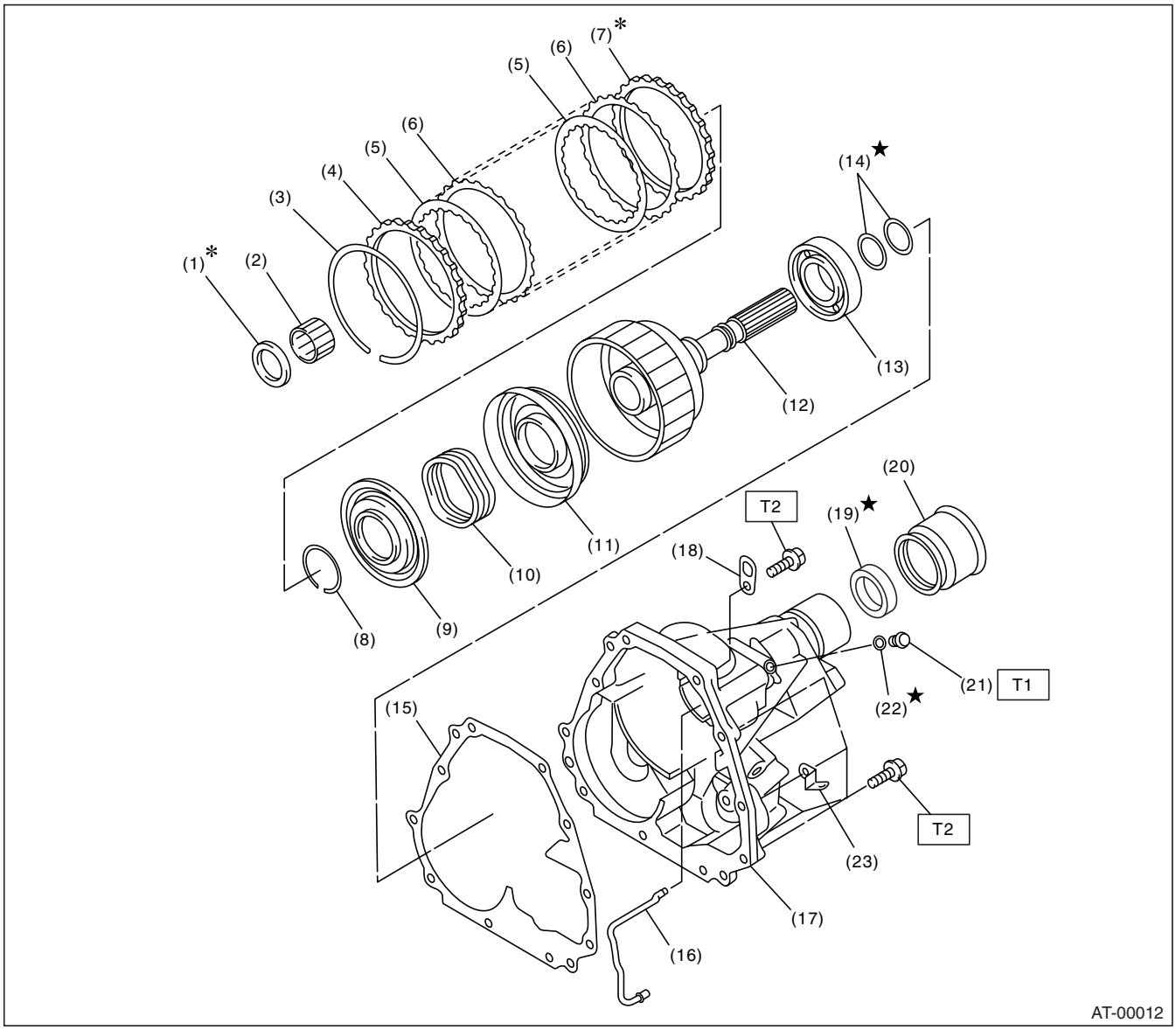


(1) Crown gear
(2) Pinion shaft
(3) Differential case (RH)
(4) Straight pin
(5) Differential case (LH)
(6) Taper roller bearing
(7) Oil seal
(8) O-ring
(9) Differential side retainer
(10) Circlip
(11) Lock plate
(12) Axle shaft
(13) Washer
(14) Differential bevel pinion
(15) Differential bevel gear

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 62 (6.3, 45.6)

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11.TRANSFER AND EXTENSION CASE WITH MPT

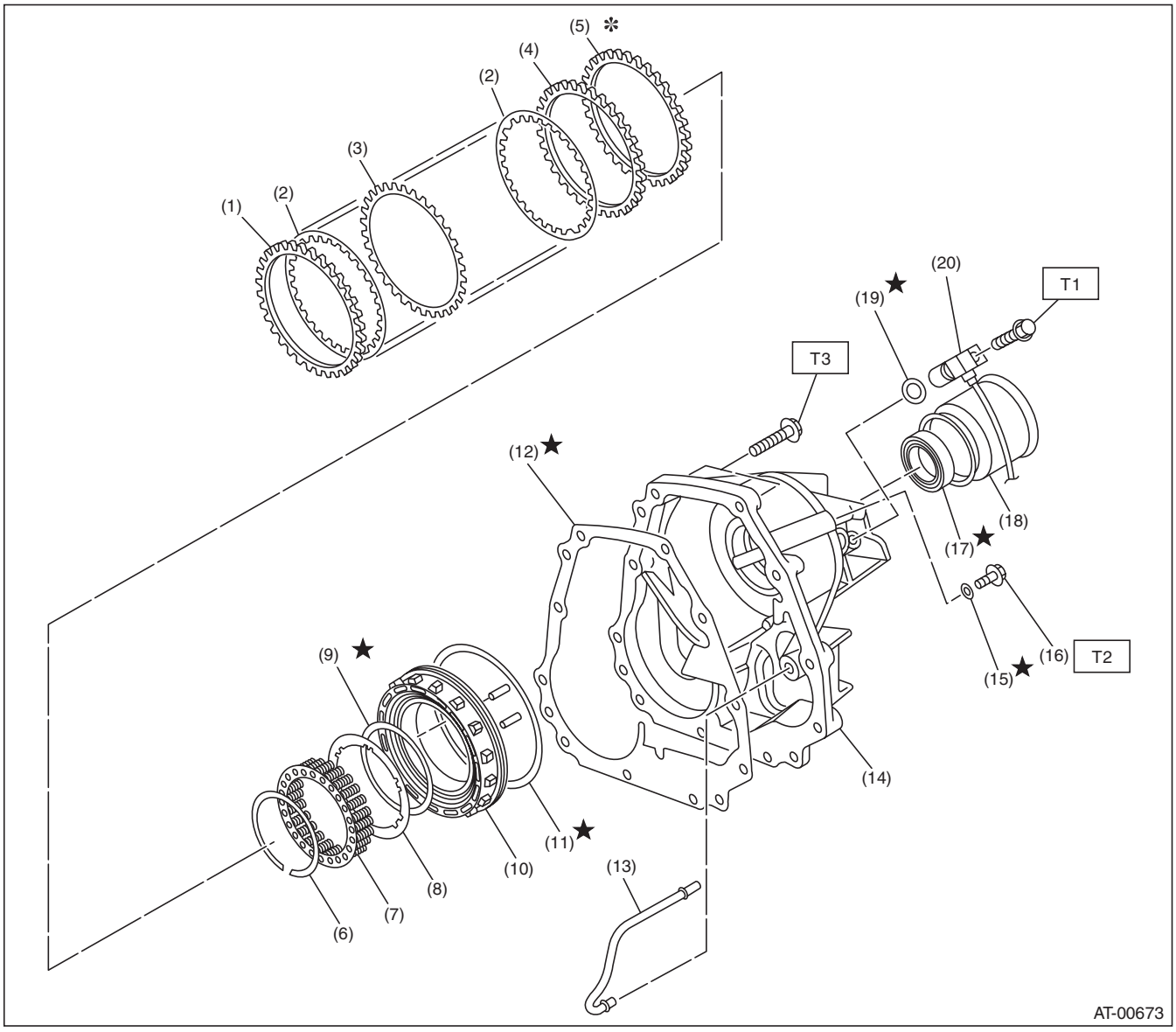


(1) Thrust needle bearing
(2) Needle bearing
(3) Snap ring
(4) Pressure plate
(5) Drive plate
(6) Driven plate
(7) Retaining plate
(8) Snap ring
(9) Transfer piston seal
(10) Return spring
(11) Transfer clutch piston
(12) Rear drive shaft
(13) Ball bearing
(14) Seal ring
(15) Gasket
(16) Transfer clutch 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)

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12.TRANSFER AND EXTENSION CASE WITH VTD

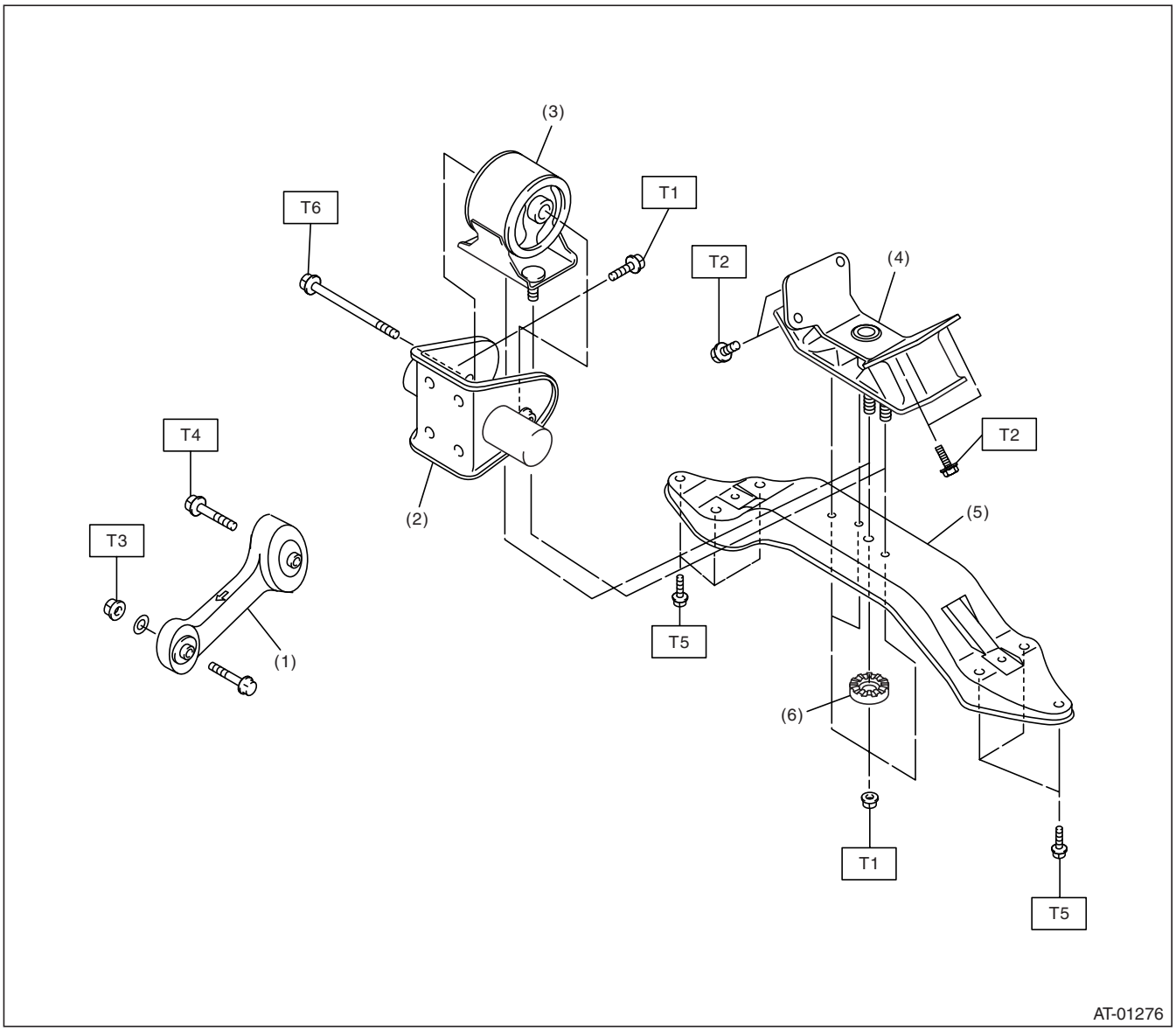


(1) Driven plate (Thick)
(2) Driven plate
(3) Driven plate (Thin)
(4) Driven plate (Thick)
(5) Retaining plate
(6) Snap ring
(7) Spring retainer
(8) Plate
(9) O-ring
(10) Multi-plate clutch (LSD) piston
(11) D-ring
(12) Gasket
(13) Multi-plate clutch (LSD) pipe
(14) Extension case
(15) O-ring
(16) Test plug
(17) Oil seal
(18) Dust cover
(19) O-ring
(20) Rear wheel sensor

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*7 (0.7, 5.1)*
T2:	*13 (1.3, 9.4)*
T3:	*25 (2.5, 18.1)*

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13.TRANSMISSION MOUNTING



(1) Pitching stopper
(2) Rear bracket (FWD model)
(3) Rear cushion rubber (FWD model)
(4) Rear cushion rubber (AWD model)
(5) Crossmember
(6) Stopper

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 26)
T2: 39 (4.0, 29)
T3: 50 (5.1, 37)
T4: 58 (5.9, 43)
T5: 70 (7.1, 51)
T6: 123 (12.5, 90)

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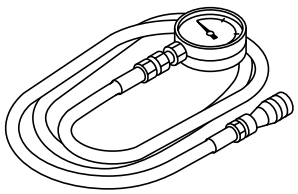
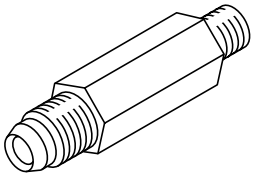
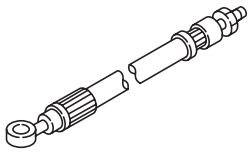
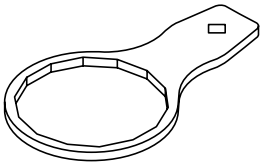
C: CAUTION

• 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.

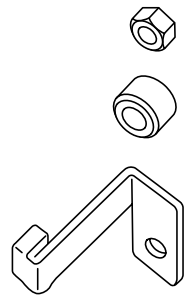
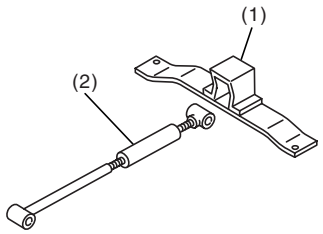
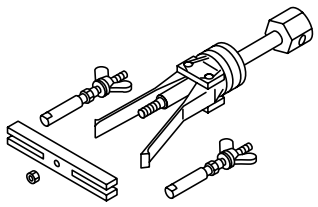
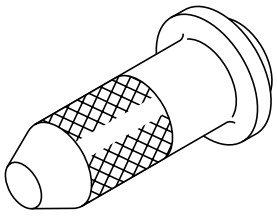
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D: PREPARATION TOOL

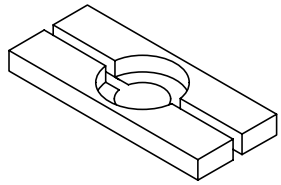
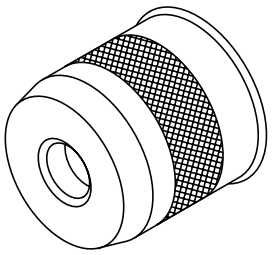
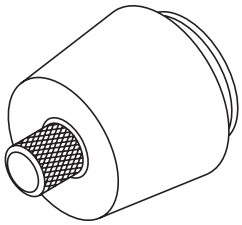
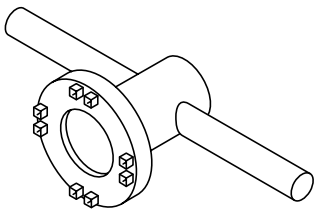
1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	ADAPTER	Used oil pump housing when measuring reverse clutch pressure and line pressure.
 ST-498897700	498897700	ADAPTER SET	Used for measuring transfer clutch pressure.
 ST-498545400	498545400	FILTER WRENCH	Used for removing and installing ATF filter.

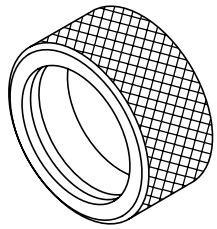
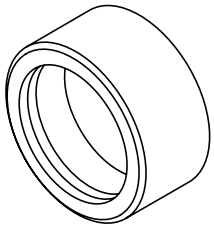
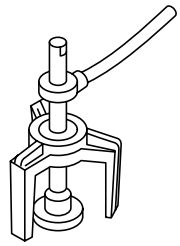
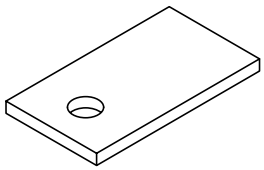
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498277200	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.
 ST41099AA000	41099AA000	ENGINE SUPPORT ASSY	Used for supporting engine. (1) ENGINE SUPPORT BRACKET (41099AA010) (2) ENGINE SUPPORT (41099AA020)
 ST-398527700	398527700	PULLER ASSY	• 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.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.

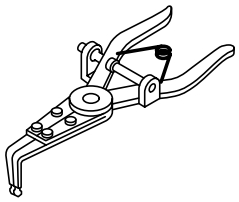
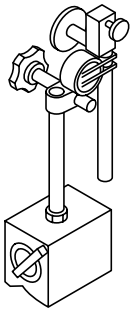
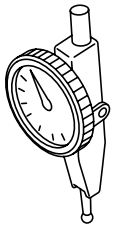
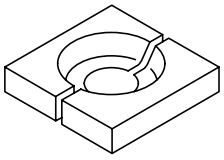
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077000	498077000	REMOVER	Used for removing differential taper roller bearing.
 ST-499247400	499247400	INSTALLER	• Used for installing transfer outer snap ring. • Used with GUIDE (499257300).
 ST-499257300	499257300	SNAP RING OUTER GUIDE	• Used for installing transfer outer snap ring. • Used with INSTALLER (499247400).
 ST-499787000	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.

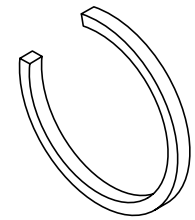
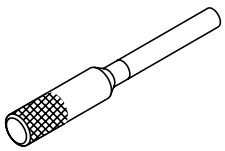
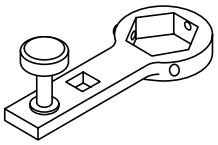
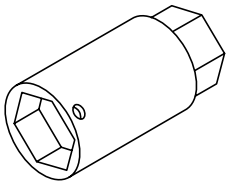
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398437700	398437700	DRIFT	Used for installing converter case oil seal.
 ST-398487700	398487700	INSTALLER	Used for installing taper roller bearing of front differential.
 ST-398673600	398673600	COMPRESSOR	Used for removing and installing clutch spring.
 ST-498255400	498255400	PLATE	Used for measuring backlash of hypoid gear.

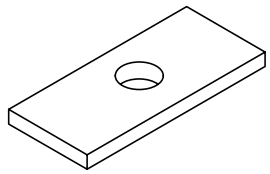
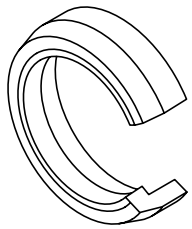
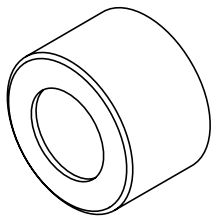
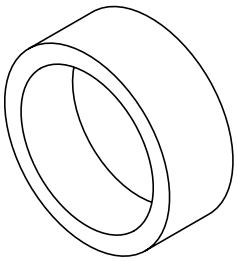
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399893600	399893600	PLIERS	Used for removing and installing clutch spring.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring gear backlash. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring gear backlash. • Used with MAGNET BASE (498247001).
 ST-498517000	498517000	REPLACER	Used for removing front roller bearing.

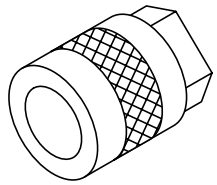
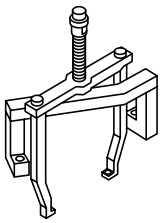
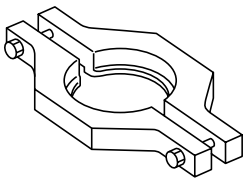
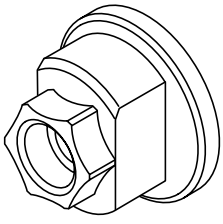
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398623600	398623600	SEAT	Used for removing spring of transfer clutch piston.
 ST-499267300	499267300	STOPPER PIN	Used for installing inhibitor switch.
 ST-499787700	499787700	WRENCH	Used for removing and installing drive pinion lock nut.
 ST-499787500	499787500	ADAPTER	Used for removing and installing drive pinion lock nut.

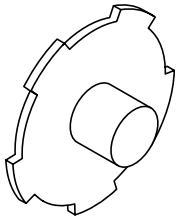
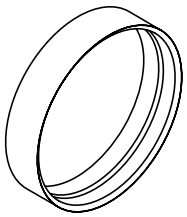
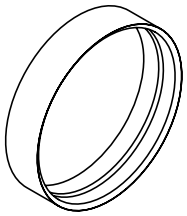
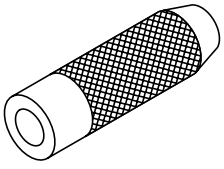
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 ST-498627100	498627100	SEAT	Used for holding low clutch piston retainer spring when installing snap ring.
 ST-499577000	499577000	GAUGE	• Used for measuring the transmission case mating surface to the reduction gear end surface. • For MPT model.
 ST-398744300	398744300	GAUGE	• Use for measuring contact face between multiplate clutch end and transmission. • For VTD model.

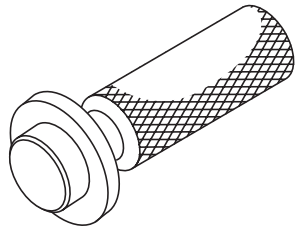
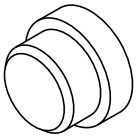
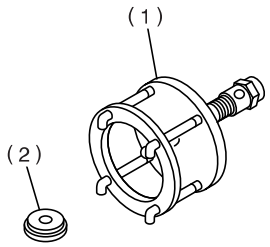
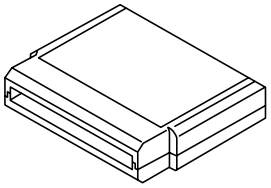
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499737000	499737000	PULLER	Used for removing reduction driven gear assembly.
 ST-499737100	499737100	PULLER SET	Used for removing reduction drive gear assembly.
 ST-498077600	498077600	REMOVER	Used for removing ball bearing.
 ST-498937110	498937110	HOLDER	Used for removing and installing drive pinion lock nut.

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

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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499797000	499797000	DIFERENTIAL OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.
 ST-398497701	398497701	SEAT	Used for installing needle bearing.
 ST-899524100	899524100	PULLER SET	• Using the bolt only. (1) Bolt • Used with PULLER SET (499737100). • Used with PULLER (499737000). (1) Puller (2) Cap
 ST24082AA210	24082AA210 (Newly adapted tool)	CARTRIDGE	Troubleshooting for electrical systems.

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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST22771AA030	22771AA030	SUBARU 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.
TORX® T70	Used for removing and installing differential gear oil drain plug.

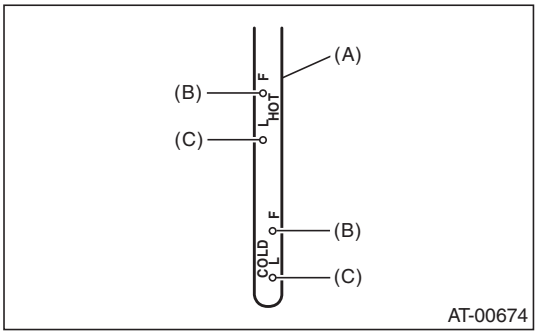
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2. Automatic Transmission Fluid

A: INSPECTION

NOTE:
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 4AT-21, 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 at HOT side.

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.

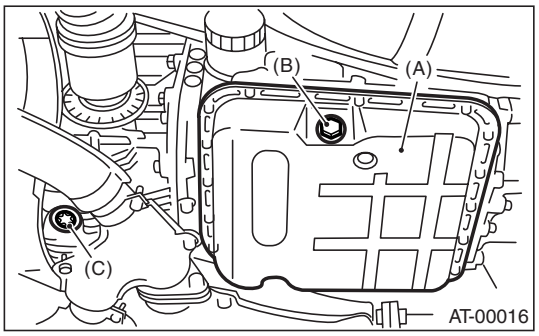
B: REPLACEMENT

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:
1.6 L FWD model:
8.0 — 8.3 ℓ (8.5 — 8.8 US qt, 7.0 — 7.3 Imp qt)
1.6 L AWD and 2.0 L Non-turbo model:
8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)
2.5 L and 2.0 L Turbo model:
9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

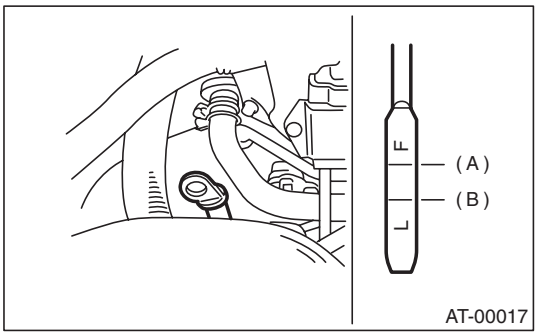
6) Check the level and leaks of ATF.
<Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>

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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

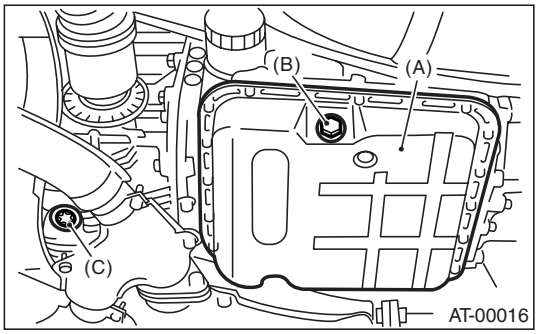
B: REPLACEMENT

1) Lift-up the vehicle.
2) Remove the differential gear oil drain plug using TORX® T70, and then 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 using TORX® T70.

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 4AT-32, INSPECTION, Differential Gear Oil.>

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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 engine speed does not change sharply when the acclelerator 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. (MPT model)

11.OIL LEAKS

After the driving test, inspect for oil leaks.

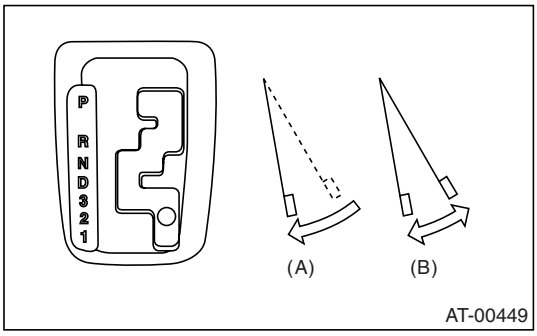
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5. Stall Test

A: INSPECTION

NOTE:
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:
• To check the operation of the automatic transmission clutch.
• To check the operation of the torque converter clutch.
• To check engine performance.
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 70 to 80°C (158 to 176°F) by idling the engine for approx. 30 minutes (with select lever set to “N” or “P”).
7) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
8) Move the manual linkage to ensure it operates properly, and shift the select lever to the “2” range. Turn hold switch ON.
9) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.



(A) Brake pedal
(B) Accelerator pedal

10) When the engine speed is stabilized, record that speed quickly and release the accelerator pedal.
11) Shift the select lever to “N” range, and cool down the engine by idling it for more than one minute.
12) 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.
13) Perform the stall tests with the select lever in “D” range. Turn hold switch OFF.

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):
1.6 L model: 2,400 — 3,000 rpm
2.0 L Non-turbo model: 2,200 — 2,700 rpm
2.0 L Turbo model: 2,900 — 3,500 rpm
2.5 L model: 2,100 — 2,600 rpm

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Stall speed (at sea level)	Position	Cause
Less than specifications	2, R	• Throttle valve not fully open • Erroneous engine operation • Torque converter clutch's one-way clutch slipping
Greater than specifications	D	• Line pressure too low • Low clutch slipping • One-way clutch malfunction
	R	• Line pressure too low • Reverse clutch slipping • Low & reverse brake slipping
	2	• Line pressure too low • Low clutch slipping • 2-4 brake slipping

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6. Time Lag Test

A: INSPECTION

NOTE:
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.

- Perform the test at normal operating fluid temperature 70 to 80°C (158 to 176°F).
- Be sure to allow a 1 minute interval between tests.
- Make three measurements and take the average value.

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
If “N” → “D” time lag is longer than specified:

- Line pressure too low
- Low clutch worn
- One-way clutch not operating properly

4) In the same manner, measure the time lag for “N” → “R”.
Time lag: Less than 1.5 seconds
If “N” → “R” time lag is longer than specified:

- Line pressure too low
- Reverse clutch worn
- Low & reverse brake worn

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7. Line Pressure Test

A: MEASUREMENT

NOTE:
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.

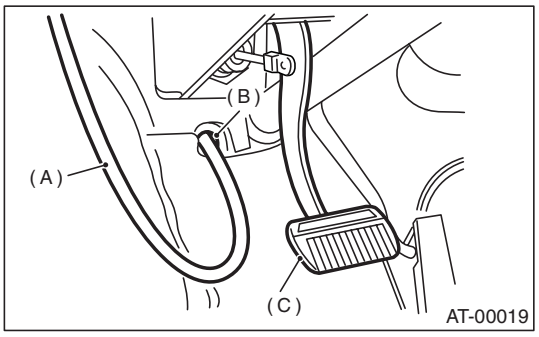
• Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.

1) Line pressure measurement (under no load)
   (1) Before measuring the line pressure, jack-up all wheels.
   (2) Maintain the temperature of ATF at approx. 70 — 80°C (158 — 176°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)
   (1) Before measuring the line pressure, apply both foot and parking brakes with all wheels chocked (Same as for “stall” test conditions).
   (2) Measure the line pressure when select lever is in “R”, “2” with engine under stall conditions.
   (3) 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.)
   (4) Maintain the temperature of ATF at approx. 70 — 80°C (158 — 176°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”.)

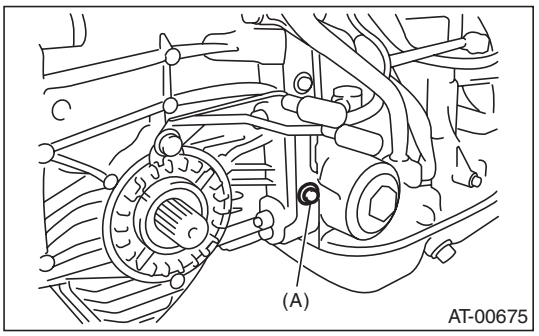
3) Temporarily attach the ST to a suitable place in the driver's compartment, remove the blind plug located in front of the toe board and pass the hose of the ST to engine compartment.

ST 498575400 OIL PRESSURE GAUGE ASSY



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

4) Remove the test plug and install the ST instead.
ST 498897200 OIL PRESSURE GAUGE ADAPTER



(A) Test plug

5) Connect the ST1 with ST2.
ST1 498897200 OIL PRESSURE GAUGE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY

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

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)

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8. Transfer Clutch Pressure Test

A: INSPECTION

• MPT MODEL

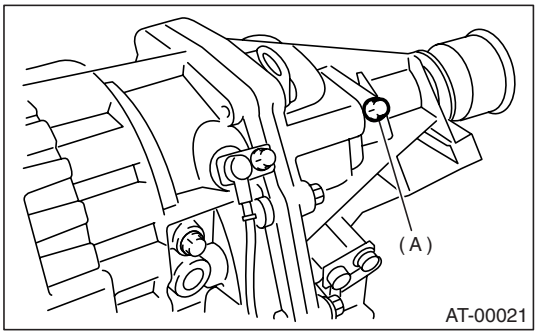
Check the transfer clutch pressure in accordance with the following chart in the same manner as with line pressure. <Ref. to 4AT-37, Line Pressure Test.>

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

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.

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



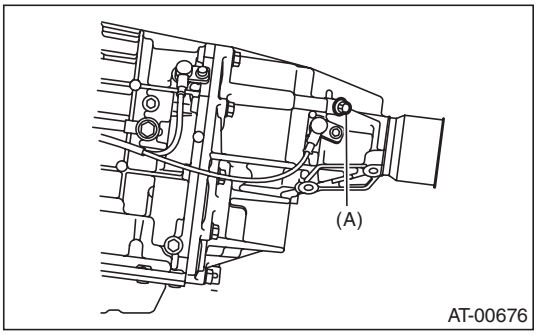
(A) Test plug

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

Check transfer clutch pressure using the following chart. <Ref. to 4AT-37, Line Pressure Test.>

ST 498897700 OIL PRESSURE ADAPTER SET
ST 498575400 OIL PRESSURE GAUGE ASSY



(A) Test plug

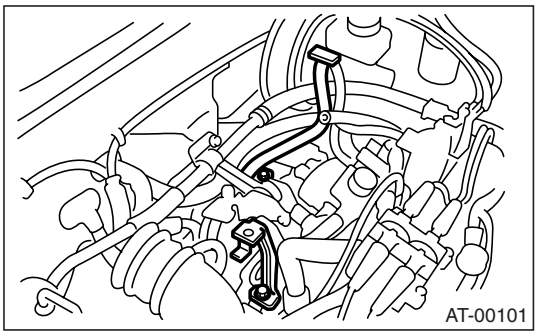
Duty ratio (%)	Throttle opening angle	Standard of transfer clutch pressure kPa (kg/cm^2, psi)
95	Fully open	932 — 1,089 (9.5 — 11.1, 135 — 158)
60	2/3 open	216 — 294 (2.2 — 3.0, 33 — 43)

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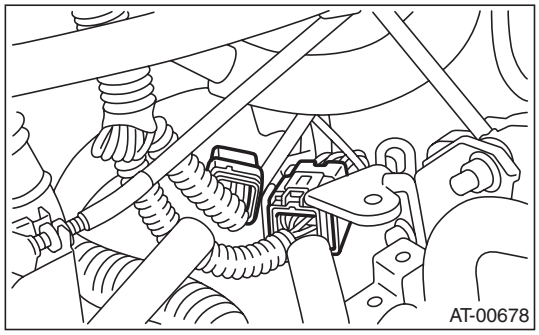
9. Automatic Transmission Assembly

A: REMOVAL

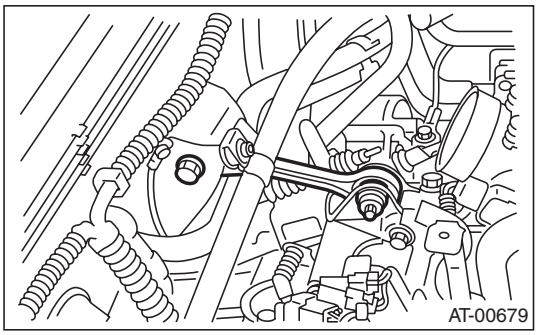
1) Set the vehicle on a lift.
2) Open the front hood fully, and support it with stay.
3) Disconnect the battery ground cable.
4) Remove the air intake duct. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
5) Remove the air cleaner case or air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
6) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
7) Remove the air cleaner case stay. (Non-turbo model)



8) Disconnect the following connectors.
(1) Transmission harness connector

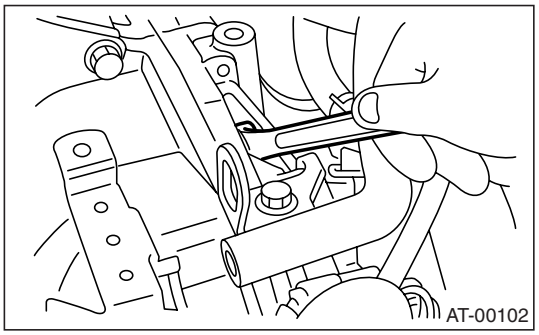


(2) Transmission ground terminal
9) Remove the starter.
2.0 L Non-turbo and 2.5 L models
<Ref. to SC(H4SO)-7, REMOVAL, Starter.>
2.0 L Turbo model
<Ref. to SC(H4SO)-7, REMOVAL, Starter.>
10) Remove the pitching stopper.

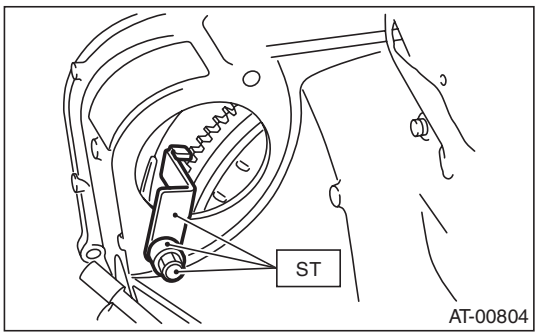


11) Separate the torque converter clutch from drive plate.
(1) Remove the service hole plug.
(2) Remove the bolts which hold torque converter clutch to drive plate.
(3) While rotating the engine, remove the other bolts using ST.

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



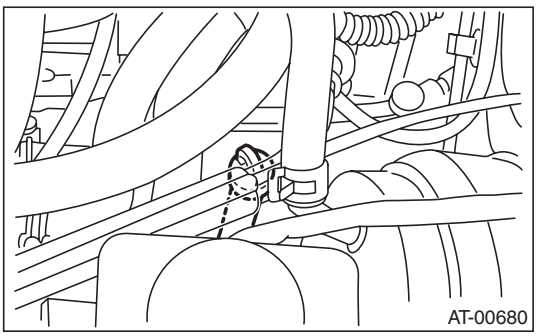
12) Install the ST to torque converter clutch case.
ST 498277200 STOPPER SET



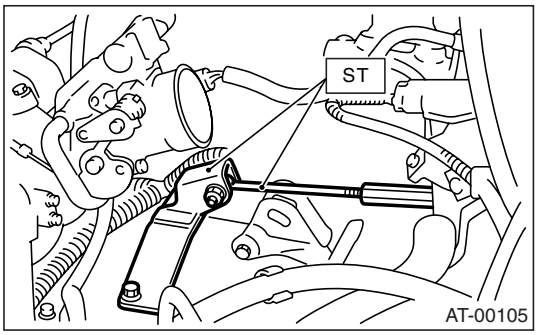
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13) Remove the ATF level gauge.

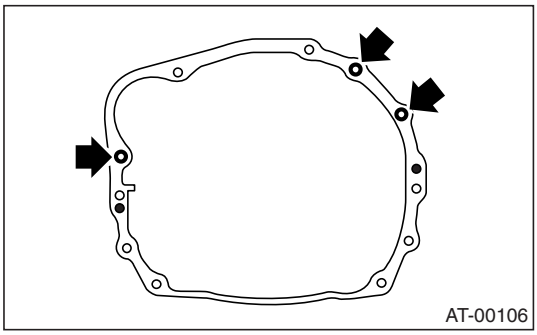
NOTE:
Plug the opening to prevent an entry of foreign particles into transmission fluid.



14) Set the ST.
ST 41099AA000 ENGINE SUPPORT ASSY

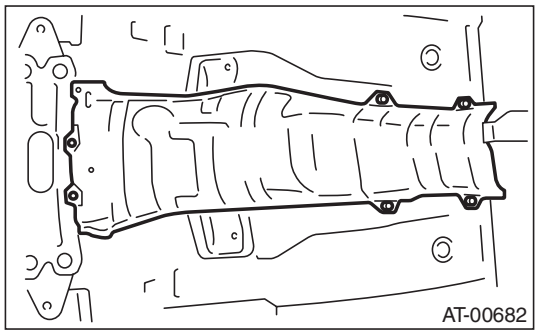


15) Remove the bolt which holds the right upper side of transmission to engine.

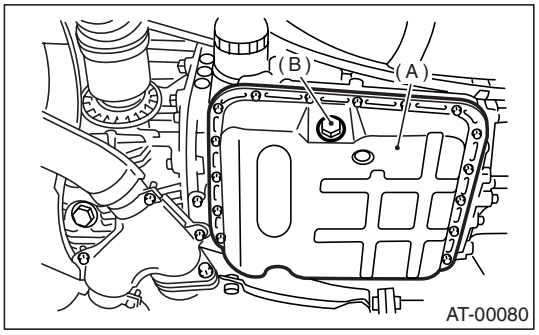


16) Lift-up the vehicle.
17) Remove the under cover.
18) Remove the front, center and rear exhaust pipe, and muffler. (Non-turbo model)
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>

19) Remove the center and rear exhaust pipes, and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
20) Remove the heat shield cover. (If equipped)

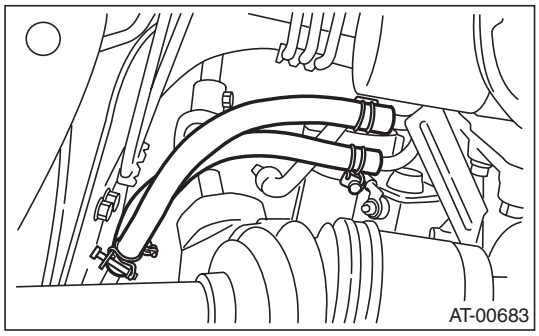


21) Drain ATF to remove the ATF drain plug.



(A) Oil pan
(B) Drain plug

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

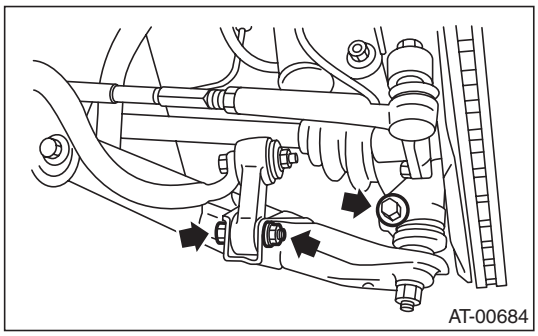


23) Remove the propeller shaft.
<Ref. to DS-15, REMOVAL, Propeller Shaft.>
24) Remove the shift select cable. <Ref. to CS-13, REMOVAL, Select Cable.>
25) Disconnect the stabilizer link from transverse link.

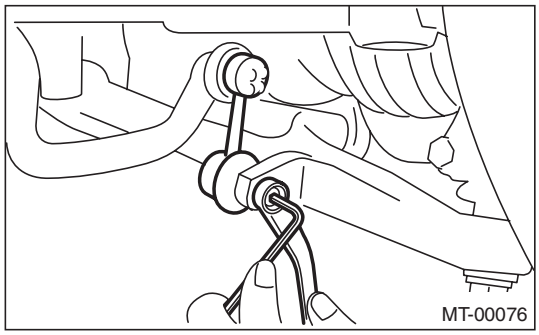
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26) Remove the bolt securing ball joint of transverse link to housing.

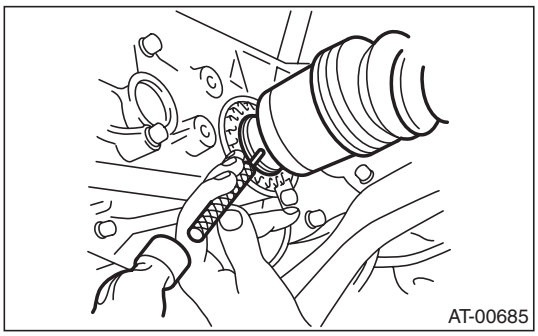
• WAGON MODEL



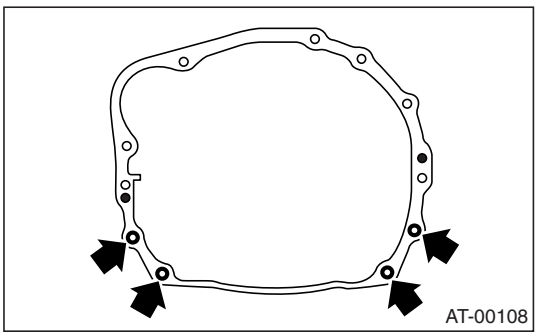
• SEDAN MODEL



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



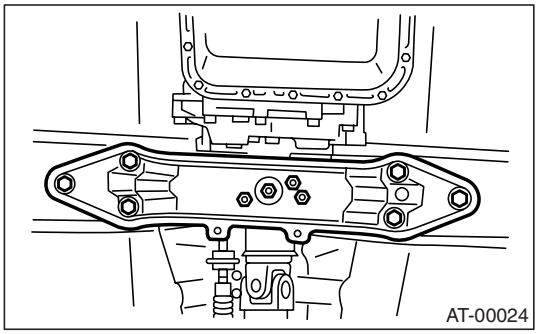
28) Remove the nuts which hold the lower side of transmission to engine.



29) Place the transmission jack under transmission.

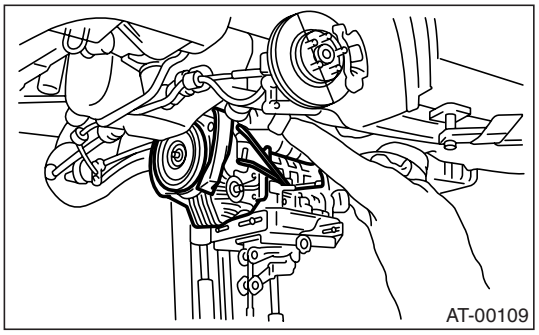
NOTE:
Make sure that the support plates of transmission jack don't touch the oil pan.

30) Remove the transmission rear crossmember from vehicle.



31) Remove the transmission.

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



32) Separate the transmission assembly and rear cushion rubber.

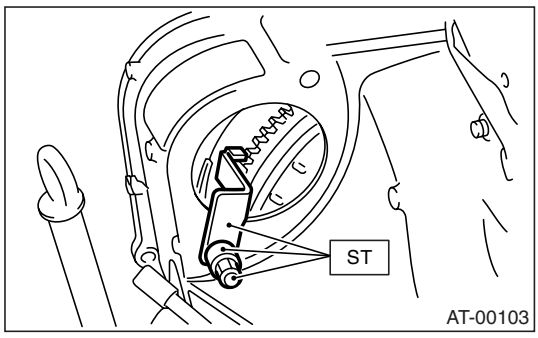
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B: INSTALLATION

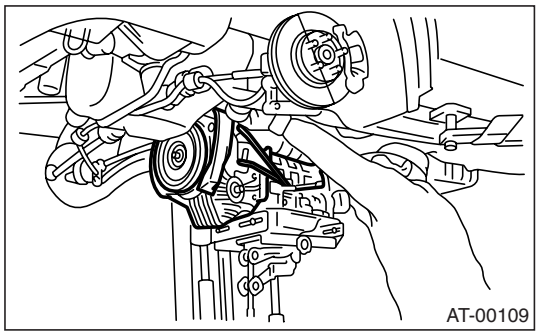
1) Install the rear cushion rubber to transmission assembly.

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

2) Install the ST to torque converter clutch case.
ST 498277200 STOPPER SET



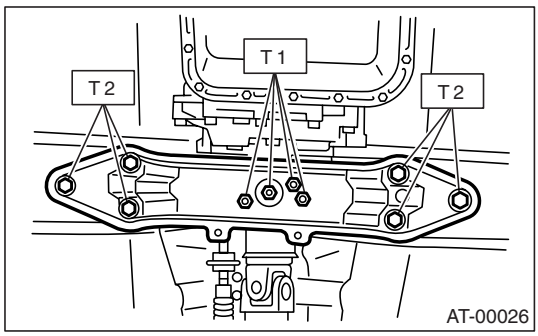
3) Install the transmission onto engine.
(1) Gradually raise the transmission with transmission jack.



(2) Engage them at splines.

4) Install the transmission rear crossmember.

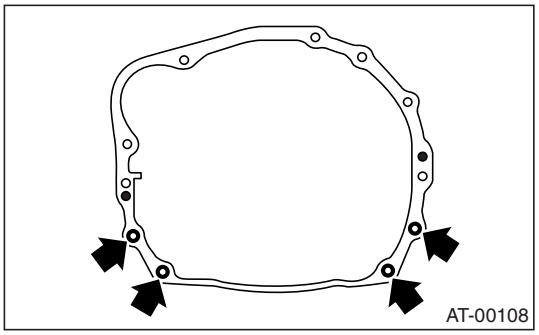
Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



5) Take off the transmission jack.

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

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



7) Lower the vehicle.

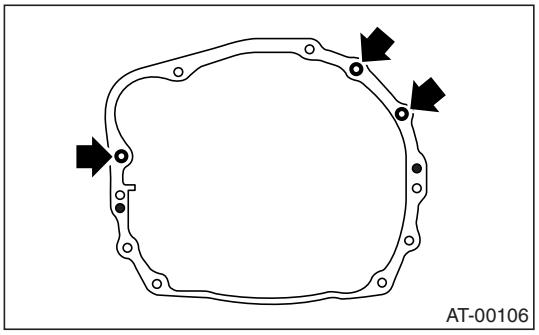
8) Connect the engine and transmission.
(1) Remove the ST from torque converter clutch case.

NOTE:
Be careful not to drop the ST into torque converter clutch case when removing ST.
ST 498277200 STOPPER SET

(2) Install the starter.
<Ref. to SC(H4SO)-7, INSTALLATION, Starter.>

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

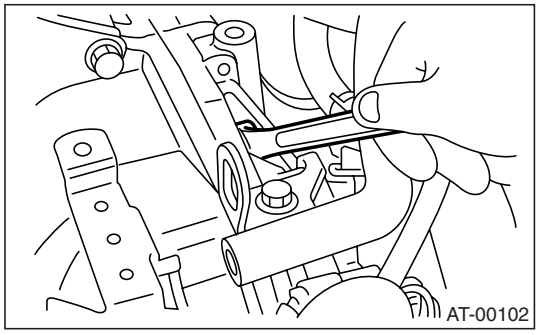
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



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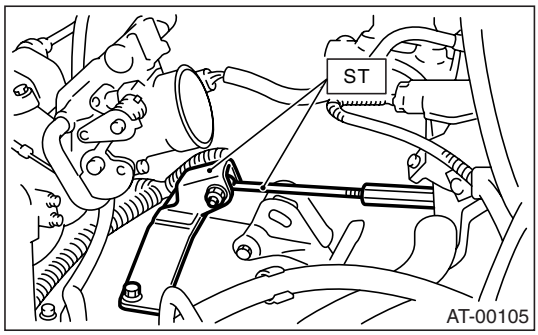
9) Install the torque converter clutch to drive plate.
(1) Tighten the bolts which hold the torque converter clutch to drive plate.
(2) Tighten the other bolts while rotating the engine by using ST.

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



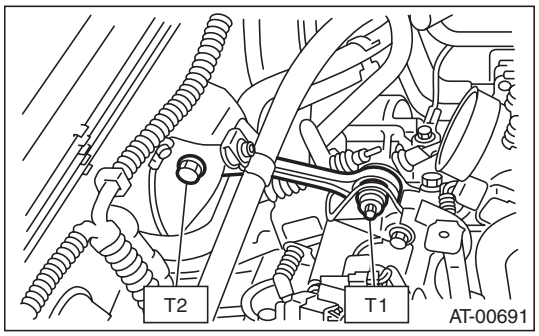
(3) Clog the plug onto service hole.

10) Remove the ST.



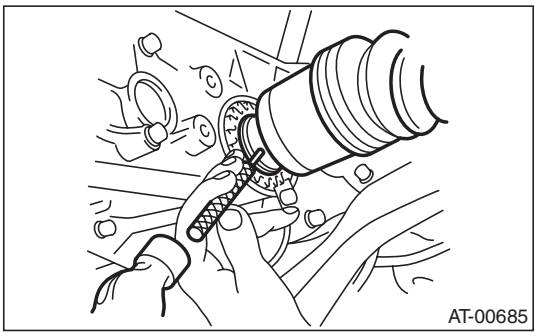
11) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



12) Lift-up the vehicle.

13) Install the front drive shafts into transmission.
(1) Lift-up the vehicle.
(2) Install the front drive shaft into transmission.
(3) Drive a new drive spring pin into chamfered hole of drive shaft.

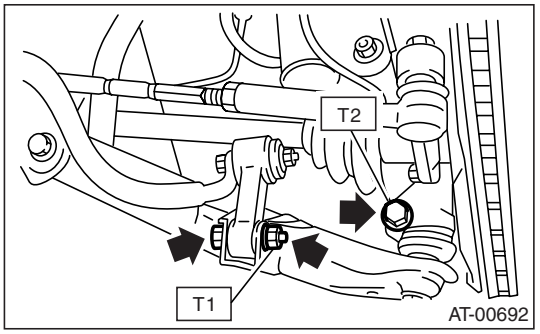


14) Install the ball joint into housing.

15) Connect the stabilizer link to transverse link, and tighten the bolts. (Wagon model)

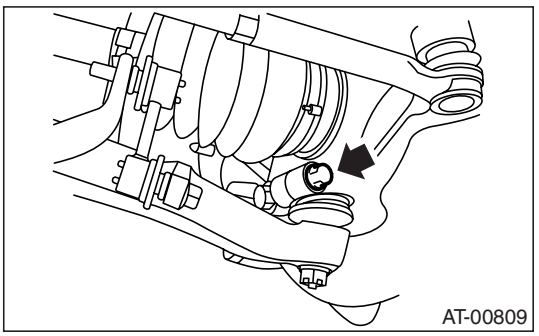
NOTE:
Discard the loosened self-locking nut and replace with a new one.

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)



16) Tighten the installing bolts. (Wagon model)

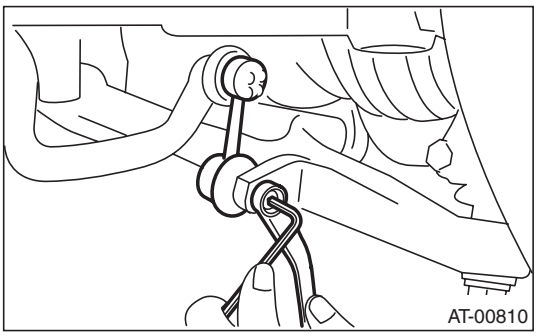
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



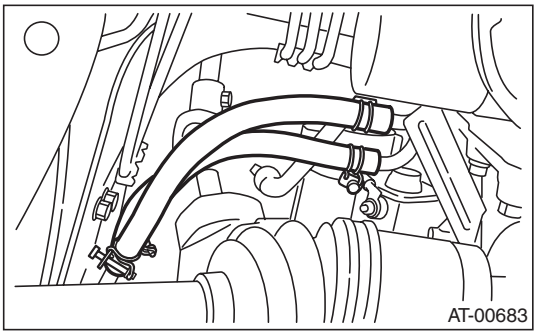
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17) Install the stabilizer link to transverse link. (Sedan model)

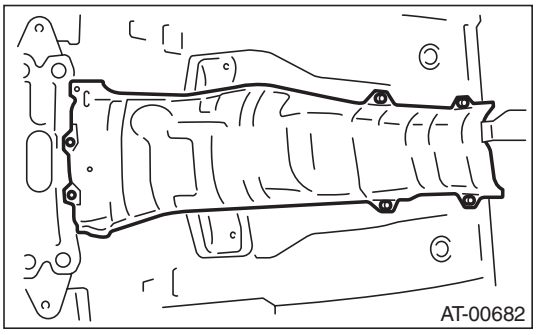
Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)



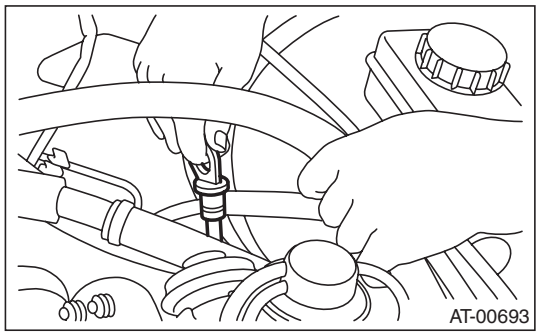
18) Install the shift select cable onto select lever. <Ref. to CS-14, INSTALLATION, Select Cable.>
19) Install the ATF level gauge guide, and connect the ATF cooler hoses to pipe.



20) Install the propeller shaft. <Ref. to DS-16, INSTALLATION, Propeller Shaft.>
21) Install the heat shield cover. (If equipped)



22) Install the rear exhaust pipe and muffler assembly.
Non-turbo model
<Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
2.0 L Turbo model
<Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, INSTALLATION, Muffler.>
23) Install the front and center exhaust pipe. (Non-turbo model)
<Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>
24) Install the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-10, INSTALLATION, Center Exhaust Pipe.>
25) Install the under cover.
26) Lower the vehicle.
27) Install the ATF level gauge.



28) Connect the following connectors.
(1) Transmission harness connectors
(2) Transmission ground terminal
29) Connect the cruise control cable (With cruise control vehicles).
30) Install the air cleaner case stay.

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

31) Install the air cleaner case or air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
32) Install the air intake duct. (Non-turbo model)
<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
33) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>
34) Connect the battery ground cable.
35) Fill ATF up to the middle of the “COLD” side on level gauge by using the gauge hole. <Ref. to 4AT-31, Automatic Transmission Fluid.>
36) Take off the vehicle from lift arms.
37) Check select lever operation.
<Ref. to 4AT-48, INSPECTION, Inhibitor Switch.>
38) Check the ATF level. <Ref. to 4AT-31, Automatic Transmission Fluid.>
39) Check the road test.
<Ref. to 4AT-33, Road Test.>

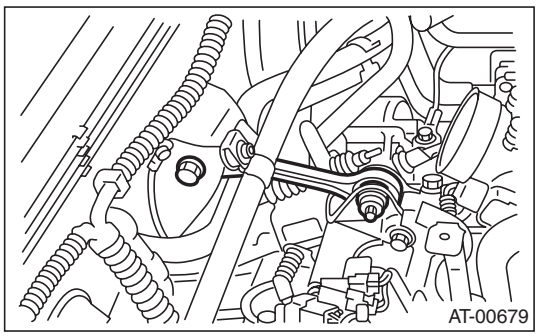
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10.Transmission Mounting System

A: REMOVAL

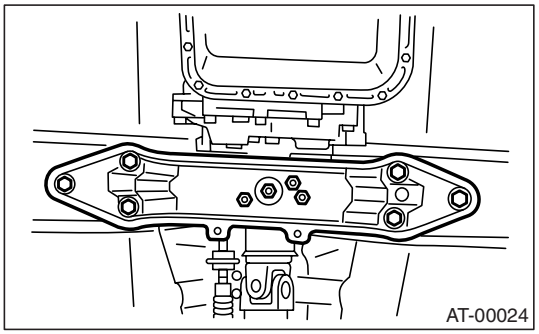
1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the air cleaner case. (2.0 L Non-turbo model)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
3) Remove the intercooler. (2.0 L Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
4) Remove the pitching stopper.



2. TRANSMISSION REAR CROSSMEMBER AND REAR 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. (Non-turbo model)
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
4) Remove the center and rear exhaust pipes, and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
5) Remove the heat shield cover. (If equipped)
6) Set the transmission jack under the transmission. Make sure that the support plates of transmission jack don't touch the oil pan.
7) Remove the transmission rear crossmember.



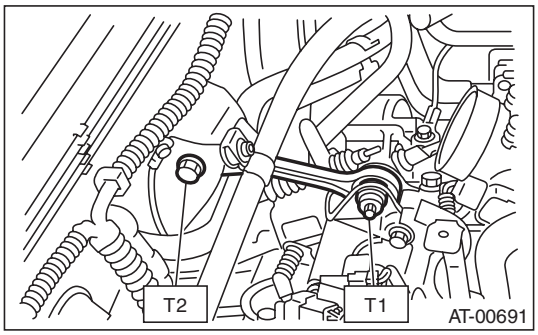
8) Remove the rear cushion rubber.

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. (Non-turbo model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
3) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

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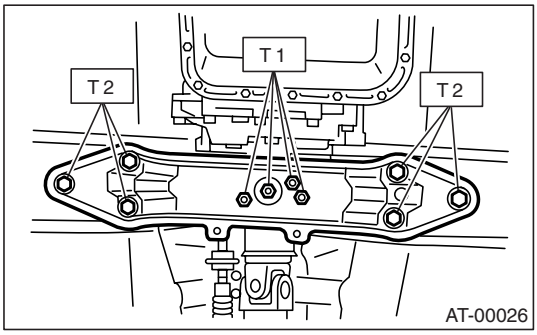
2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

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: 70 N·m (7.1 kgf-m, 51 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover. (If equipped)
5) Install the front, center, rear exhaust pipes and the muffler. (Non-turbo model)
<Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SOw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, INSTALLATION, Muffler.>
6) Install center and rear exhaust pipes, and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, 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. TRANSMISSION REAR CROSSMEMBER AND REAR 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.

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11.Extension Case Oil Seal

A: INSPECTION

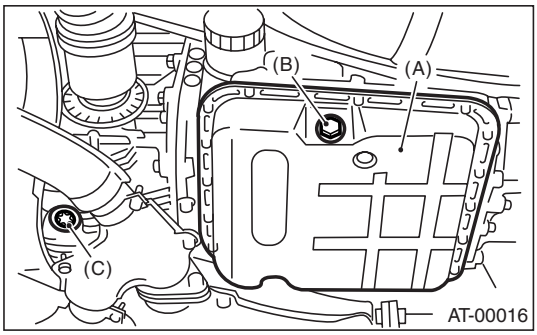
Make sure the ATF does not leak from the joint of transmission and propeller shaft. If so, replace the oil seal. <Ref. to 4AT-47, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT

1) Clean the transmission exterior.
2) Drain the ATF completely.

NOTE:
Tighten the ATF drain plug after draining the ATF.

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



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

3) Remove the rear exhaust pipe and muffler.
Non-turbo model
<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.> or <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
Turbo model
<Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
4) Remove the heat shield cover. (If equipped)
5) Remove the propeller shaft. <Ref. to DS-15, REMOVAL, Propeller Shaft.>
6) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY
7) Using the ST, install the oil seal.
ST 498057300 INSTALLER
8) Install the propeller shaft. <Ref. to DS-16, INSTALLATION, Propeller Shaft.>
9) Install the heat shield cover. (If equipped)
10) Install the rear exhaust pipe and muffler.
Non-turbo model
<Ref. to EX(H4SOw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, INSTALLATION, Muffler.> or <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
Turbo model
<Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, INSTALLATION, Muffler.>
11) Pour ATF and check the ATF level. <Ref. to 4AT-31, Automatic Transmission Fluid.>

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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.

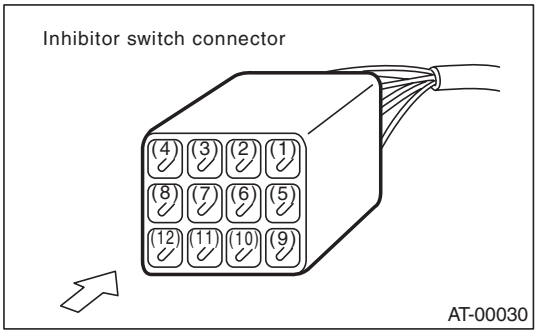
1) Disconnect the inhibitor switch connector.

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

NOTE:

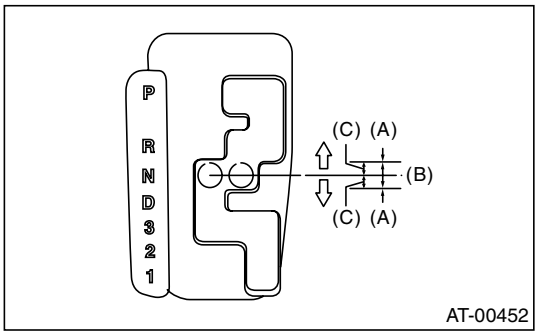
- Also check that continuity in ignition circuit does not exist when the select lever is in “R”, “D”, “3”, “2” and “1” ranges.
- If the inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	Position	Pin No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
	3	4 — 7
	2	4 — 6
	1	4 — 5
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



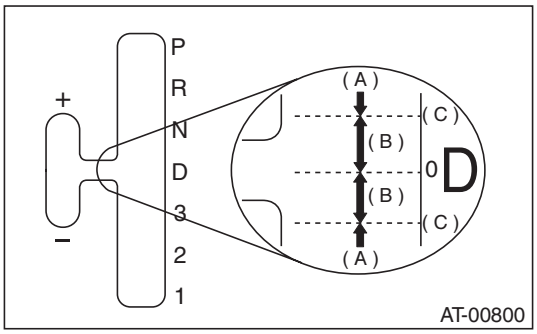
3) Check if there is continuity at equal points when the select lever is turned 1.5° in both directions from “N” range.

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 4AT-49, ADJUSTMENT, Inhibitor Switch.>



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

- MODEL WITH SPORT SHIFT



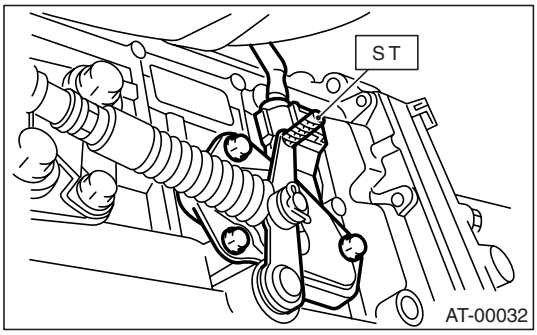
(A) Continuity does not exist.
(B) Continuity exists.
(C) 1.5°

4) Repeat the above checks. If there are abnormalities, adjust the select cable. <Ref. to CS-15, ADJUSTMENT, Select Cable.>

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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



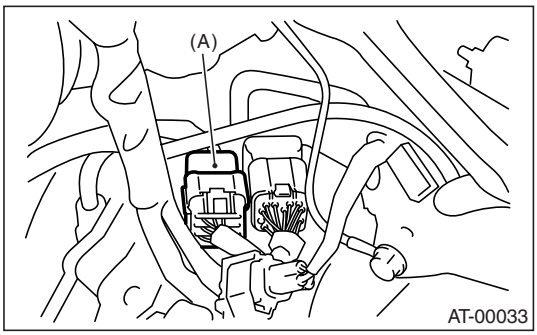
4) Tighten the three inhibitor switch bolts.

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.

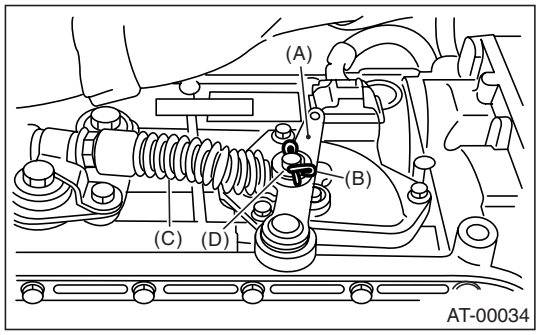
C: REMOVAL

1) Set up the vehicle on a lift.
2) Move the select lever to “N” range.
3) Remove the air cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
5) Disconnect the inhibitor switch connector.



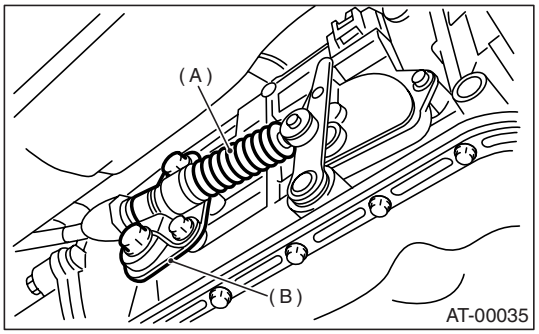
(A) Inhibitor switch

6) Remove the inhibitor switch connector from stay.
7) Lift-up the vehicle.
8) Remove the front and center exhaust pipes. <Ref. to EX(H4SOw/oOBD)-6, REMOVAL, Front Exhaust Pipe.> or <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>
9) Remove the snap pin and washer from range select lever.



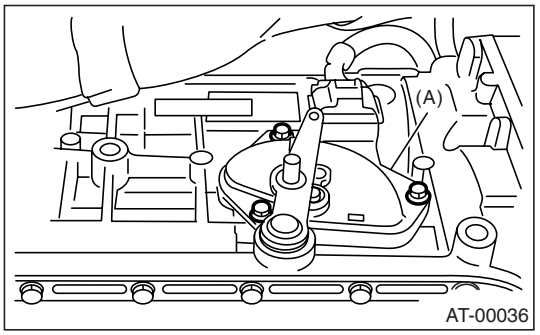
(A) Snap pin
(B) Select cable
(C) Range select lever
(D) Washer

10) Remove the plate assembly from transmission case.



(A) Select cable
(B) Plate ASSY

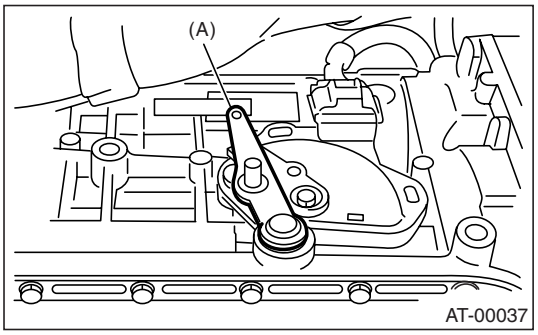
11) Remove the bolts.



(A) Inhibitor switch

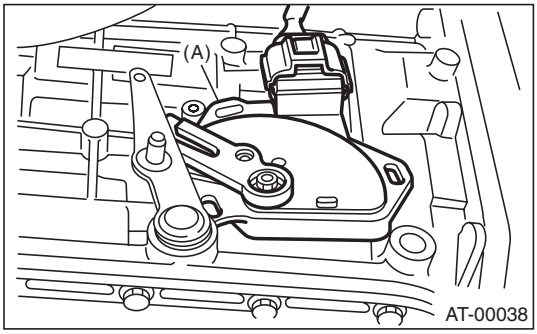
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12) Move the range select lever to parking position (left side).



(A) Range select lever

13) Remove the inhibitor switch from transmission.

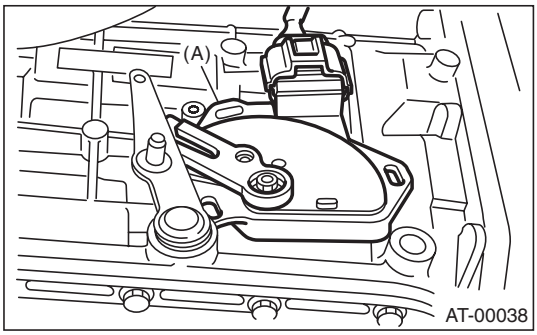


(A) Inhibitor switch

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

D: INSTALLATION

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

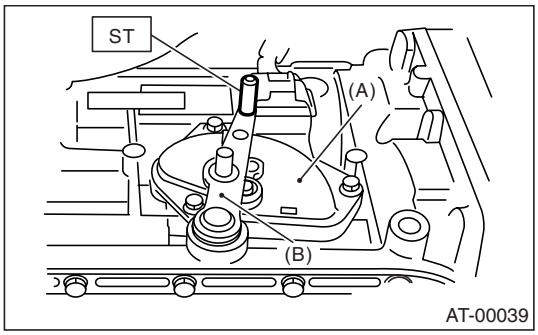


(A) Inhibitor switch

3) Move the range select lever to neutral position.

4) Using the ST, tighten the bolts of inhibitor switch.
ST 499267300STOPPER PIN

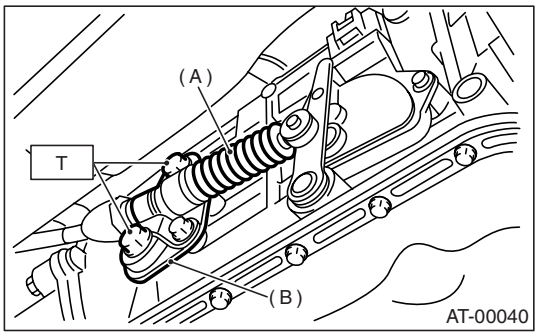
Tightening torque:
3.5 N·m (0.36 kgf-m, 2.6 ft-lb)



(A) Inhibitor switch
(B) Range select lever

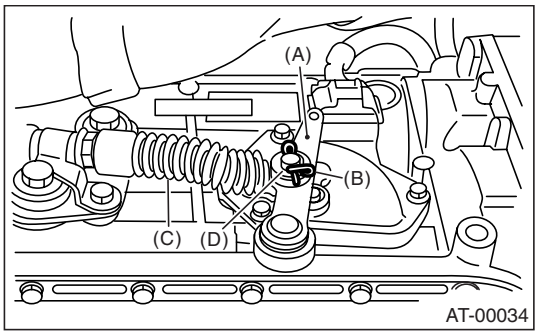
5) Install the select cable to range select lever.
6) Install the plate assembly to transmission.

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



(A) Select cable
(B) Plate ASSY

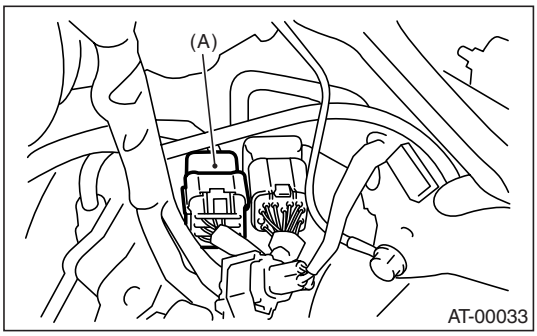
7) Install the washer and snap pin to range select lever.



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

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8) Install the front and center exhaust pipes. (Non-turbo model)
<Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.> or <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>
9) Install the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-10, INSTALLATION, Center Exhaust Pipe.>
10) Lower the vehicle.
11) Install the inhibitor switch connector from stay.
12) Connect the inhibitor switch connector.



(A) Inhibitor switch

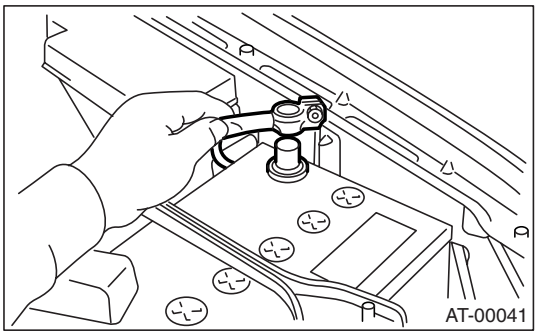
13) Install the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
14) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>
15) Inspect the inhibitor switch. <Ref. to 4AT-48, INSPECTION, Inhibitor Switch.>

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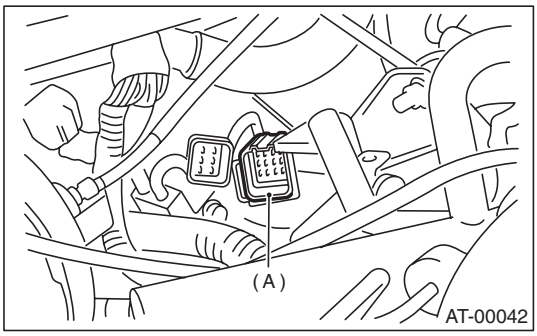
13.Front Vehicle Speed Sensor

A: REMOVAL

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



3) Remove the air cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
5) Disconnect the transmission connector.

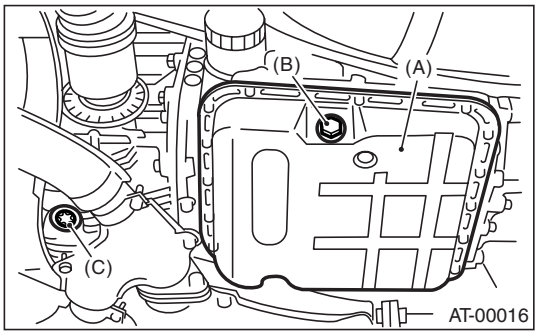


(A) Transmission connector

6) Remove the pitching stopper. <Ref. to 4AT-45, 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.

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



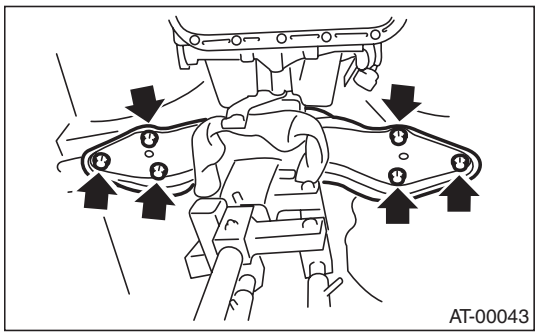
(A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

11) Remove the front, center, exhaust pipes and muffler. (Non-turbo model)
<Ref. to EX(H4SOw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.> or <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
12) Remove the center, rear exhaust pipe and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
13) Remove the shield cover. (If equipped)
14) Remove the propeller shaft. <Ref. to DS-15, REMOVAL, Propeller Shaft.>
15) Place the transmission jack under transmission.

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

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16) Remove the transmission rear crossmember bolts.



17) Lower the AT jack.

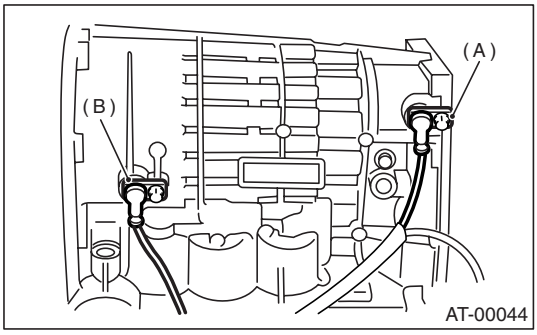
NOTE:
Do not separate the AT jack and transmission.

18) Remove the oil cooler inlet and outlet pipe.

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

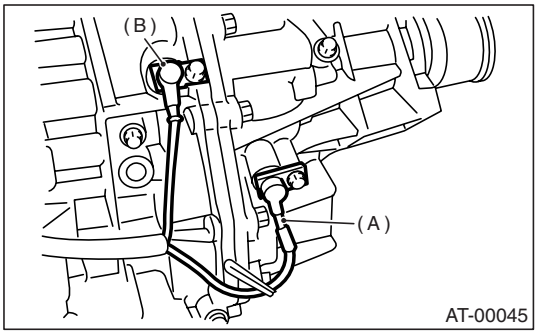
19) Remove the front and rear vehicle speed sensor and torque converter turbine speed sensor.

• Front vehicle speed sensor and torque converter turbine speed sensor



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

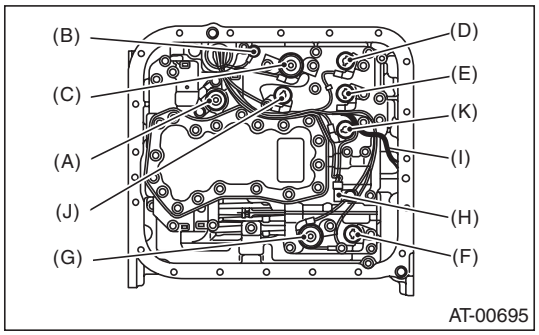
• Rear vehicle speed sensor



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

20) Remove the oil pan.

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

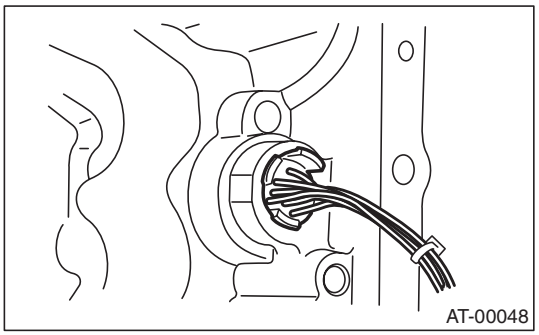


(A) Lock-up duty solenoid (Blue)
(B) Transmission ground
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)
(J) Low clutch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

22) Remove the harness assembly.

B: INSTALLATION

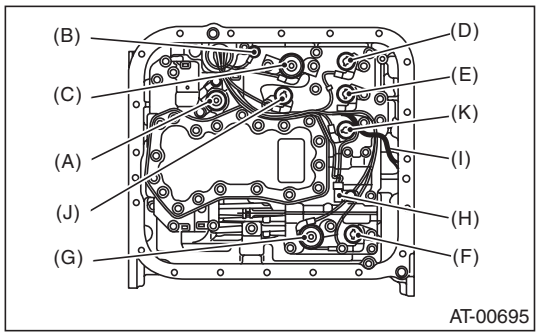
1) Pass the harness assembly through the hole in the transmission case.



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

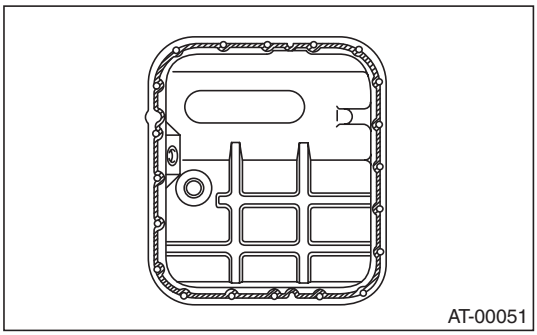
Tightening torque (Transmission ground cable)
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(A) Lock-up duty solenoid (Blue)
(B) Transmission ground
(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) Low clutch timing solenoid (Gray)

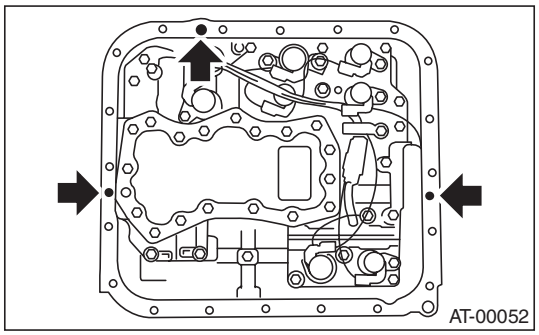
3) Apply proper amount of liquid gasket to the entire oil pan mating surface.

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)

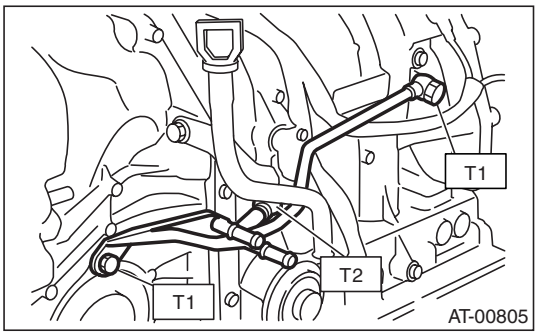
6) Install the front and rear vehicle speed sensor, and also the torque converter turbine speed sensor, and then fasten the harness.

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

7) Install the oil cooler pipes.

NOTE:
Be sure to use a new copper 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)



8) Install the transmission rear crossmember bolts.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)

9) Install the propeller shaft. <Ref. to DS-16, INSTALLATION, Propeller Shaft.>
10) Install the shield cover. (If equipped)

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11) Install the front, center, rear exhaust pipes and muffler. (Non-turbo model)
<Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SOw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, INSTALLATION, Muffler.> or <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
12) Install the center, rear exhaust pipes and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, INSTALLATION, Muffler.>
13) Lower the vehicle.
14) Install the transmission connector to the stay.
15) Install the pitching stopper. <Ref. to 4AT-45, INSTALLATION, Transmission Mounting System.>
16) Install the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
17) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

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14.Rear Vehicle Speed Sensor

A: REMOVAL

When removing the rear vehicle speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-52, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

When installing the rear vehicle speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-53, INSTALLATION, Front Vehicle Speed Sensor.>

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15.Torque Converter Turbine Speed Sensor

A: REMOVAL

When removing the torque converter turbine speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-52, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

When installing the torque converter turbine speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-53, INSTALLATION, Front Vehicle Speed Sensor.>

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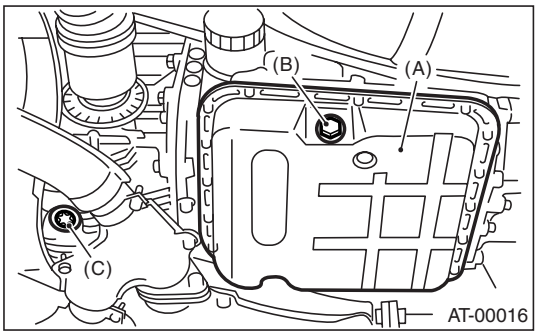
16.Control Valve Body

A: REMOVAL

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

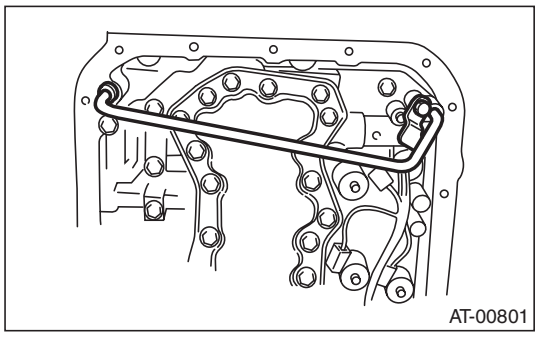
NOTE:
• Tighten the ATF drain plug after draining the ATF.
• Replace the gasket with a new one.

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

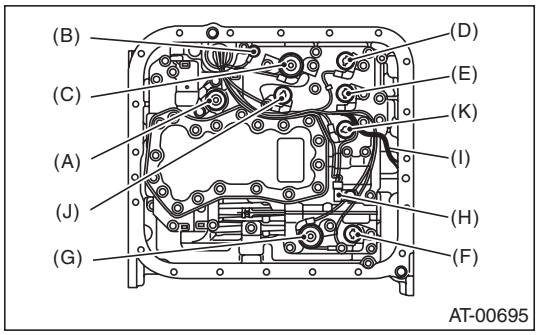


(A) Oil pan
(B) Drain plug
(C) Differential oil drain plug

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) Remove the pipe. (Turbo model)



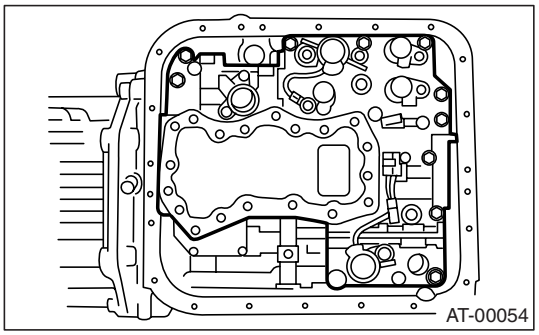
8) Disconnect each solenoid connector and remove ATF temperature sensor from control valve.



(A) Lock-up duty solenoid (Blue)
(B) Transmission ground
(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) Low clutch timing solenoid (Gray)
(K) Sport shift solenoid (Beige) (if equipped)

9) Remove the control valve.

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

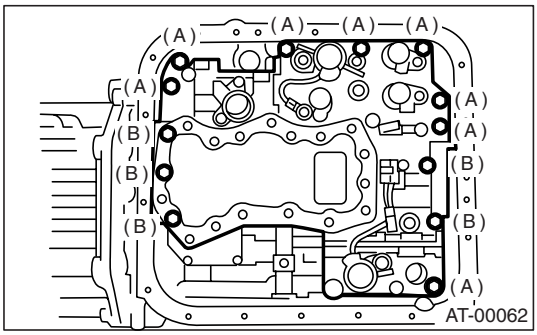


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B: INSTALLATION

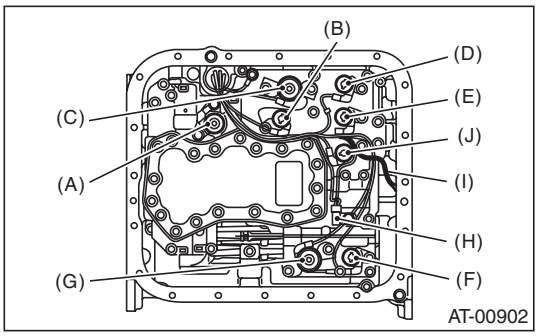
1) Set the range select lever in “N” range.
2) Install the control valve, ATF temperature sensor and ground connectors.

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)

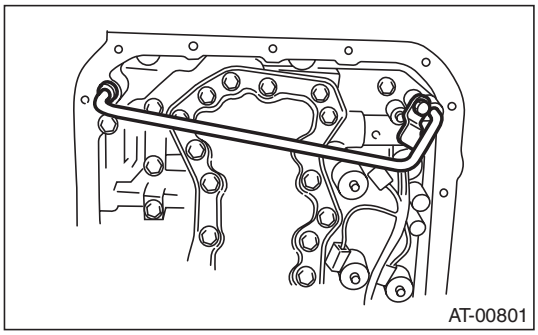
3) Connect all connectors.



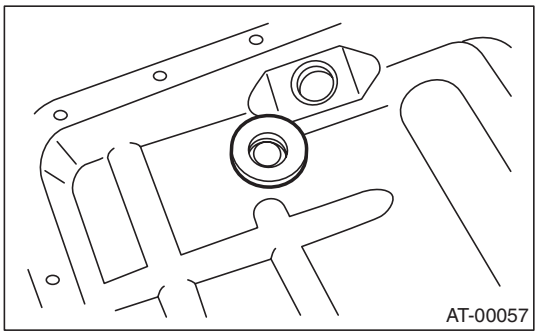
(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)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

4) Install the pipe. (Turbo model)

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

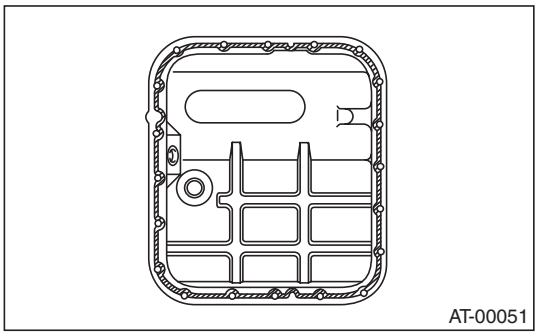


5) Attach the magnet at specified position.



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

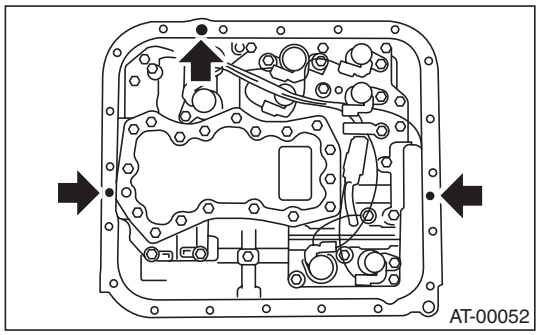
Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



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

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



8) Install the oil pan.

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

9) Pour ATF into the oil charge pipe.

Recommended fluid:
SUBARU ATF

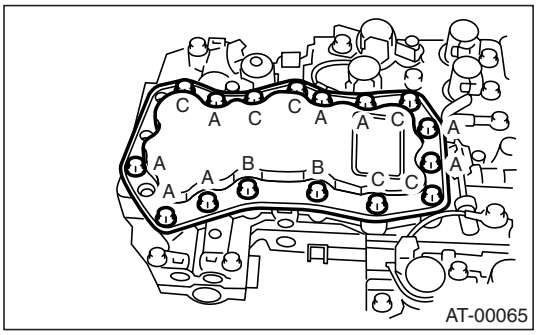
Fluid capacity:
Fill the same amount of fluid drained from drain plug hole.

10) Check the level of ATF.
<Ref. to 4AT-31, Automatic Transmission Fluid.>

C: DISASSEMBLY

1) Remove oil strainer from lower control valve body.

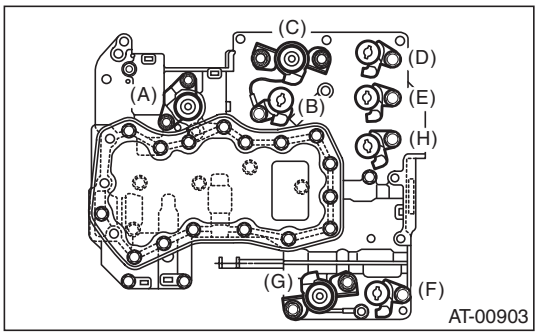
NOTE:
Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.



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

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

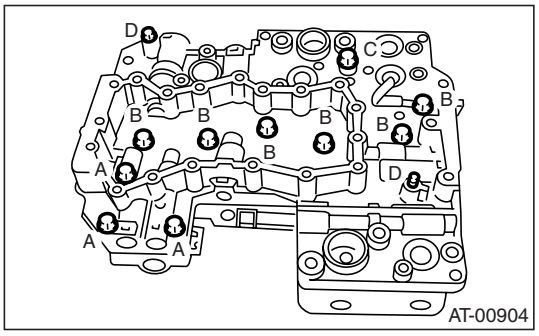
NOTE:
Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.



(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)

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

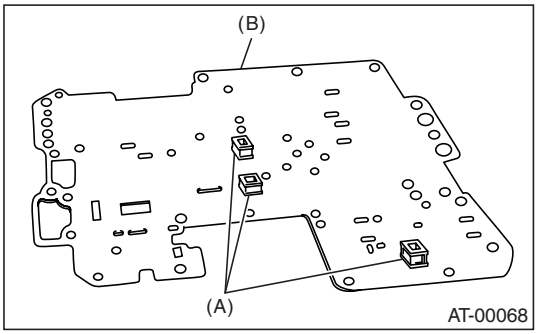
NOTE:
Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.



4) Remove the lower valve body.

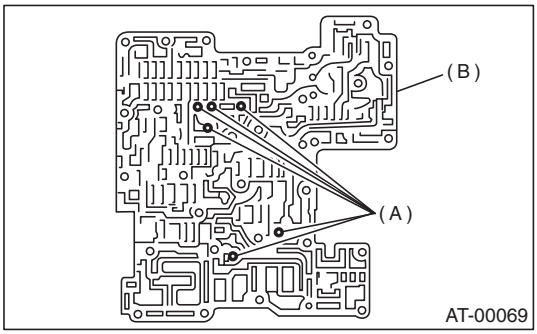
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5) Remove the oil filter and plate.



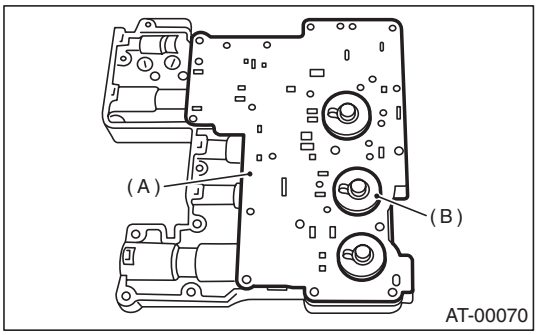
(A) Oil filter
(B) Plate

6) Remove six steel balls from middle valve body.



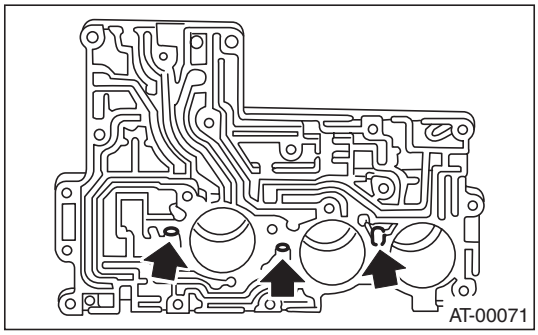
(A) Steel ball
(B) Middle valve body

7) Remove the middle valve body.
8) Remove upper separator plate from middle valve body.

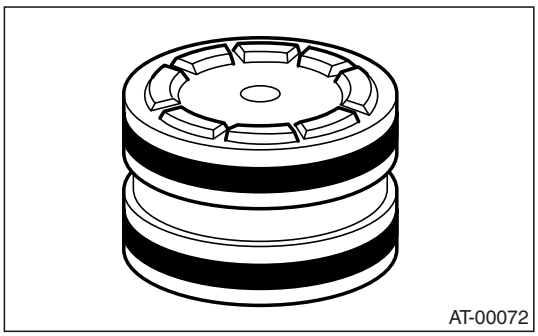


(A) Upper separator plate
(B) Side plate

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.

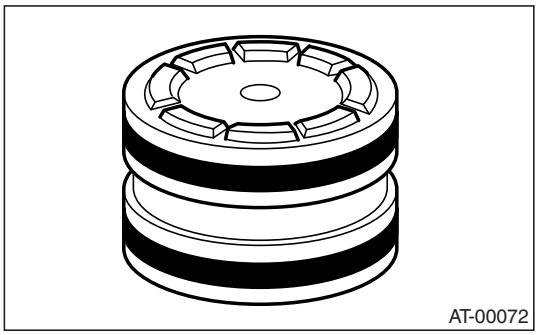


12) Remove the seal ring from piston.

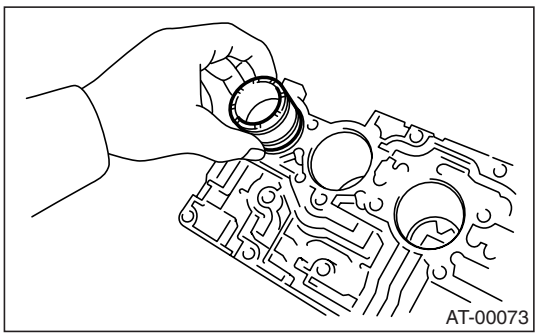


D: ASSEMBLY

1) Install a new seal ring to piston.

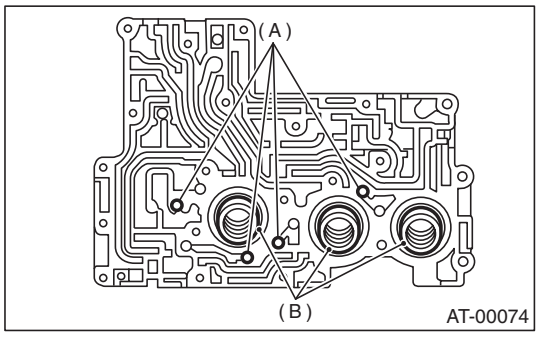


2) Apply ATF to the seal ring.
3) Insert the piston fully into upper valve body.



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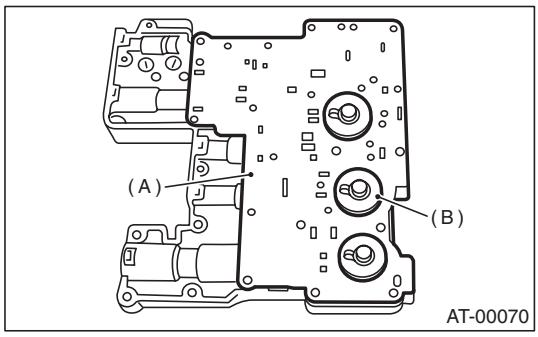
4) Install the spring and four steel balls to specified positions of upper valve body.



(A) Steel ball
(B) Spring

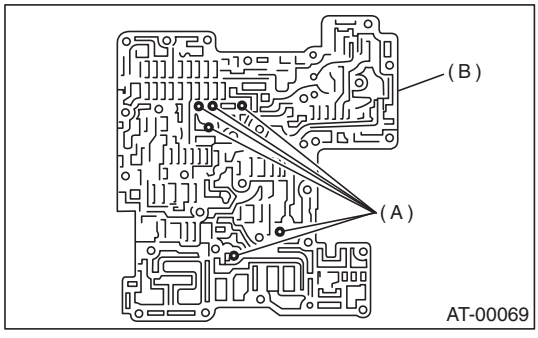
5) Align the hole in side plate with the hole in separator plate, and then install support plate and upper separator plate to middle valve body.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(A) Upper separator plate
(B) Side plate

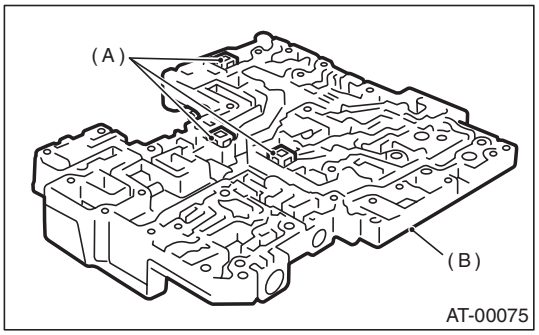
6) Insert six steel balls in their proper positions to middle valve body.



(A) Steel ball
(B) Middle valve body

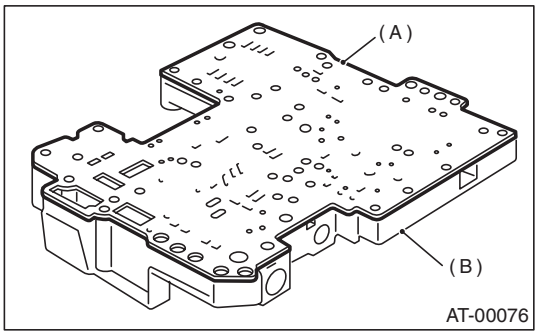
7) Install three filters to lower valve body.

NOTE:
Pay attention to the location of filters.



(A) Strainer
(B) Lower valve body

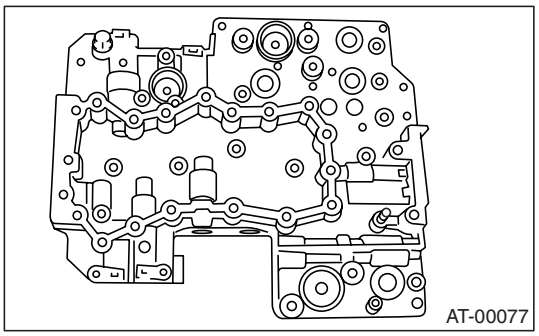
8) Install lower separate plate to lower valve body.



(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.

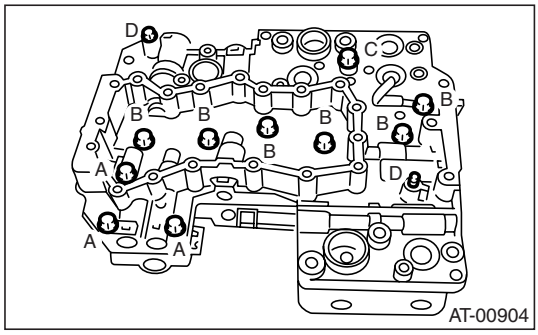


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10) Tighten bolts.

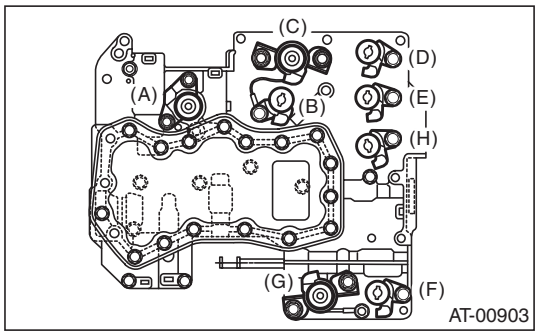
NOTE:
Install the bolts (D) from upper valve body side.

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)

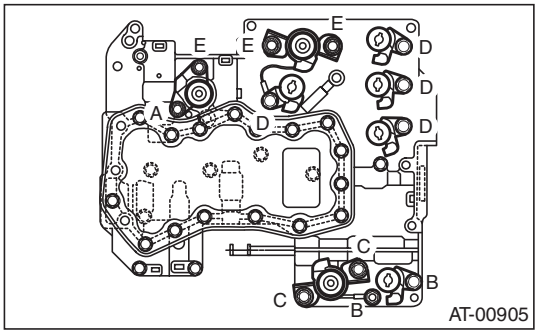
11) Install the sensor, solenoids and duty solenoids to specified positions.



(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.

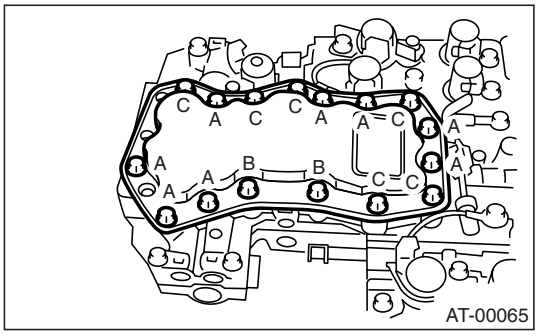
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



Bolt length mm (in)
(A) 12 (0.47)
(B) 40 (1.57)
(C) 45 (1.77)
(D) 62 (2.44)
(E) 73 (2.87)

13) Install oil strainer to lower valve body.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



Bolt length mm (in)
(A) 12 (0.47)
(B) 62 (2.44)
(C) 81 (3.19)

E: INSPECTION

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

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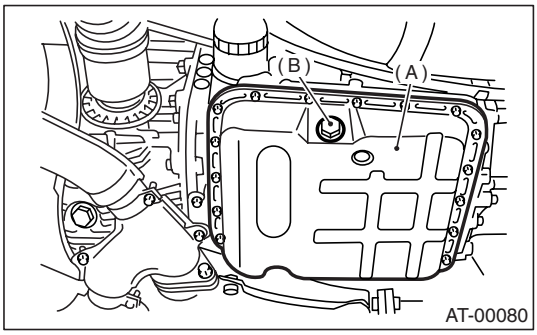
17.Shift Solenoids, Duty Solenoids and ATF Temperature Sensor

A: REMOVAL

1. SHIFT SOLENOIDS AND DUTY SOLENOIDS

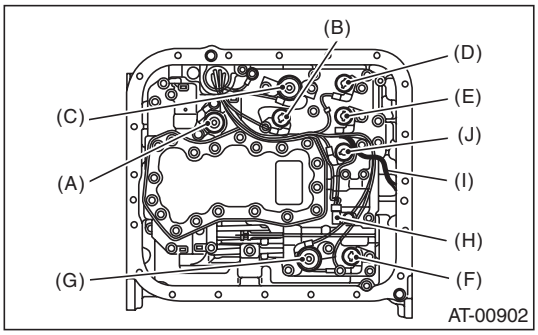
1) Lift-up the vehicle.
2) Clean the transmission exterior.
3) Replace the gasket with a new one, and tighten the drain plug.
4) Drain the ATF completely.

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



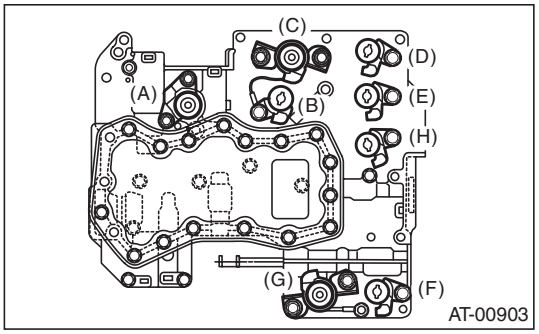
(A) Oil pan
(B) Drain plug

5) Remove the oil pan.
6) Disconnect the solenoid and duty solenoid 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)

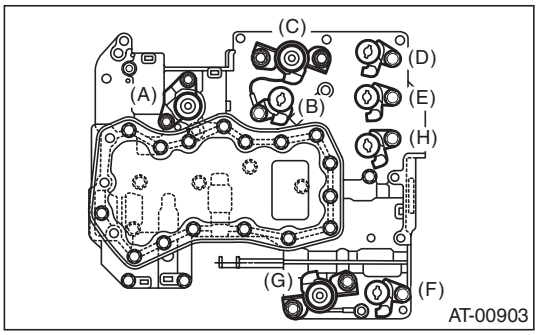
2. ATF TEMPERATURE SENSOR

For removal of ATF temperature sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-52, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

1. SHIFT SOLENOIDS AND DUTY SOLENOIDS

1) Insert solenoid and duty solenoid to specified position.

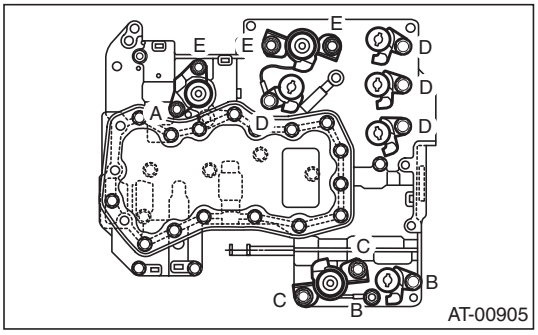


(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) SPORT shift solenoid (Beige) (if equipped)

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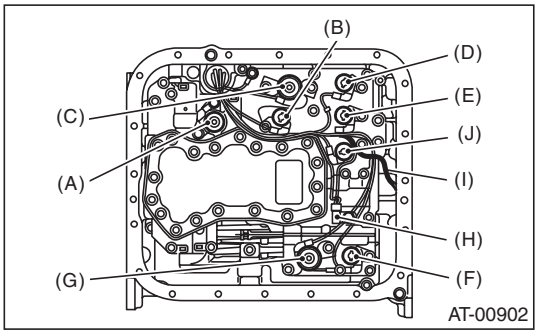
2) Tighten the bolts and nuts.

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)

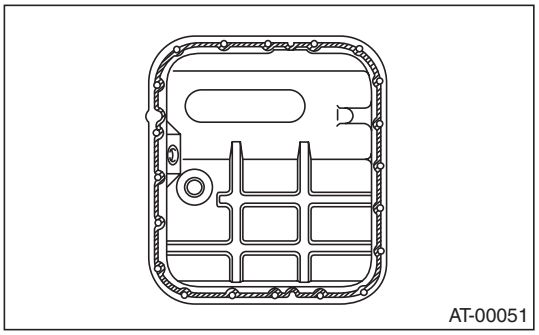
3) Connect the harness connectors.
Connect the connectors of same color, and secure the connectors to valve body using clips.



(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) ATF temperature sensor
(I) Transfer duty solenoid (Brown)
(J) SPORT shift solenoid (Beige) (if equipped)

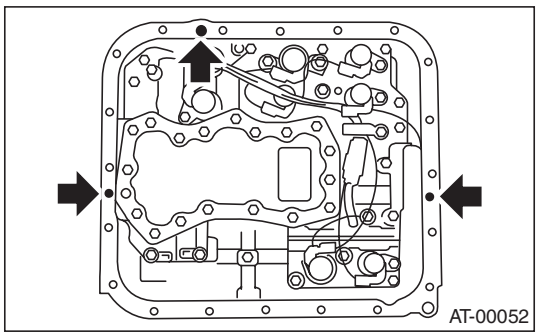
4) Apply proper amount of liquid gasket to the entire oil pan mating surface.

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



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 4AT-31, Automatic Transmission Fluid.>
8) Check the ATF level. <Ref. to 4AT-31, Automatic Transmission Fluid.>

2. ATF TEMPERATURE SENSOR

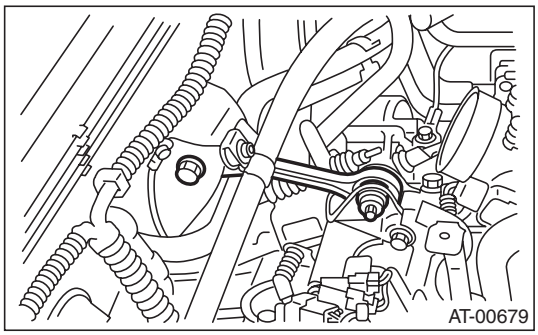
For installation of ATF temperature sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-53, INSTALLATION, Front Vehicle Speed Sensor.>

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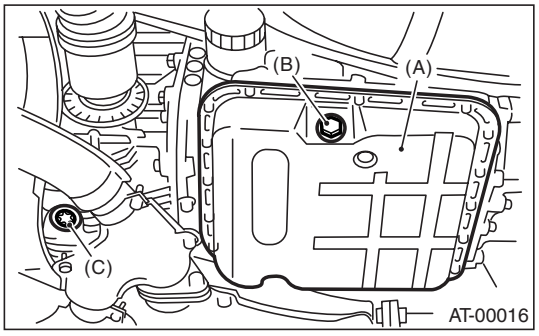
18.Transfer Duty Solenoid and Valve Body

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the air cleaner case. (2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Remove intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
5) Remove the pitching stopper.

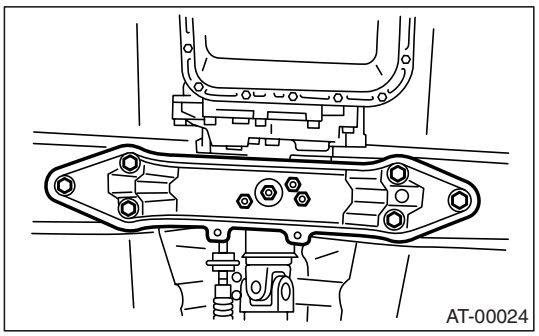


6) Remove the front exhaust pipe with center exhaust pipe. (Non-turbo model)
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>
7) Remove center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-9, REMOVAL, Center Exhaust Pipe.>
8) Remove the rear exhaust pipe and muffler. (Non-turbo model)
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
(Turbo model)
<Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, REMOVAL, Muffler.>
9) Raise the vehicle and drain the ATF.

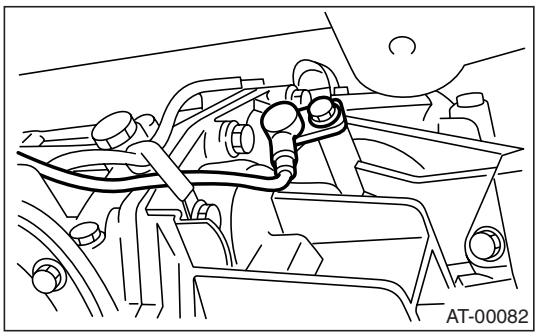


(A) Oil pan
(B) Drain plug
(C) Deferential oil drain plug

10) Remove the heat shield cover. (If equipped)
11) Remove the propeller shaft. <Ref. to DS-15, REMOVAL, Propeller Shaft.>
12) 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.

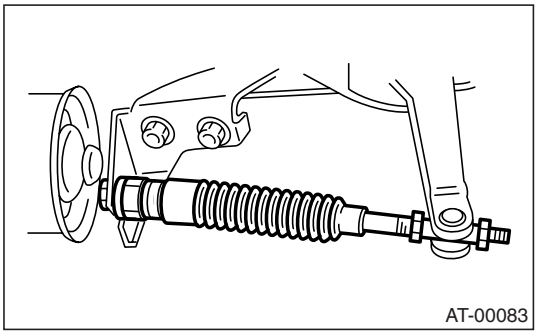


13) Remove the rear vehicle speed sensor.



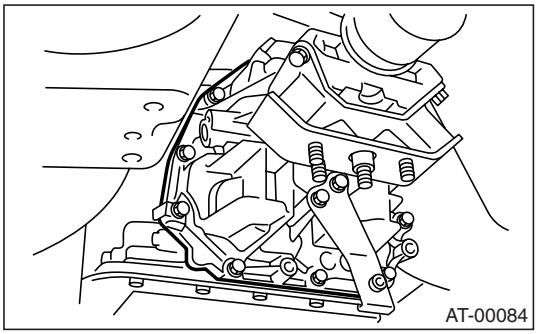
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14) Remove the select cable nut.

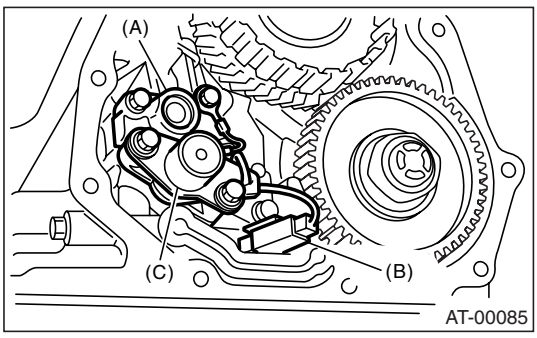


15) Move the gear select cable so that extension bolts can be removed.
16) Remove the bolts.
17) Remove the extension case.

NOTE:
Use a container to catch oil flowing from extension.



18) Disconnect the transfer duty solenoid connector.
19) Remove the transfer duty solenoid and transfer valve body.



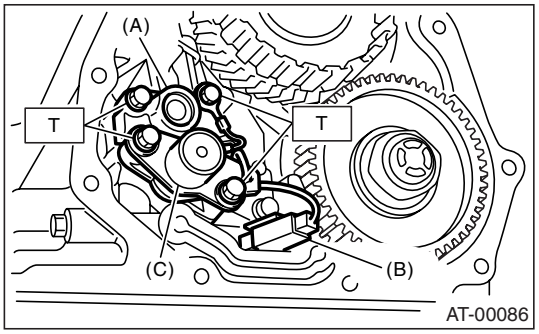
(A) Transfer valve body
(B) Transfer duty solenoid connector
(C) Transfer duty solenoid

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.



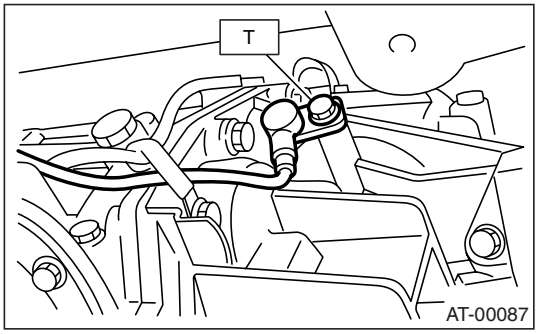
(A) Transfer valve body
(B) Transfer duty solenoid connector
(C) Transfer duty solenoid

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-15, ADJUSTMENT, Select Cable.>
3) Install the rear vehicle speed sensor.

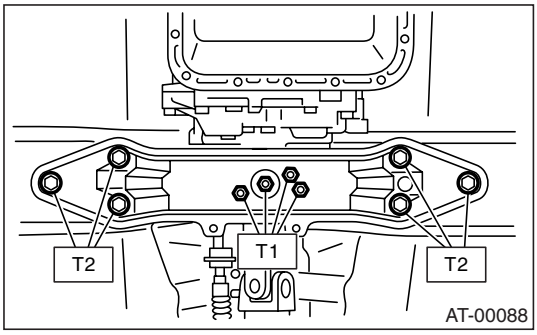
Tightening torque:
T: 7 N·m (0.7 kgf-m, 5.1 ft-lb)



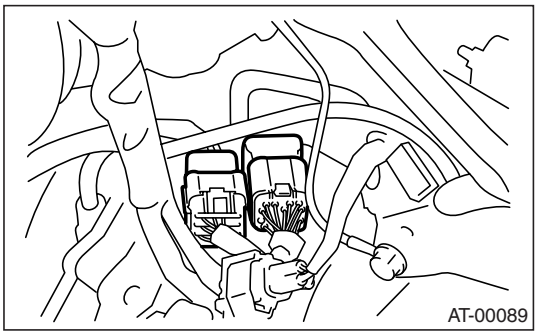
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4) Install the transmission rear crossmember.
(1) Tighten the bolts.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)

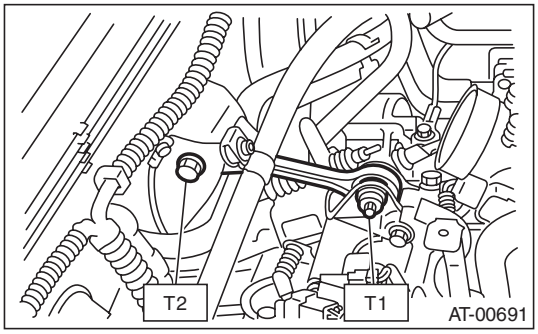


(2) Remove the transmission jack.
5) Install the propeller shaft. <Ref. to DS-16, INSTALLATION, Propeller Shaft.>
6) Install the front, center rear exhaust pipe and muffler. (Non-turbo model)
<Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
7) Install center and rear exhaust pipes, and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-10, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-15, INSTALLATION, Muffler.>
8) Connect the transmission harness connector.



9) 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)



10) Install the air cleaner case. (2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
11) Install intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>
12) Fill ATF up to the middle of the “COLD” side on level gauge by using the gauge hole. <Ref. to 4AT-31, Automatic Transmission Fluid.>
13) Check the ATF level. <Ref. to 4AT-31, Automatic Transmission Fluid.>

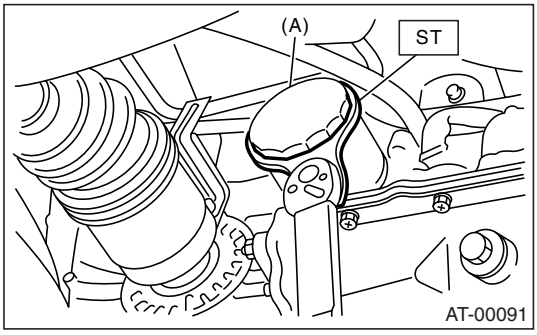
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19.ATF Filter

A: REMOVAL

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

B: INSTALLATION

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.
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 4AT-31, Automatic Transmission Fluid.>

C: INSPECTION

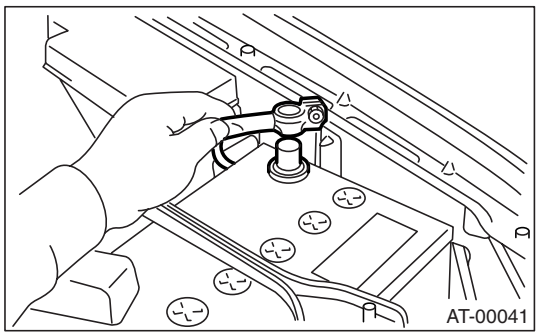
Replace the part if any defect is found from the inspection.
Check for rust, hole, ATF leaks, and other damage.

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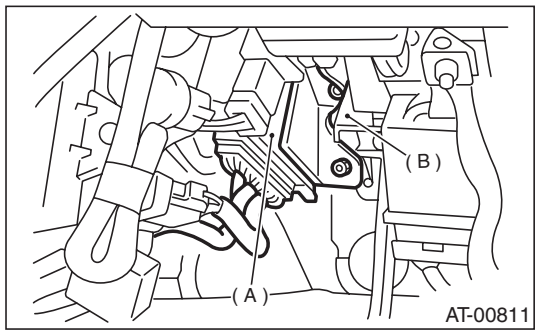
20.Transmission Control Module (TCM)

A: REMOVAL

1) Disconnect the ground cable from battery.

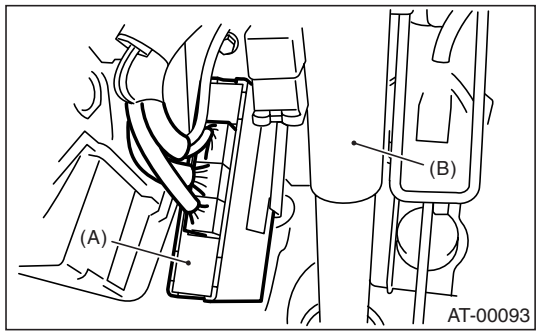


2) Remove the lower cover and then disconnect the connector.
3) Disconnect the connectors from TCM.
LHD model



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

RHD model



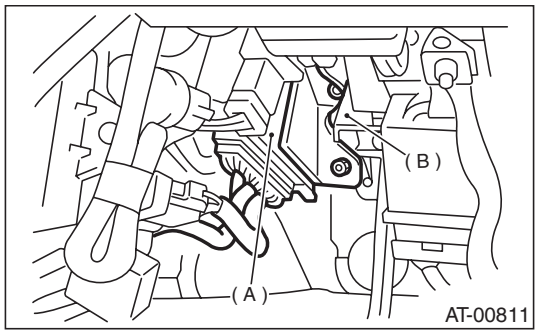
(A) Transmission control module (TCM)
(B) Column shaft

4) Remove the TCM.

B: INSTALLATION

1) Install the TCM.
LHD model

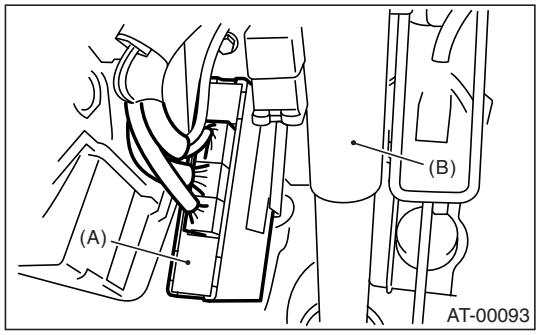
Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



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

RHD model

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



(A) Transmission control module (TCM)
(B) Column shaft

2) Connect the connectors to TCM.
3) Install in the reverse order of removal.

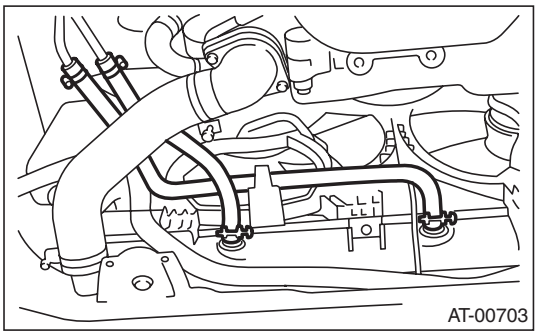
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21.ATF Cooler Pipe and Hose

A: REMOVAL

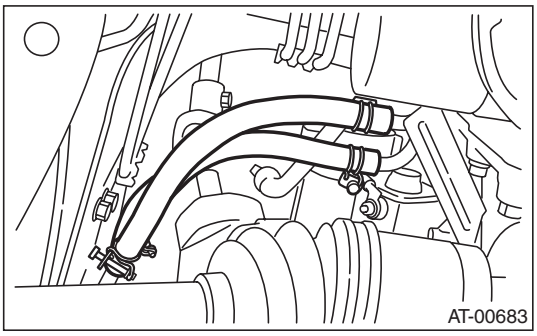
1) Set the vehicle on a lift.
2) Remove battery and washer tank.
3) Lift-up the vehicle.
4) Remove the under cover.
5) Disconnect ATF cooler hose from radiator.

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.

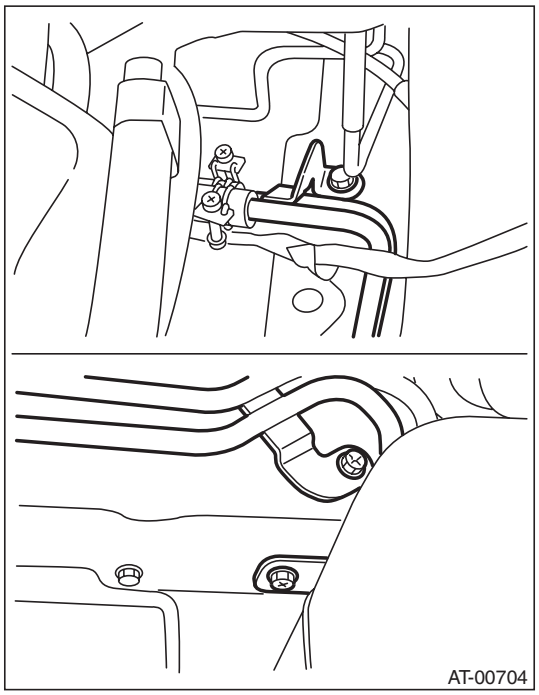


6) Disconnect ATF cooler hoses from pipes.

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.

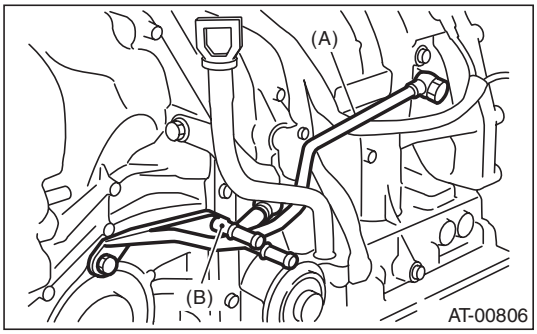


7) Remove ATF cooler pipe from frame.



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.



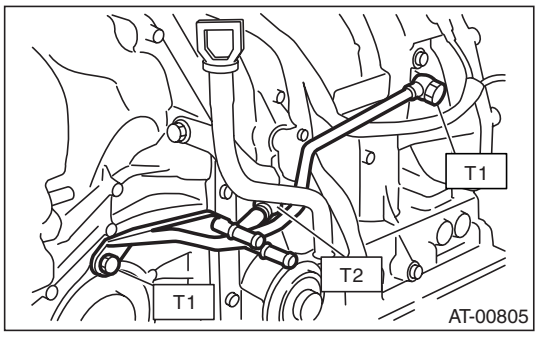
(A) Inlet pipe
(B) Outlet pipe

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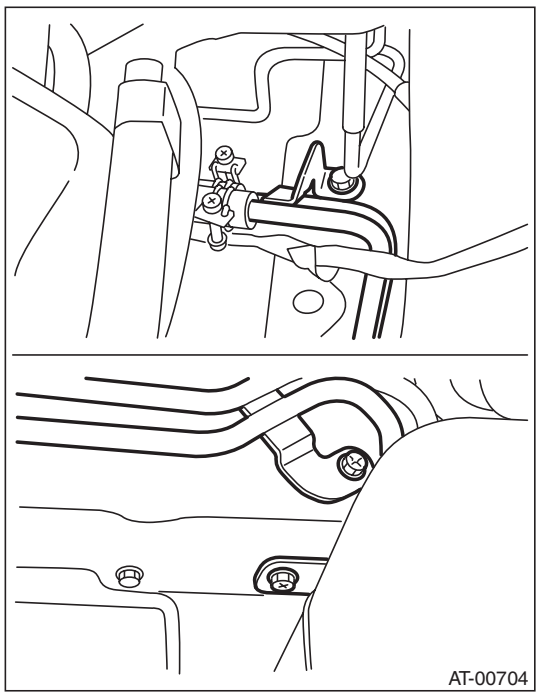
B: INSTALLATION

1) Install the oil cooler outlet and inlet pipes using 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)

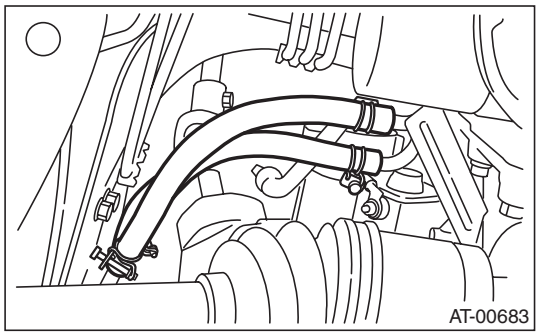


2) Install ATF cooler pipe to frame.



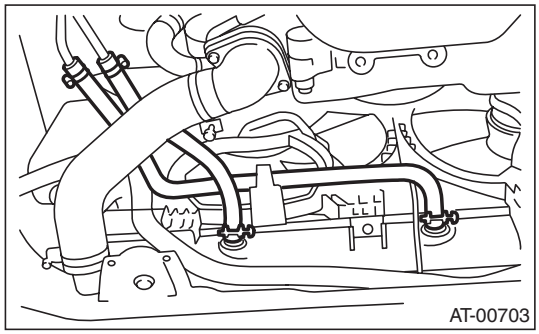
3) Connect ATF cooler hose to pipe transmission side.

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 4AT-31, 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.

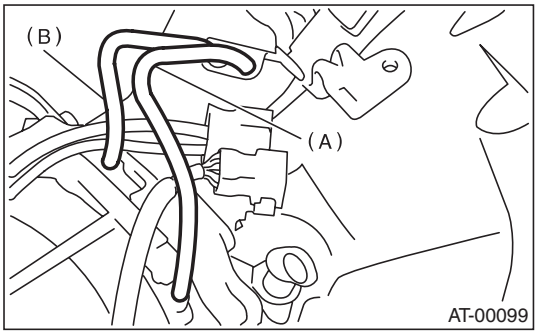
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22.Air Breather Hose

A: REMOVAL

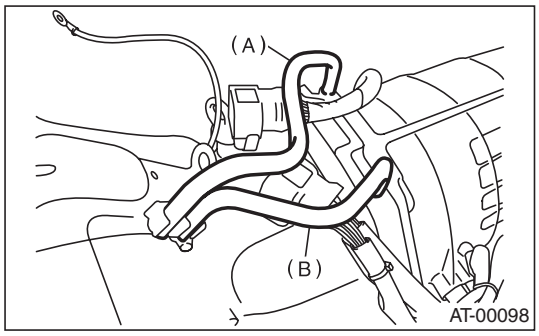
1) Remove the air cleaner case. (2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
2) Remove intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
3) Disconnect the air breather hoses.

• NON-TURBO MODEL



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

• TURBO MODEL

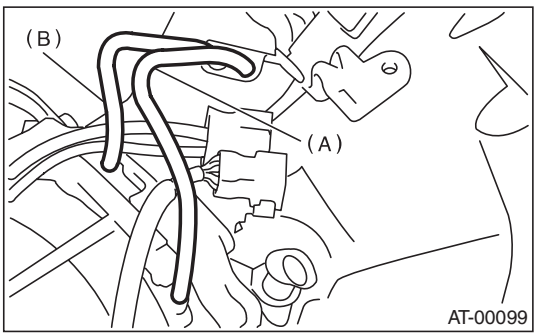


(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

B: INSTALLATION

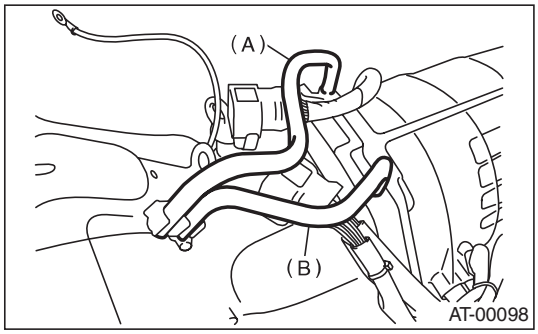
1) Install air breather hoses.

• NON-TURBO MODEL



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

• TURBO MODEL



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

2) Install the air cleaner case. (2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
3) Install intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

C: INSPECTION

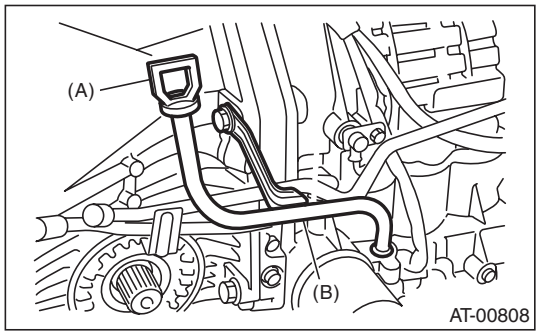
Make sure the hose is not cracked or clogged.

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23.Oil Charger Pipe

A: REMOVAL

1) Remove the air cleaner case. (2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
2) Remove intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
3) Remove the oil charger pipe, and remove the O-ring from the flange face.

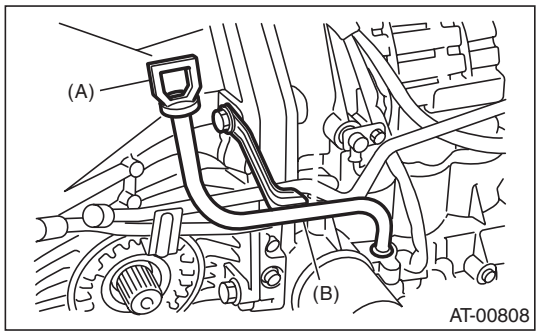


(A) Oil level gauge
(B) Oil charger pipe

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. (2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
3) Install intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

C: INSPECTION

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

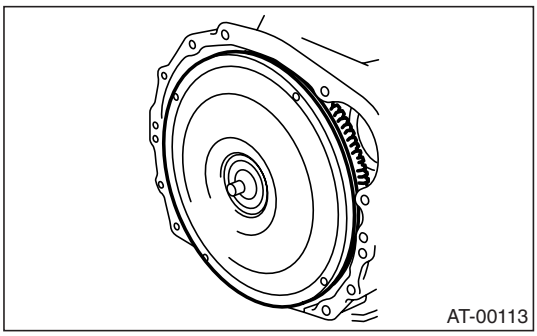
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24.Torque Converter Clutch Assembly

A: REMOVAL

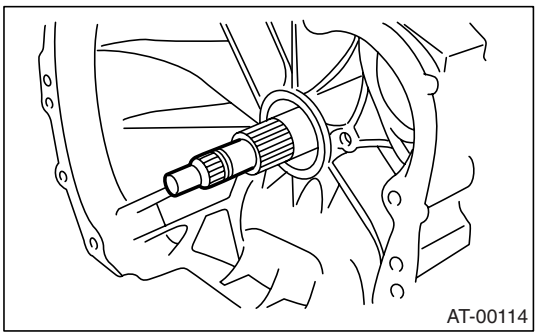
1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch and oil pump shaft horizontally.

NOTE:
Be careful not to scratch the bushing inside the oil pump shaft.



3) Remove the input shaft.

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

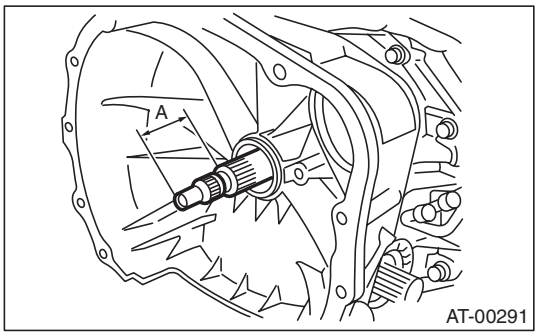


4) Remove the clip from torque converter clutch.

B: INSTALLATION

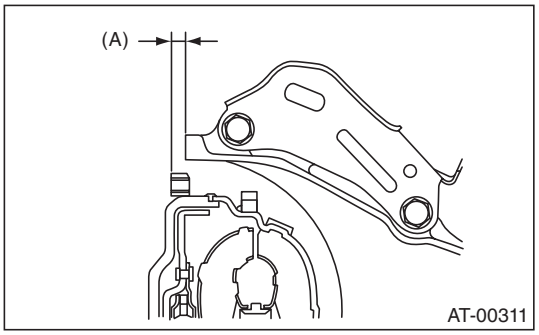
1) Install the clip to torque converter clutch.
2) Install the oil pump shaft to the torque converter clutch, and then check the clip fits securely in its groove.
3) Insert the input shaft while turning lightly by hand.

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:
1.6 L and 2.0 L Non-turbo model
−1.3 — −1.1 mm (−0.051 — −0.043 in)
2.5 L and 2.0 L Turbo model
2.7 — 2.9 mm (0.106 — 0.114 in)



(A) Dimension A

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

C: INSPECTION

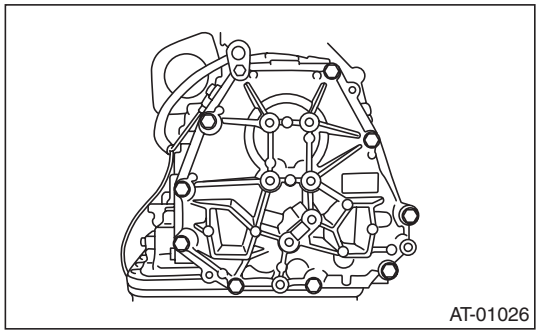
Make sure the ring gear is not damaged and that the protrusion on the edge of the torque converter clutch is not deformed or otherwise damaged.

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25.Transmission Cover

A: REMOVAL

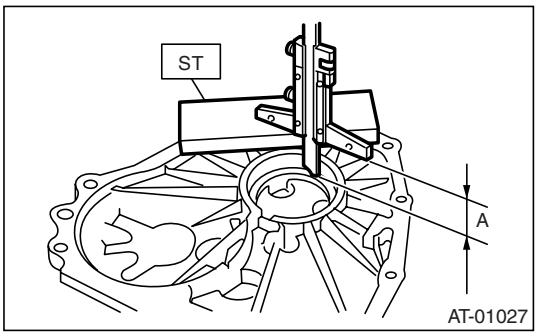
1) Remove transmission cover.



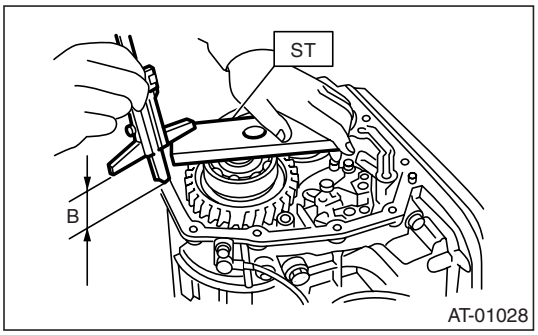
2) Take out shim from transmission cover.

B: INSTALLATION

1) Measure distance “A” from end of transmission cover point at bearing location with ST.
ST 398643600 GAUGE



2) Measure the distance “B” from the transmission case mating surface to end of bearing with ST.
ST 398643600 GAUGE



3) Calculation equation:
T = A − B + 0.40 mm (0.015 in)
T: Shim clearance
A: Distance from end of extension case to end of rear drive shaft.
B: Height from end of transmission case to end of reduction drive gear.

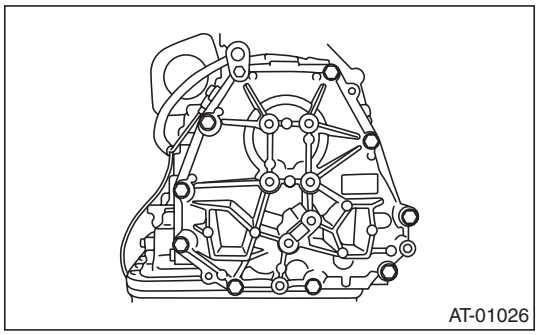
Adjusting shim	
Part No.	Thickness mm (in)
31288AA020	0.15 (0.0059)

4) Attach the selected adjusting shim to transmission cover.
5) Install the transmission cover to the transmission case.

CAUTION:
Be sure to use a new gasket.

6) Tighten bolts to secure the case.

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



C: INSPECTION

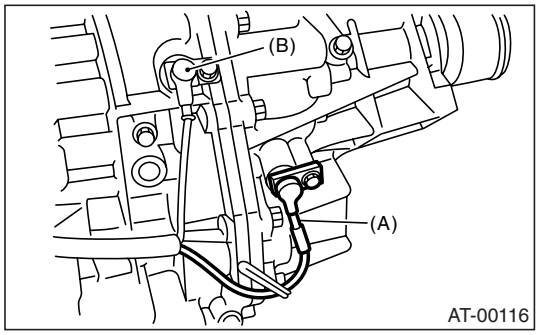
Make sure that the transmission cover has no cracks.

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26.Extension Case

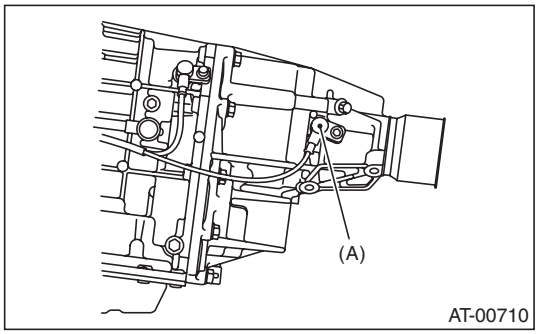
A: REMOVAL

1) Remove the transmission assembly. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear vehicle speed sensor.
• MPT MODEL



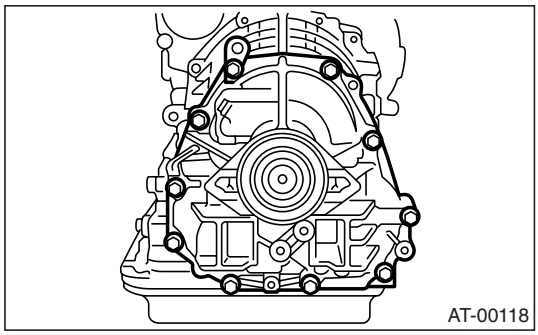
(A) Rear vehicle speed sensor
(B) Front vehicle speed sensor

• VTD MODEL



(A) Rear vehicle speed sensor

3) Separate transmission case and extension case sections.



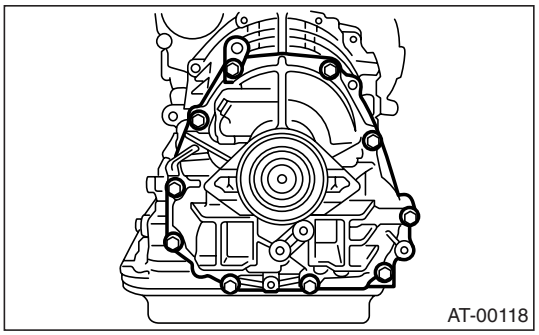
B: INSTALLATION

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.

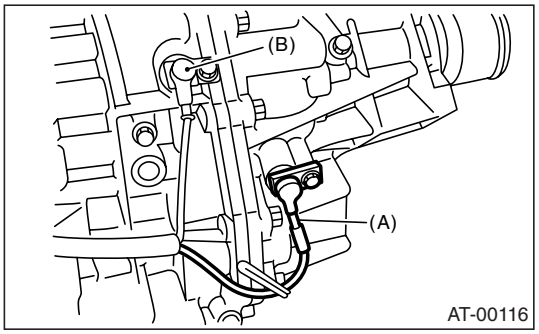
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



5) Install the rear vehicle speed sensor.

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

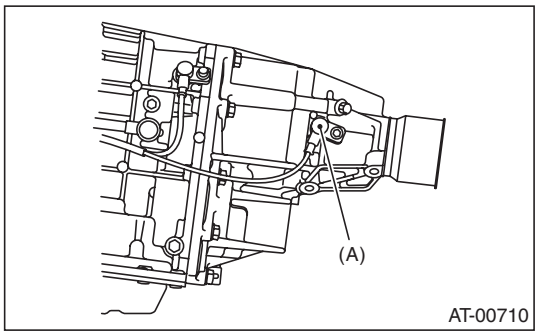
• MPT MODEL



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

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• VTD MODEL



(A) Rear vehicle speed sensor

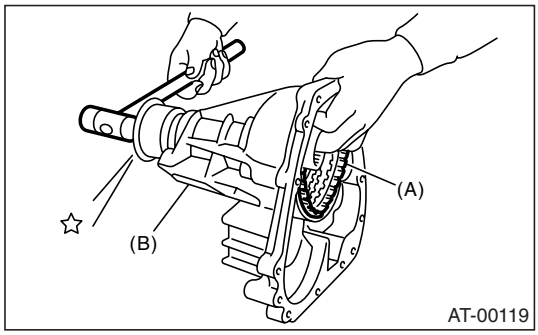
6) Install the transmission assembly. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

1. MPT MODEL

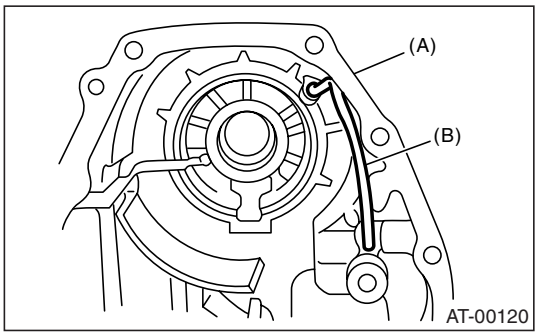
1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

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.

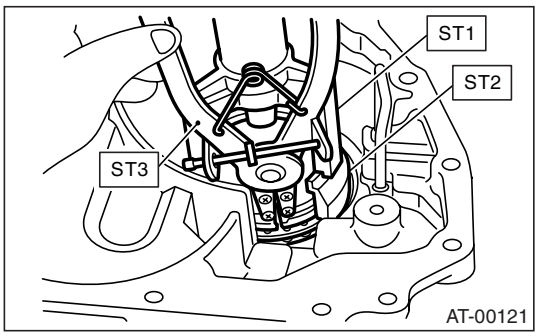


(A) Extension case
(B) Transfer clutch pipe

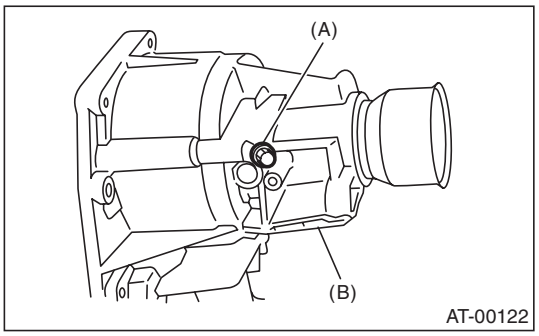
2. VTD MODEL

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

ST1	398673600	COMPRESSOR
ST2	498627100	SHEAT
ST3	398663600	PLYER



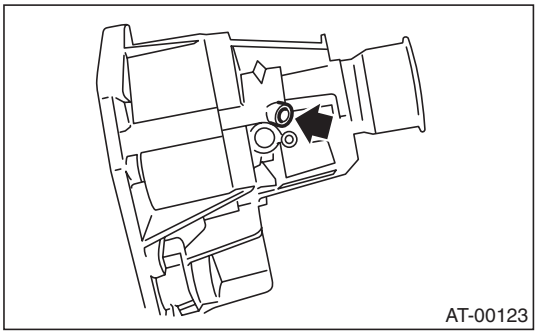
2) Remove test plug.



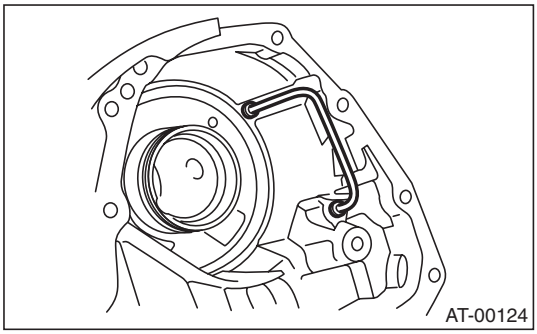
(A) Extension case
(B) Test plug

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3) Remove clutch piston using compressed air.



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

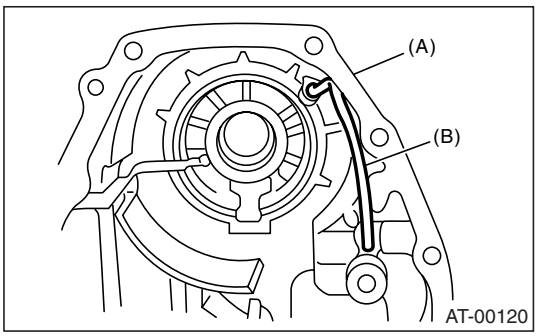


5) Remove the dust cover from the extension case.
6) Remove the oil seal from the extension case.

D: ASSEMBLY

1. MPT MODEL

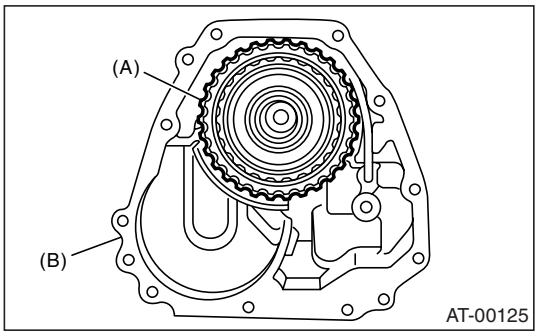
1) Using the ST and a press, press in a new oil seal.
ST 498057300 INSTALLER
2) Press in the dust cover.
3) Install the transfer clutch pipe to extension case without bending pipe.



(A) Extension case
(B) Transfer clutch pipe

4) Install the transfer clutch assembly to the case.

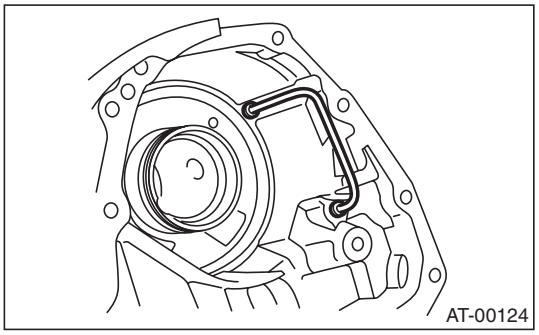
NOTE:
• Be careful not to damage the seal rings.
• Insert the clutch assembly fully into position until the bearing shoulder bottoms.



(A) Transfer clutch
(B) Extension case

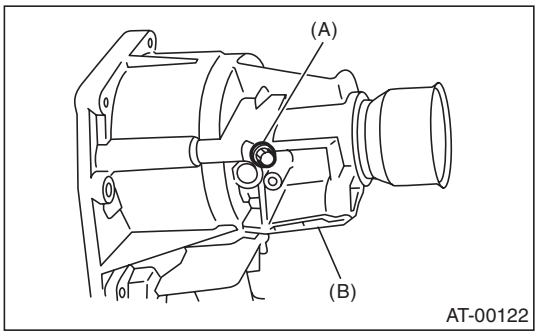
2. VTD MODEL

1) Press new oil seal using ST and a press.
ST 498057300 INSTALLER
2) Press dust cover.
3) Install the transfer clutch pipe onto the extension case, taking care not to bend the pipe.



4) Install the test plug.

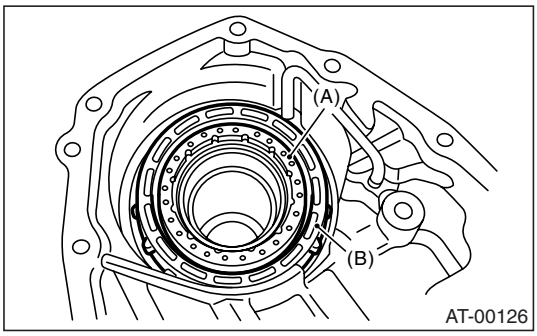
Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(A) Test plug
(B) Extension case

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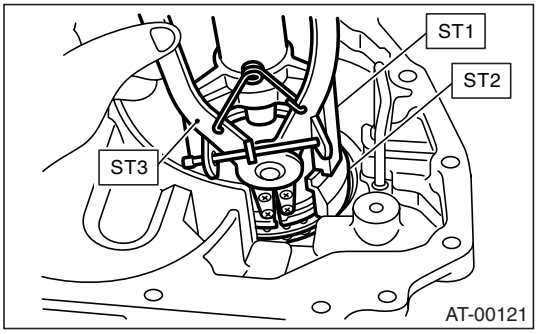
5) Insert the multi-plate clutch, drive plates, driven plates, and spring retainer.



(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
ST3 398663600 PLIERS



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 4AT-84, MPT MODEL, ADJUSTMENT, Transfer Clutch.>
VTD model
<Ref. to 4AT-85, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

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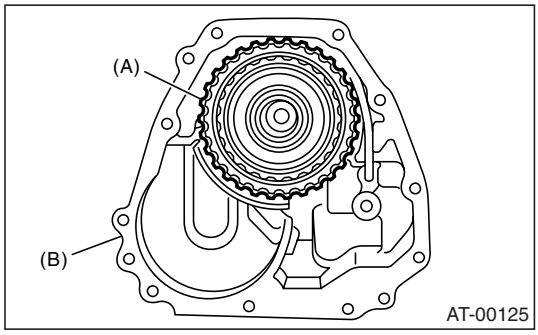
27.Transfer Clutch

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case and remove the transfer clutch. <Ref. to 4AT-77, REMOVAL, Extension Case.> and <Ref. to 4AT-78, DISASSEMBLY, Extension Case.>

B: INSTALLATION

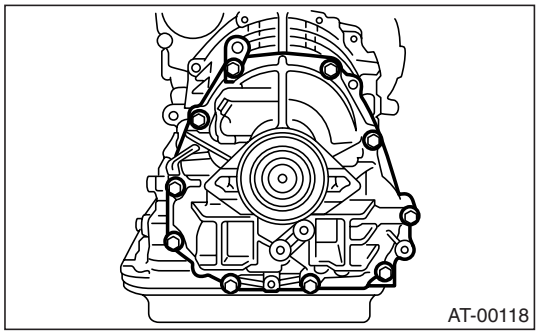
1) Select the thrust needle bearing. <Ref. to 4AT-84, ADJUSTMENT, Transfer Clutch.>
2) Install the transfer clutch assembly to the case.



(A) Transfer clutch
(B) Extension case

3) Tighten bolts to secure the case.

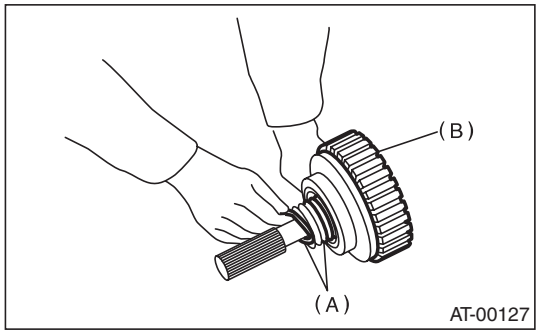
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



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

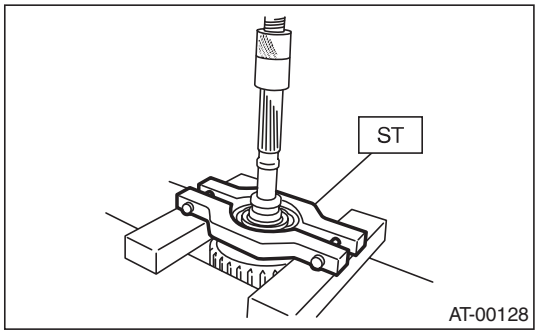
C: DISASSEMBLY

1) Remove the seal ring.

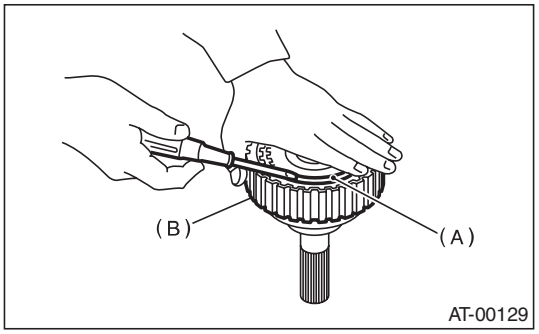


(A) Seal ring
(B) Transfer clutch

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



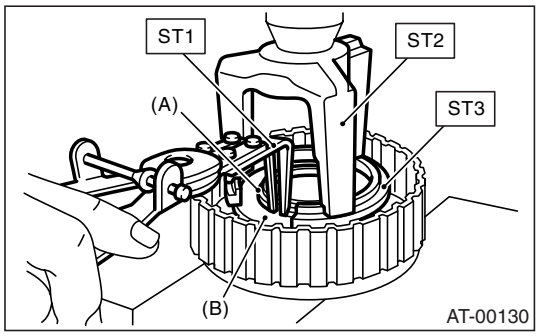
3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.



(A) Snap ring
(B) Transfer clutch

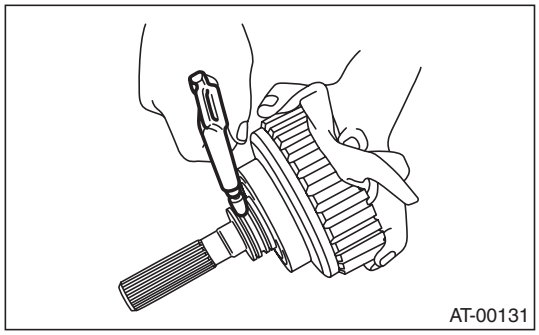
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4) Remove the snap ring with ST1, ST2 and ST3, and take out the return spring and transfer clutch piston seal.
ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR
ST3 398623600 SEAT



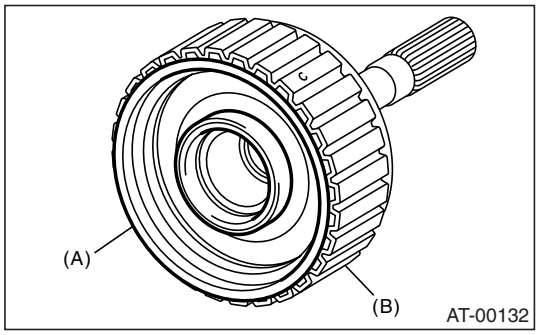
(A) Snap ring
(B) Transfer piston seal

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



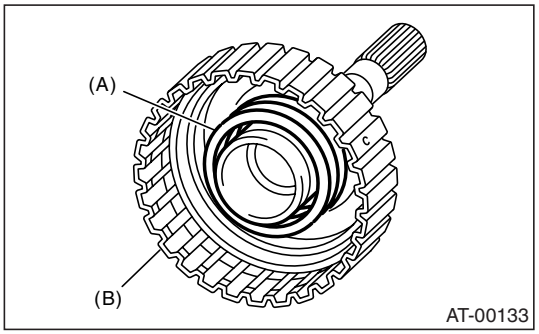
D: ASSEMBLY

1) Install the transfer clutch piston.



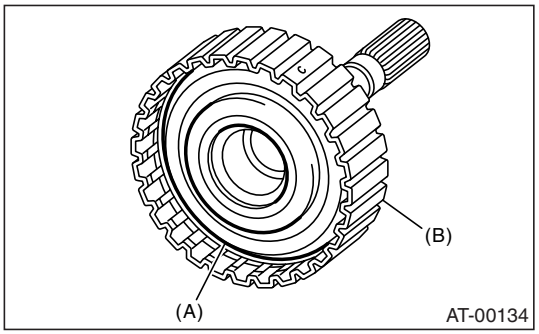
(A) Transfer clutch piston
(B) Rear drive shaft

2) Install return spring to transfer piston.



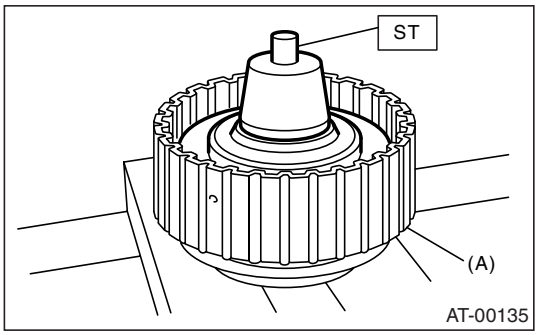
(A) Return spring
(B) Rear drive shaft

3) Install transfer clutch piston seal.



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

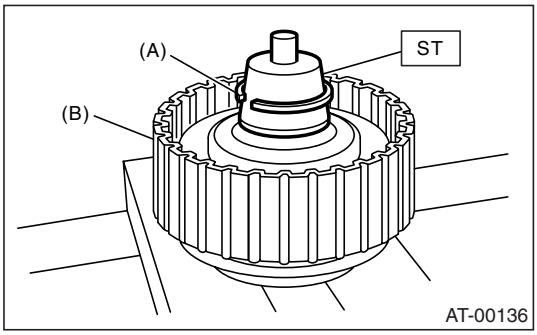
4) Install ST to rear drive shaft.
ST 499257300 SNAP RING OUTER GUIDE



(A) Transfer clutch

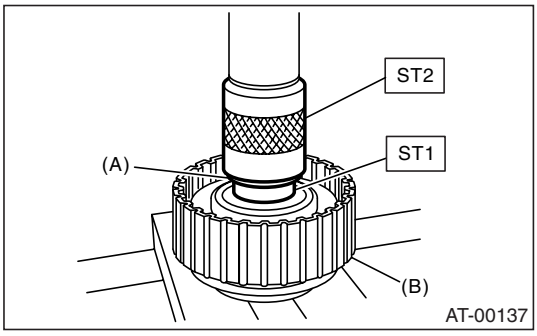
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5) Install snap ring to ST.
ST 499257300 SNAP RING OUTER GUIDE



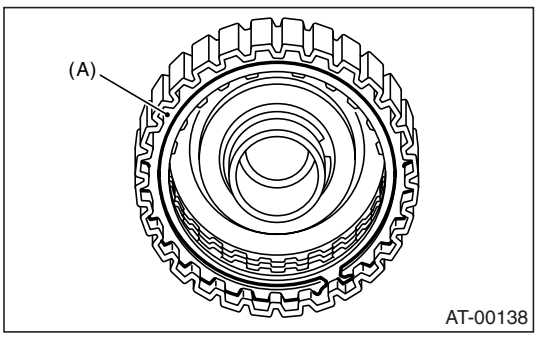
(A) Snap ring
(B) Transfer clutch

6) Using ST1 and ST2, install snap ring to rear drive shaft.
ST1 499257300 SNAP RING OUTER GUIDE
ST2 499247400 INSTALLER



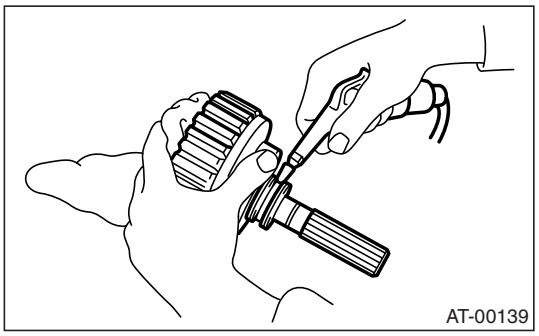
(A) Snap ring
(B) Transfer clutch

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

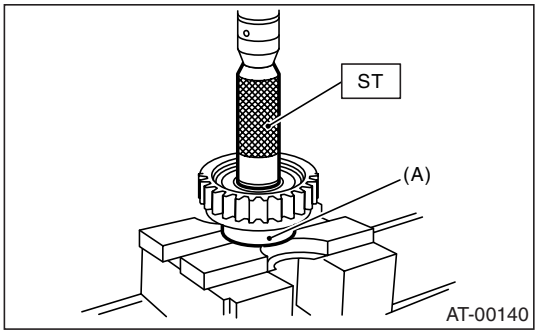


(A) Snap ring

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



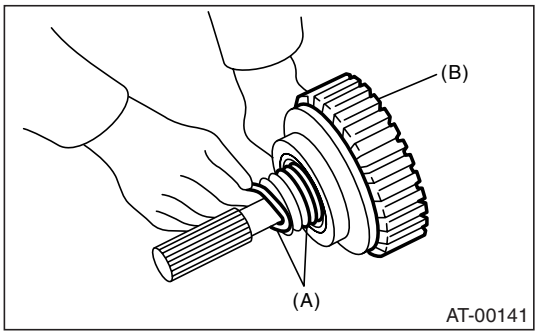
9) Check clearance between snap ring and pressure plate. <Ref. to 4AT-84, INSPECTION, Transfer Clutch.>
10) Press-fit a new ball bearing with ST.
ST 899580100 INSTALLER



(A) Ball bearing

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

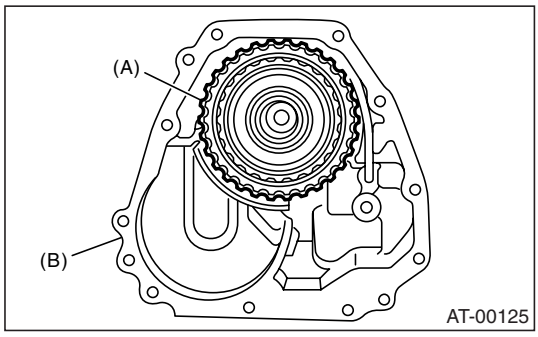
NOTE:
Do not expand the seal ring excessively when installing.



(A) Snap ring
(B) Transfer clutch

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



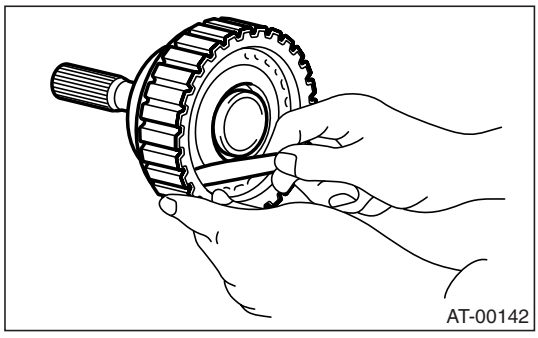
(A) Transfer clutch
(B) Extension case

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 seal ring for damage.
• Measure the extension end play and adjust it to within specifications.
<Ref. to 4AT-84, 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)



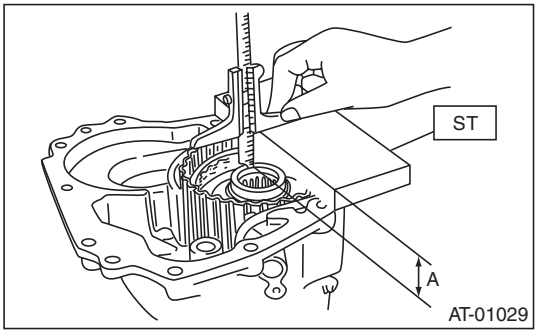
Pressure plates	
Part No.	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

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

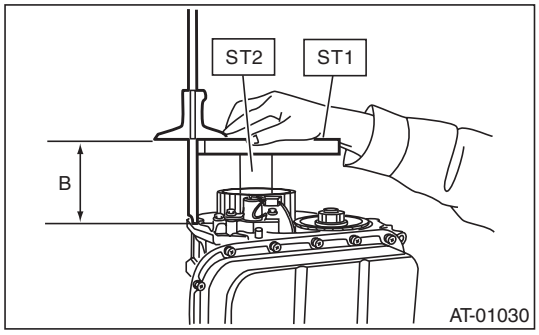
1) Measure distance “A” from end of extension case and rear drive shaft with ST.
ST 398643600 GAUGE



A: Measured value

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2) Measure the distance “B” from the transmission case mating surface to the reduction drive gear end surface with ST1 and ST2.
ST1 398643600 GAUGE
ST2 499577000 GAUGE



B: Measured value

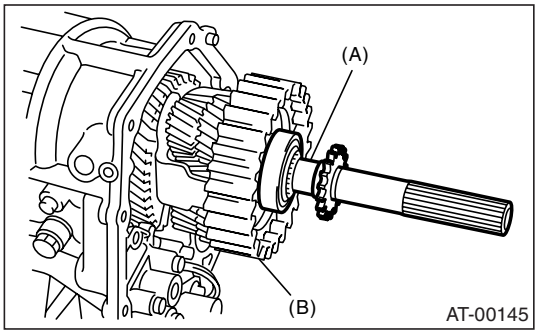
3) Calculation formula:

NOTE:
• Calculate “T”:
T = A − B + 35.4 mm
[T = A − B + 1.3937 in]
T: Thrust needle bearing thickness
A: Distance from end of extension case to end of rear drive shaft
B: Distance from end of transmission case to end of reduction drive gear
Example:
When, A = 33.6 mm (1.3228 in), B = 65.05 mm (2.5610 in)
T = 33.6 − 65.05 + 35.4 = 3.95
[T = 1.3228 − 2.5610 + 1.3937 = 0.1555]
After calculation, the value of “H” becomes 3.95, therefore select bearing thickness of 3.8.
• Calculation formula for “T” is applied when measuring using ST (398643600 GUAGE, 499577000 GUAGE). When not using ST, apply
T = (A − α + 0.45 mm) − (B − β) − H
[T = (A − α + 0.0177 in) − (B − β) − H].
T: Thrust needle bearing thickness
A: Distance from end of extension case to end of reduction drive shaft
B: Distance from end of transmission case to end of rear drive shaft
α: Collar thickness used when measuring “A”
β: Collar thickness used when measuring “B”
0.45: Gasket thickness (mm)
H: Shim clearance

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)

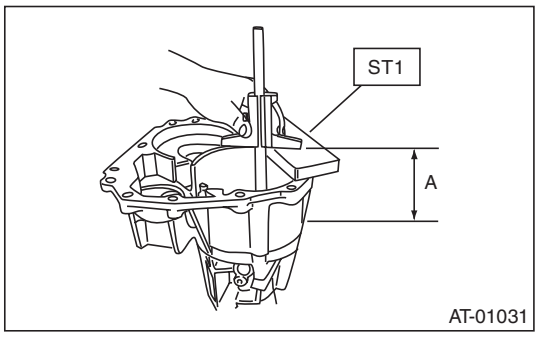
2. VTD MODEL

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



(A) Rear drive plate
(B) Center differential carrier

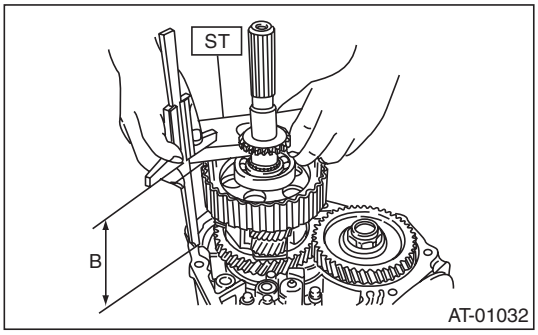
2) Using the special tool, measure the distance “A” between the mating surface of extension case and multi-plate clutch (LSD) piston.
ST 398643600 GAUGE



A: Measured value

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3) Using the special tool, measure the distance “B” between the mating surface of transmission case and reduction drive gear edge.
ST 398643600 GAUGE



B: Measured value

4) Formula:

NOTE:
• Calculation of “T”:
When clearances are 0.05 mm (0.0020 in), select up to four adjusting shims from the table, suitable for clearance value.
When clearances are 0.05 mm (0.0020 in)
T = A − B + 0.40 mm
[T = A − B + 0.0157 in]
When clearances are 0.25 mm (0.0098 in)
T = A − B + 0.20 mm
[T = A − B + 0.0079 in]
T: Shim clearance
A: Distance between extension case edge and rear driveshaft edge
B: Distance between transmission case edge and reduction drive gear edge
T: Shim thickness
0.05 — 0.25 mm (0.0020 — 0.0098 in)
Example:
When, A = 90.50 mm (3.5630 in), B = 90.35 mm (3.5571 in)
Calculation for 0.05 mm (0.0020 in) of clearance
T = 90.50 − 90.35 + 0.4 = 0.55
[T = 3.5630 − 3.5571 + 0.0157 = 0.0216]
Calculation when clearance is 0.25 mm (0.0098 in)
T = 90.50 − 90.35 + 0.2 = 0.35
[T = 3.5630 − 3.5571 + 0.0079 = 0.0138]
• Calculation formula for “T” is applied when measuring using ST (398643600 GUAGE). When not using ST, apply
T = (A − α + 0.45 mm) − (B − β) − H
[T = (A − α + 0.0177 in) − (B − β) − H].
T: Thrust needle bearing thickness
A: Distance from end of extension case to end of reduction drive shaft
B: Distance from end of transmission case to end of rear drive shaft
α: Collar thickness used when measuring “A”
β: Collar thickness used when measuring “B”
0.45: Gasket thickness (mm)
H: Shim clearance
After calculation, the value of “T” 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)

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28.Multi-plate Clutch

A: REMOVAL

Remove multi-plate clutch following the same instructions as for the extension case. <Ref. to 4AT-77, REMOVAL, Extension Case.>

B: INSTALLATION

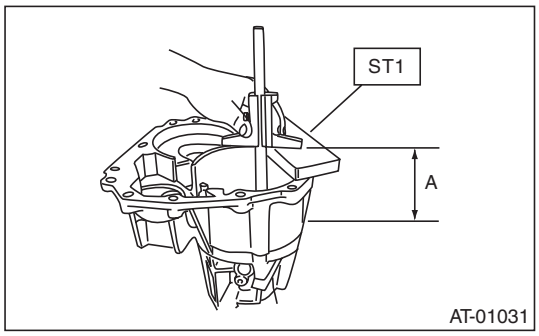
Install multi-plate clutch following the same instructions as for the extension case. <Ref. to 4AT-77, INSTALLATION, Extension Case.>

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 lathe cut seal ring for damage.
- Measure multi-plate clutch clearance and adjust it to within the specification range. <Ref. to 4AT-87, ADJUSTMENT, Multi-plate Clutch.>

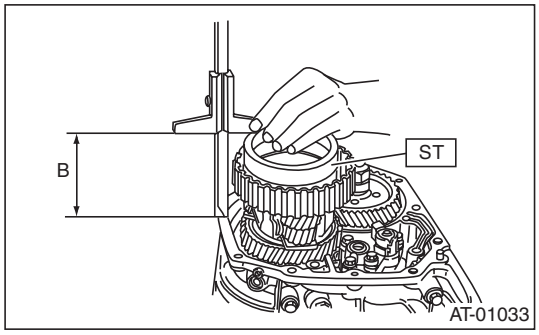
D: ADJUSTMENT

1) Remove drive plate and driven plate from center differential carrier.
2) Using the special tool, measure distance “A” from extension case joining surface to multi-plate clutch (LSD) piston.
ST 398643600 GAUGE



A: Measured value

3) Using ST, measure height “B” from transmission case joining edge to center differential clutch drum edge.
ST 398744300 GAUGE



B: Measured value

4) Calculation formula
$T = A - B + 0.45$ mm
[$T = A - B + 0.0177$ in]

NOTE:
- Calculation formula for “T” is applied when measuring using ST (398643600 GUAGE, 398744300 GAUGE). When not using ST, apply
$T = (A - \alpha + 0.45\text{ mm}) - (B - \beta)$
[$T = (A - \alpha + 0.0177\text{ in}) - (B - \beta)$].
T: Thrust needle bearing thickness
A: Distance from end of extension case to end of reduction drive shaft
B: Distance from end of transmission case to end of rear drive shaft
α: Collar thickness used when measuring “A”
β: Collar thickness used when measuring “B”
0.45: Gasket thickness (mm)
- 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.

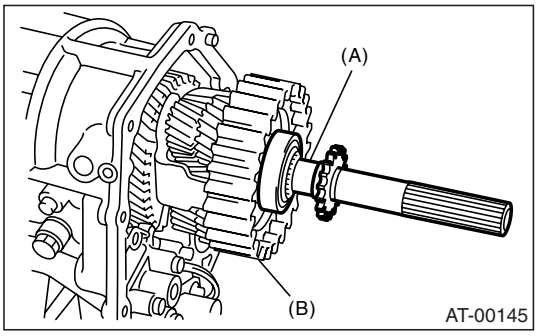
Obtainable driven plates	
Part No.	Thickness mm (in)
31589AA041	1.6 (0.063)
31589AA050	2.0 (0.079)
31589AA060	2.4 (0.094)
31589AA070	2.8 (0.110)

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29.Rear Drive Shaft

A: REMOVAL

1) Remove transmission assembly. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear wheel speed sensor and separate extension case from transmission case. <Ref. to 4AT-77, REMOVAL, Extension Case.>
3) Pull out the rear driveshaft from the center differential assembly.



(A) Rear driveshaft
(B) Center differential carrier

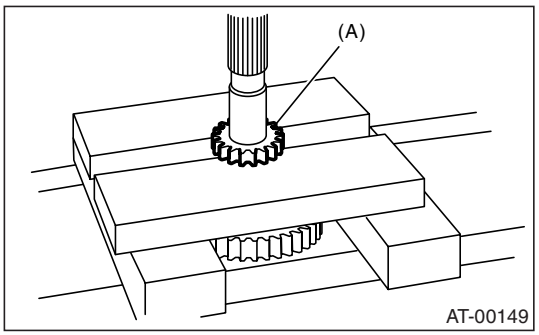
4) Remove drive plate and driven plate.

B: INSTALLATION

1) Select the appropriate shim. <Ref. to 4AT-85, 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 4AT-77, INSTALLATION, Extension Case.>
5) Install transmission assembly. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

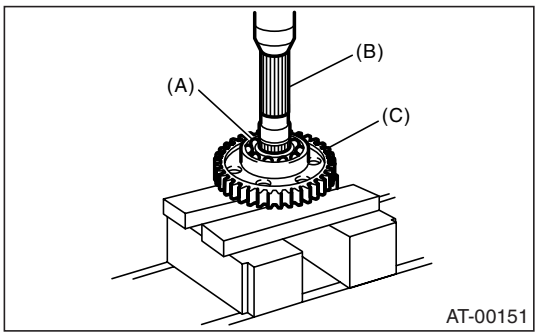
C: DISASSEMBLY

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.



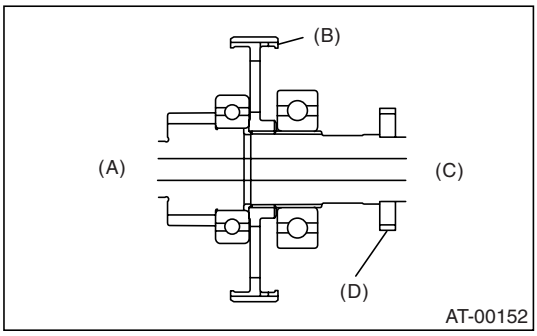
(A) Rear ball bearing
(B) Rear driveshaft
(C) Clutch hub

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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.



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

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 4AT-85, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

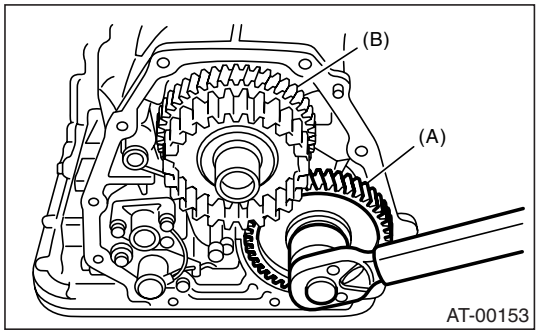
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30.Reduction Driven Gear

A: REMOVAL

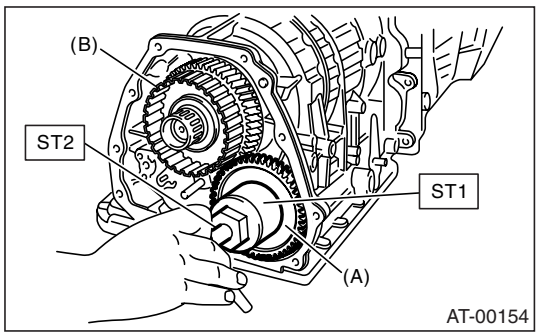
1. MPT MODEL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to 4AT-77, 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

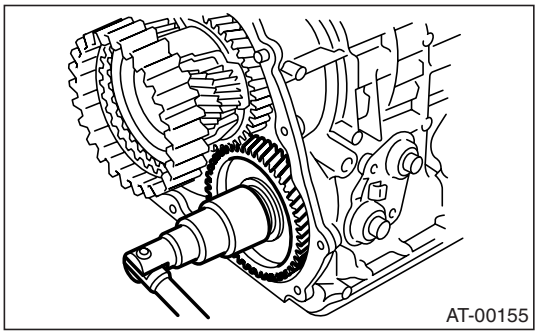
5) Using the ST1 and ST2, extract the reduction driven gear.
ST1 499737000 PULLER
ST2 899524100 PULLER SET



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

2. VTD MODEL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to 4AT-77, REMOVAL, Extension Case.>
3) Remove the rear drive shaft. <Ref. to 4AT-88, REMOVAL, Rear Drive Shaft.>
4) Set the range select lever to “P”.
5) Straighten the staked portion, and remove the lock nut.



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 4AT-95, REMOVAL, Center Differential Carrier.>

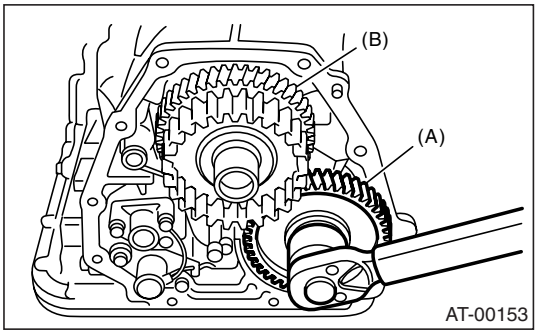
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B: INSTALLATION

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)



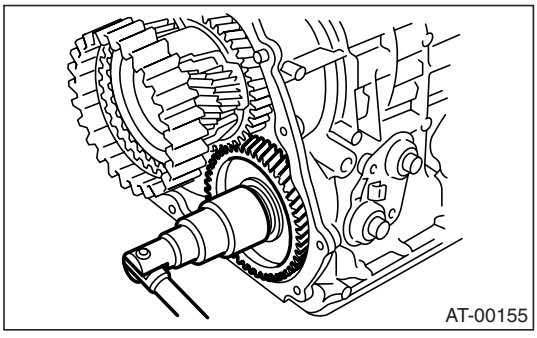
(A) Reduction driven gear
(B) Reduction drive gear

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 4AT-77, INSTALLATION, Extension Case.>
5) Install the transmission assembly to vehicle. <Ref. to 4AT-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.

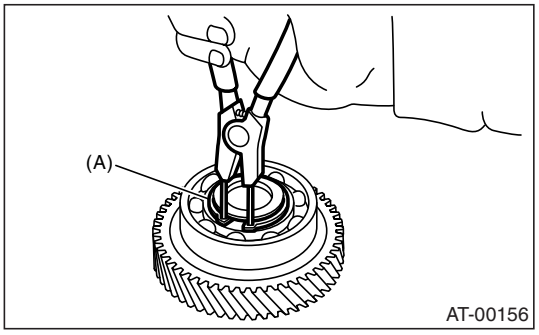
Tightening torque:
100 N·m (10.2 kgf-m, 73.8 ft-lb)



5) After tightening, stake the lock nut securely.
6) Insert the rear drive shaft assembly. <Ref. to 4AT-88, INSTALLATION, Rear Drive Shaft.>
7) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to 4AT-77, INSTALLATION, Extension Case.>
8) Install the transmission assembly to vehicle. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

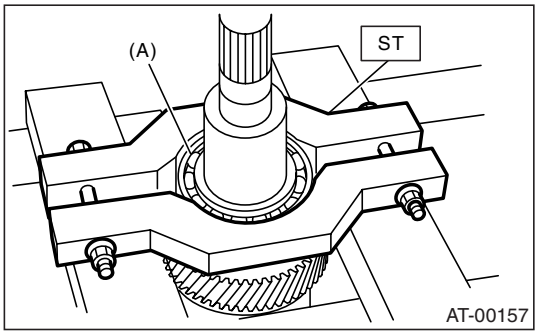
C: DISASSEMBLY

1) Remove snap ring from reduction driven gear.



(A) Snap ring

2) Using ST, remove ball bearing from reduction driven gear.
ST 498077600 REMOVER



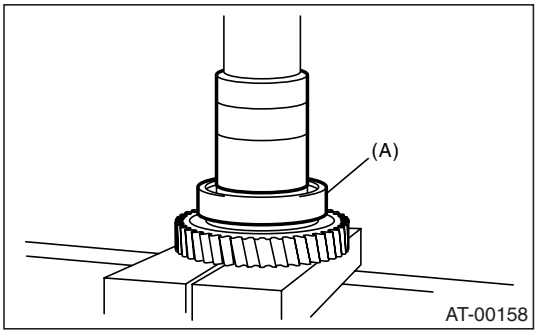
(A) Ball bearing

3) Remove snap ring reduction driven gear.

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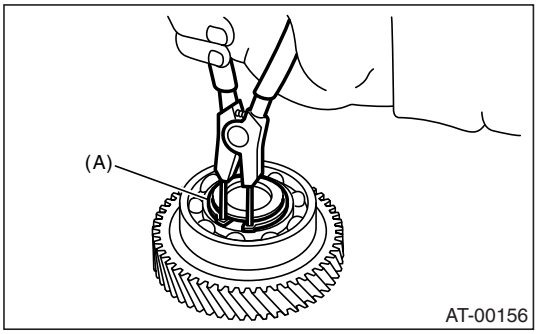
D: ASSEMBLY

1) Install snap ring to reduction driven gear.
2) Using a press, install a new ball bearing to reduction driven gear.



(A) Ball bearing

3) Install snap ring to reduction driven gear.



(A) Snap ring

E: INSPECTION

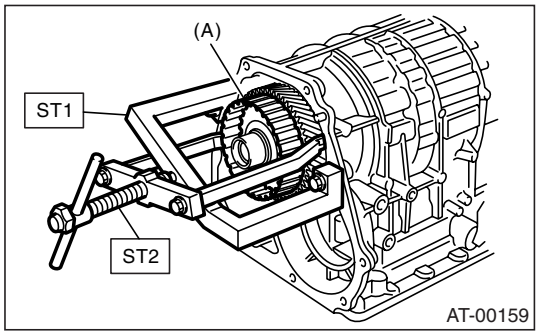
Check ball bearing and gear for dents or damage.

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31.Reduction Drive Gear

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to 4AT-77, REMOVAL, Extension Case.>
3) Remove the reduction driven gear. <Ref. to 4AT-90, REMOVAL, Reduction Driven Gear.>
4) Using ST, extract the reduction drive gear.
ST1 499737100 PULLER
ST2 899524100 PULLER SET

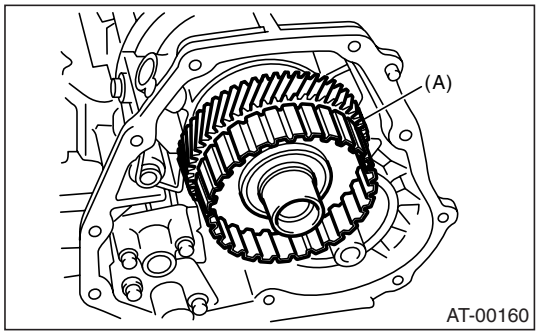


(A) Reduction drive gear

B: INSTALLATION

1) Install the reduction drive gear assembly.

NOTE:
Insert it fully into position until the bearing shoulder bottoms.

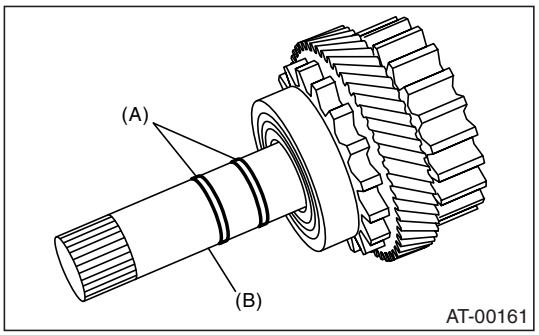


(A) Reduction drive gear

2) Install the reduction driven gear. <Ref. to 4AT-91, INSTALLATION, Reduction Driven Gear.>
3) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to 4AT-77, INSTALLATION, Extension Case.>
4) Install the transmission assembly to the vehicle. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

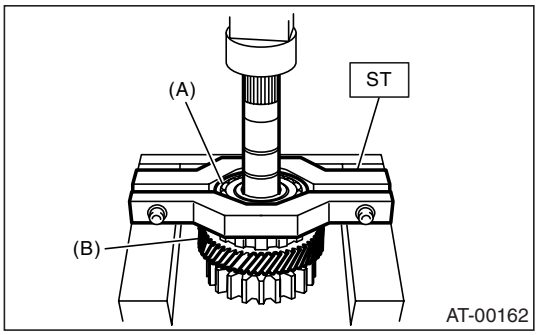
C: DISASSEMBLY

1) Take out the seal rings.



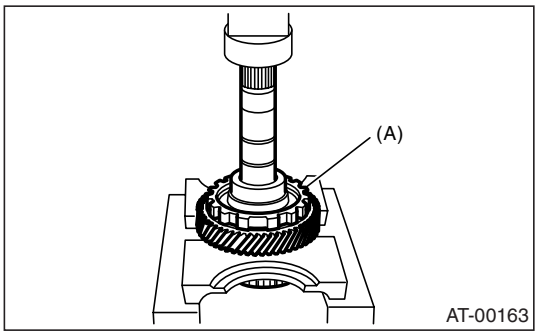
(A) Seal rings
(B) Reduction drive shaft

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.

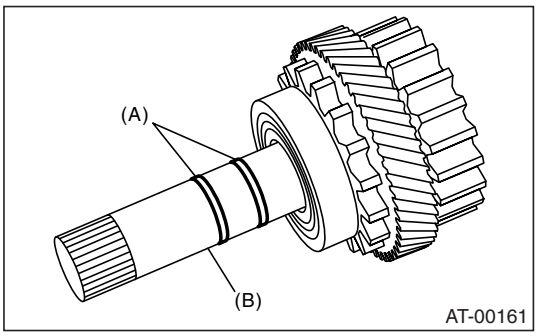


(A) Reduction drive gear

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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

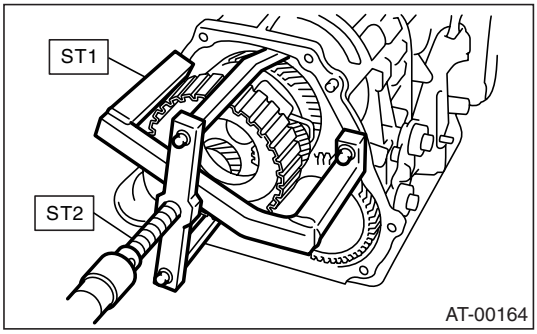
• Rotate bearing by hand, make sure it rotates smoothly.
• Make sure that each component is free of harmful gouges, cuts, or dust.
• Measure the extension end play and adjust it to within specifications.<Ref. to 4AT-84, ADJUSTMENT, Transfer Clutch.>

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32.Center Differential Carrier

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case from the transmission case. <Ref. to 4AT-77, REMOVAL, Extension Case.>
3) Pull out the rear driveshaft. <Ref. to 4AT-88, REMOVAL, Rear Drive Shaft.>
4) Using the special tools, pull out the center differential carrier assembly.
ST1 499737100 PULLER
ST2 899524100 PULLER SET

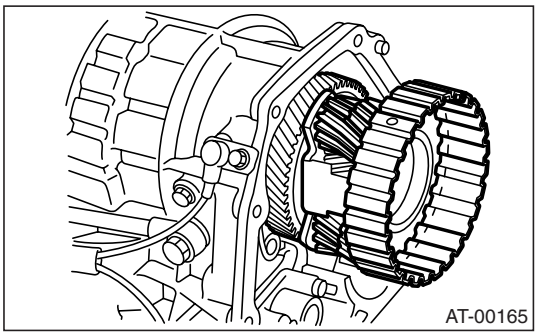


5) Pull out the shim(s) from transmission case.

B: INSTALLATION

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

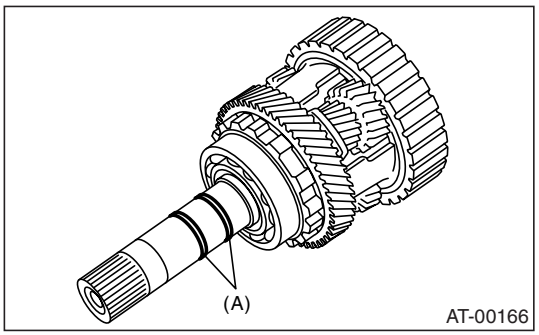
NOTE:
Insert the center differential assembly and shim(s) completely into the bearing shoulder bottom.



2) Insert the rear driveshaft. <Ref. to 4AT-88, INSTALLATION, Rear Drive Shaft.>
3) Connect the transmission case and extension case, and install the rear wheel speed sensor. <Ref. to 4AT-77, INSTALLATION, Extension Case.>
4) Install the transmission assembly onto vehicle. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

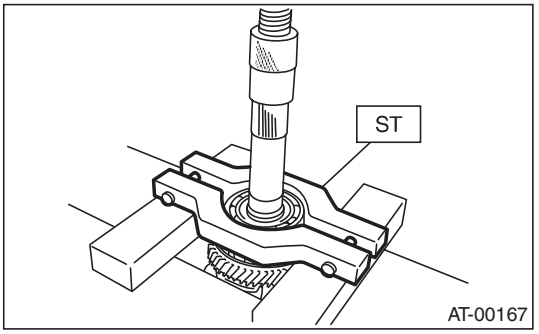
C: DISASSEMBLY

1) Remove the seal rings.

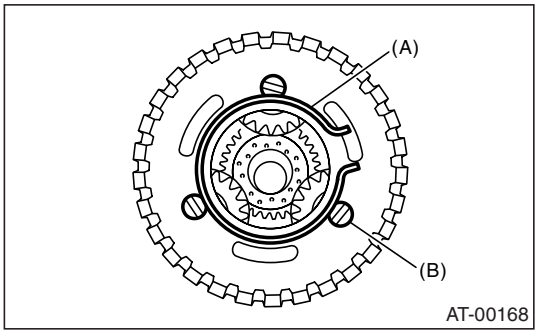


(A) Seal ring

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



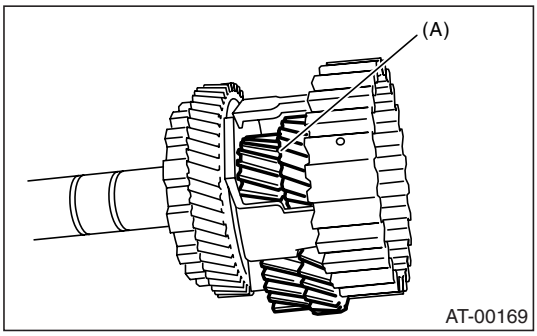
3) Remove the snap ring, and pull out the shaft from the center differential assembly.



(A) Snap ring
(B) Shaft

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

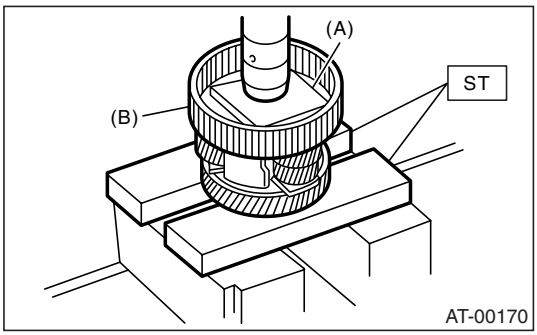


(A) Pinion gear

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

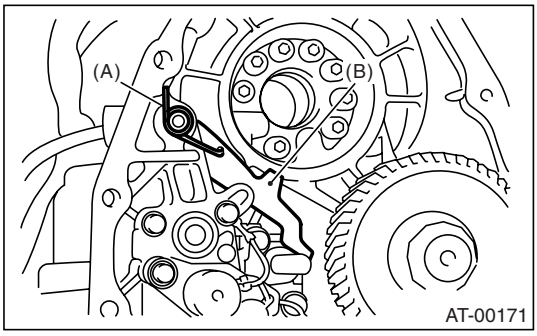
- Check all parts for hole, score, or dirt.
- Check the play of the extension end, and if necessary, adjust it. <Ref. to 4AT-85, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

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33.Parking Pawl

A: REMOVAL

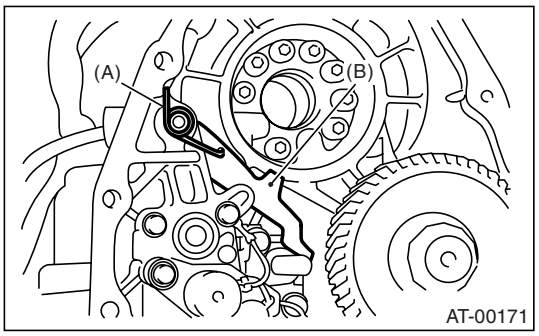
1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear vehicle speed sensor and separate transmission case and extension case sections. <Ref. to 4AT-77, REMOVAL, Extension Case.>
3) Remove the reduction drive gear. (MPT model) <Ref. to 4AT-93, REMOVAL, Reduction Drive Gear.>
4) Remove the center differential carrier. (VTD model) <Ref. to 4AT-95, 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 4AT-93, INSTALLATION, Reduction Drive Gear.>
3) Install the center differential carrier. (VTD model) <Ref. to 4AT-95, INSTALLATION, Center Differential Carrier.>
4) Install the rear vehicle speed sensor and extension case. <Ref. to 4AT-77, INSTALLATION, Extension Case.>
5) Install the transmission assembly to the vehicle. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

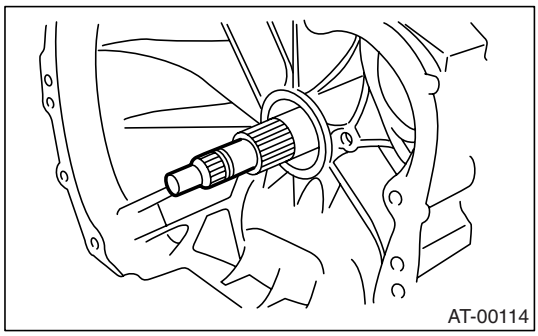
Make sure that the tab of the packing pole on the reduction gear is not worn or otherwise damaged.

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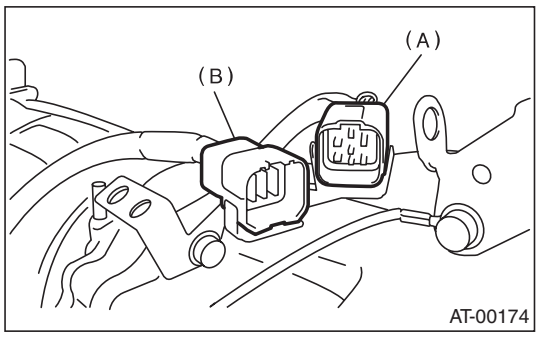
34.Torque Converter Clutch Case

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-75, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.



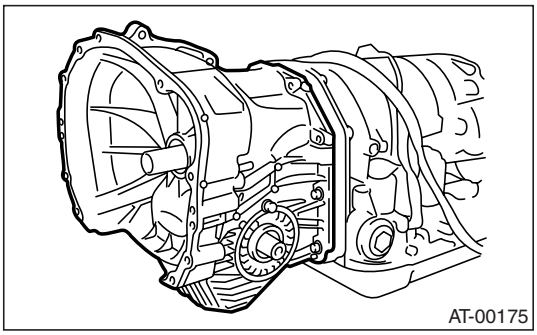
4) Lift-up lever behind the connector and disconnect it from stay.
5) Disconnect inhibitor switch connector from stay.



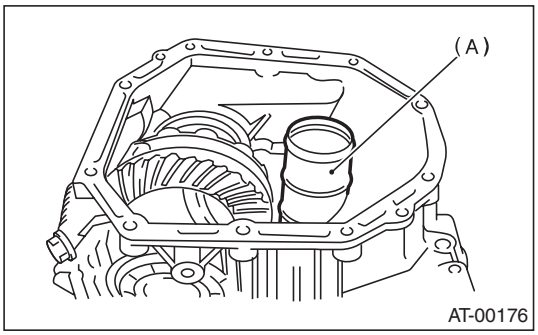
(A) Transmission harness
(B) Inhibitor switch harness

6) Remove the oil charger pipe. <Ref. to 4AT-74, REMOVAL, Oil Charger Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-71, REMOVAL, ATF Cooler Pipe and Hose.>
8) 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.



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

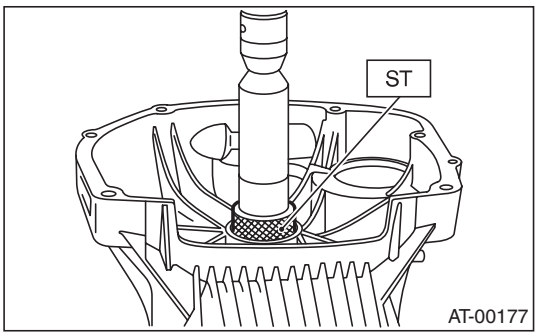


(A) Seal pipe

10) Remove the differential assembly. <Ref. to 4AT-112, REMOVAL, Front Differential.>
11) Remove the oil seal from torque converter clutch case.

B: INSTALLATION

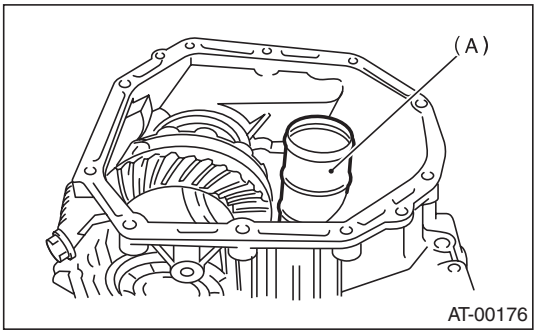
1) Check the appearance of each component and clean.
2) Force-fit the oil seal to the torque converter clutch case with ST.
ST 398437700 DRIFT



3) Install the differential assembly to the case. <Ref. to 4AT-112, INSTALLATION, Front Differential.>
4) Install the left and right side retainers. <Ref. to 4AT-116, ADJUSTMENT, Front Differential.>

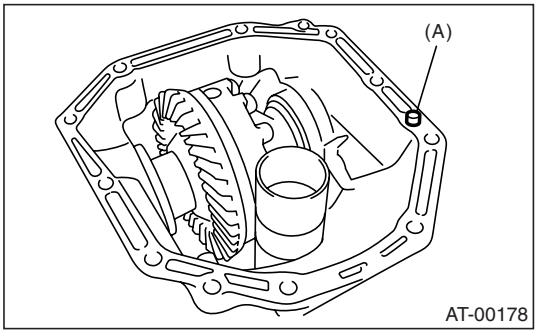
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5) Install the new seal pipe to the torque converter clutch case.



(A) Seal pipe

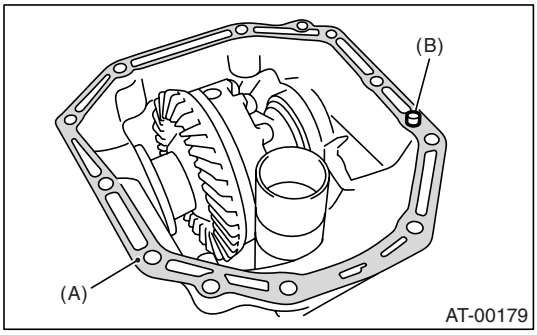
6) Install the rubber seal to the torque converter clutch case.



(A) Rubber seal

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

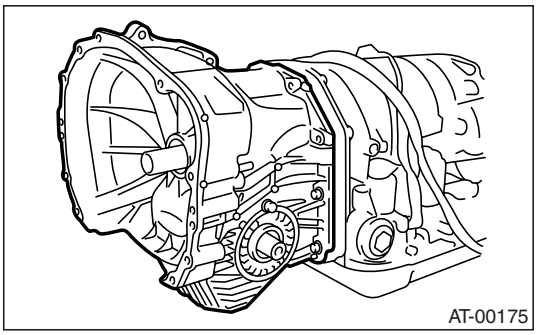
Liquid gasket:
THREE BOND 1215 (Part No. 004403007)



(A) THREE BOND 1215
(B) Rubber seal

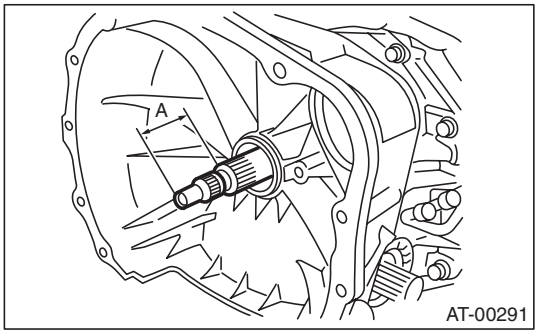
8) Install the torque converter clutch case assembly without damaging bush and oil seal and secure with six bolts and four nuts.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



9) Insert inhibitor switch and transmission connector into stay.
10) Install air breather hose. <Ref. to 4AT-73, INSTALLATION, Air Breather Hose.>
11) Install the oil cooler pipes. <Ref. to 4AT-72, INSTALLATION, ATF Cooler Pipe and Hose.>
12) Install the oil charger pipe with O-ring. <Ref. to 4AT-74, INSTALLATION, Oil Charger Pipe.>
13) Insert the input shaft while turning lightly by hand and verify the protrusion amount.

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



14) Install the torque converter clutch assembly. <Ref. to 4AT-75, INSTALLATION, Torque Converter Clutch Assembly.>
15) Install the transmission assembly to the vehicle. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

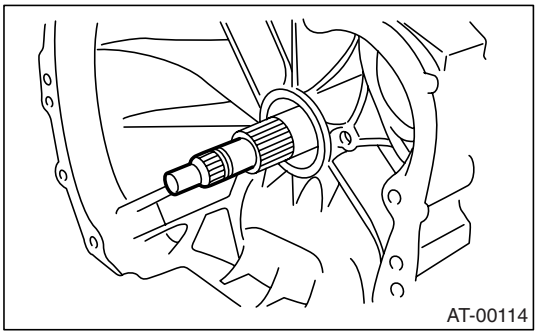
Measure the backlash and adjust to within specifications. <Ref. to 4AT-109, ADJUSTMENT, Drive Pinion Shaft.>

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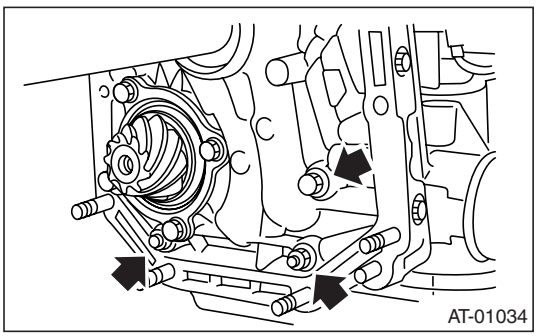
35.Oil Pump Housing

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-75, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.

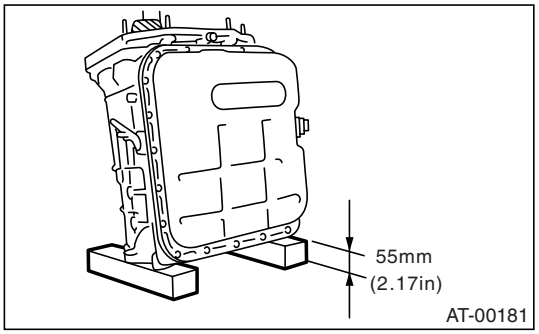


4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
5) Disconnect inhibitor switch connector from stay.
6) Remove the oil charger pipe. <Ref. to 4AT-74, REMOVAL, Oil Charger Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-71, REMOVAL, ATF Cooler Pipe and Hose.>
8) Separation of torque converter clutch case and transmission case sections <Ref. to 4AT-98, REMOVAL, Torque Converter Clutch Case.>
9) Separate transmission case and extension case sections. <Ref. to 4AT-77, REMOVAL, Extension Case.>
10) Remove the reduction drive gear. (MPT model) <Ref. to 4AT-93, REMOVAL, Reduction Drive Gear.>
11) Remove the center differential carrier. (VTD model) <Ref. to 4AT-95, REMOVAL, Center Differential Carrier.>
12) Remove the reduction driven gear. <Ref. to 4AT-90, REMOVAL, REMOVAL, Reduction Driven Gear.>
13) Loosen the oil pump housing mounting bolts.

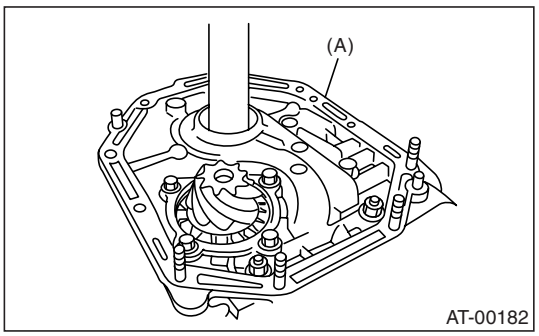


14) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

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.



15) Remove the oil pump housing and adjusting thrust washer.



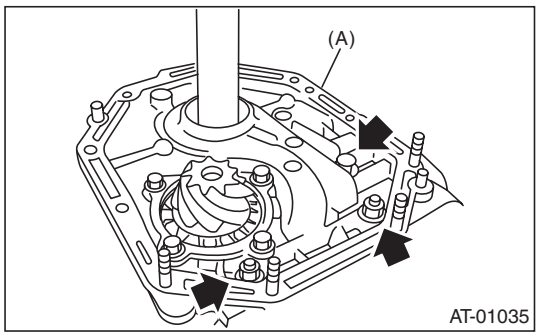
(A) Oil pump housing

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B: INSTALLATION

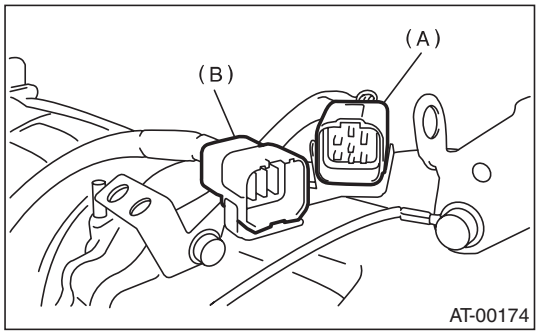
1) Secure the oil pump housing with two nuts and the bolt.

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



(A) Oil pump housing

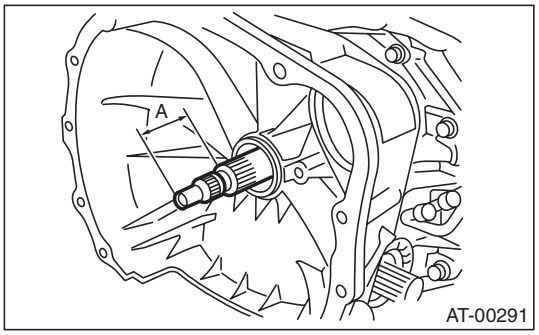
2) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to 4AT-75, INSTALLATION, Torque Converter Clutch Assembly.>
3) Install reduction driven gear. <Ref. to 4AT-91, INSTALLATION, Reduction Driven Gear.>
4) Install the reduction drive gear. (MPT model) <Ref. to 4AT-93, INSTALLATION, Reduction Drive Gear.>
5) Install the center differential carrier. (VTD model) <Ref. to 4AT-95, INSTALLATION, Center Differential Carrier.>
6) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to 4AT-77, INSTALLATION, Extension Case.>
7) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness
(B) Inhibitor switch harness

8) Install the oil cooler pipe. <Ref. to 4AT-72, INSTALLATION, ATF Cooler Pipe and Hose.>
9) Install the oil charger pipe with O-ring. <Ref. to 4AT-74, INSTALLATION, Oil Charger Pipe.>
10) Insert the input shaft while turning lightly by hand and verify the protrusion amount.

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



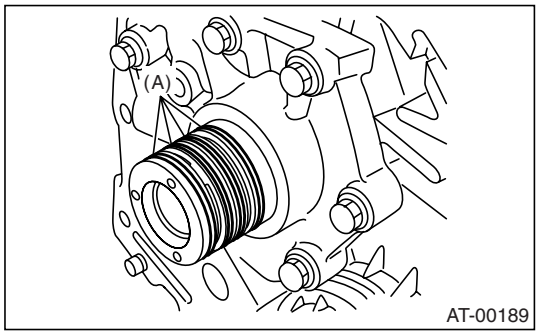
11) Install the torque converter clutch assembly. <Ref. to 4AT-75, INSTALLATION, Torque Converter Clutch Assembly.>
12) Install the transmission assembly to the vehicle. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

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C: DISASSEMBLY

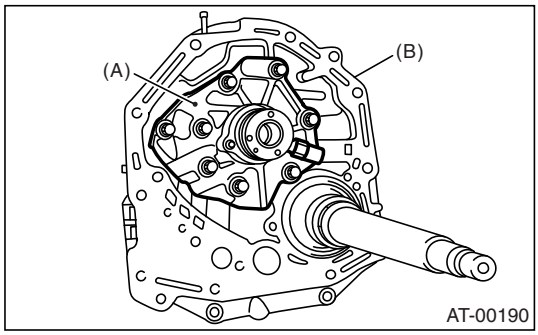
1. OIL PUMP COVER

1) Remove four seal rings.



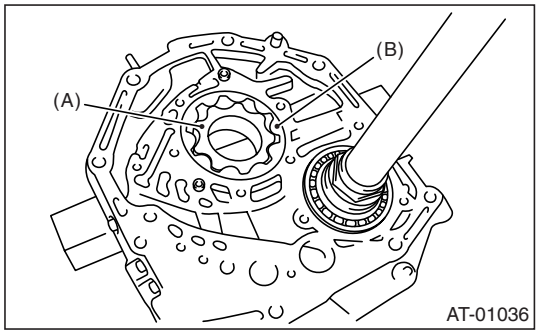
(A) Seal rings

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



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

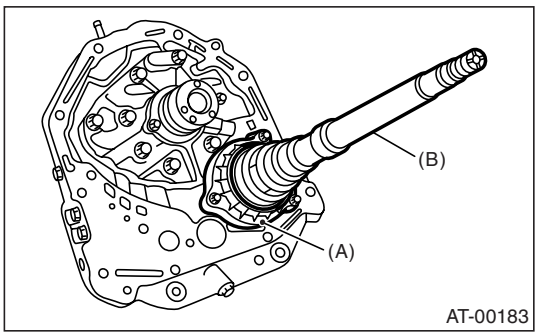
3) Remove the inner and outer rotor.



(A) Inner rotor
(B) Outer rotor

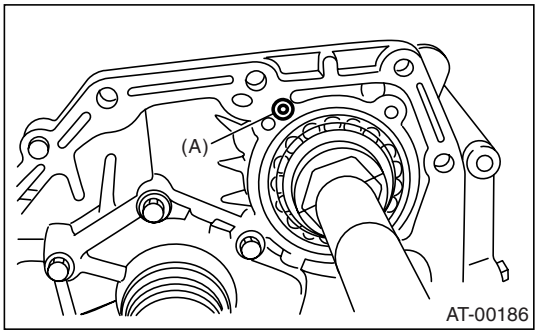
2. OIL SEAL RETAINER

1) Remove the oil seal retainer.



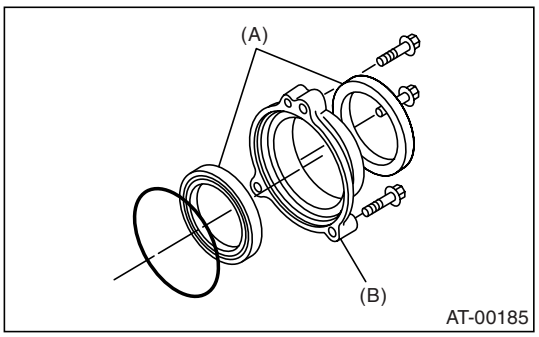
(A) Oil seal retainer
(B) Drive pinion shaft

2) Remove the O-ring.



(A) O-ring

3) Remove the oil seal from oil seal retainer.



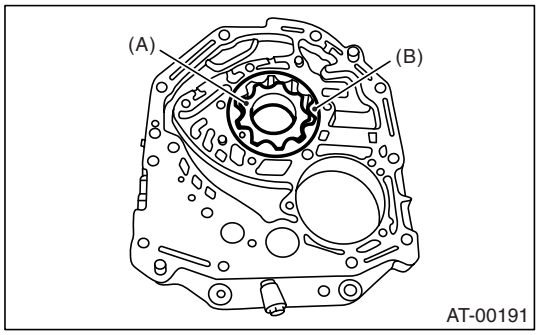
(A) Oil seal
(B) Oil seal retainer

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D: ASSEMBLY

1. OIL PUMP COVER

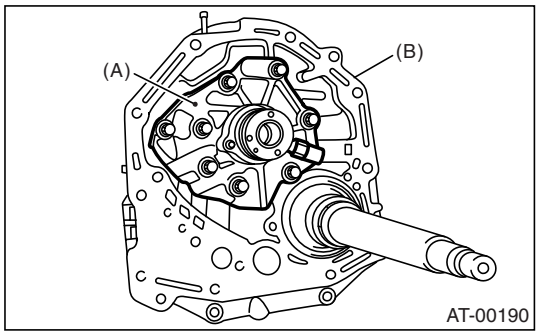
1) Install oil pump rotor assembly to oil pump housing.



(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.

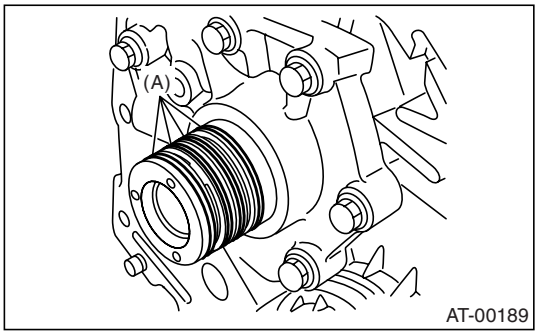
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



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

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

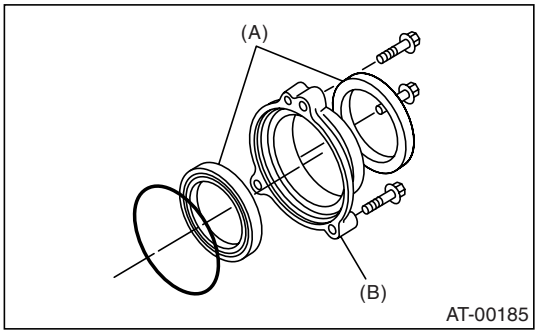
4) Install the oil seal retainer and new seal rings. After adjusting the drive pinion backlash and tooth contact. <Ref. to 4AT-105, ADJUSTMENT, Oil Pump Housing.>



(A) Seal rings

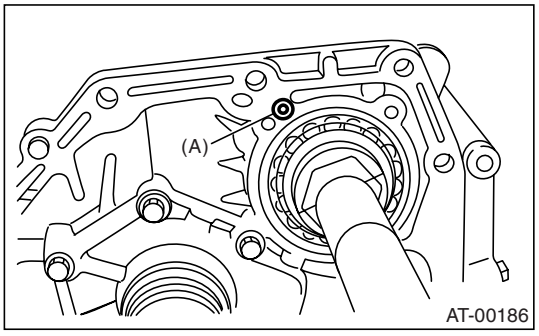
2. OIL SEAL RETAINER

1) Install two new oil seals to the oil seal retainer in proper position using ST.



(A) Oil seal
(B) Oil seal retainer

2) Install a new O-ring to the oil seal retainer using vaseline. Install the seal to oil pump housing bore.

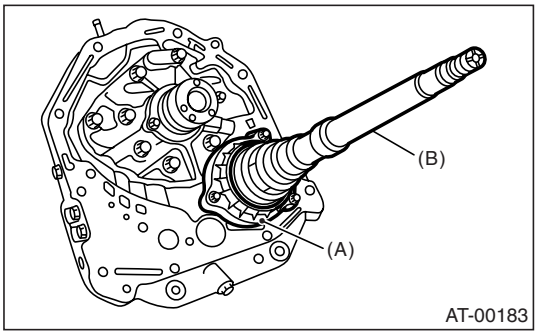


(A) O-ring

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3) Install the oil seal and secure it using three bolts being careful not to damage oil seal lip.

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

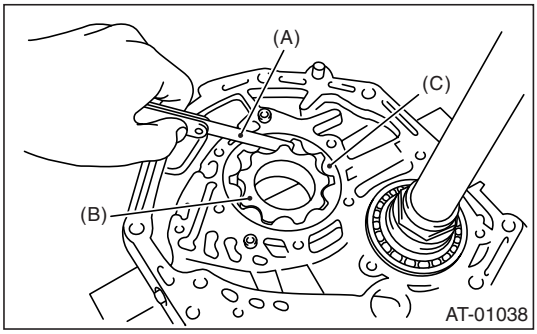


(A) Oil seal retainer
(B) Drive pinion shaft

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.

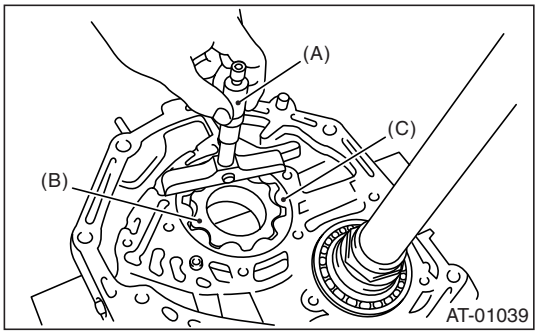
Tip clearance:
0.02 — 0.15 mm (0.0008 — 0.0059 in)



(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.

Side clearance:
0.02 — 0.04 mm (0.0008 — 0.0016 in)



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

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

Non-turbo model:

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)

Turbo model:

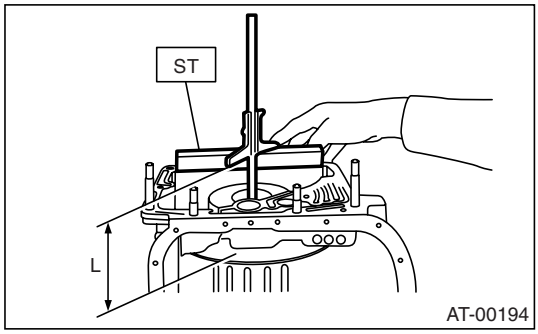
Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA100	14.87 — 14.88 (0.5067 — 0.5071)
15008AA110	14.88 — 14.89 (0.5071 — 0.5075)
15008AA120	14.89 — 14.90 (0.5075 — 0.5079)

Measure the total end play and adjust to within specifications. <Ref. to 4AT-105, ADJUSTMENT, Oil Pump Housing.>

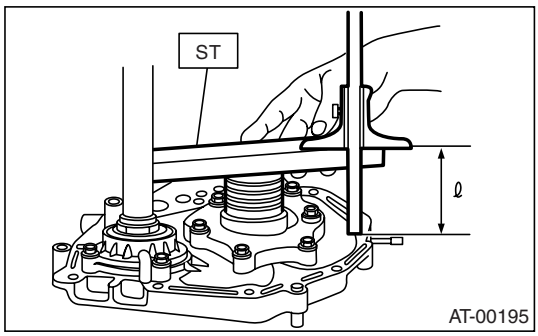
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F: ADJUSTMENT

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

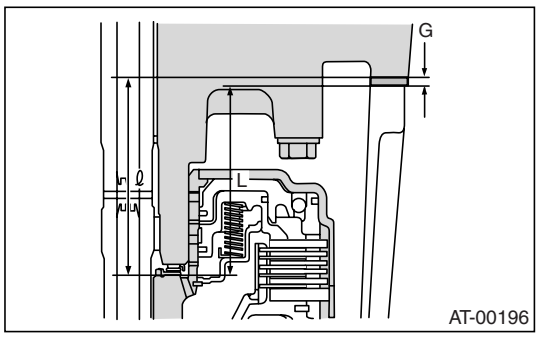


2) Using ST, measure the distance from the oil pump housing mating surface to the top surface of the oil pump cover with thrust needle bearing.
ST 398643600 GAUGE



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) − ℓ

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)]
ℓ	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)

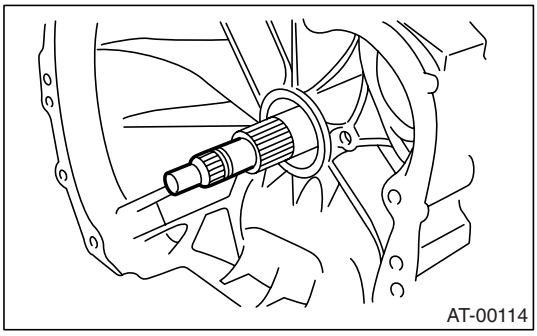
4) After completing end play adjustment, insert the bearing race in the recess of the high clutch. Attach the thrust needle bearing to the oil pump cover with vaseline.
5) After correctly installing the new gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful 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.

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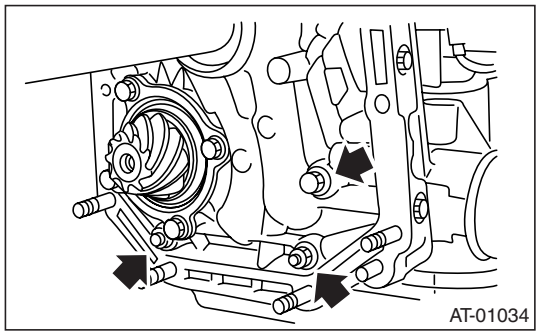
36.Drive Pinion Shaft

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-75, 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 4AT-73, REMOVAL, Air Breather Hose.>
7) Remove the oil charger pipe. <Ref. to 4AT-74, REMOVAL, Oil Charger Pipe.>
8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-71, REMOVAL, ATF Cooler Pipe and Hose.>
9) Separation of torque converter clutch case and transmission case sections <Ref. to 4AT-98, REMOVAL, Torque Converter Clutch Case.>
10) Separate transmission case and extension case sections. <Ref. to 4AT-77, REMOVAL, Extension Case.>
11) Remove the reduction drive gear. (MPT model) <Ref. to 4AT-93, REMOVAL, Reduction Drive Gear.>
12) Remove the center differential carrier. (VTD model) <Ref. to 4AT-95, REMOVAL, Center Differential Carrier.>
13) Remove the reduction driven gear.
<Ref. to 4AT-90, REMOVAL, Reduction Driven Gear.>
14) Remove the drive pinion shaft mounting bolt and remove the drive shaft assembly from oil pump housing.

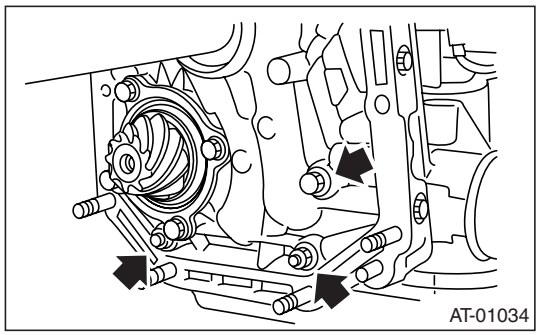


B: INSTALLATION

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

NOTE:
- Pay attention not to bend the shim.
- Pay attention not to press the pinion into housing bore.

Tightening torque:
40 N·m (4.0 kgf-m, 30 ft-lb)

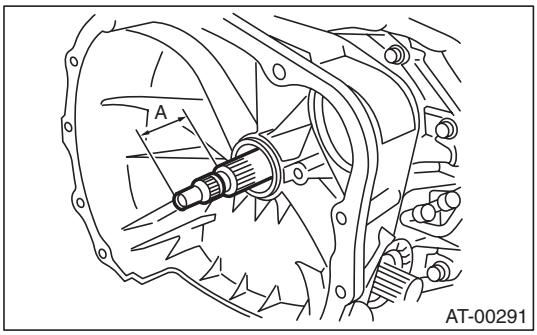


2) Combine the torque converter case with the transmission case. <Ref. to 4AT-98, INSTALLATION, Torque Converter Clutch Case.>
3) Install the reduction driven gear.
<Ref. to 4AT-91, INSTALLATION, Reduction Driven Gear.>
4) Install the reduction drive gear. (MPT model) <Ref. to 4AT-93, INSTALLATION, Reduction Drive Gear.>
5) Install the center differential carrier. (VTD model) <Ref. to 4AT-95, INSTALLATION, Center Differential Carrier.>
6) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to 4AT-77, INSTALLATION, Extension Case.>
7) Insert inhibitor switch and transmission connector into stay.

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8) Install the oil cooler inlet and outlet pipes. <Ref. to 4AT-72, INSTALLATION, ATF Cooler Pipe and Hose.>
9) Install the oil charger pipe with O-ring.
10) Insert the input shaft while turning lightly by hand and verify the protrusion amount.

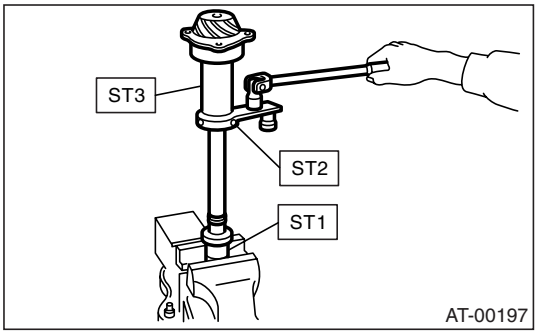
Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



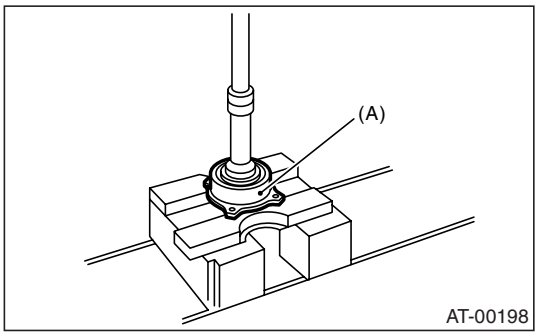
11) Install the torque converter clutch assembly. <Ref. to 4AT-75, INSTALLATION, Torque Converter Clutch Assembly.>
12) Install the transmission assembly to vehicle. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

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

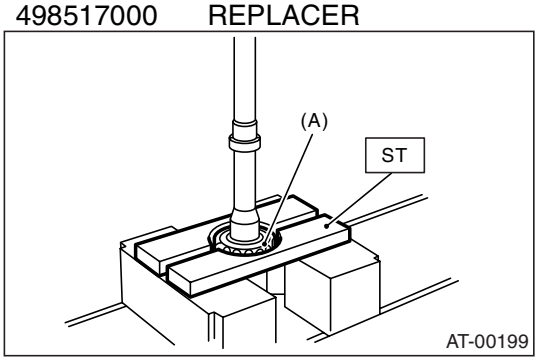


2) Remove the O-ring.
3) Using a press, separate the rear roller bearing and outer race from the shaft.



(A) Outer race

4) Using a press and ST, separate the front roller bearing from the shaft.
ST 498517000 REPLACER

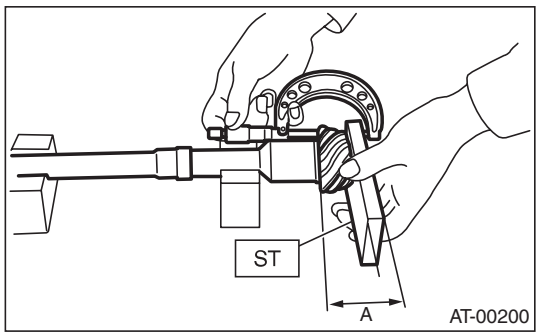


(A) Front roller bearing

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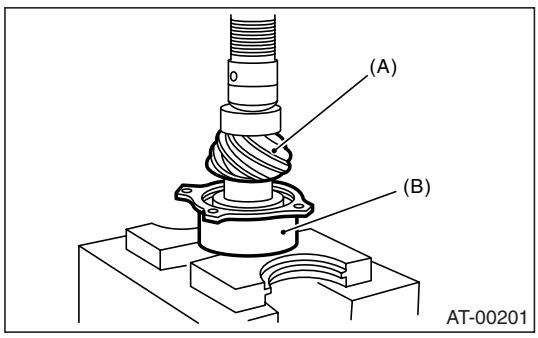
D: ASSEMBLY

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.



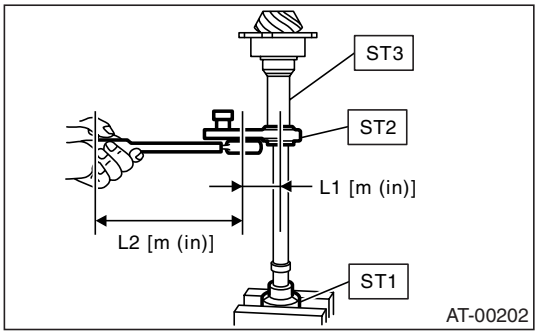
(A) Drive pinion shaft
(B) Roller bearing

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)

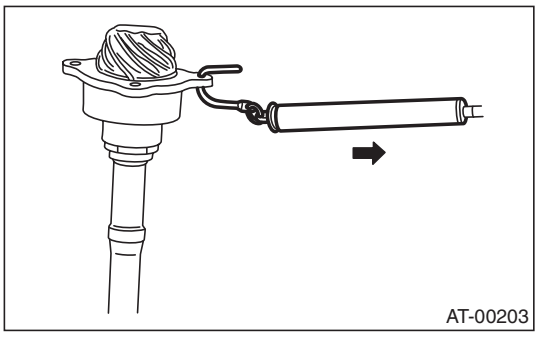
ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

NOTE:
Install ST2 to torque wrench as straight as possible.

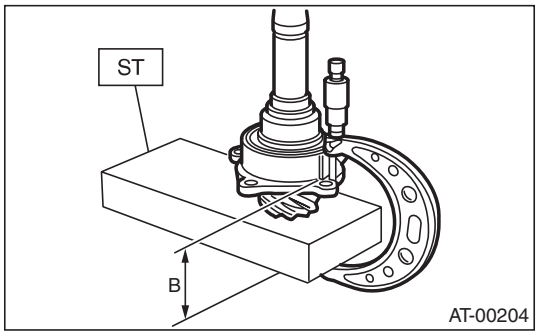


6) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If out of the allowable range, replace the roller bearing.

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

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10) Select three or less shims from following table.

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

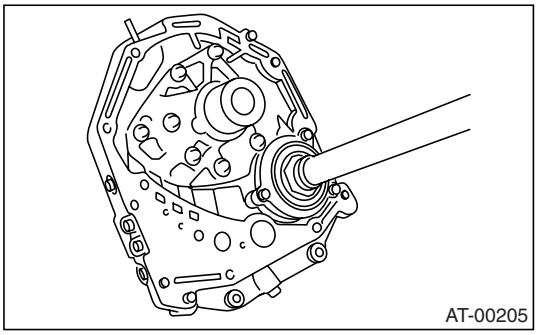
• Make sure that all component parts are free of harmful cuts, gouges, and other faults.
• Adjust the teeth alignment. <Ref. to 4AT-109, ADJUSTMENT, Drive Pinion Shaft.>

F: ADJUSTMENT

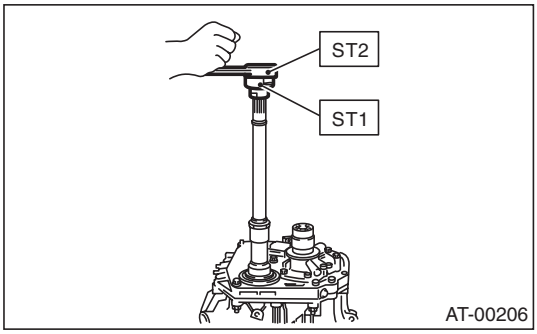
1) Thoroughly remove the liquid gasket from the case mating surface beforehand.
2) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening four bolts.

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)

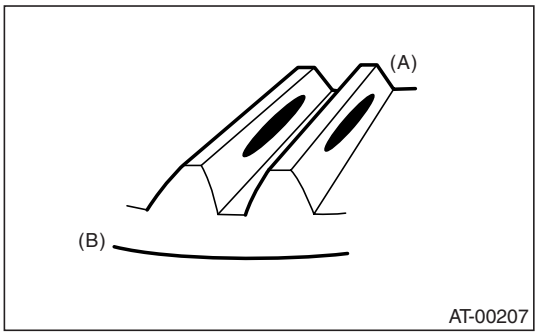

AT-00205

3) Rotate the drive pinion several times with ST1 and ST2.
ST1 498937110 HOLDER
ST2 499787700 WRENCH



AT-00206

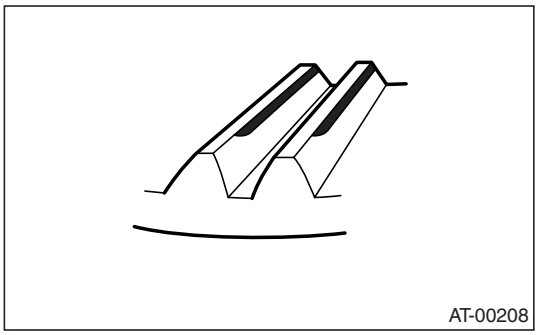
4) Adjust the backlash between drive pinion and crown gear. <Ref. to 4AT-116, ADJUSTMENT, Front Differential.>
5) Apply red lead evenly to the surfaces of three or four teeth of the crown gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern.
If tooth contact is improper, readjust the backlash or shim thickness.<Ref. to 4AT-116, ADJUSTMENT, Front Differential.>
• 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.]



AT-00207

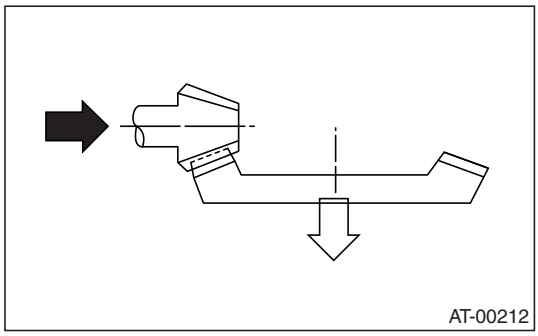
(A) Toe side
(B) Heel side

• Face contact
Checking item: Backlash is too large.
Contact pattern


AT-00208

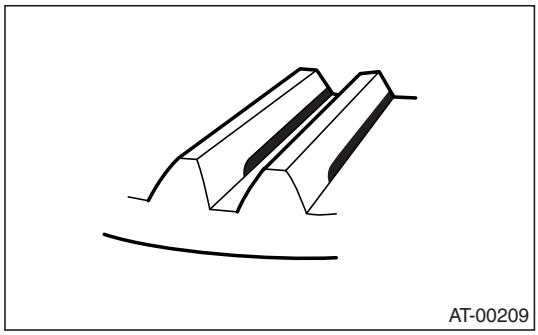
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Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.

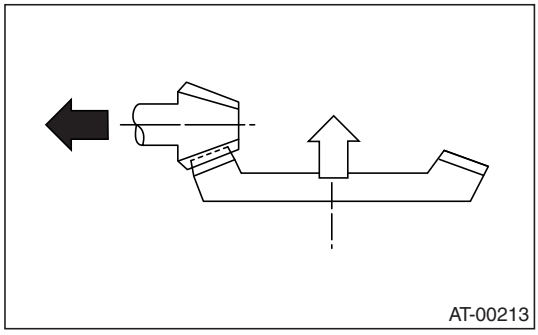


- Flank contact

Checking item: Backlash is too small.
Contact pattern

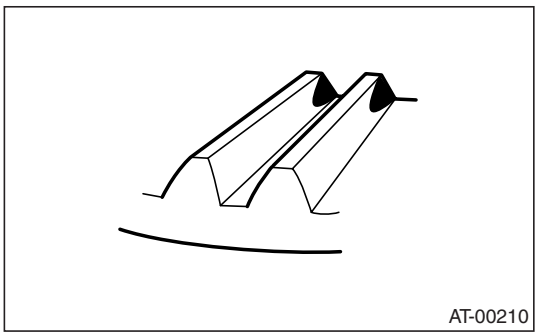


Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.

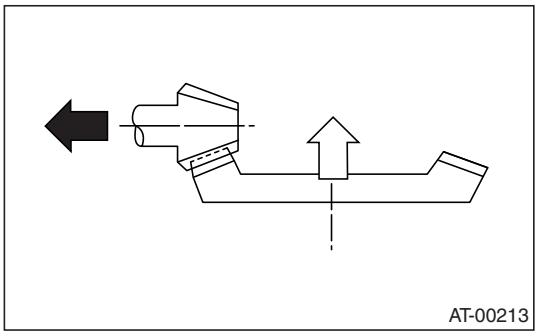


- Toe contact (Inside end contact)

Checking item: Contact areas is small.
Contact pattern

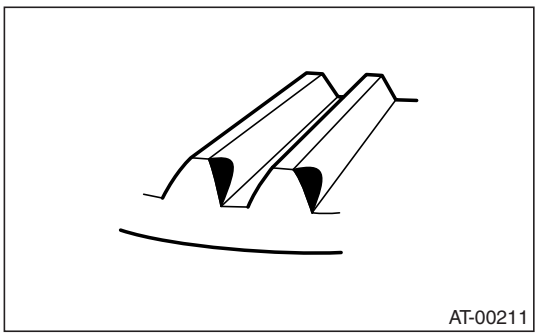


Corrective action: Decrease thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



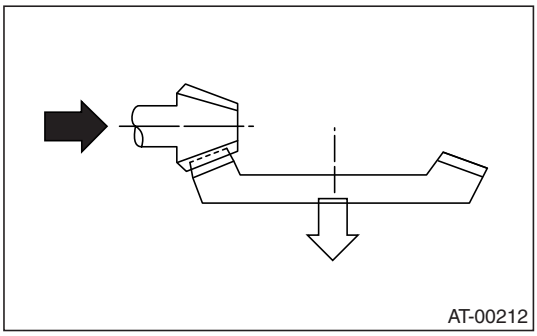
- Heel contact (Outside end contact)

Checking item: Contact areas is small.
Contact pattern



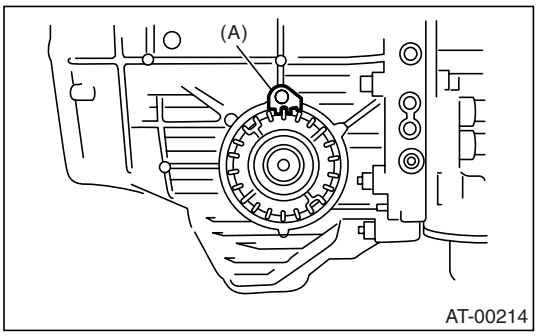
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Corrective action: Increase thickness of drive pinion height adjusting shim in order to move drive pinion close to crown gear.



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.

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



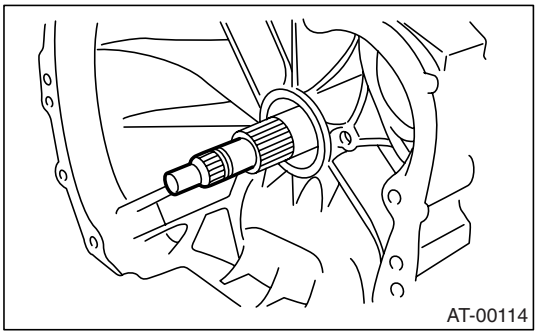
(A) Lock plate

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37.Front Differential

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-75, 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 from stay.
6) Remove the oil charger pipe. <Ref. to 4AT-74, REMOVAL, Oil Charger Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-71, REMOVAL, ATF Cooler Pipe and Hose.>
8) Separation of torque converter clutch case and transmission case.<Ref. to 4AT-98, REMOVAL, Torque Converter Clutch Case.>
9) Remove the seal pipe.
10) Remove the differential side retainer with ST.

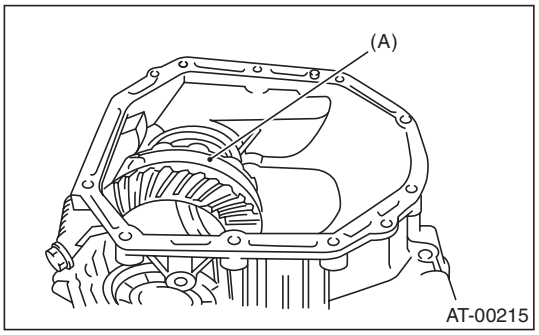
NOTE:
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the torque converter clutch case.

ST 499787000 WRENCH ASSY

11) 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).



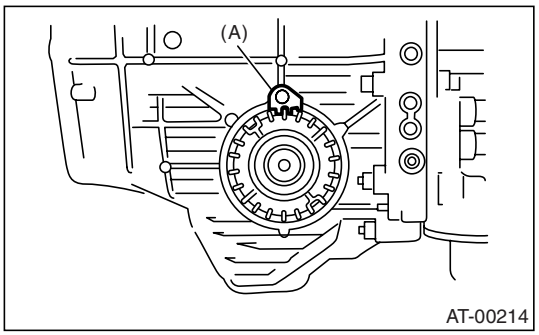
(A) Differential assembly

2) Install the O-rings from left and right side retainer.
3) Using ST, install the side retainers. <Ref. to 4AT-112, REMOVAL, Front Differential.>

ST 499787000 WRENCH ASSY

4) Adjust the front differential backlash. <Ref. to 4AT-116, ADJUSTMENT, Front Differential.>
5) Install the lock plate.

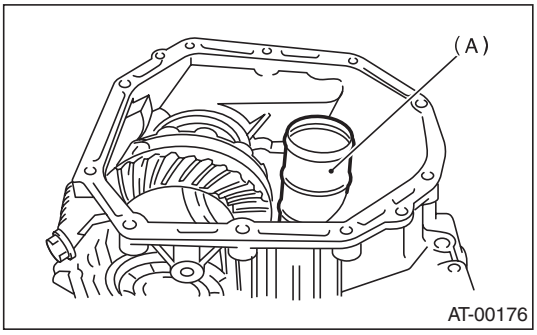
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Lock plate

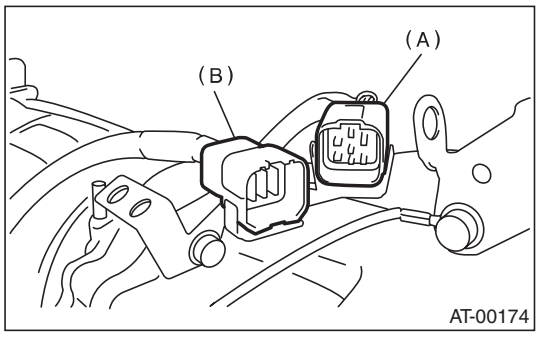
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6) Install the new seal pipe to the torque converter clutch case.



(A) Seal pipe

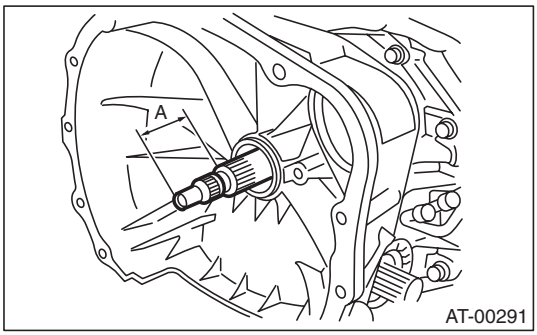
7) Install the torque converter clutch case to transmission case. <Ref. to 4AT-98, INSTALLATION, Torque Converter Clutch Case.>
8) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness
(B) Inhibitor switch harness

9) Install oil cooler pipes. <Ref. to 4AT-72, INSTALLATION, ATF Cooler Pipe and Hose.>
10) Install the oil charger pipe with O-ring <Ref. to 4AT-74, INSTALLATION, Oil Charger Pipe.>
11) Insert the input shaft while turning lightly by hand and verify the protrusion amount.

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

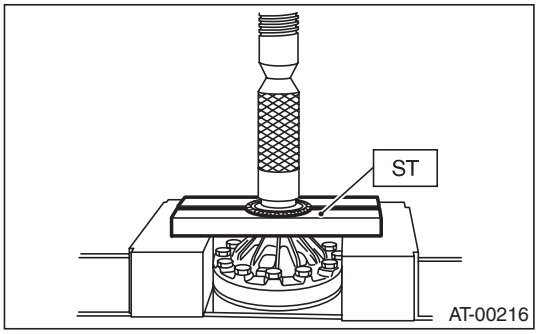


12) Install the torque converter clutch assembly. <Ref. to 4AT-75, INSTALLATION, Torque Converter Clutch Assembly.>
13) Install the transmission assembly to the vehicle. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

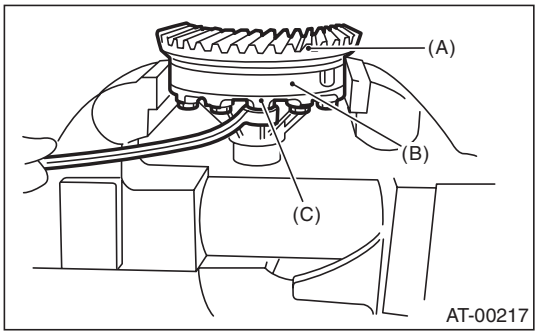
C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Using a press and ST, remove the taper roller bearing.
ST 498077000 REMOVER



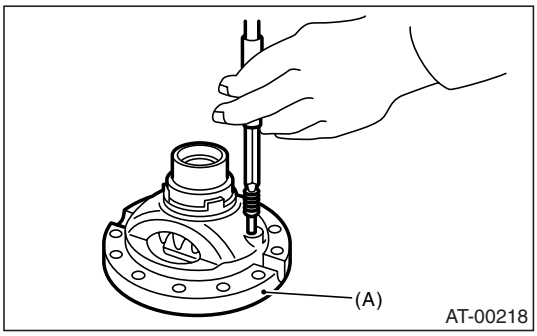
2) Secure the case in a vise and remove the crown gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



(A) Crown gear
(B) Differential case (RH)
(C) Differential case (LH)

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3) Pull out the straight pin and shaft, and remove the differential bevel gear, washer, and differential bevel pinion.

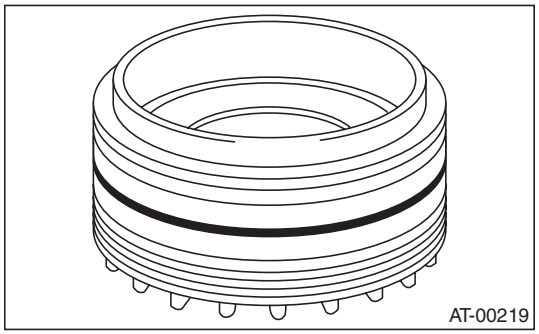


(A) Differential case (RH)

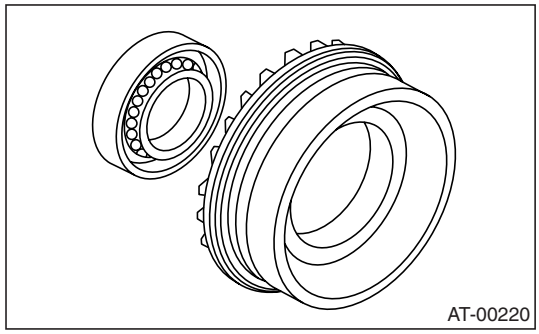
2. SIDE RETAINER

NOTE:
After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.

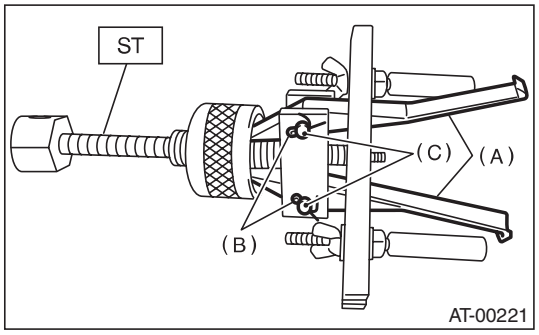
1) Remove O-ring.



2) Remove oil seal.

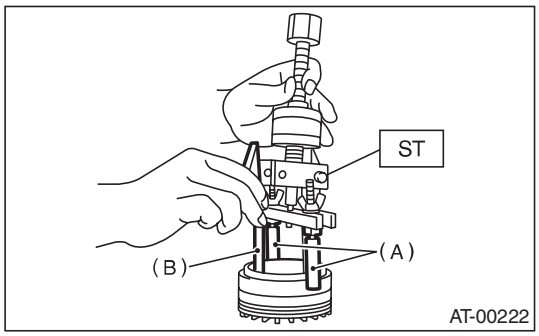


3) Take out either split pin, remove claw.
ST 398527700 PULLER ASSY



(A) Claw
(B) Split pin
(C) Pin

4) Securely attach two claws to outer race, set ST to side retainer.
ST 398527700 PULLER ASSY



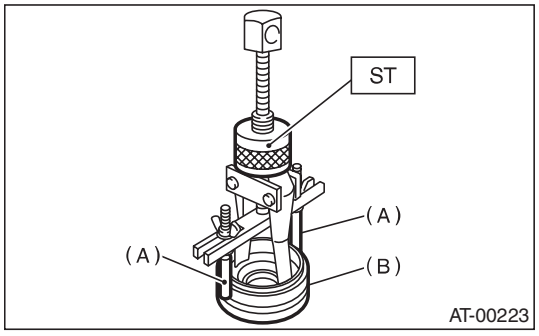
(A) Shaft
(B) Claw

5) Return removed claw to the original position, and install pin and split pin.

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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.

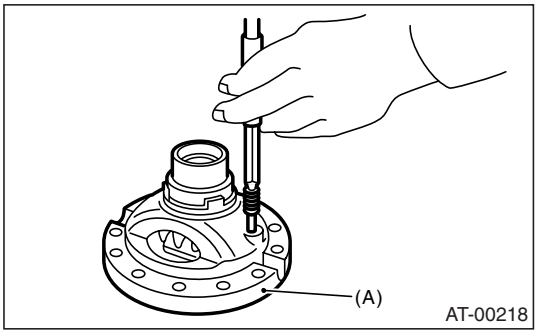


(A) Shaft
(B) Side retainer

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.

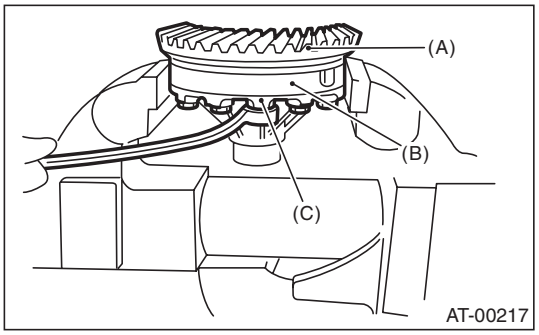


(A) Differential case (RH)

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)

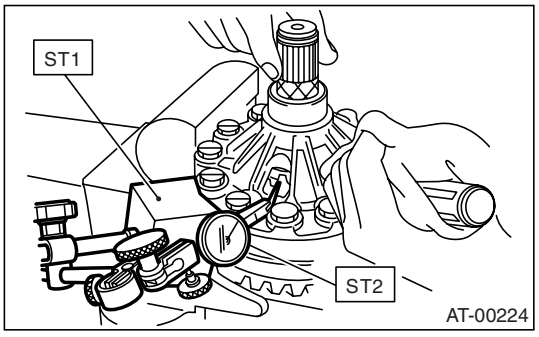


(A) Crown gear
(B) Differential case (RH)
(C) Differential case (LH)

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)

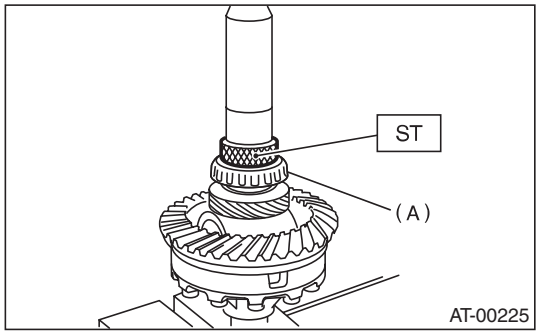


(2) If backlash is not as specified, select a washer from the table below.

Washer	
Part No.	Thickness mm (in)
803038021	0.95 (0.037)
803038022	1.00 (0.039)
803038023	1.05 (0.041)

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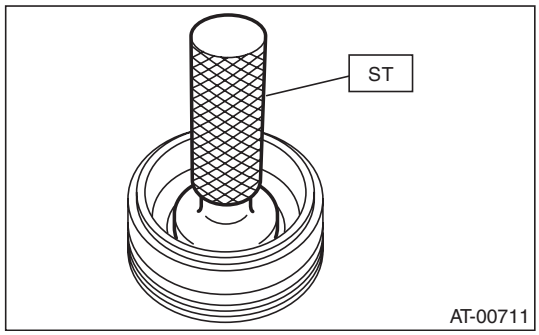
6) Using ST, install taper roller bearing.
ST 398437700 DRIFT



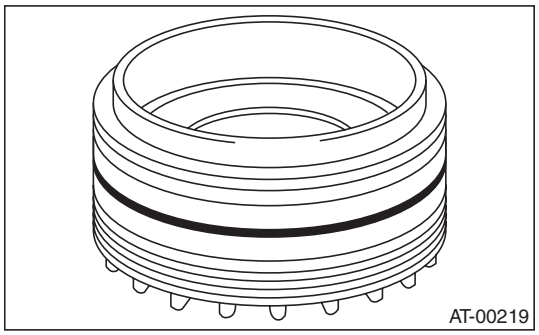
(A) Taper roller bearing

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



3) Install new O-ring.



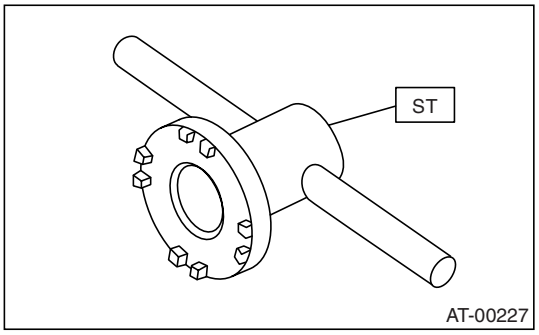
E: INSPECTION

• Check each component for harmful cuts, damage and other faults.
• Measure the backlash and adjust to within specifications.
<Ref. to 4AT-116, ADJUSTMENT, Front Differential.>

F: ADJUSTMENT

1) Using ST, screw in the retainer until light contact is felt.

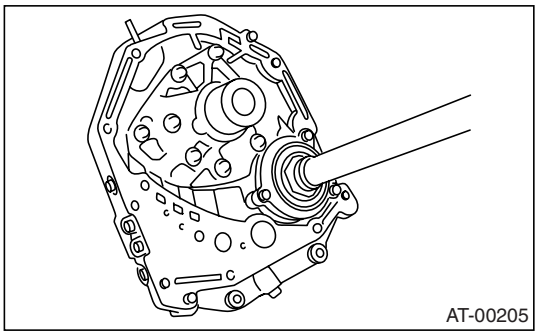
NOTE:
Screw in the RH side slightly deeper than the LH side.
ST 499787000 WRENCH ASSY



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.

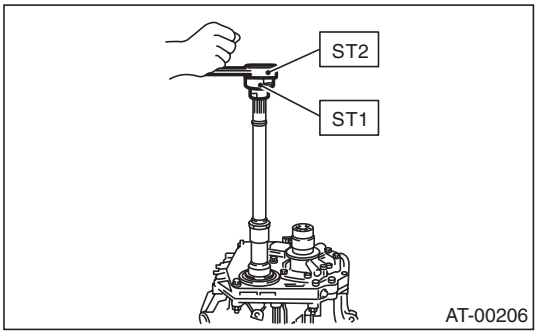
Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



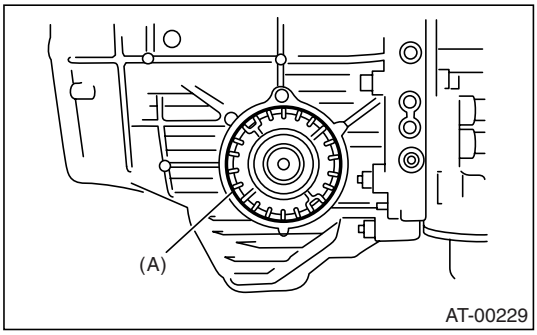
5) Rotate the drive pinion several times with ST1 and ST2.
ST1 498937110 HOLDER

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ST2 499787700 WRENCH

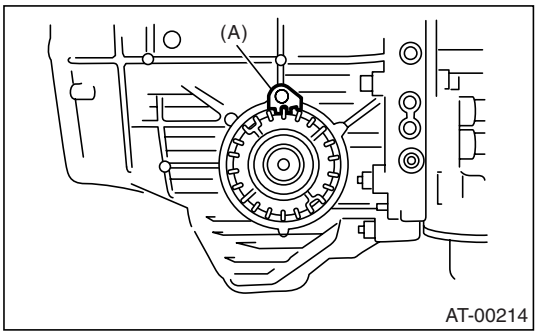


6) Tighten the LH retainer until contact is felt while rotating the shaft. Then loosen the RH retainer. Keep tightening the LH retainer and loosening the RH retainer until the pinion shaft can no longer be turned. This is the “zero” state.



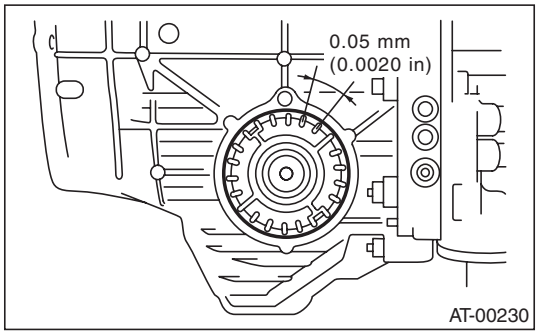
(A) Retainer

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

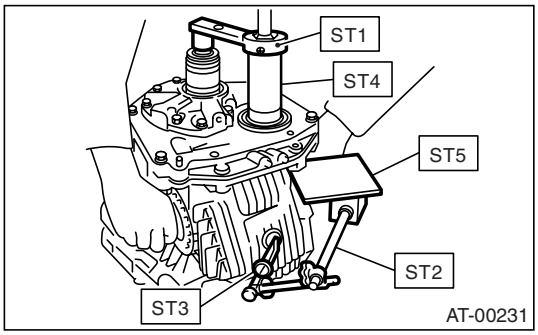
NOTE:
Turning the retainer by one tooth changes the backlash about 0.05 mm (0.0020 in).



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)



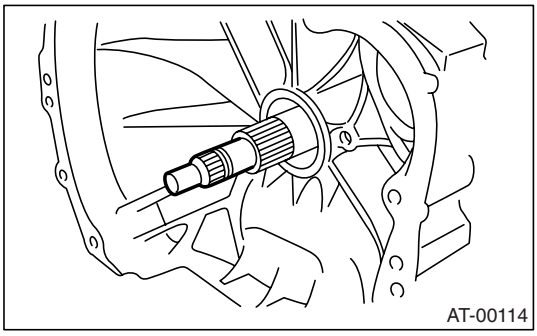
9) Adjust the tooth contact between front differential and drive shaft. <Ref. to 4AT-109, ADJUSTMENT, Drive Pinion Shaft.>

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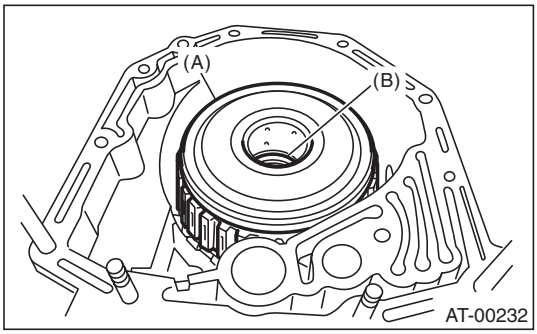
38.AT Transmission Main Case

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-75, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.

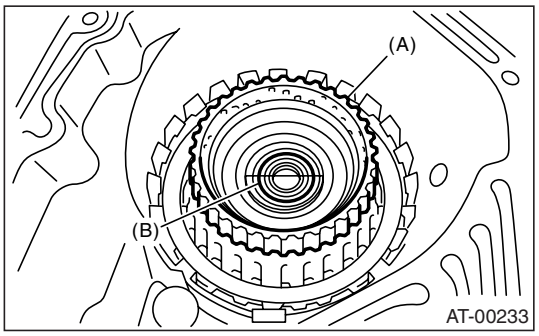


4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
5) Disconnect inhibitor switch connector from stay.
6) Disconnect the air breather hose.
7) Remove the oil charger pipe. <Ref. to 4AT-74, REMOVAL, Oil Charger Pipe.>
8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-71, REMOVAL, ATF Cooler Pipe and Hose.>
9) Separation of torque converter clutch case and transmission case.<Ref. to 4AT-98, REMOVAL, Torque Converter Clutch Case.>
10) Remove the oil pump housing.
<Ref. to 4AT-100, REMOVAL, Oil Pump Housing.>
11) Take out the high clutch, thrust needle bearing and reverse clutch assembly.



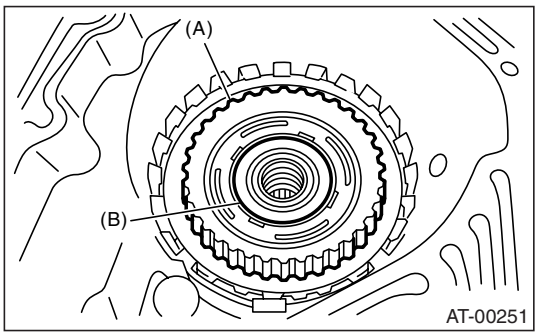
(A) High clutch and reverse clutch assembly
(B) Thrust needle bearing

12) Take out the high clutch hub and the thrust bearing.



(A) High clutch hub
(B) Thrust needle bearing

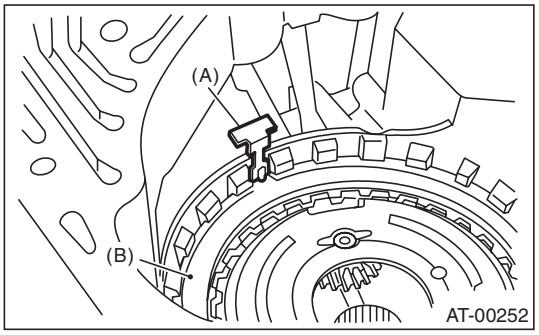
13) Take out the front sun gear and the thrust bearing.



(A) Front sun gear
(B) Thrust needle bearing

14) Pull out leaf spring without folding.

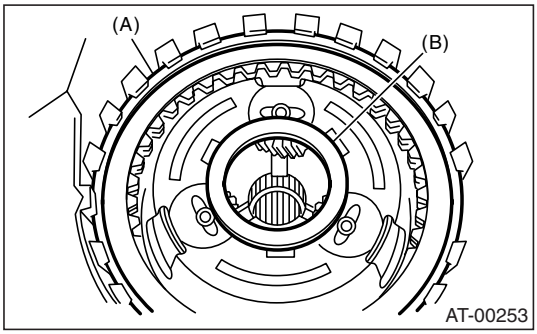
NOTE:
Remove it while pressing down on lower leaf spring.



(A) Leaf spring
(B) Retaining plate

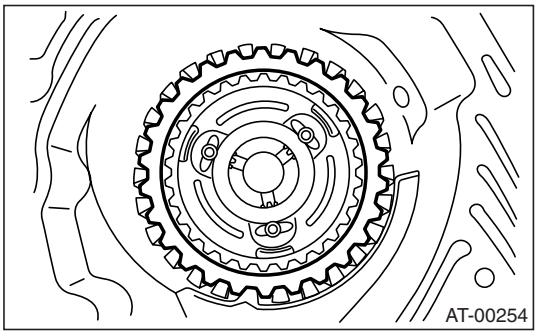
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15) Remove snap ring and thrust needle bearing.

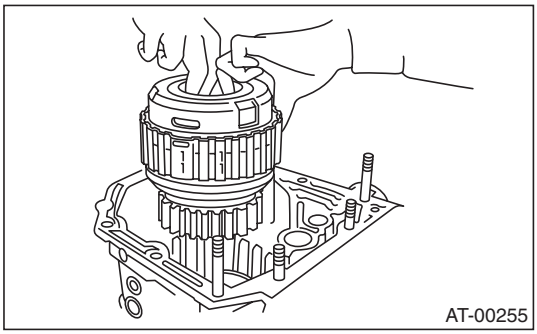


(A) Snap ring
(B) Thrust needle bearing

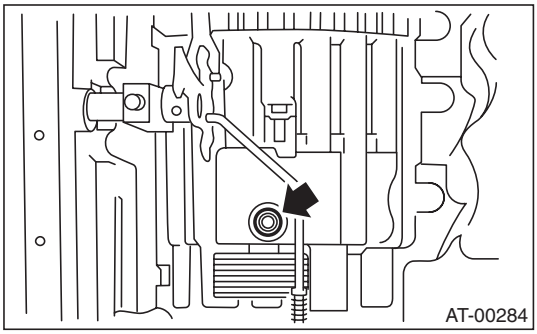
16) Take out retaining plate, drive plate and driven plate of 2-4 brake.



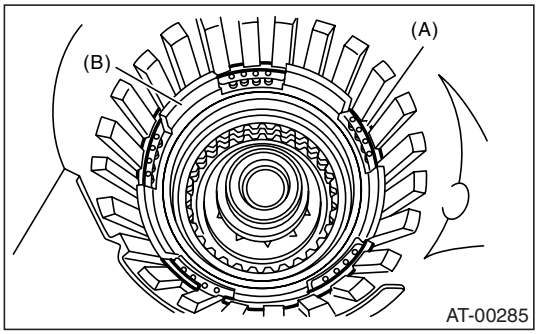
17) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly.



18) Remove 2-4 brake seal.

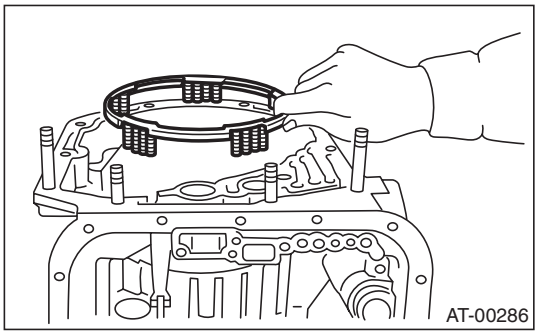


19) Remove snap ring.

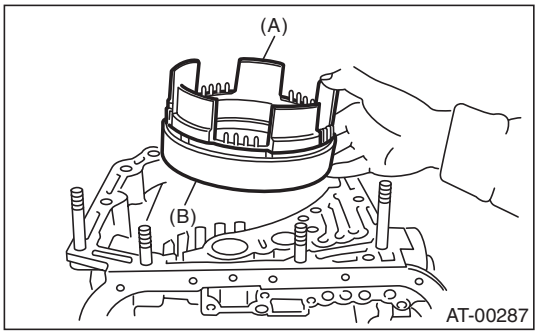


(A) Snap ring
(B) 2-4 brake piston

20) Take out 2-4 brake return spring.



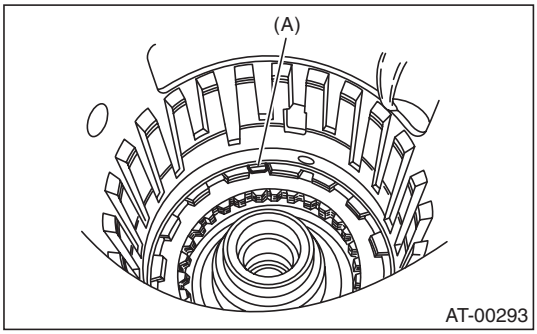
21) Remove the 2-4 brake piston and piston retainer without damaging.



(A) 2-4 brake piston
(B) 2-4 brake piston retainer

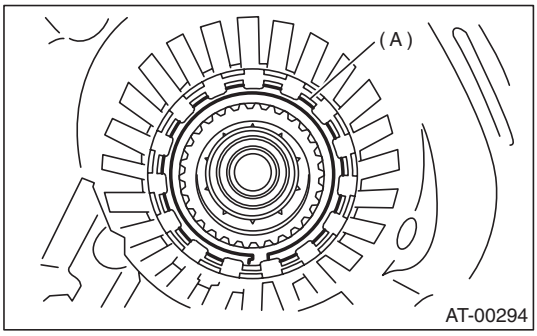
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22) Pull out the leaf spring without folding.



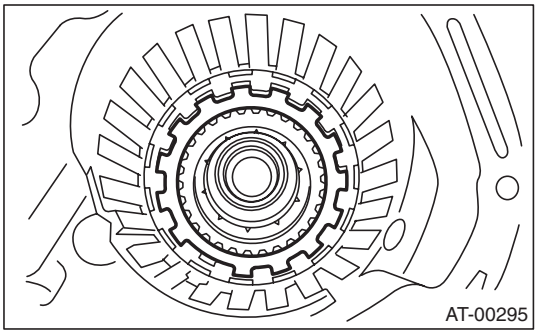
(A) Leaf spring

23) Remove snap ring.

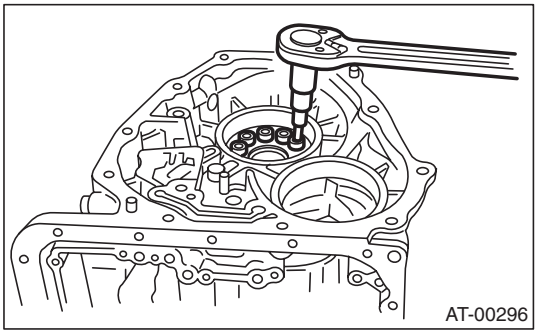


(A) Snap ring

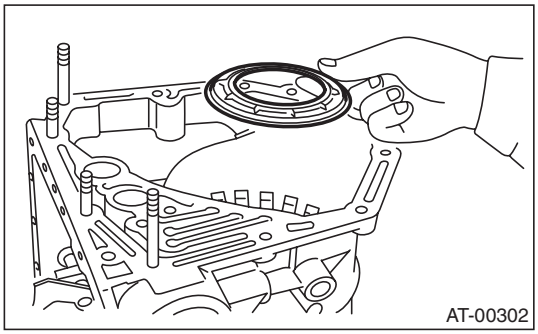
24) Take out retaining plate, drive plate, driven plate and dish plate.



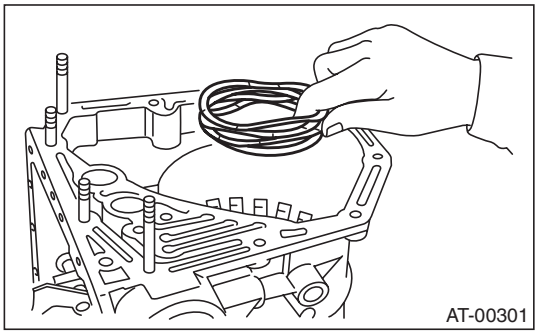
25) Turn the transmission case upside down, and then take out the socket bolts while holding the one-way clutch inner race with hand.



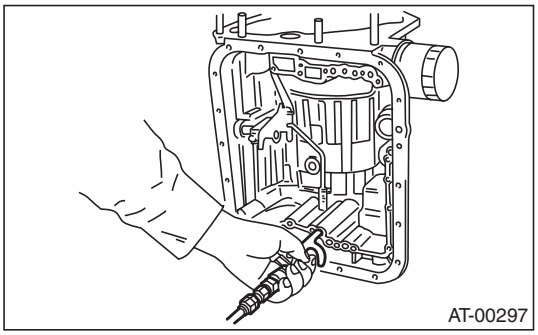
26) Take out the spring retainer.



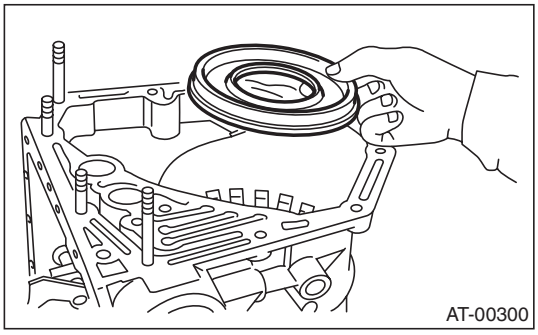
27) Take out the return spring.



28) Apply compressed air.



29) Take out the low & reverse piston.

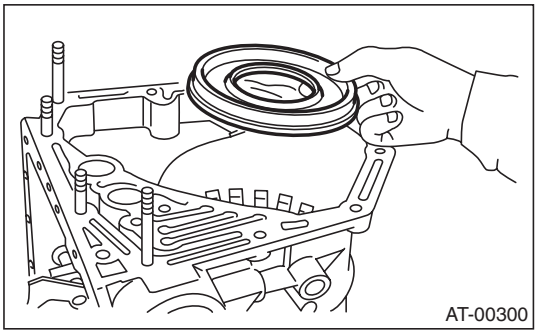


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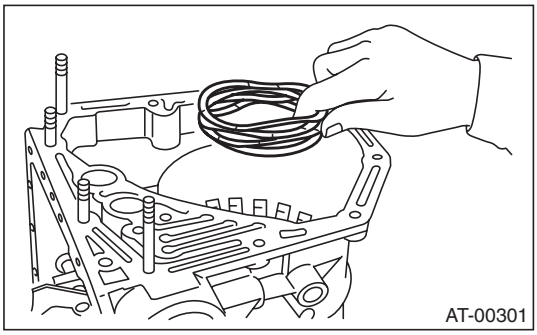
B: INSTALLATION

1) Install the low and reverse piston without tilting.

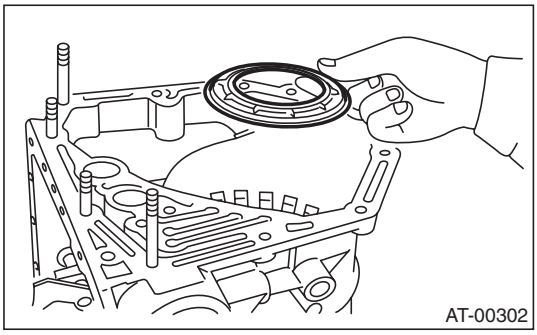
NOTE:
Be careful not to damage the lip seal.



2) Install return spring.



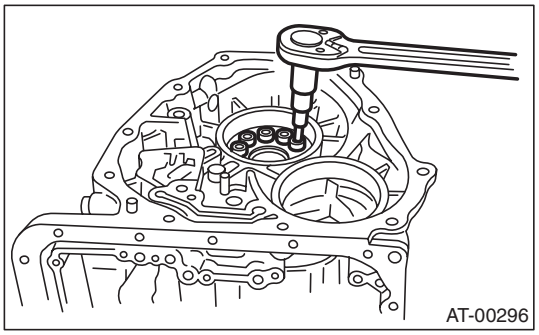
3) Install spring retainer.



4) Install the one-way clutch inner race, spring retainer and return spring.

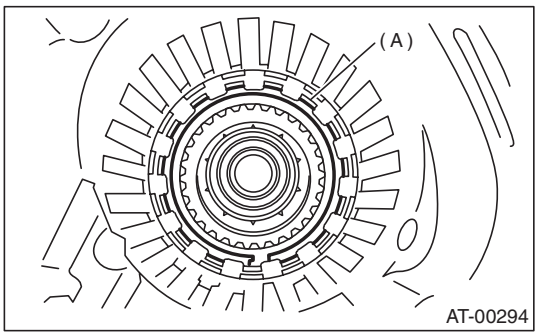
5) Tighten socket head bolts evenly from the rear side of the transmission case.

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



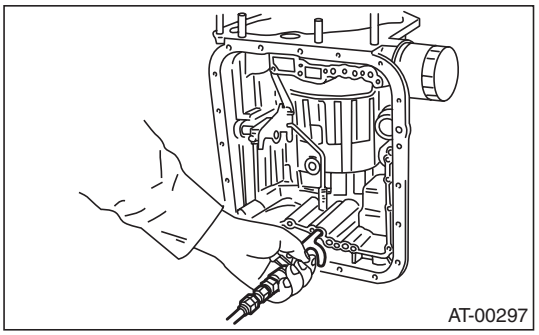
6) Place the front side of transmission body up.
7) Install thrust needle bearing.
8) Installation of the low & reverse brake:
Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

NOTE:
Pay attention to the orientation of the dish plate.



(A) Snap ring

9) Apply compressed air intermittently to check for operation.

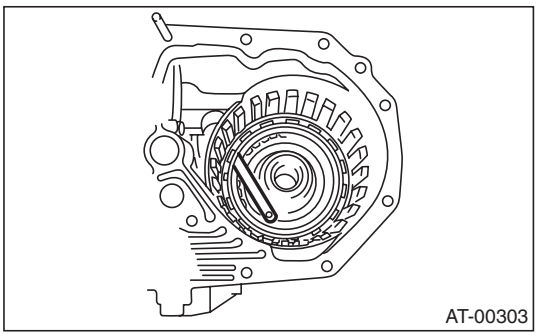


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10) Check the clearance and select retaining plate. Place the same thickness of shim on both sides to prevent retaining plate from tilting.

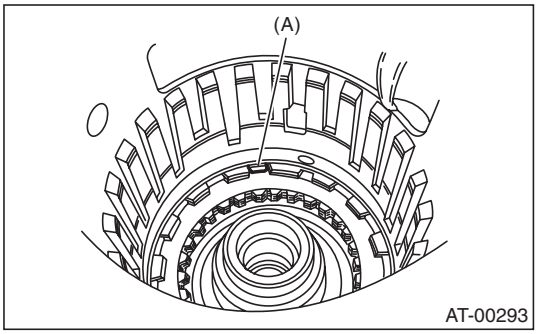
Standard value:
0.7 — 1.2 mm (0.028 — 0.047 in)

Allowable limit:
2.2 mm (0.087 in)

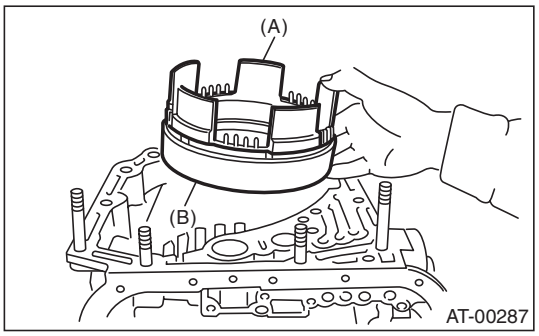


Retaining plates	
Part No.	Thickness mm (in)
31667AA320	4.1 (0.161)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

11) Install the low & reverse brake leaf spring.

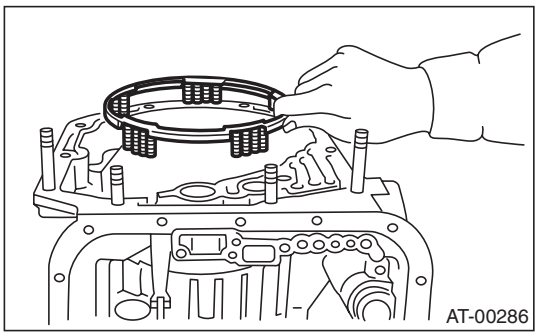


12) Install the 2-4 brake piston and 2-4 brake retainer by aligning hole of 2-4 brake retainer and hole of transmission case.

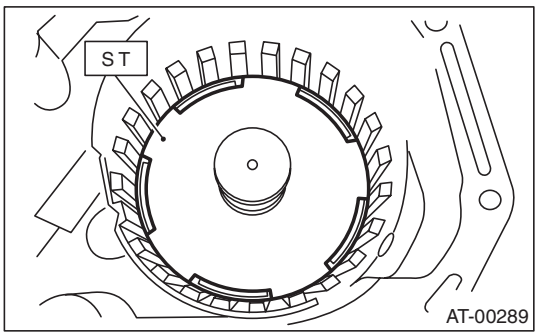


(A) 2-4 brake piston
(B) 2-4 brake piston retainer

13) Install 2-4 brake piston return spring to transmission case.

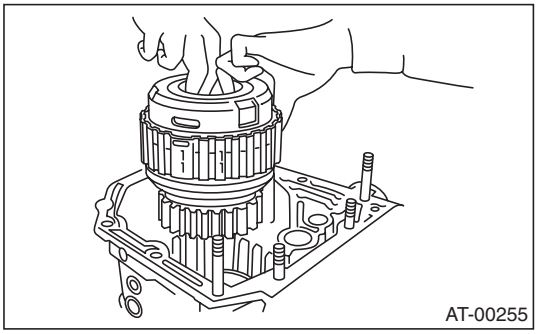


14) Position snap ring in transmission. Using ST, press the snap ring into place.
ST 498677100 COMPRESSOR

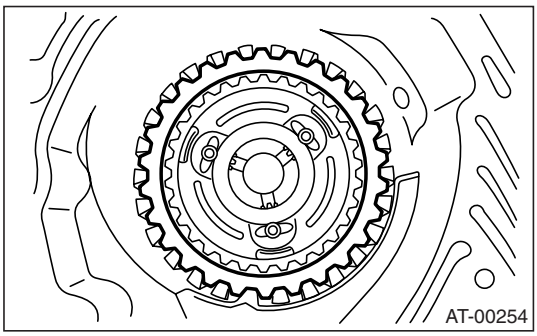


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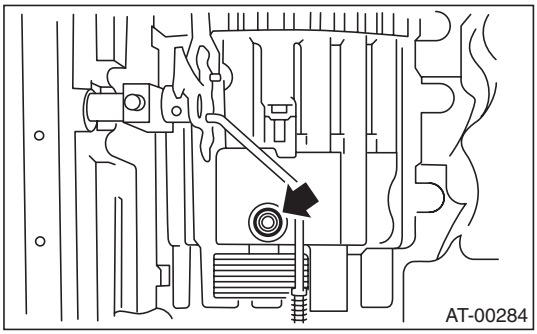
15) Install planetary gear and low clutch assembly to transmission case.
Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring.



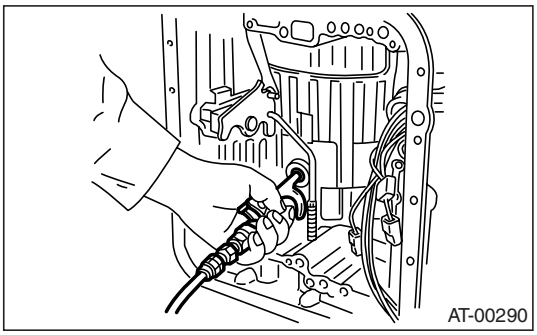
16) Install pressure plate, drive plate, driven plate, retaining plate and snap ring.



17) Install a new 2-4 brake oil seal to transmission case.



18) After all 2-4 brake component parts have been installed, blow in air intermittently and confirm the operation of the brake.

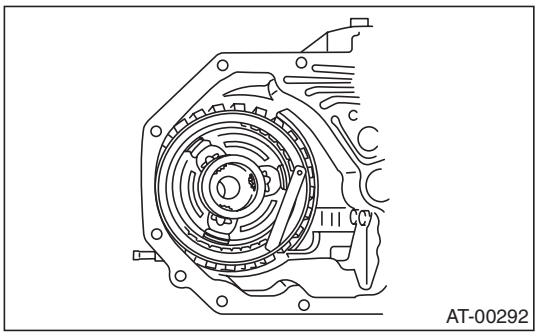


19) Check the clearance between the retaining plate and the snap ring.

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)

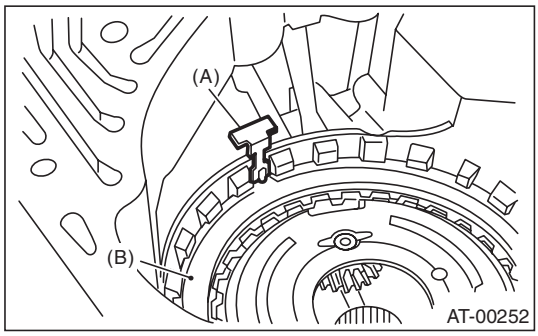
Allowable limit:
1.5 mm (0.059 in)



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)

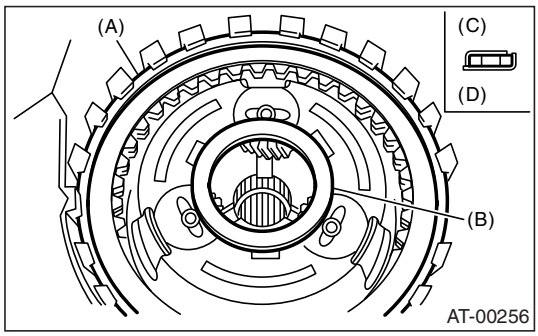
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20) Be careful not to mistake the location of the leaf spring to be inserted.



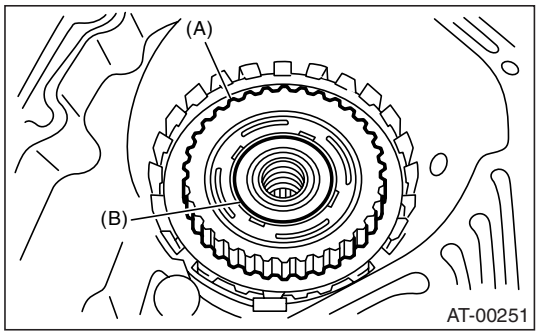
(A) Leaf spring
(B) Retaining plate

21) Install thrust needle bearing in the correct direction.



(A) Snap ring
(B) Thrust needle bearing
(C) Upside
(D) Downside

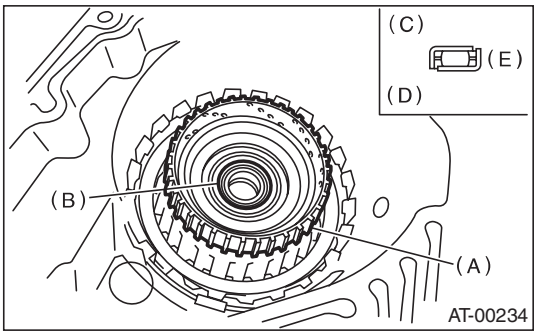
22) Install front sun gear and thrust needle bearing.



(A) Front sun gear
(B) Thrust needle bearing

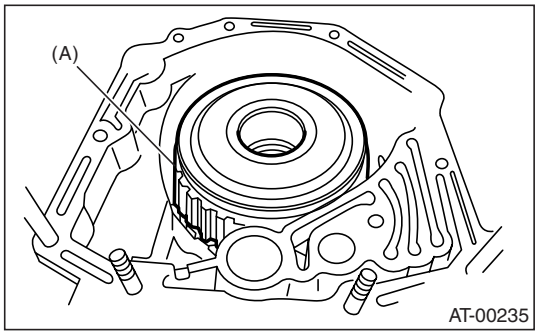
23) Install the high clutch hub.
Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.

24) Install the thrust needle bearing in proper direction.



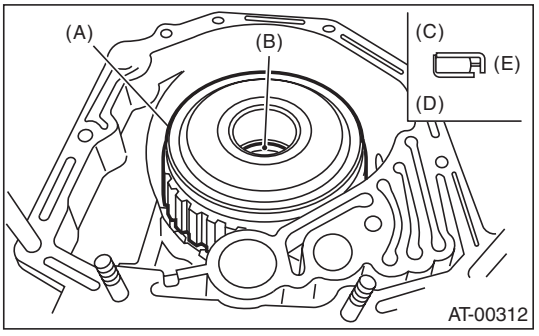
(A) High clutch hub
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

25) Install the high clutch assembly.



(A) High clutch and reverse clutch assembly

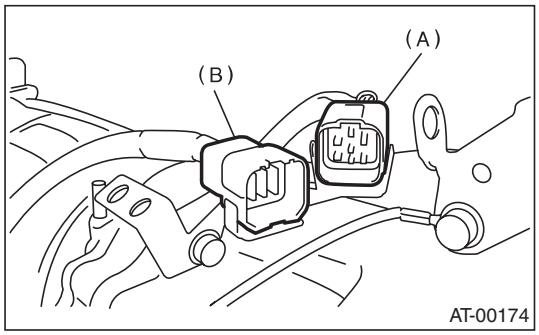
26) Adjust total end play. <Ref. to 4AT-105, ADJUSTMENT, Oil Pump Housing.>
27) Install the thrust needle bearing in proper direction.



(A) High clutch and reverse clutch ASSY
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

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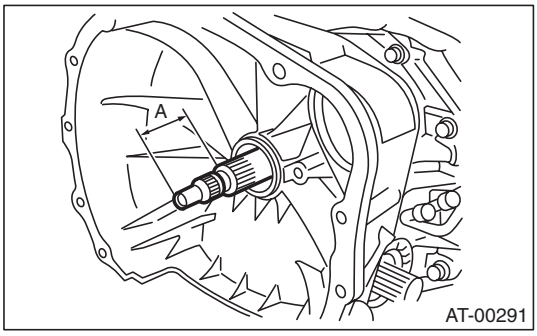
28) Install the oil pump housing assembly.
29) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to 4AT-98, INSTALLATION, Torque Converter Clutch Case.>
30) Insert inhibitor switch and transmission connector into stay.
31) Install air breather hose. <Ref. to 4AT-73, INSTALLATION, Air Breather Hose.>



(A) Transmission harness
(B) Inhibitor switch harness

32) Install oil cooler pipes. <Ref. to 4AT-72, INSTALLATION, ATF Cooler Pipe and Hose.>
33) Install the oil charger pipe with O-ring. <Ref. to 4AT-74, INSTALLATION, Oil Charger Pipe.>
34) 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)

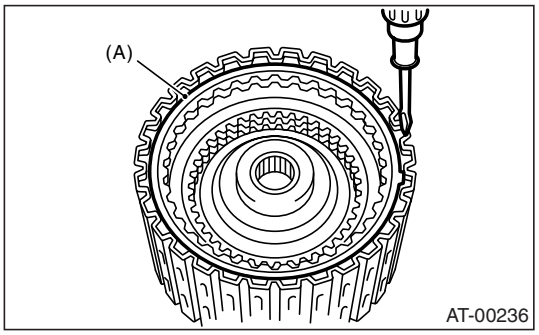


35) Install the torque converter clutch assembly. <Ref. to 4AT-75, INSTALLATION, Torque Converter Clutch Assembly.>
36) Install the transmission assembly to the vehicle. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

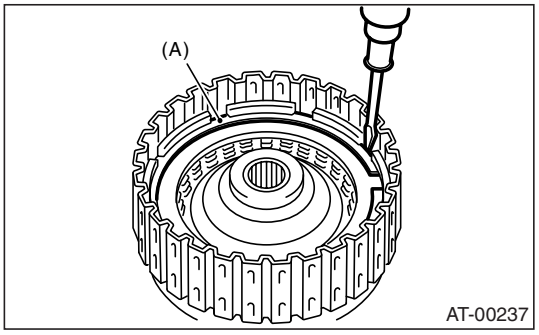
1. HIGH CLUTCH, REVERSE CLUTCH

1) Remove the snap ring, and take out the retaining plate, drive plates, driven plates.



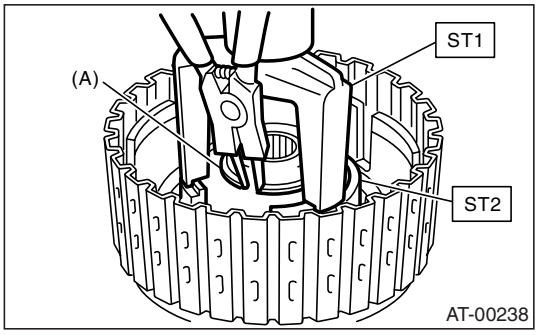
(A) Snap ring

2) Remove snap ring, and take out the retaining plate, drive plates and driven plates.



(A) Snap ring

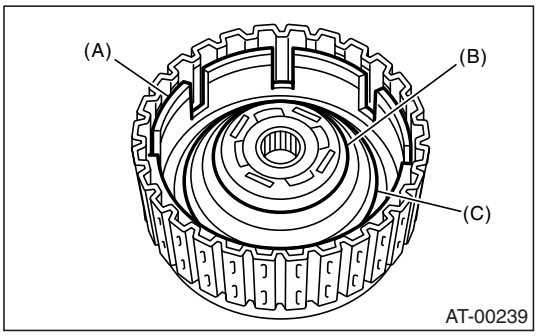
3) Using ST1 and ST2, remove snap ring.
ST1 398673600 COMPRESSOR
ST2 498627100 SEAT



(A) Snap ring

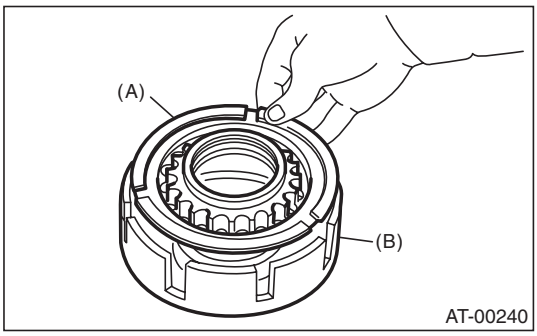
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4) Take out clutch cover, spring retainer, high clutch piston and reverse clutch piston.



(A) Reverse clutch piston
(B) Cover
(C) Return spring

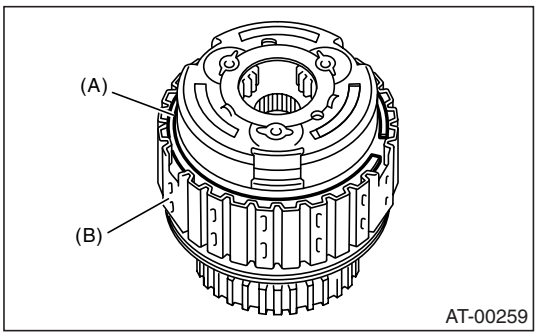
5) Remove seal rings and lip seal from high clutch piston and reverse clutch piston.



(A) High clutch piston
(B) Reverse clutch piston

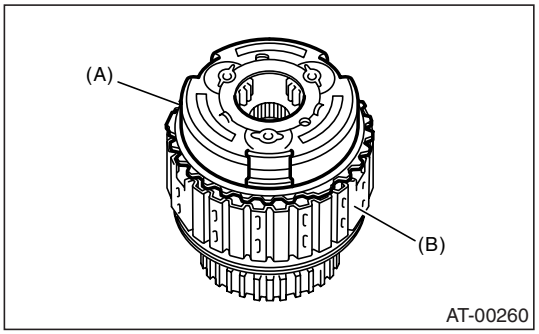
2. PLANETARY GEAR, LOW CLUTCH

1) Remove snap ring from the low clutch drum.



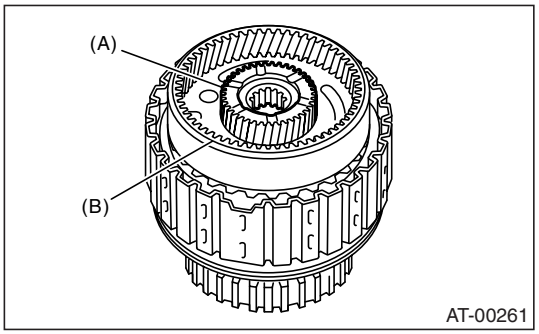
(A) Snap ring
(B) Low clutch drum

2) Take out front planetary carrier.



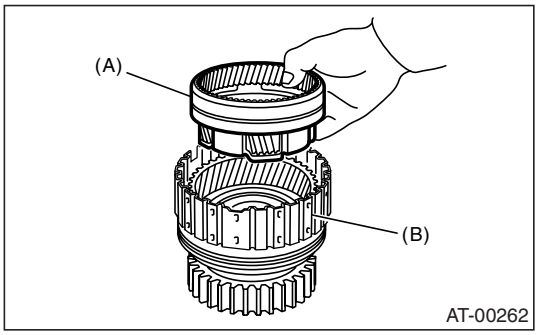
(A) Front planetary carrier
(B) Low clutch drum

3) Take out rear sun gear.



(A) Rear sun gear
(B) Rear planetary carrier

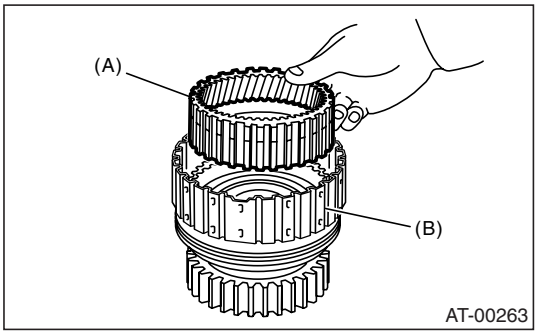
4) Take out rear planetary carrier, washer and thrust needle bearing.



(A) Rear planetary carrier
(B) Low clutch drum

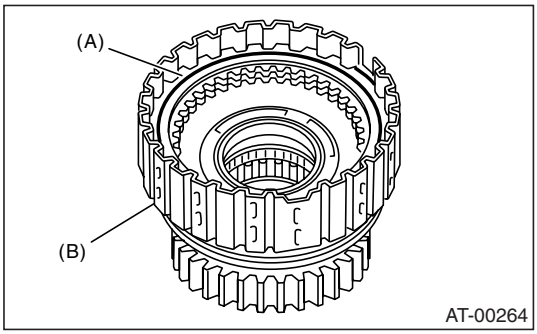
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5) Take out rear internal gear.



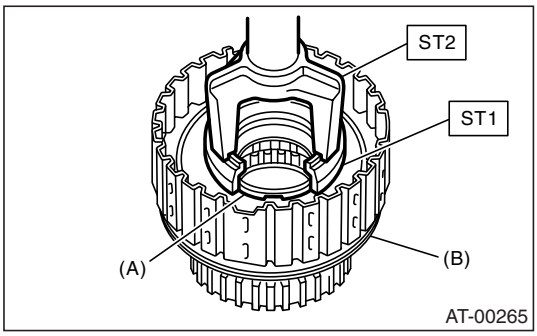
(A) Rear internal gear
(B) Low clutch drum

6) Remove the snap ring from the low clutch drum.



(A) Snap ring
(B) Low clutch drum

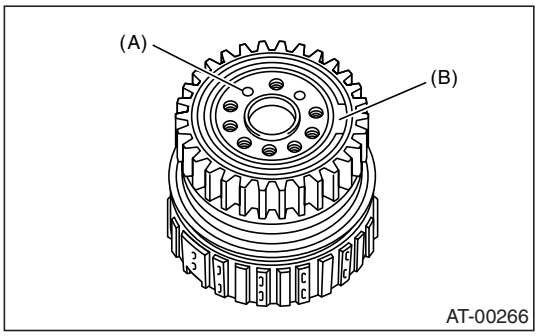
7) Compress the spring retainer, and remove the snap ring from the low clutch drum, by using ST1 and ST2.
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



(A) Snap ring
(B) Low clutch drum

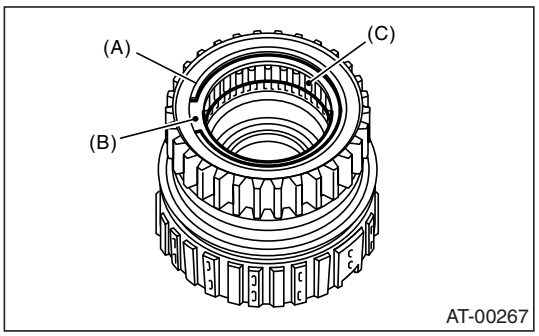
8) Remove one-way clutch. <Ref. to 4AT-118, REMOVAL, AT Transmission Main Case.>

9) Install the one-way clutch inner race to the low clutch drum, and apply compressed air to remove the low clutch piston.



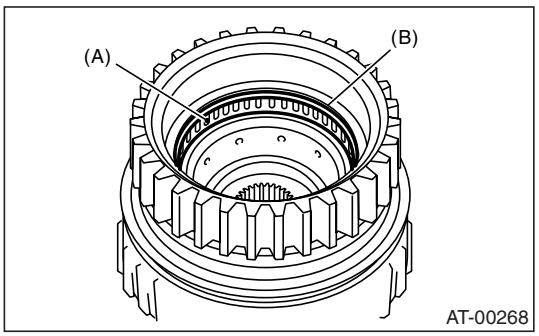
(A) Apply compressed air
(B) One-way clutch inner race

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.

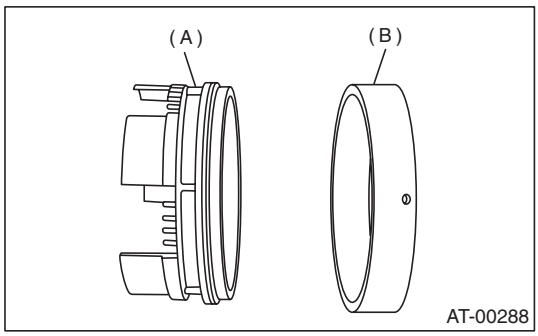


(A) Needle bearing
(B) Snap ring

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3. 2-4 BRAKE

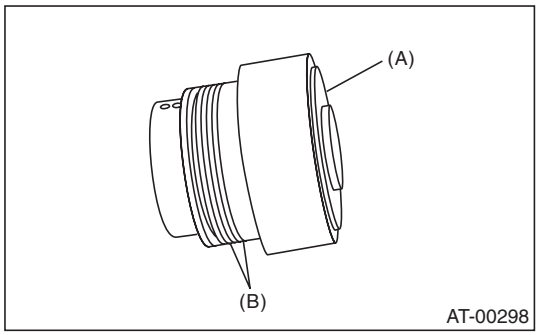
1) Separate 2-4 brake piston and piston retainer.



(A) 2-4 brake piston
(B) 2-4 brake piston retainer

4. ONE-WAY CLUTCH INNER RACE

1) Remove seal rings.

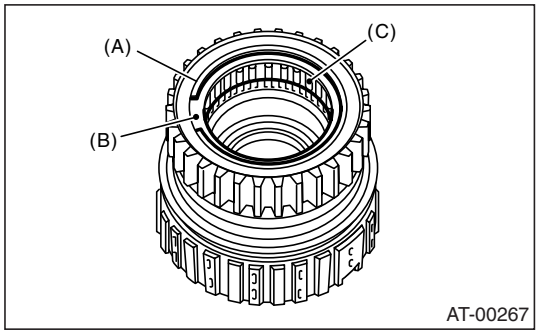


(A) One way clutch inner race
(B) Seal rings

2) Using ST, remove needle bearing.
ST 398527700 PULLER ASSY

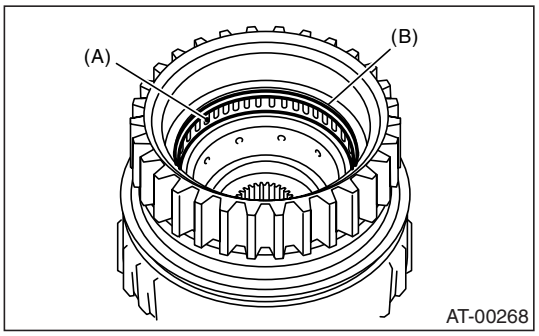
5. ONE-WAY CLUTCH OUTER RACE

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.



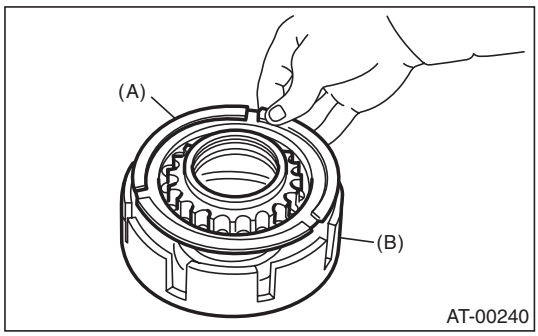
(A) Needle bearing
(B) Snap ring

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D: ASSEMBLY

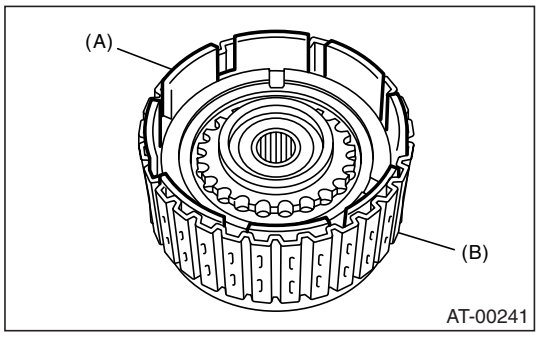
1. HIGH CLUTCH, REVERSE CLUTCH

1) Install seal rings and lip seal to high clutch piston and reverse clutch piston.
2) Install high clutch piston to reverse clutch piston.



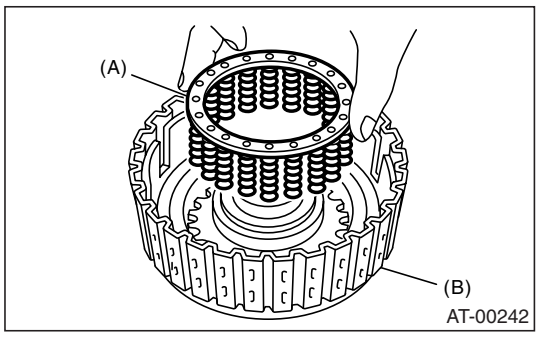
(A) High clutch piston
(B) Reverse clutch piston

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.



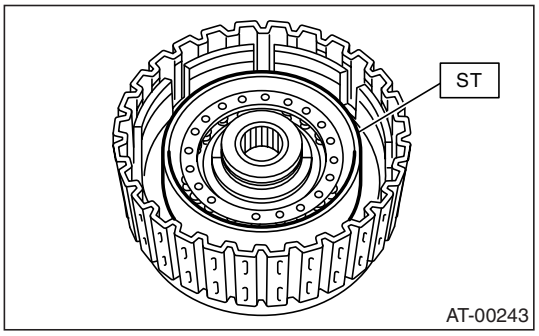
(A) Reverse clutch piston
(B) High clutch drum

4) Install spring retainer to high clutch piston.

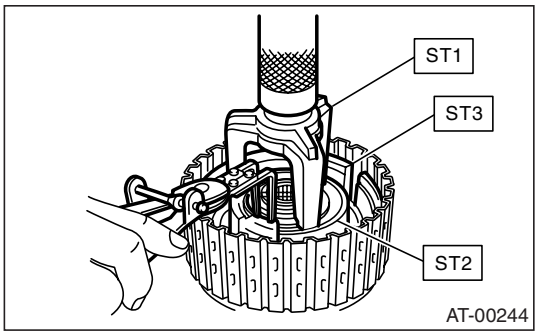


(A) Return spring
(B) High clutch drum

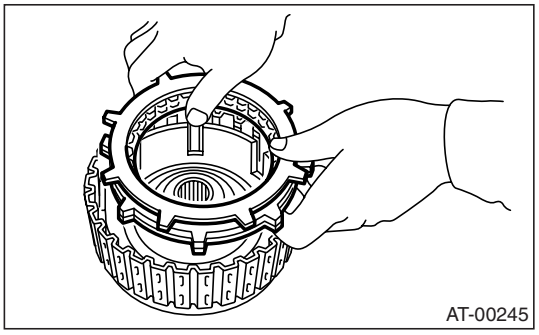
5) Install ST to high clutch piston.
ST 498437000 HIGH CLUTCH PISTON GAUGE



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



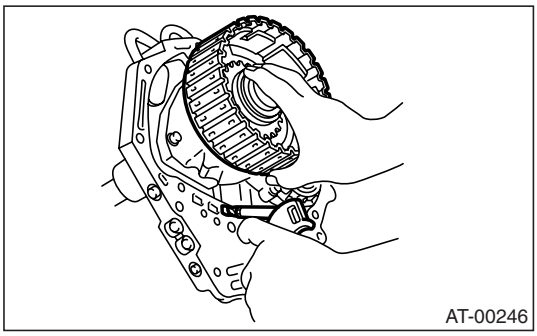
8) Install the thickest driven plate to piston side, and then install the driven plate, drive plate, retaining plate to high clutch drum.



9) Install snap ring to high clutch drum.

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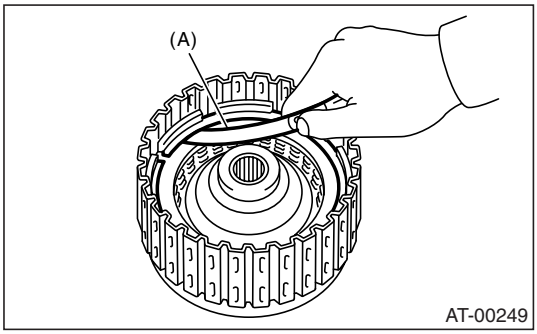
10) Apply compressed air intermittently to check for operation.



11) Measure the 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)

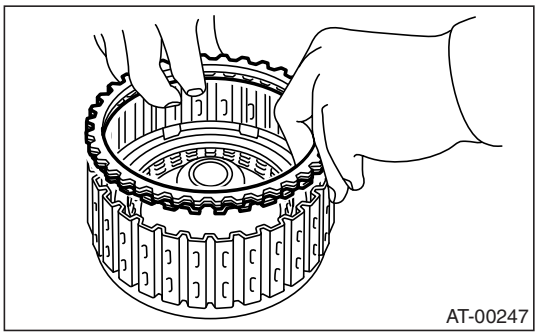


(A) Thickness gauge

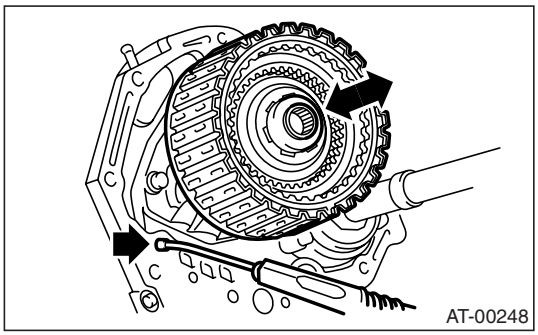
If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

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)

12) Install driven plate, drive plate, retaining plate and snap ring.



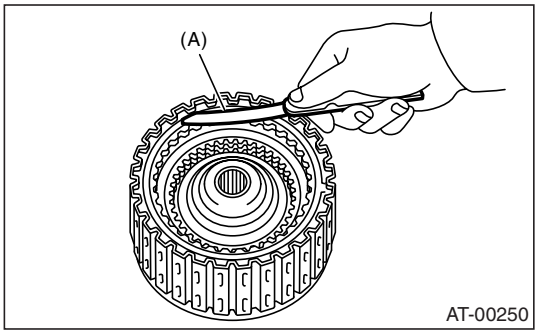
13) Apply compressed air intermittently to check for operation.



14) Measure the clearance between the retaining plate and snap ring (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

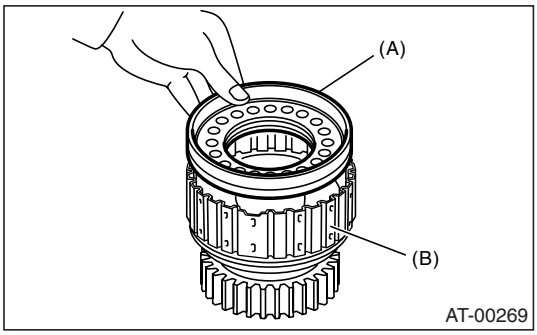
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If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.

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)

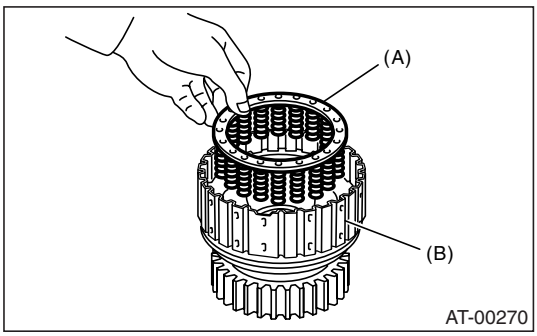
2. PLANETARY GEAR, LOW CLUTCH

1) Install lathe cut seal ring to low clutch piston.
2) Fit the low clutch piston to the low clutch drum.



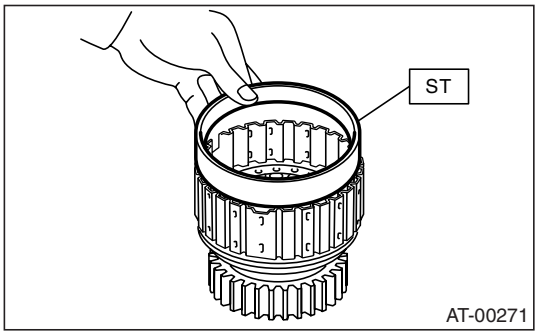
(A) Low clutch piston
(B) Low clutch drum

3) Install spring retainer to low clutch piston.

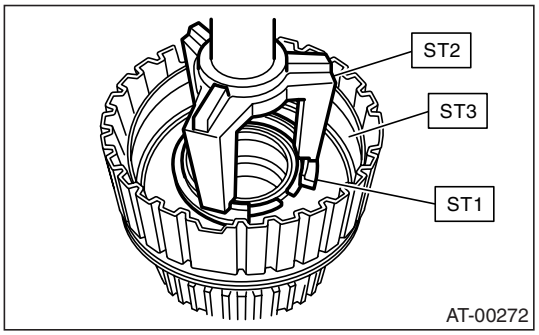


(A) Spring retainer
(B) Low clutch drum

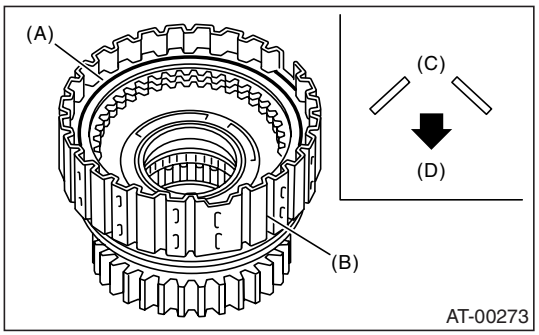
4) Install ST to low clutch drum.
ST 498437100 LOW CLUTCH PISTON GUIDE



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



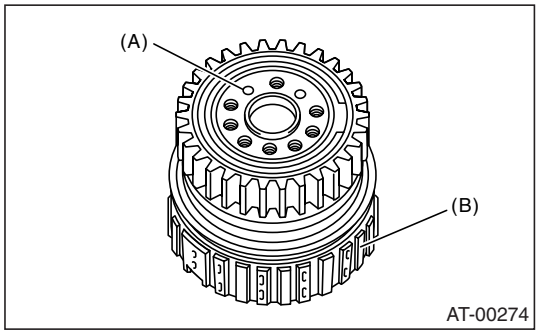
6) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring.



(A) Snap ring
(B) Low clutch drum
(C) Dish plate
(D) Low clutch piston side

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7) Check the low clutch for operation.
(1) Remove one-way clutch. <Ref. to 4AT-118, REMOVAL, AT Transmission Main Case.>
(2) Set the one-way clutch inner race, and apply compressed air for checking.

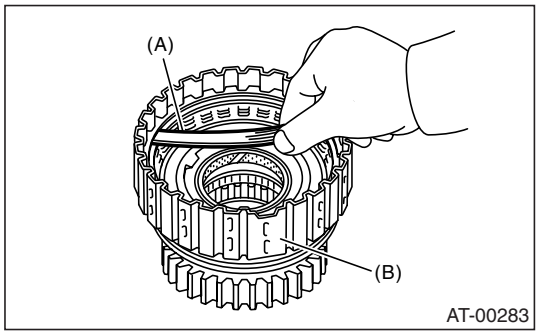


(A) Apply compressed air
(B) Low clutch drum

8) Checking low clutch clearance.
(1) Place the same thickness of shim on both sides to prevent retaining plate from tilting.
(2) 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)

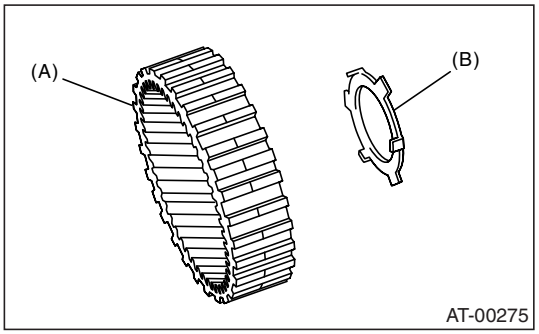


(A) Thickness gauge
(B) Low clutch drum

If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

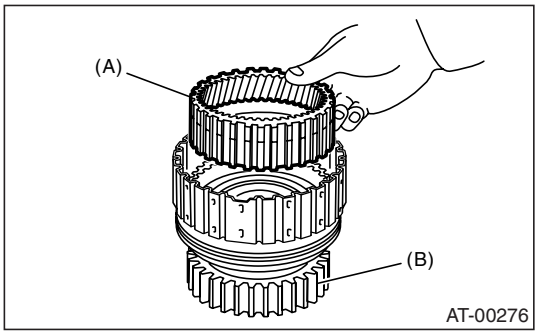
Available retaining plates	
Part No.	Thickness mm (in)
31567AA830	3.8 (0.150)
31567AA840	4.0 (0.157)
31567AA850	4.2 (0.165)
31567AA860	4.4 (0.173)
31567AA870	4.6 (0.181)

9) Install washer to rear internal gear.



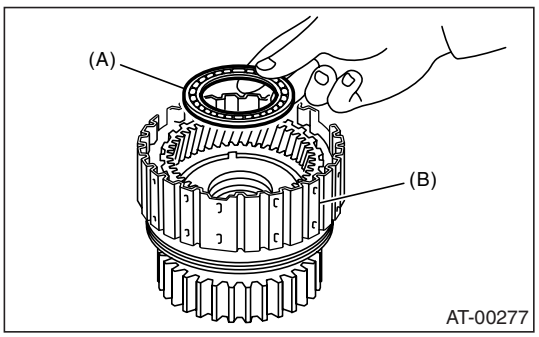
(A) Rear internal gear
(B) Washer

10) Install rear internal gear.



(A) Rear internal gear
(B) Low clutch drum

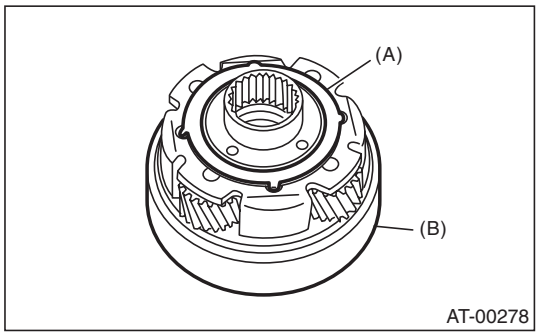
11) Install thrust needle bearing in the correct direction.



(A) Thrust needle bearing
(B) Low clutch drum

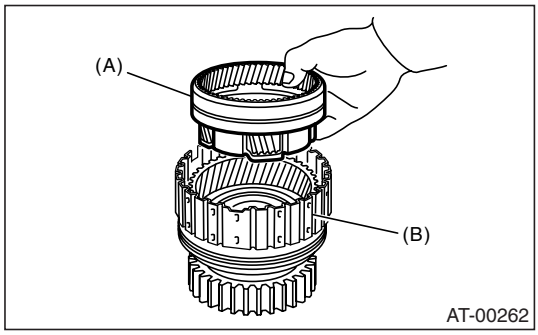
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12) Install the washer by aligning protrusion of washer and hole of rear planetary carrier.



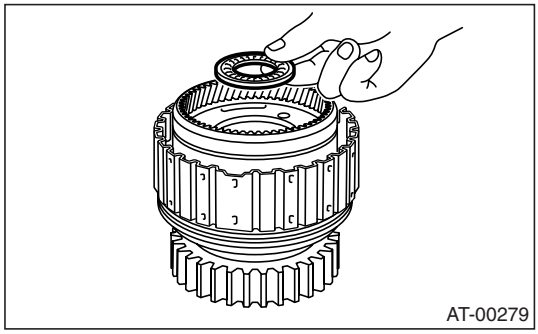
(A) Washer
(B) Rear planetary carrier

13) Install rear planetary carrier to low clutch drum.

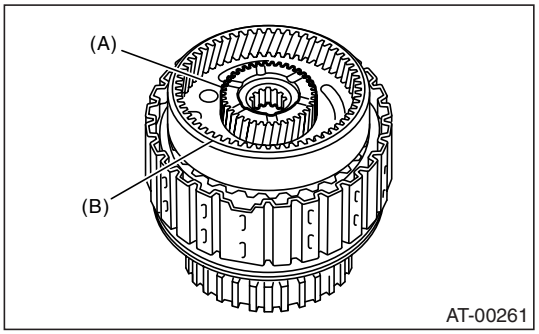


(A) Rear planetary carrier
(B) Low clutch drum

14) Install thrust needle bearing in the correct direction.

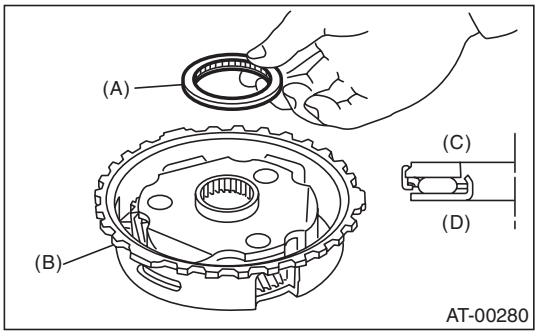


15) Install the rear sun gear in proper direction.



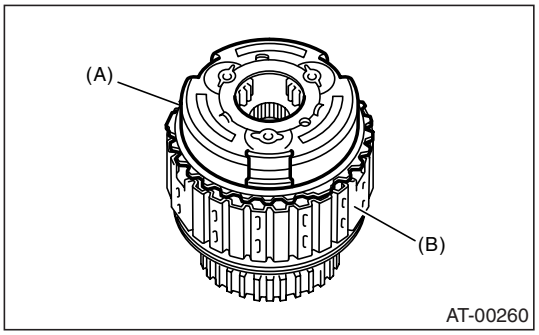
(A) Rear sun gear
(B) Rear planetary carrier

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

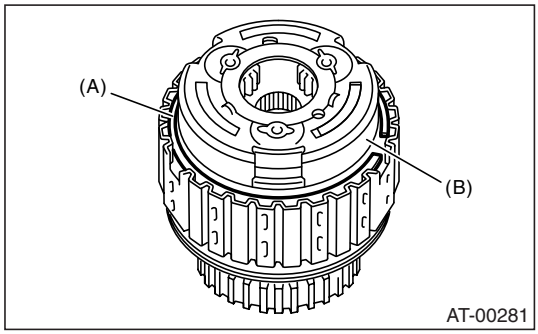
17) Install front planetary carrier to low clutch drum.



(A) Front planetary carrier
(B) Low clutch drum

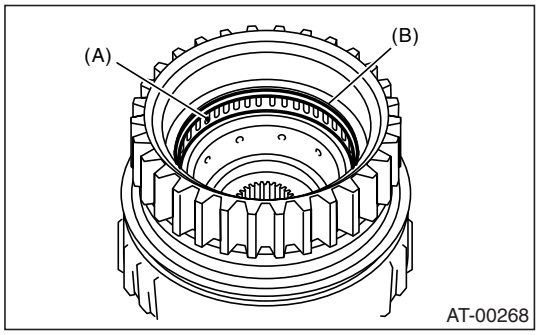
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18) Install snap ring to low clutch drum.



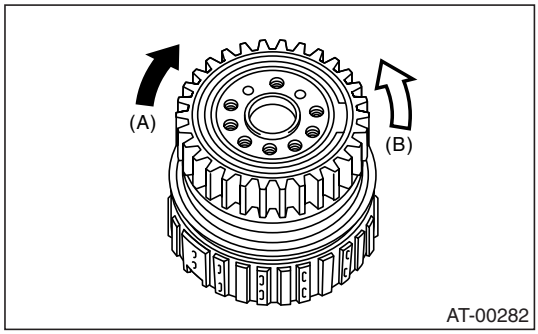
(A) Snap ring
(B) Front planetary carrier

19) Install the needle bearing, and secure with the snap ring.



(A) Needle bearing
(B) Snap ring

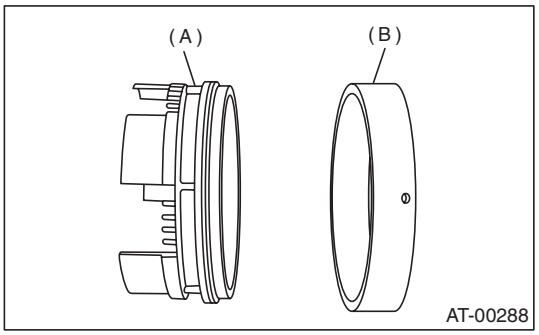
20) Install the one-way clutch, one-way clutch inner race and plate, and secure with the snap ring.
21) Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



(A) Locked
(B) Free

3. 2-4 BRAKE

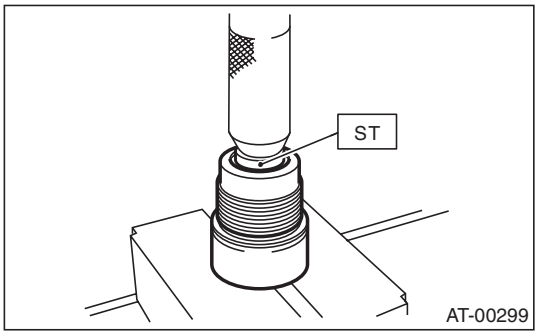
1) Install 2-4 brake piston to 2-4 brake piston retainer.



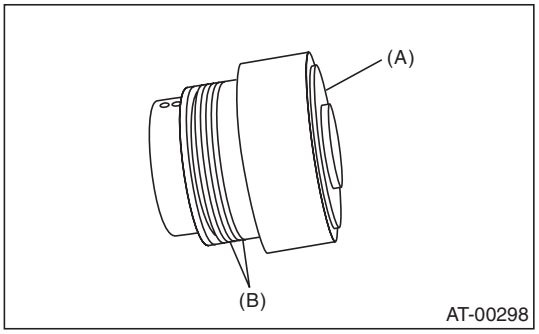
(A) 2-4 brake piston
(B) 2-4 brake piston retainer

4. ONE-WAY CLUTCH INNER RACE

1) Using a press and ST, install the needle bearing to the inner race.
ST 398497701 INSTALLER



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.

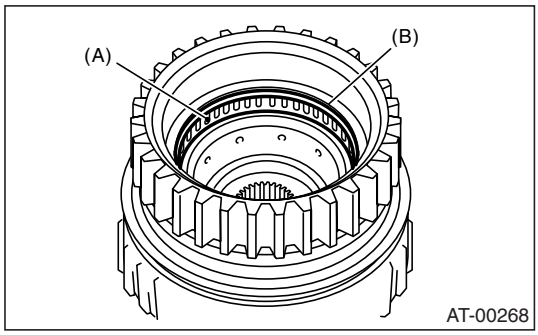


(A) One way clutch inner race
(B) Seal rings

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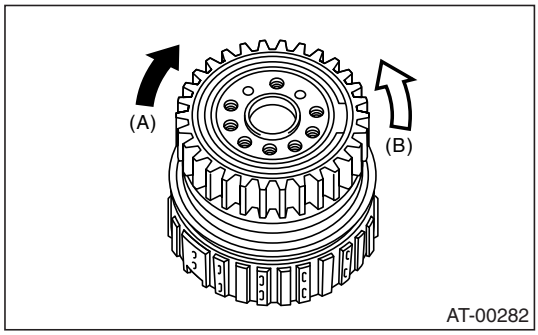
5. ONE-WAY CLUTCH OUTER RACE

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.
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

1. HIGH CLUTCH AND REVERSE CLUTCH

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 seal ring for damage
- Piston and drum check ball for operation
- Adjust total end play. <Ref. to 4AT-105, ADJUSTMENT, Oil Pump Housing.>

2. PLANETARY GEAR AND LOW CLUTCH

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 4AT-105, ADJUSTMENT, Oil Pump Housing.>

3. 2-4 BRAKE

Inspect the following items.
- 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 4AT-105, ADJUSTMENT, Oil Pump Housing.>

4. ONE-WAY CLUTCH

- 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 4AT-105, ADJUSTMENT, Oil Pump Housing.>

5. LOW AND REVERSE BRAKE

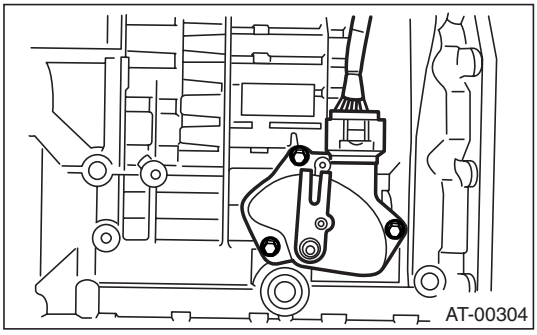
Check for the following.
- Drive plate facing for wear or damage
- Snap ring for wear and spring retainer for deformation

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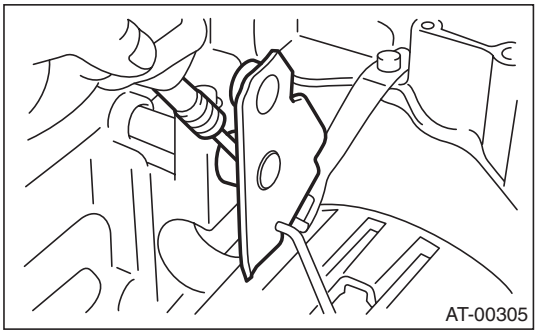
39.Transmission Control Device

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-75, 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 4AT-73, 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.

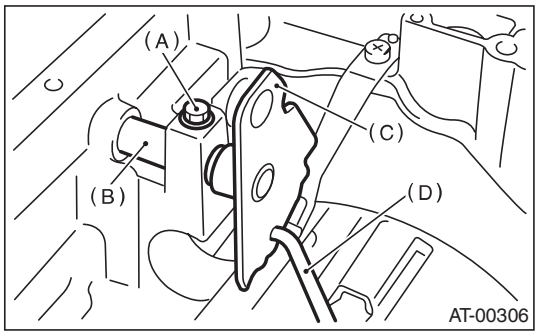


10) Remove control valve body assembly. <Ref. to 4AT-58, REMOVAL, Control Valve Body.>
11) Pull off the straight pin of manual plate.



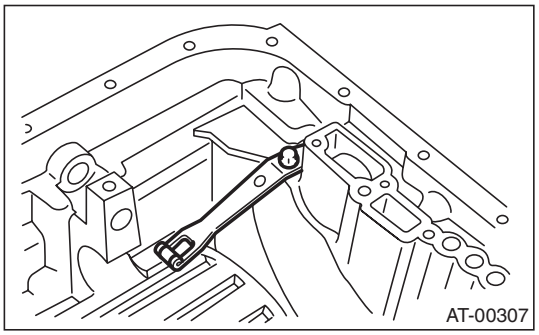
12) Remove bolts securing select lever, then remove select lever, manual plate and parking rod.

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

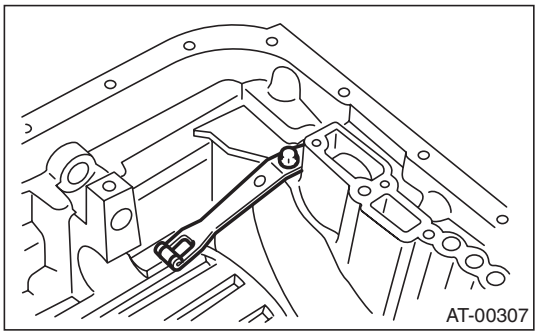
13) Remove the detention spring.



B: INSTALLATION

1) Install detention spring to transmission case.

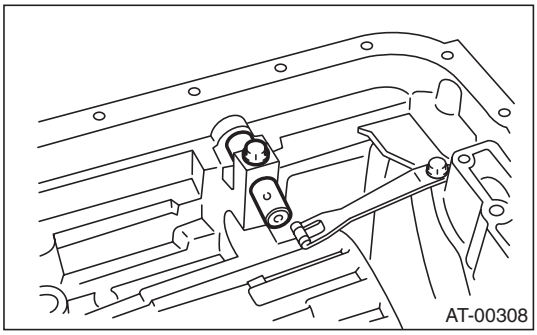
Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)



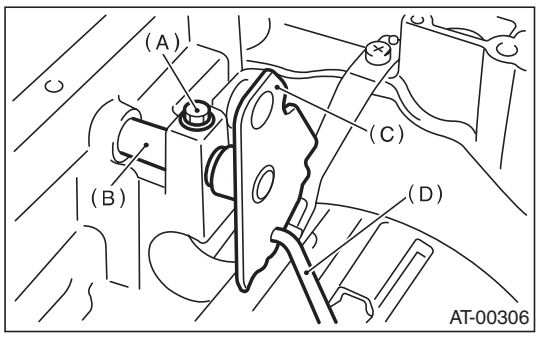
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2) Insert range select lever, and tighten bolt.

Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)

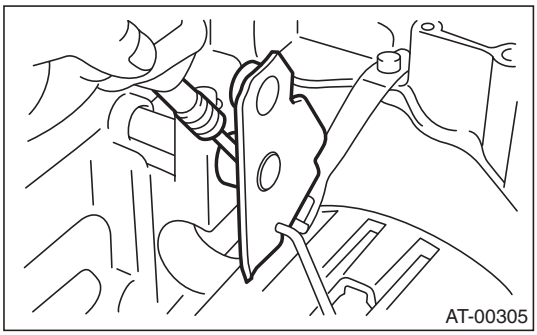


3) Insert manual plate and parking rod.



(A) Bolt
(B) Range select lever
(C) Manual plate
(D) Parking rod

4) Insert spring pin to manual plate.

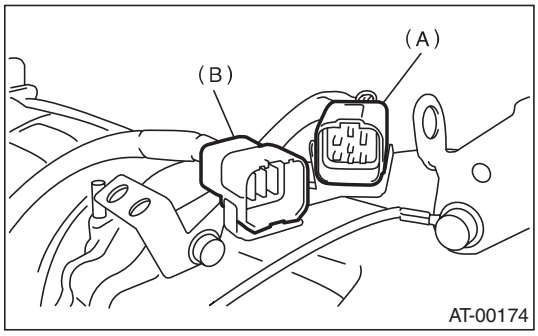


5) Install control valve assembly and oil pan. <Ref. to 4AT-59, INSTALLATION, Control Valve Body.>
6) Turn over the transmission case to its original position.
7) Install pitching stopper bracket.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

8) Install inhibitor switch and adjust the inhibitor switch. <Ref. to 4AT-48, Inhibitor Switch.>

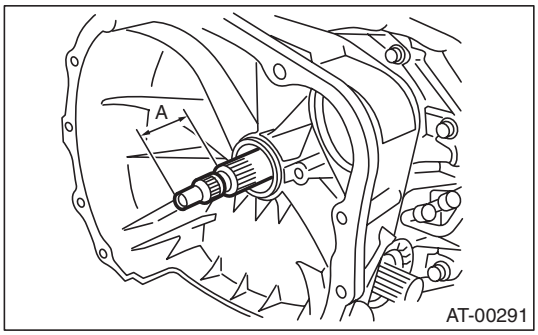
9) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness
(B) Inhibitor switch harness

10) Install air breather hose. <Ref. to 4AT-73, INSTALLATION, Air Breather Hose.>
11) Insert the input shaft while turning lightly by hand and verify the protrusion amount.

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



12) Install the torque converter clutch assembly. <Ref. to 4AT-75, INSTALLATION, Torque Converter Clutch Assembly.>
13) Install the transmission assembly to the vehicle. <Ref. to 4AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Make sure the manual lever and detention spring are not worn or otherwise damaged.

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AUTOMATIC TRANSMISSION (DIAGNOSTICS)

4AT

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1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1)Ask the customer when and how trouble occurred using interview checklist. <Ref. to 4AT-4, Check List for Interview.> 2)Before performing the diagnosis, inspect following items which might influence the AT problems. •General inspection <Ref. to 4AT-5, INSPECTION, General Description.> •Oil leak •Stall speed test <Ref. to 4AT-34, Stall Test.> •Line pressure test <Ref. to 4AT-37, Line Pressure Test.> •Transfer clutch pressure test <Ref. to 4AT-38, Transfer Clutch Pressure Test.> •Time lag test <Ref. to 4AT-36, Time Lag Test.> •Road test <Ref. to 4AT-33, Road Test.> •Inhibitor switch <Ref. to 4AT-48, Inhibitor Switch.>	Is the unit that might influence AT problem normal?	Go to step **2.**	Repair or replace each item.
2	**CHECK POWER INDICATOR LIGHT.** Turn the ignition switch to ON.	Does the POWER indicator light illuminate?	Go to step **4.**	Go to step **3.**
3	**CHECK POWER INDICATOR LIGHT.** 1)Turn the ignition switch to OFF. 2)Repair the POWER indicator light circuit or power supply and ground line circuit. <Ref. to 4AT-31, Diagnostic Procedure for POWER Indicator Light.> 3)Turn the ignition switch to ON.	Is the POWER indicator light illuminate?	Go to step **4.**	Go to step **5.**
4	**CHECK INDICATION OF DTC.** Calling up the DTC. Without Subaru Select Monitor <Ref. to 4AT-24, WITHOUT SUBARU SELECT MONITOR, Read Diagnostic Trouble Code (DTC).> With Subaru Select Monitor <Ref. to 4AT-25, WITH SUBARU SELECT MONITOR, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of select monitor cannot be executed normally, check the communication circuit. <Ref. to 4AT-38, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Select Monitor Communication.>	Is the DTC displayed?	Go to step **6.** NOTE: Record all DTC.	Go to step **5.**

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	Step	Check	Yes	No
5	**PERFORM THE GENERAL DIAGNOSTICS.** 1)Inspect using “Diagnostic Procedure without DTC”.<Ref. to 4AT-97, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2)Inspect using “Symptom Related Diagnostic”. <Ref. to 4AT-133, Symptom Related Diagnostic.> 3)Perform the clear memory mode. Without Subaru Select Monitor <Ref. to 4AT-27, WITH SUBARU SELECT MONITOR, Clear Memory Mode.> With Subaru Select Monitor <Ref. to 4AT-27, WITHOUT SUBARU SELECT MONITOR, Clear Memory Mode.> 4)Perform the inspection mode. <Ref. to 4AT-26, Inspection Mode.> 5)Calling up the DTC. Without Subaru Select Monitor <Ref. to 4AT-24, WITHOUT SUBARU SELECT MONITOR, Read Diagnostic Trouble Code (DTC).> With Subaru Select Monitor <Ref. to 4AT-25, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC displayed?	Complete the diagnosis.	Go to step **6.**
6	**PERFORM THE DIAGNOSIS.** 1)Inspect using “Diagnostics Chart with DTC”. <Ref. to 4AT-41, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC table, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 4AT-29, List of Diagnostic Trouble Code (DTC).> 2)Repair the trouble cause. 3)Perform the clear memory mode. Without Subaru Select Monitor <Ref. to 4AT-27, WITH SUBARU SELECT MONITOR, OPERATION, Clear Memory Mode.> With Subaru Select Monitor <Ref. to 4AT-27, WITHOUT SUBARU SELECT MONITOR, Clear Memory Mode.> 4)Perform the inspection mode. <Ref. to 4AT-26, Inspection Mode.> 5)Calling up the DTC. Without Subaru Select Monitor <Ref. to 4AT-24, WITHOUT SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> With Subaru Select Monitor <Ref. to 4AT-25, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC displayed?	Complete the diagnosis.	Inspect using “Diagnostics Chart with Diagnostic Connector”. <Ref. to 4AT-41, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

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2. Check List for Interview

A: CHECK

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name			
Date of purchase			
Date of repair			
Trans. model	TRANSMISSION	VIN	
Odometer reading	km/h or miles		
Frequency	❑ Continuous ❑ Intermittent (times a day)		
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others ( )		
Place	❑ High ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Rough road ❑ Others ( )		
Outdoor temperature	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Vehicle speed	km/h (MPH)		
AT diagnostic indicator light (POWER indicator light)	❑ Continuously lit	❑ Not lit	
Select lever position	❑ P ❑ R ❑ N ❑ D ❑ 3 ❑ 2 ❑ 1		
Driving condition	❑ Not affected ❑ At racing ❑ While decelerating	❑ At starting ❑ While accelerating ❑ While turning (❑ RH/❑ LH)	❑ While idling ❑ While cruising
POWER switch	❑ ON ❑ OFF		
HOLD switch	❑ ON ❑ OFF		
Symptoms	❑ No up-shift		
	❑ No down-shift		
	❑ No kick down		
	❑ Vehicle does not move (❑ Any position ❑ Particular position)		
	❑ Lock-up malfunction		
	❑ Noise or vibration		
	❑ Shift shock or slip		
	❑ Select lever does not move		
	❑ Others ( )		

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3. General Description

A: CAUTION

• Supplemental Restraint System "Airbag"

The 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 an electrical test equipment on these circuit.

• Be careful not to damage the airbag system wiring harness when performing diagnostics and servicing the TCM.

• Measurement

When measuring the voltage and resistance of ECM, TCM or each sensor, use a tapered pin with 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 (0.256 in).

B: INSPECTION

1. BATTERY

Measure the battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V or more

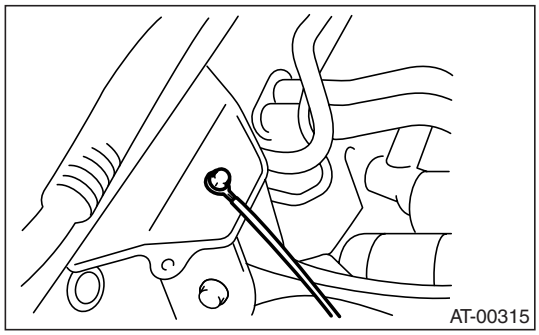
Specific gravity: Above 1.260

2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

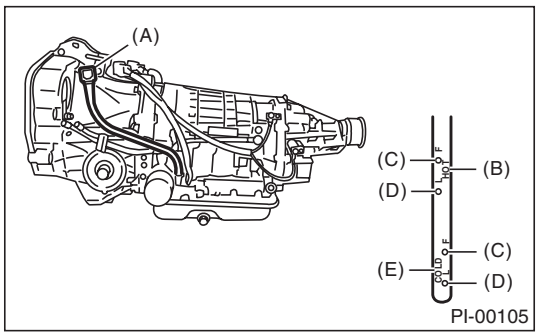
• Chassis side

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL

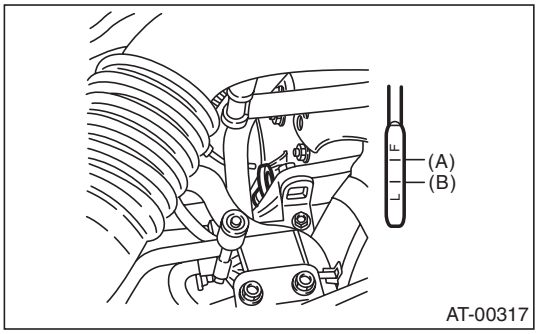
Make sure that ATF level is in the specification. <Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>



(A) Level gauge
(B) "HOT" side
(C) Upper level
(D) Lower level
(E) "COLD" side

4. FRONT DIFFERENTIAL OIL LEVEL

Make sure that the front differential oil level is in specification. <Ref. to 4AT-32, INSPECTION, Differential Gear Oil.>



(A) Upper level
(B) Lower level

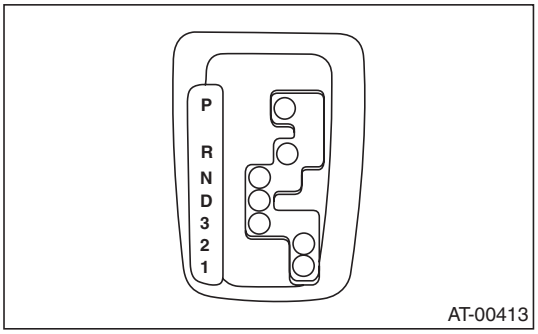
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5. OPERATION OF SHIFT SELECT LEVER

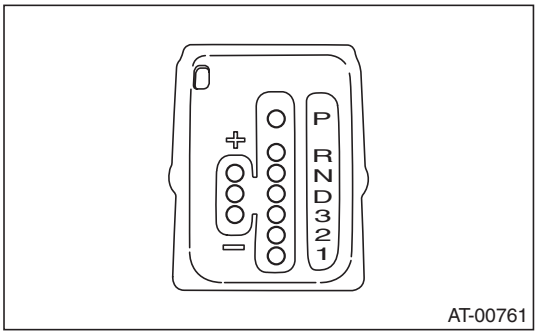
Make sure there is no abnormal noise, dragging or contact pattern in each select lever range.

WARNING:
Stop the engine while checking operation of selector lever.

- Without SPORT shift

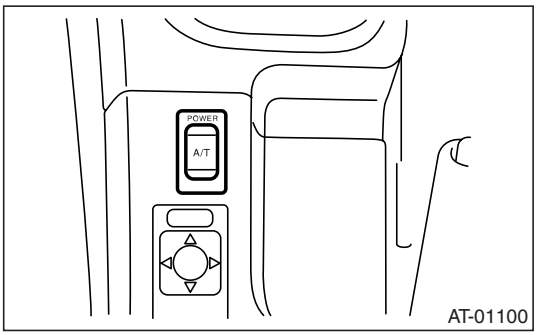


- With SPORT shift



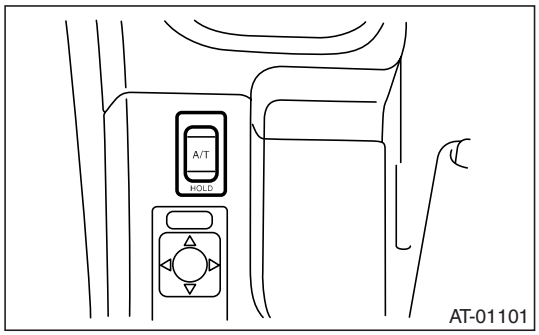
6. POWER SWITCH

Make sure that the POWER indicator light in combination meter comes ON, when turning the POWER switch to ON.



7. HOLD SWITCH

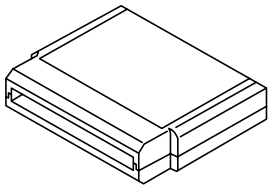
Make sure that the HOLD indicator light in combination meter comes ON, when turning the HOLD switch to ON.



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C: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA210	24082AA210	CARTRIDGE	Troubleshooting for electrical systems.
 ST22771AA030	22771AA030	SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL PURPOSE TOOLS

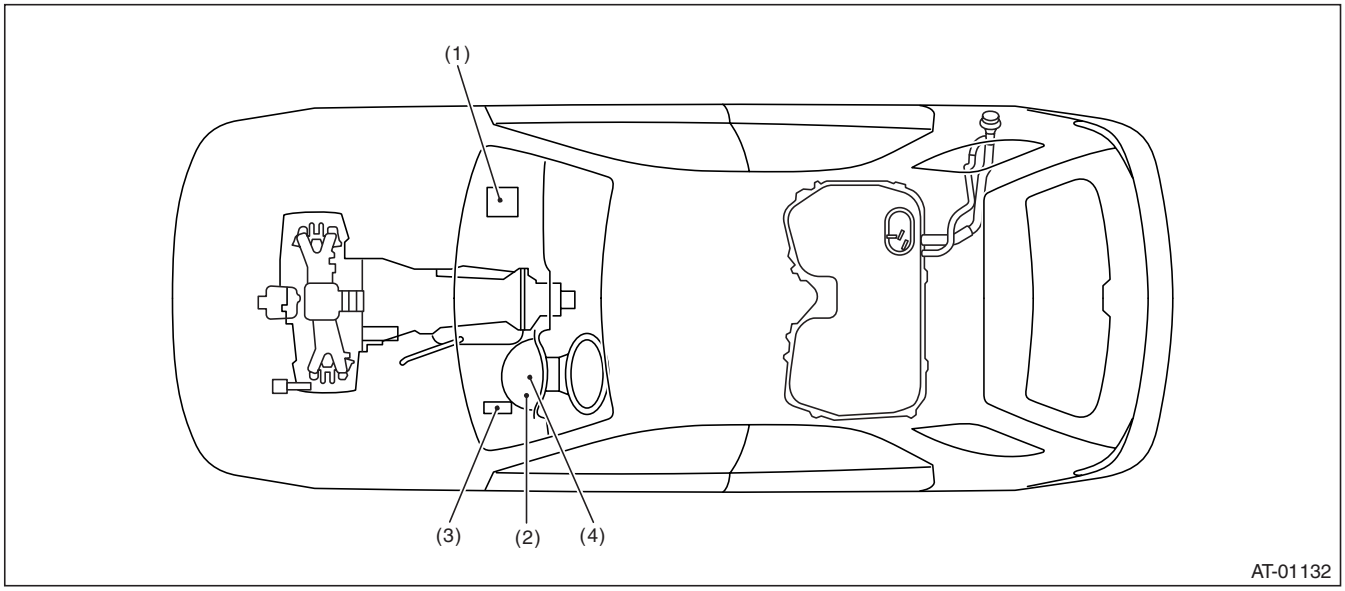
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

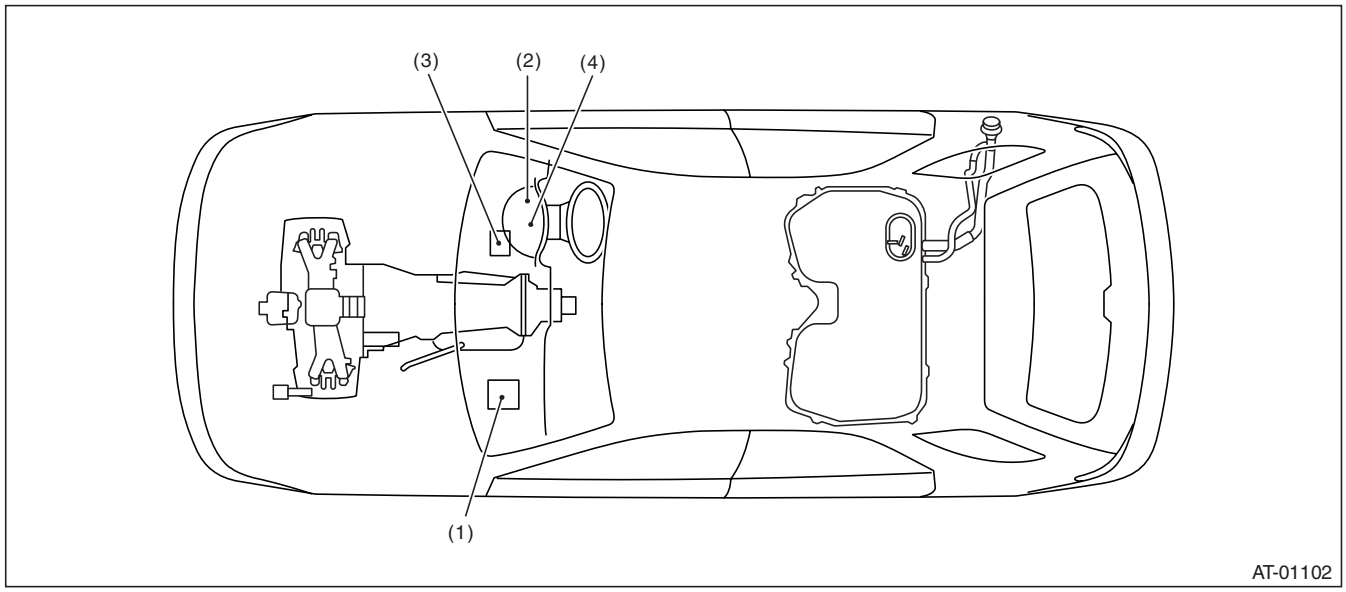
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4. Electrical Components Location

A: LOCATION

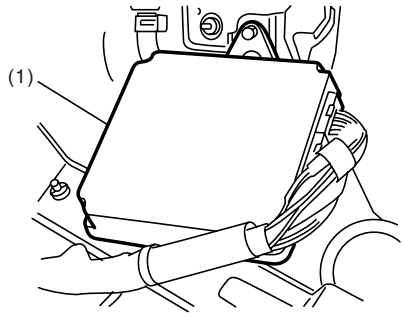
1. CONTROL MODULE



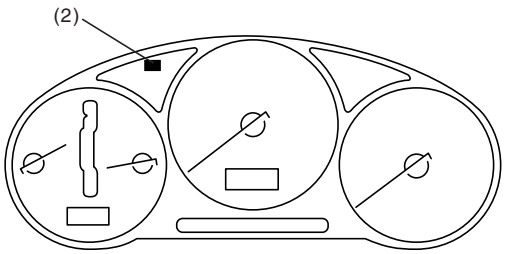


(1) Engine control module (ECM)
(2) POWER indicator light (AT diagnostic indicator light)
(3) Transmission control module (TCM)
(4) Data link connector

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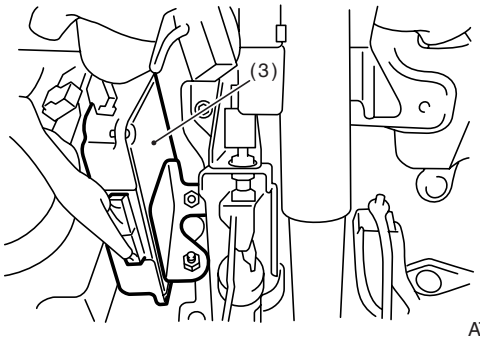


AT-00323



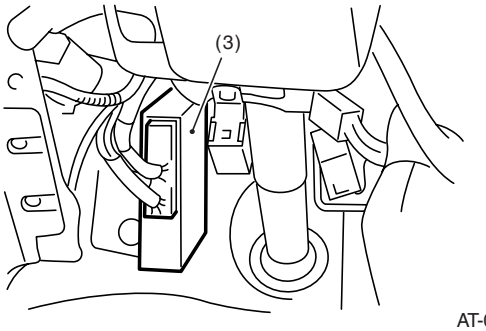
AT-01103

LHD

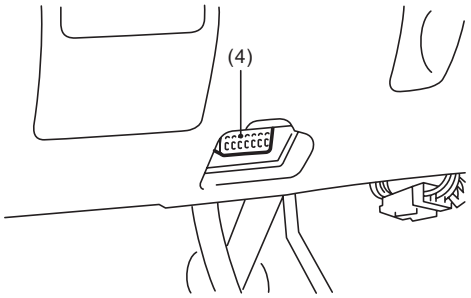


AT-00416

RHD



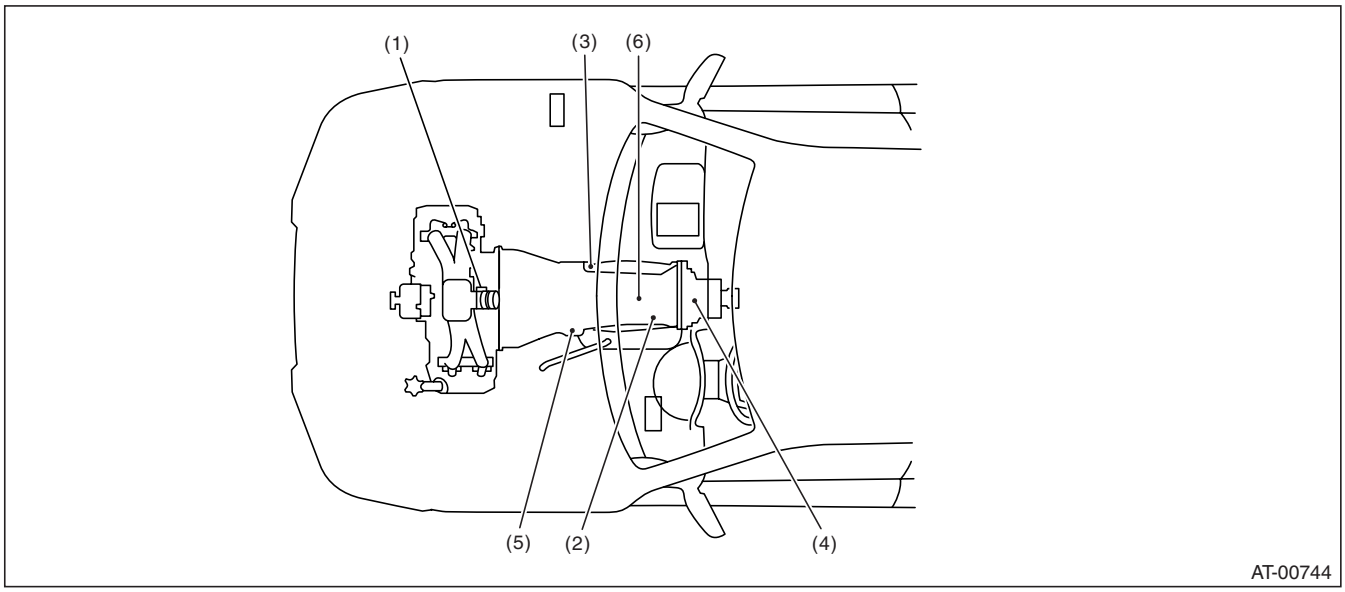
AT-00372



AT-00417

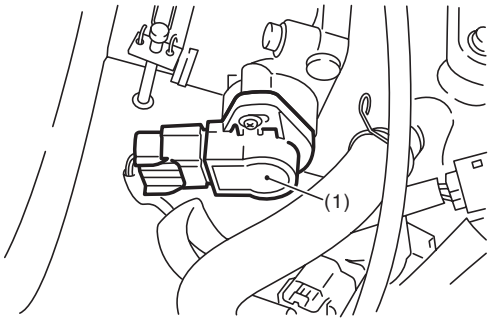
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2. SENSOR



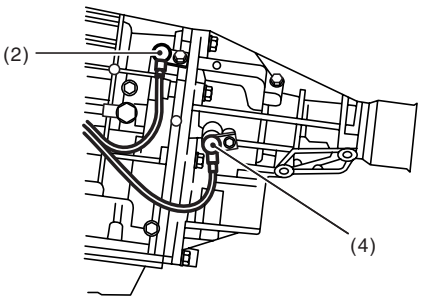
(1) Throttle position sensor
(2) Front vehicle speed sensor
(3) Inhibitor switch
(4) Rear vehicle speed sensor
(5) Torque converter turbine speed sensor
(6) ATF temperature sensor

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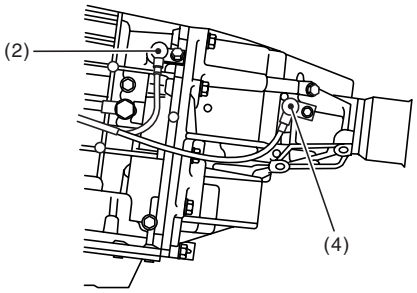
AT-00328

SOHC model

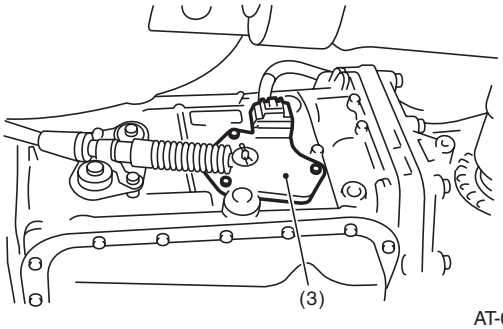


AT-00329

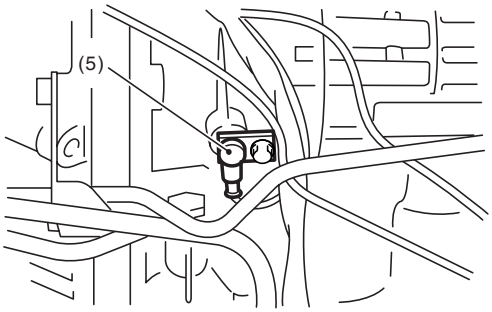
DOHC turbo model



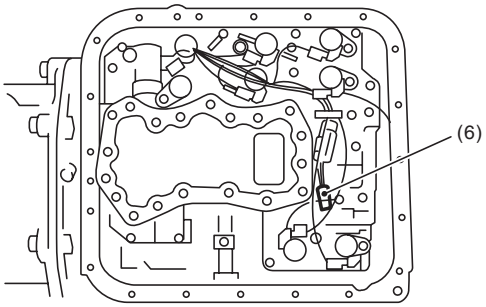
AT-01133



AT-00330



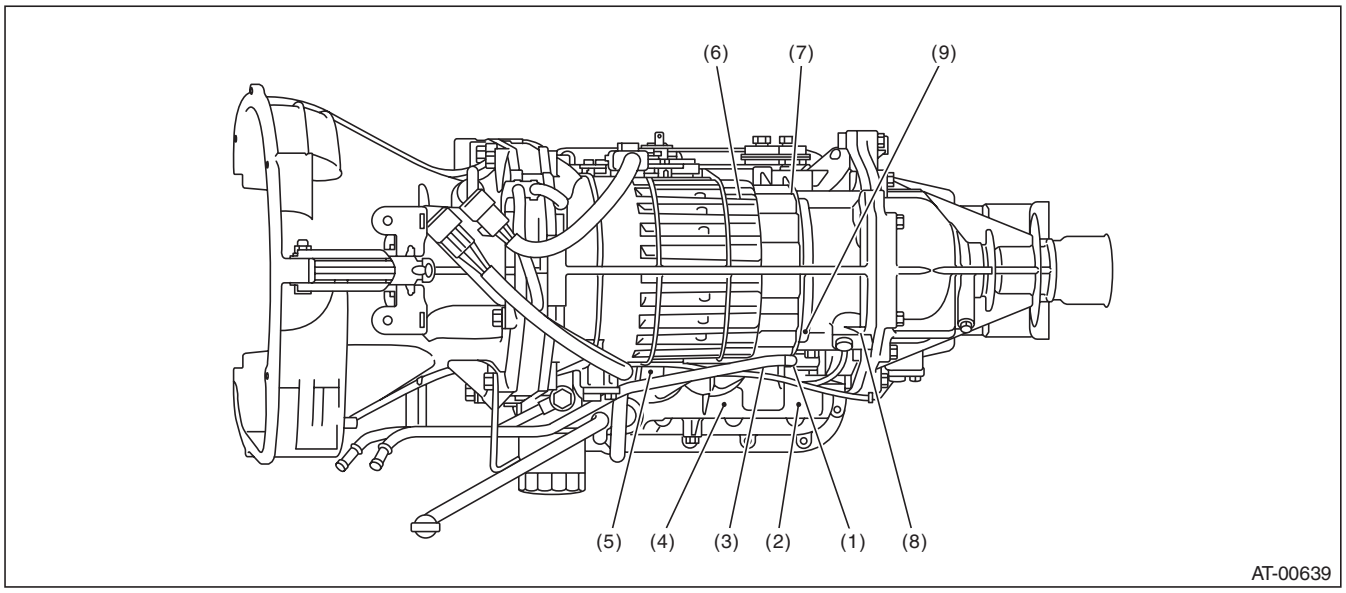
AT-00331



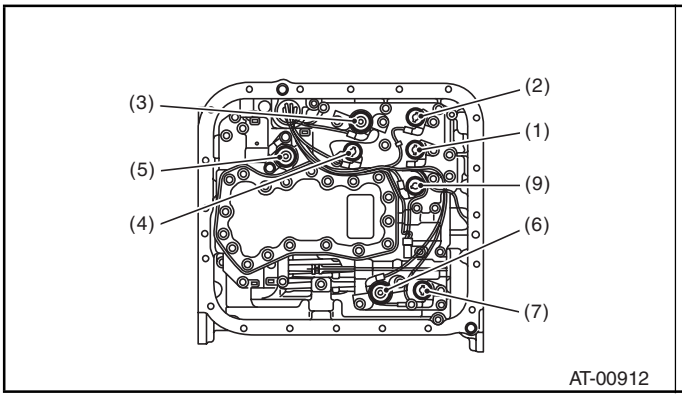
AT-00332

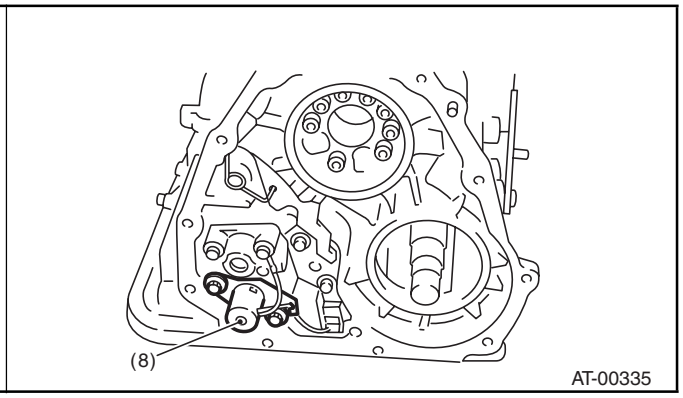
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3. SOLENOID



(1) Solenoid 1
(2) Solenoid 2
(3) Line pressure duty solenoid
(4) Low clutch timing solenoid
(5) Lock-up duty solenoid
(6) 2-4 brake duty solenoid
(7) 2-4 brake timing solenoid
(8) Transfer duty solenoid
(9) Sport shift solenoid (with SPORT shift)

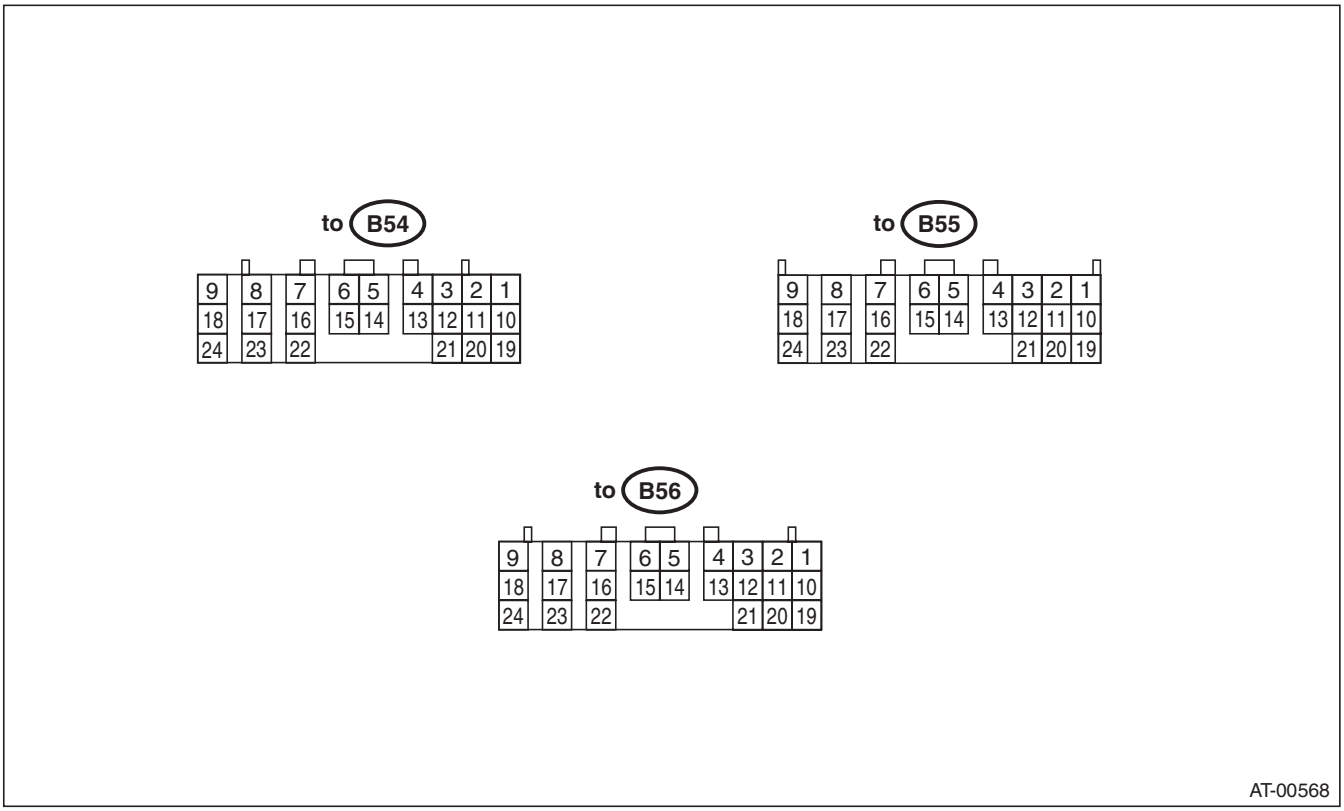




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5. Transmission Control Module (TCM) I/O Signal

A: ELECTRICAL SPECIFICATION



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	

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Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Inhibitor switch	"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	
Kick-down switch		B55	11	Throttle fully opened.	Less than 1	—
				Throttle fully closed.	More than 6.5	
AT OIL TEMP warning light		B56	10	Light ON	Less than 1	—
				Light OFF	More than 9	
Throttle position sensor		B54	3	Throttle fully closed.	0.2 — 1.0	—
				Throttle fully open.	4.2 — 4.7	
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)	More than 10.5	—
				Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal		B55	22	When cruise control is set. (SET lamp ON)	Less than 1	—
				When cruise control is not set. (SET lamp OFF)	More than 6.5	
Torque control signal 1		B56	5	Ignition switch ON (with engine ON)	More than 4	—
Torque control signal 2		B56	14	Ignition switch ON (with engine ON)	More than 4	—
Torque control cut signal		B55	10	Ignition switch ON	8	—
Intake manifold pressure signal (SOHC model)		B54	1	Engine idling after warm-up.	0.4 — 1.6	—
Mass air flow signal (DOHC turbo model)		B54	1	Engine idling after warm-up.	0.9 — 1.4	—
Shift solenoid 1		B54	22	1st or 4th gear	More than 9	10 — 16
				2nd or 3rd gear	Less than 1	

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Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
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 (SOHC model)	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	
Transfer duty solenoid (DOHC turbo model)	B56	6	Throttle fully closed.	More than 8.5	10 — 17
			Throttle fully open.	Less than 0.5	
2-4 brake duty solenoid	B54	18	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 timing solenoid	B54	16	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	15	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
HOLD switch	B55	16	HOLD switch ON	Less than 1	—
			HOLD switch OFF	More than 8	—
POWER switch	B55	23	POWER switch ON	Less than 1	—
			POWER switch OFF	More than 10	—
POWER indicator light	B56	11	Light ON	Less than 1	—
			Light OFF	More than 9	—
FWD switch	B55	20	Fuse removed.	6 — 9.1	—
			Fuse installed.	Less than 1	—
FWD indicator light	B56	2	Fused ON FWD switch	Less than 1	—
			Fuse removed from FWD switch.	More than 9	—
ABS signal	B55	21	ABS switch ON	Less than 1	—
			ABS switch OFF	6.5 — 15	—
Sensor ground line 1	B54	20	—	0	Less than 1
Sensor ground line 2	B55	9	—	0	Less than 1
System ground line	B56	19	—	0	Less than 1
	B54	21			
Sensor ground line 3	B54	10	—	0	Less than 1
Sensor ground line 4	B54	19	—	0	Less than 1
AT diagnosis signal	B56	21	Ignition switch ON	Less than 1 ← → More than 4	—

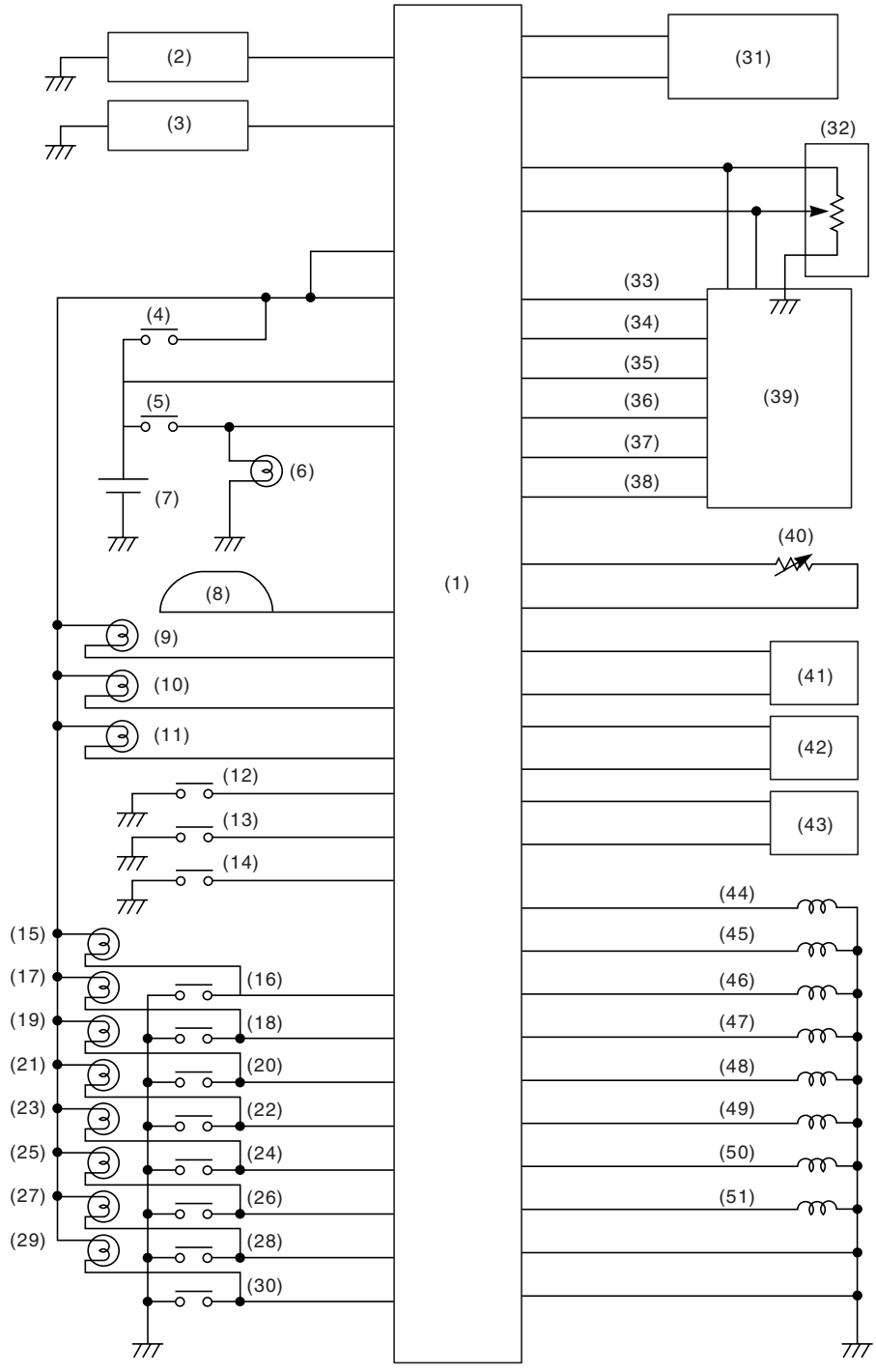
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Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Data link signal (Subaru Select Monitor)	B56	15	—	—	—
SPORT shift solenoid (with SPORT shift)	B54	14	SPORT shift activated	More than 8	10 — 16
			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	2	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	

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B: SCHEMATIC

1. WITHOUT SPORT SHIFT



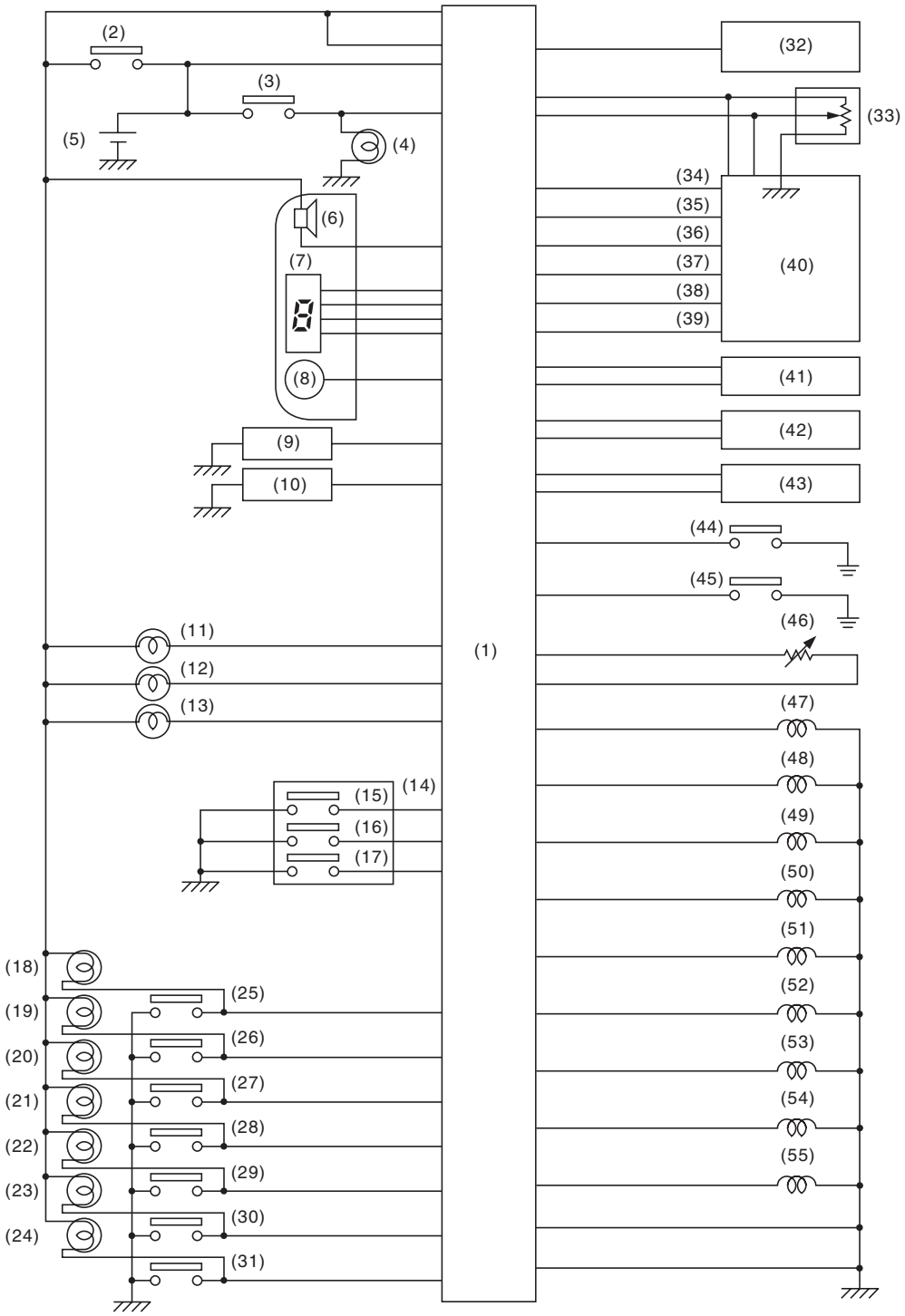
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(1) Transmission control module
(2) Cruise control module
(3) ABS control module
(4) Ignition switch
(5) Brake switch
(6) Brake light
(7) Battery
(8) Combination meter (Speedometer circuit)
(9) AT OIL TEMP light
(10) FWD indicator light
(11) POWER indicator light
(12) FWD switch
(13) POWER switch
(14) Kick-down switch
(15) Hold indicator light
(16) HOLD switch
(17) “P” range indicator light
(18) “P” range switch
(19) “R” range indicator light
(20) “R” range switch
(21) “N” range indicator light
(22) “N” range switch
(23) “D” range indicator light
(24) “D” range switch
(25) “3” range indicator light
(26) “3” range switch
(27) “2” range indicator light
(28) “2” range switch
(29) “1” range indicator light
(30) “1” range switch
(31) Data link connector
(32) Throttle position sensor
(33) Engine speed signal
(34) Torque control cut signal
(35) Torque control signal 2
(36) Torque control signal 1
(37) Intake manifold pressure signal
(38) AT diagnostics signal
(39) Engine control module
(40) ATF temperature sensor
(41) Torque converter turbine speed sensor
(42) Rear vehicle speed sensor
(43) Front vehicle speed sensor
(44) Shift solenoid 1
(45) Shift solenoid 2
(46) 2-4 brake timing solenoid
(47) Line pressure duty solenoid
(48) 2-4 brake duty solenoid
(49) Lock-up duty solenoid
(50) Low clutch timing solenoid
(51) Transfer duty solenoid

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2. WITH SPORT SHIFT



AT-01135

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(1) Transmission control module
(2) Ignition switch
(3) Brake switch
(4) Brake light
(5) Battery
(6) Buzzer
(7) SPORT shift indicator
(8) Speedometer
(9) Cruise control module
(10) ABS control module
(11) “AT OIL TEMP” warning light
(12) POWER indicator light
(13) HOLD indicator light
(14) SPORT shift
(15) SPORT shift mode switch
(16) Up switch
(17) Down switch
(18) “P” range indicator light
(19) “R” range indicator light
(20) “N” range indicator light
(21) “D” range indicator light
(22) “3” range indicator light
(23) “2” range indicator light
(24) “1” range indicator light
(25) “P” range switch
(26) “R” range switch
(27) “N” range switch
(28) “D” range switch
(29) “3” range switch
(30) “2” range switch
(31) “1” range switch
(32) Data link connector
(33) Throttle position sensor
(34) Engine speed signal
(35) Torque control cut signal
(36) Torque control signal 2
(37) Torque control signal 1
(38) Intake manifold pressure signal
(39) AT diagnosis signal
(40) Engine control module
(41) Front vehicle speed sensor
(42) Rear vehicle speed sensor
(43) Torque converter turbine speed sensor
(44) POWER switch
(45) HOLD switch
(46) ATF temperature sensor
(47) Shift solenoid 1
(48) Shift solenoid 2
(49) 2-4 brake timing solenoid
(50) 2-4 brake duty solenoid
(51) Line pressure duty solenoid
(52) Lock-up duty solenoid
(53) Low clutch timing solenoid
(54) Transfer duty solenoid
(55) SPORT shift solenoid

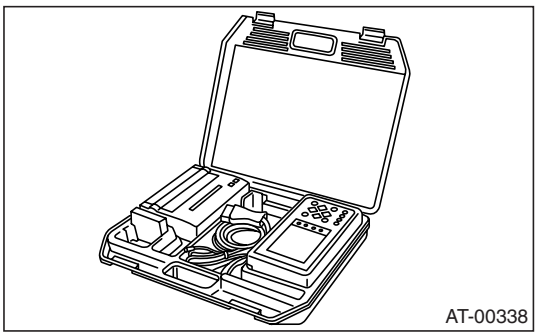
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6. Subaru Select Monitor

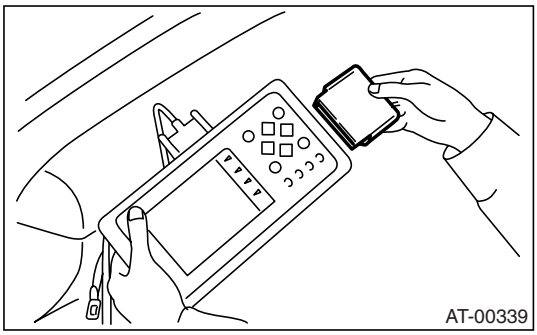
A: OPERATION

1. READ DTC

1) Prepare the Subaru Select Monitor kit.

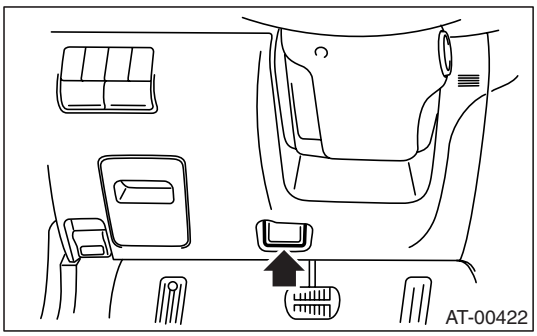


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to 4AT-7, PREPARATION TOOL, General Description.>



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

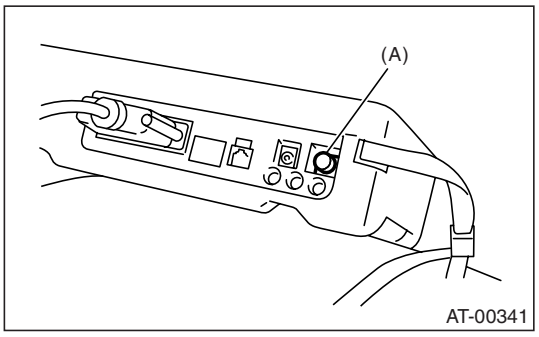
(1) Data link connector located in the lower portion of instrument panel (on driver's side).



(2) Connect the 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 the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) POWER switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
8) Press the [YES] key after the information of transmission type is displayed.
9) On the «Transmission Diagnosis» display screen, select the {DTC Display} and press the [YES] key.
10) On the «DTC Display» display screen, select the {Memorized DTC} and press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the Subaru Select Monitor OPERATION MANUAL.
• For details concerning the DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to 4AT-29, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
3) Press the [YES] key after the information of transmission type is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On the «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 desired data is shown.

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- 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 (AWD model)	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	%
Mass air flow sensor signal (DOHC turbo model)	Air Flow Sensor Voltage	V
Intake manifold pressure sensor voltage (SOHC model)	Mani. Pressure Voltage	V
2 wheel drive switch signal (SOHC model)	FWD Switch	ON or OFF
Stop lamp switch signal	Stop Light Switch	ON or OFF
Shift up signal (with SPORT shift)	Up Switch	ON or OFF
Shift down signal (with SPORT shift)	Down Switch	ON or OFF
SPORT shift mode signal (with SPORT shift)	Tip Mode 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
Power mode switch signal	Power Mode Switch	ON or OFF
Hold mode switch signal	Hold Mode Switch	ON or OFF
Kick down switch signal	Kick Down Switch	ON or OFF
Automatic transmission fluid temperature lamp	ATF Temperature Lamp	ON or OFF

NOTE:
For detailed operation procedure, refer to the Subaru Select Monitor OPERATION MANUAL.

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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 the information of transmission type is displayed.
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 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.

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7. Read Diagnostic Trouble Code (DTC)

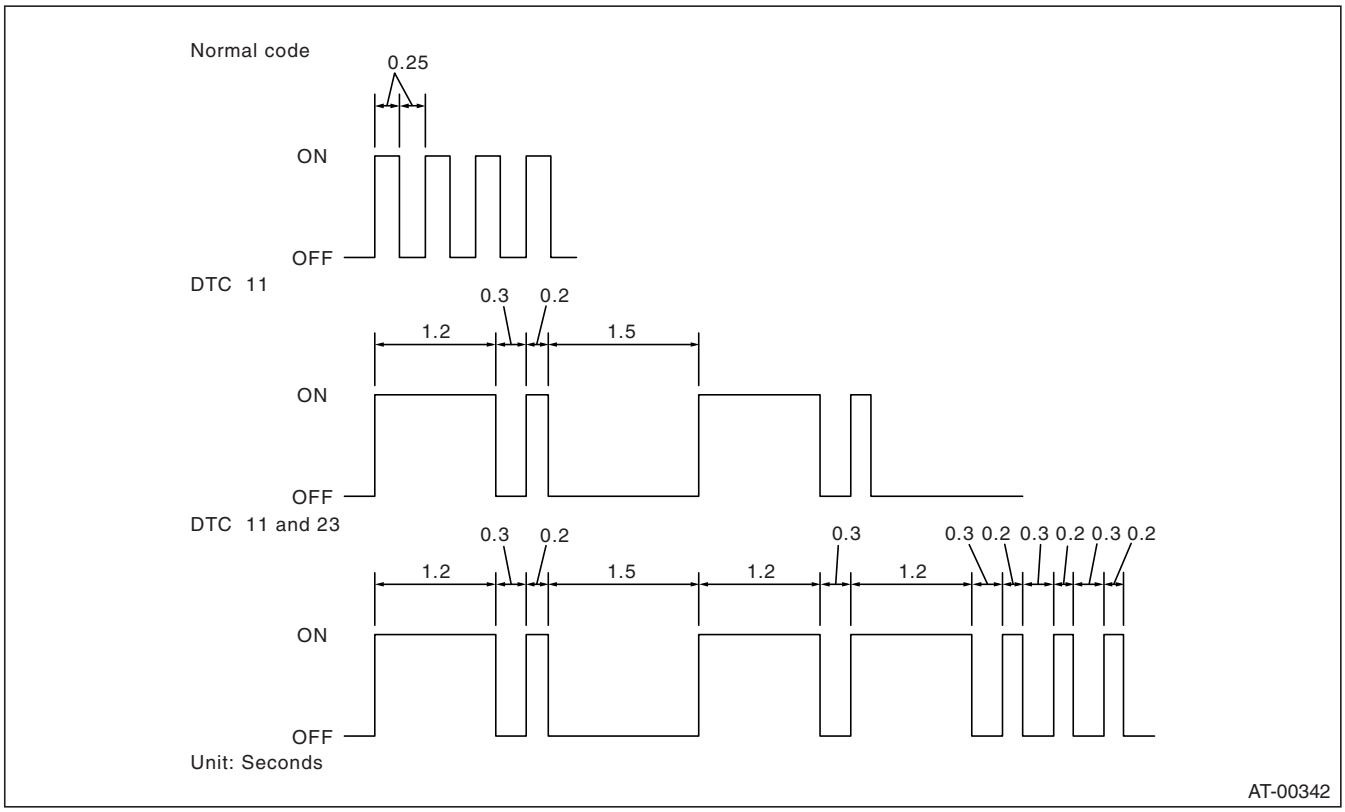
A: OPERATION

1. WITHOUT SUBARU SELECT MONITOR

	Step	Check	Yes	No
1	**PERFORM READ DTC.** 1)Warm-up the engine. 2)Turn the ignition switch to OFF. 3)Turn the ignition switch to ON. 4)Start the engine. 5)Drive the vehicle at speeds greater than 20 km/h (12 MPH). 6)Stop the vehicle. 7)The brake pedal depressed and move select lever to 1 range. 8)Turn the ignition switch to OFF. 9)Turn the ignition switch to ON. 10)Move the select lever “2” range. 11)Move the select lever “1” range. 12)Move the select lever “2” range. 13)Move the select lever “3” range. 14)Move the select lever “D” range.	Does the POWER indicator light blink at 4 Hz intervals? NOTE: Blinks every 0.125 (1/8) seconds (until the ignition switch is turned OFF).	Repair the power supply and ground circuit. <Ref. to 4AT-36, CHECK POWER SUPPLY AND GROUND LINE, Diagnostic Procedure for POWER Indicator Light.>	Go to step **2.**
2	**CHECK POWER INDICATOR LIGHT.**	Does the POWER indicator light blink at 2 Hz intervals? NOTE: Blinks every 0.25 (1/4) seconds (until ignition switch is turned to OFF).	The AT system is normal.	Go to step **3.**
3	**CHECK POWER INDICATOR LIGHT.**	Is the DTC outputted by the blink of POWER indicator light?	Inspect the problem corresponding with DTC. NOTE: Record all DTCs.	Go to step **4.**
4	**CHECK POWER INDICATOR LIGHT.**	Does the POWER indicator light remain illuminated?	Repair the POWER indicator light circuit <Ref. to 4AT-31, Diagnostic Procedure for POWER Indicator Light.>, or Inspect inhibitor switch, wiring, TCM, etc.	Calling up the DTC again.

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The POWER indicator light flashes the code corresponding to faulty part.
The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.2 sec on) signifies a “one”.



2. WITH SUBARU SELECT MONITOR

Refer to Subaru Select Monitor for information about how to obtain and understand DTC. <Ref. to 4AT-21, OPERATION, Subaru Select Monitor.>

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8. Inspection Mode

A: OPERATION

Shift the select lever to D range, and drive continuously for 10 seconds or more at 60 km/h (37 MPH).

WARNING:
Observe the road traffic law.

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9. Clear Memory Mode

A: OPERATION

1. WITHOUT SUBARU SELECT MONITOR

Current DTC shown on display are cleared by turning the ignition switch to OFF after conducting on-board diagnostics operation. Previous DTC, however, cannot be cleared since they are stored in the TCM memory which is operating on back-up power supply. These DTC can be cleared by removing the specified TCM connector for at least two minutes.

CLEAR MEMORY:
Remove the TCM connector (B56) for at least two minutes.

• TCM connector (B56) is located in the line to memory back-up power supply of TCM. Removal of this connector clears the previous DTC stored in TCM memory.
• Be sure to remove TCM connector (B56) for at least the specified length of time. Otherwise, the DTC may not be cleared.

2. WITH SUBARU SELECT MONITOR

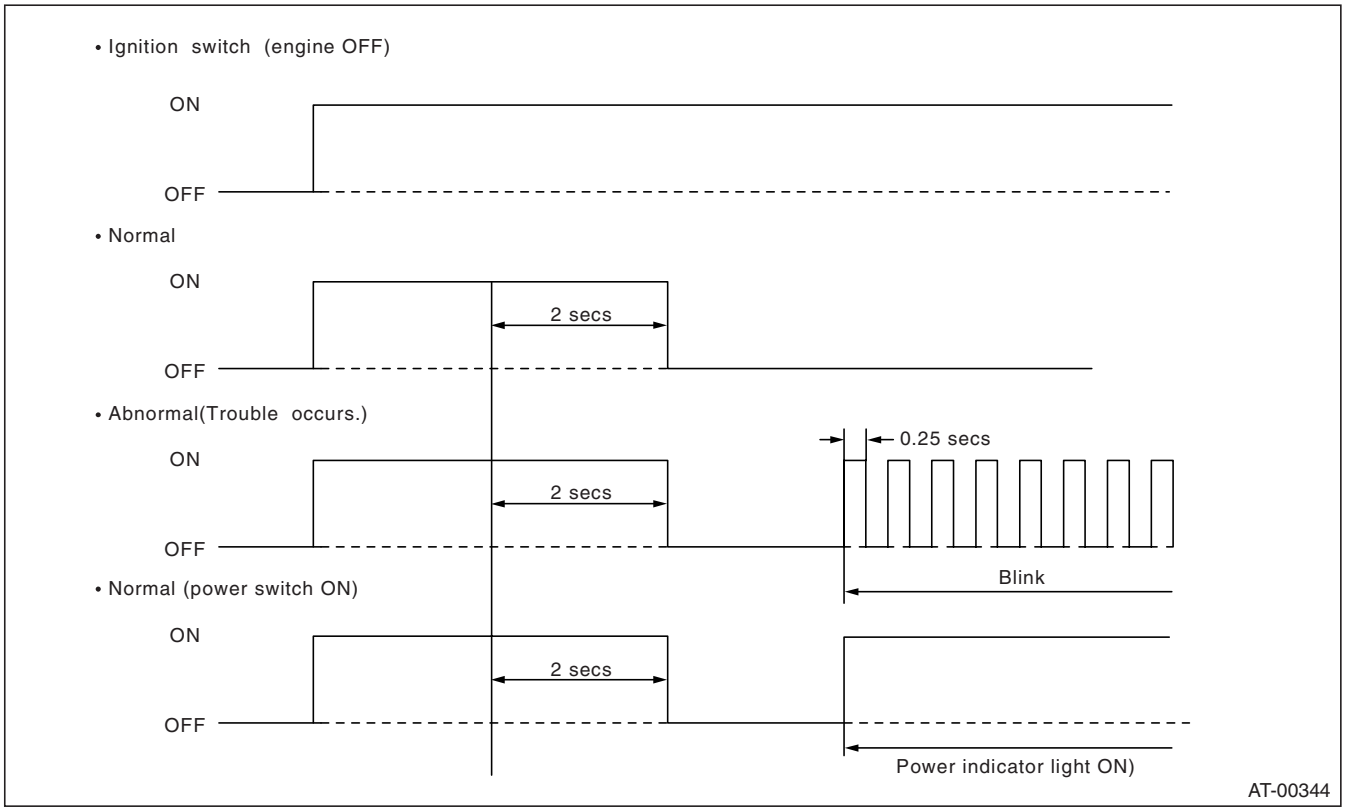
Refer to Subaru Select Monitor for information about how to clear DTC.
<Ref. to 4AT-23, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

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10.POWER Indicator Light Display

A: INSPECTION

When any on-board diagnostics item is malfunctioning, the display on POWER indicator light blinks from the time malfunction is detected after starting the engine until ignition switch is turned to 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 POWER indicator does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using select monitor. The indicator signal is as shown in the figure.



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11.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Index
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to 4AT-41, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	Mass air flow signal (DOHC turbo model)	Detects open or shorted input signal circuit.	<Ref. to 4AT-43, DTC 23 MASS AIR FLOW SIGNAL (TURBO MODEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
27	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to 4AT-45, 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 4AT-48, 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 4AT-53, 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 4AT-57, 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 4AT-60, DTC 38 TORQUE CONTROL SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
45	Intake manifold pressure signal (SOHC model)	Detects open or shorted input signal circuit.	<Ref. to 4AT-62, DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL (NON-TURBO MODEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
71	Shift solenoid 1	Detects open or shorted output signal circuit.	<Ref. to 4AT-64, 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 4AT-67, 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 4AT-70, 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 4AT-73, 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 4AT-76, 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 4AT-79, 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 4AT-82, 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 4AT-86, DTC 78 SPORT SHIFT SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

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LIST OF DIAGNOSTIC TROUBLE CODE (DTC)

DTC	Item	Content of diagnosis	Index
79	Transfer duty solenoid	Detects open or shorted output signal circuit.	<Ref. to 4AT-90, DTC 79 TRANSFER DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
93	Rear vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to 4AT-94, DTC 93 REAR VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

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12.Diagnostic Procedure for POWER Indicator Light

A: POWER INDICATOR LIGHT DOES NOT COME ON OR GO OFF

DIAGNOSIS:

The POWER Indicator light circuit is open or shorted.

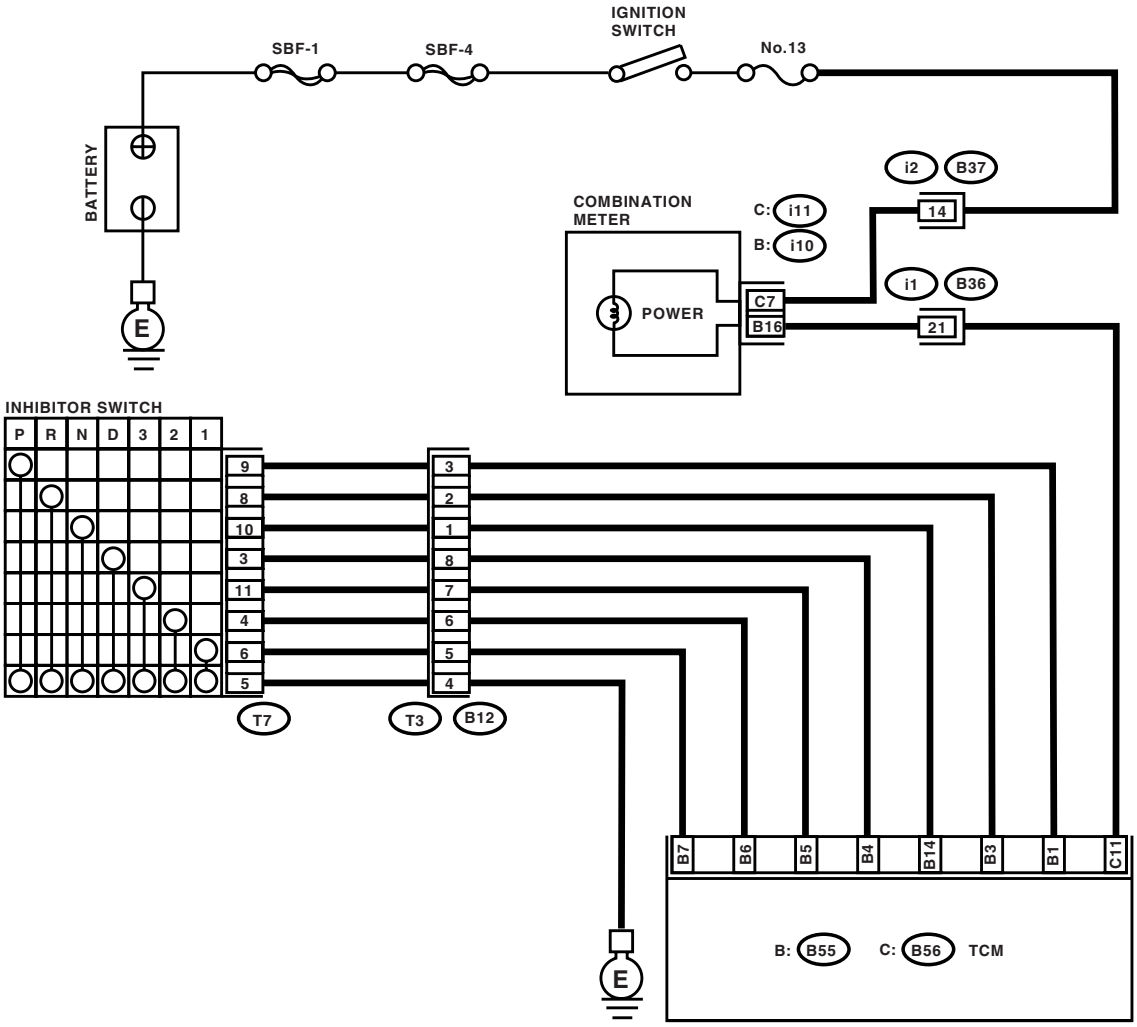
TROUBLE SYMPTOM:

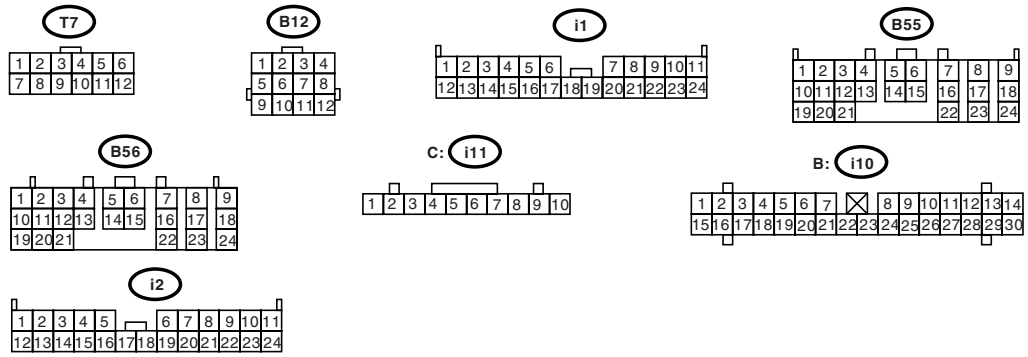
- When the ignition switch is turned to ON (engine OFF), POWER indicator light does not illuminate.
- When the on-board diagnostics is performed, POWER indicator light remains illuminated.

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DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

WIRING DIAGRAM:
LHD MODEL

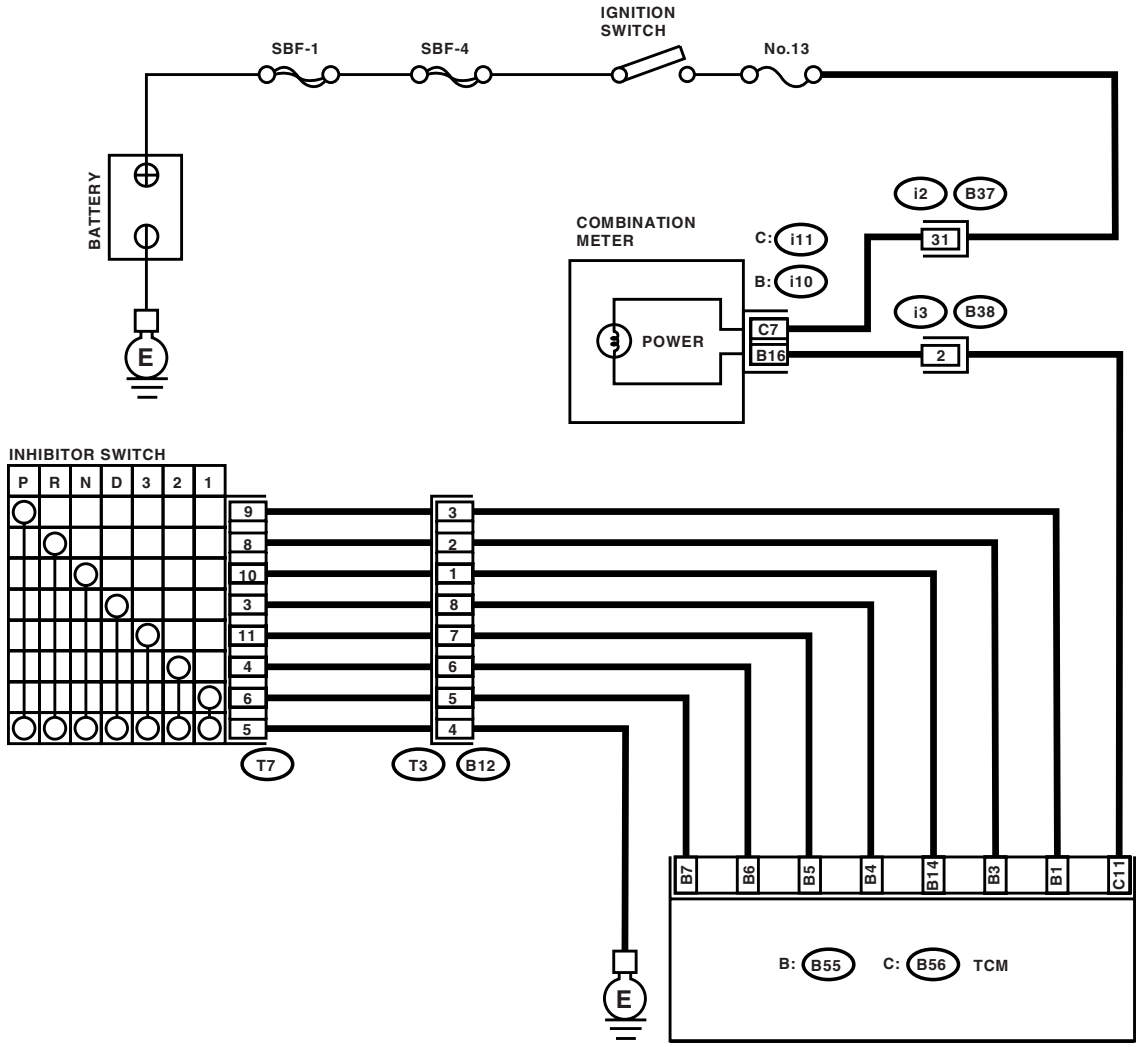


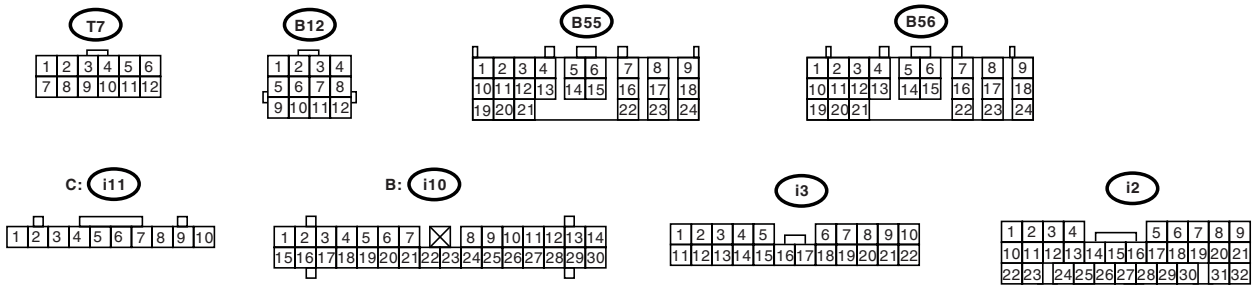


AT-01136

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RHD MODEL





AT-01137

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DIAGNOSTIC PROCEDURE FOR POWER INDICATOR LIGHT

	Step	Check	Yes	No
1	**CHECK POWER INDICATOR LIGHT.** Turn the ignition switch to ON (engine OFF).	Does the POWER indicator light illuminate?	Go to step **3.**	Go to step **2.**
2	**CHECK POWER INDICATOR LIGHT.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the POWER indicator light bulb from combination meter.	Is the POWER indicator light bulb OK?	Go to step **4.**	Replace the POWER indicator light bulb.
3	**CHECK POWER INDICATOR LIGHT.** Perform “Read Diagnostic Trouble Code (DTC)”. <Ref. to 4AT-24, Read Diagnostic Trouble Code (DTC).>	Does the POWER indicator light blink?	A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM, inhibitor switch and combination meter.	Go to step **9.**
4	**CHECK FUSE (No. 13).** Remove the fuse (No. 13).	Is the fuse (No. 13) blown out?	Replace the fuse (No. 13). If replaced fuse (No. 13) is blown out easily, repair short circuit in harness between fuse (No. 13) and combination meter.	Go to step **5.**
5	**CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH.** 1)Turn the ignition switch to ON (engine OFF). 2)Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **6.**	Repair the open circuit in harness between combination meter and battery.
6	**CHECK COMBINATION METER.** Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 16 (+) — Chassis ground (−):***	Is the voltage less than 9 V?	Repair the combination meter. <Ref. to IDI-11, Combination Meter Assembly.>	Go to step **7.**
7	**CHECK OPEN CIRCUIT OF HARNESS.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from combination meter connector. 3)Measure the resistance of harness between combination meter. ***Connector & terminal*** ***(B56) No. 11 — (i10) No. 16:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between TCM and combination meter, and poor contact in coupling connector.
8	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connector to TCM and combination meter. 2)Turn the ignition switch to ON (engine OFF). 3)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 11 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

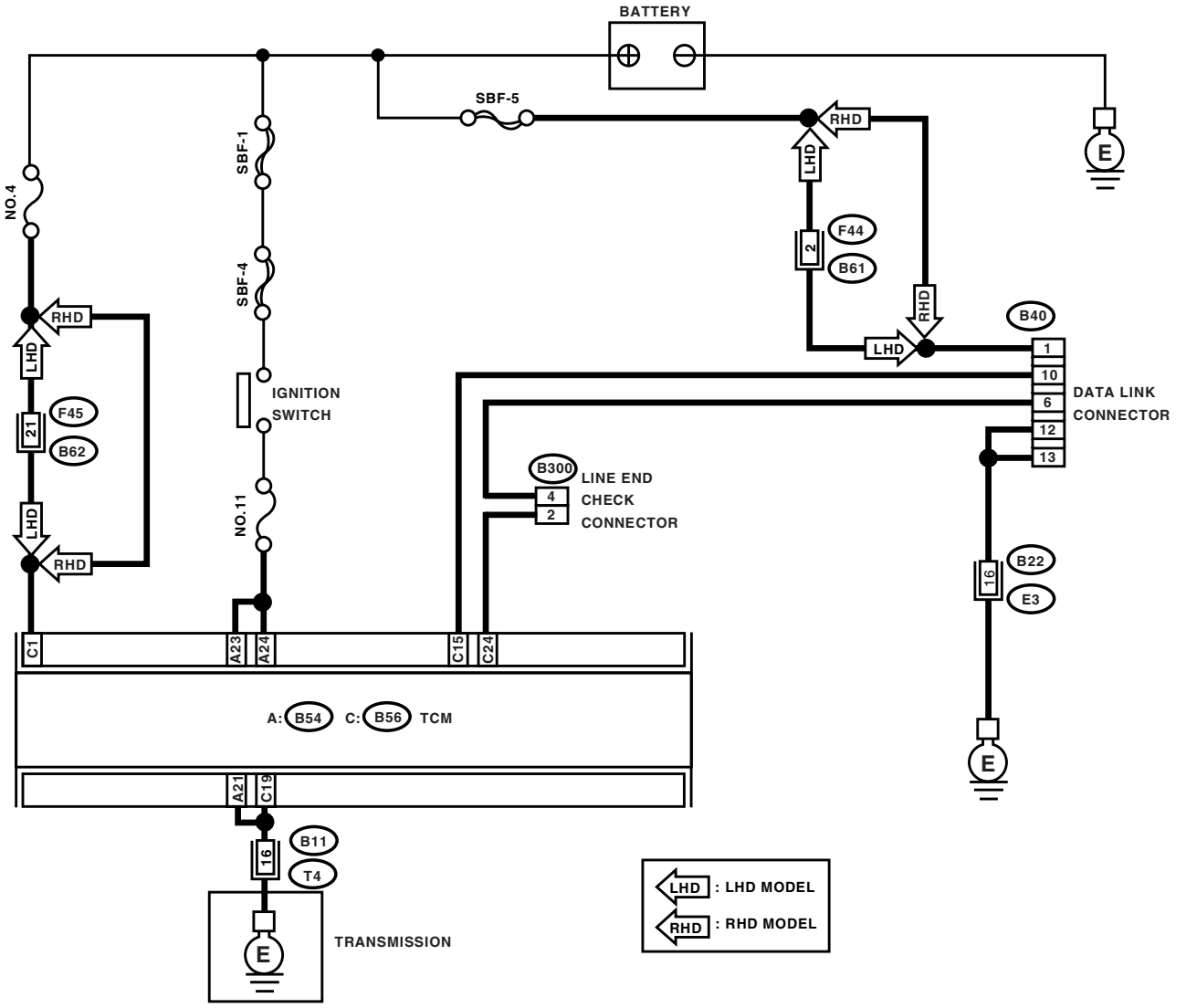
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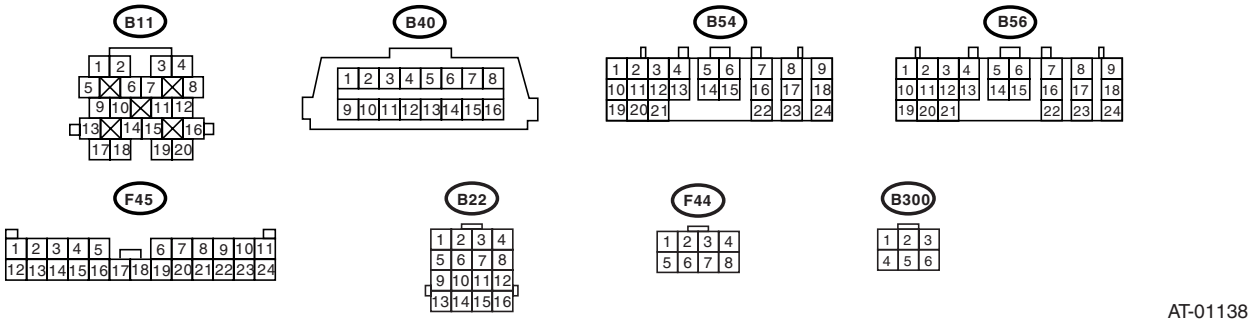
	Step	Check	Yes	No
9	**CHECK INHIBITOR SWITCH.** 1)Connect the Subaru Select Monitor to data link connector. 2)Turn the ignition switch to ON. 3)Turn the Subaru Select Monitor to ON. 4)Read the data of range switch using Subaru Select Monitor. •Range switch is indicated in ON ⇔ OFF.	When each range is selected, does the LED of Subaru Select Monitor light up?	Go to step **10.**	Check the inhibitor switch circuit. <Ref. to 4AT-109, CHECK INHIBITOR SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>
10	**CHECK SHORT CIRCUIT OF HARNESS.** 1)Disconnect the connector from TCM. 2)Remove the combination meter. 3)Disconnect the connector from combination meter. 4)Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B56) No. 11 — Chassis ground:***	Is the resistance less than 1 MΩ?	Check the TCM power supply and ground line. <Ref. to 4AT-36, CHECK POWER SUPPLY AND GROUND LINE, Diagnostic Procedure for POWER Indicator Light.>	Repair the short circuit in harness between combination meter connector and TCM connector.

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B: CHECK POWER SUPPLY AND GROUND LINE

WIRING DIAGRAM:





AT-01138

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	Step	Check	Yes	No
1	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **2.**
2	**CHECK POWER SUPPLY OF TCM.** 1)Disconnect the connector from TCM. 2)Turn the ignition switch to ON. 3)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 1 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **4.**	Go to step **3.**
3	**CHECK FUSE (NO. 4).** Remove the fuse (No. 4).	Is the fuse (No. 4) blown out?	Replace the fuse (No. 4). If replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.	Repair the 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 the ignition switch to ON (engine OFF). 2)Measure the ignition power supply voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 23 (+) — Chassis ground (–):*** ***(B54) No. 24 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **6.**	Go to step **5.**
5	**CHECK FUSE (NO. 11).** Remove the fuse (No. 11).	Is the fuse (No. 11) blown out?	Replace the fuse (No. 11). If replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.	Repair the open circuit in harness between fuse (No. 4) and TCM, or fuse (No. 4) and battery, and poor contact in coupling connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and transmission. 3)Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B56) No. 19 — (B11) No. 16:*** ***(B54) No. 21 — (B11) No. 16:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between TCM, transmission harness connector, and poor contact in coupling connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.** Measure the resistance of harness between transmission and transmission ground. ***Connector & terminal*** ***(T4) No. 16 — Transmission ground:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between transmission and transmission ground.
8	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control module power supply, ground line and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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13.Diagnostic Procedure for Select Monitor Communication

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

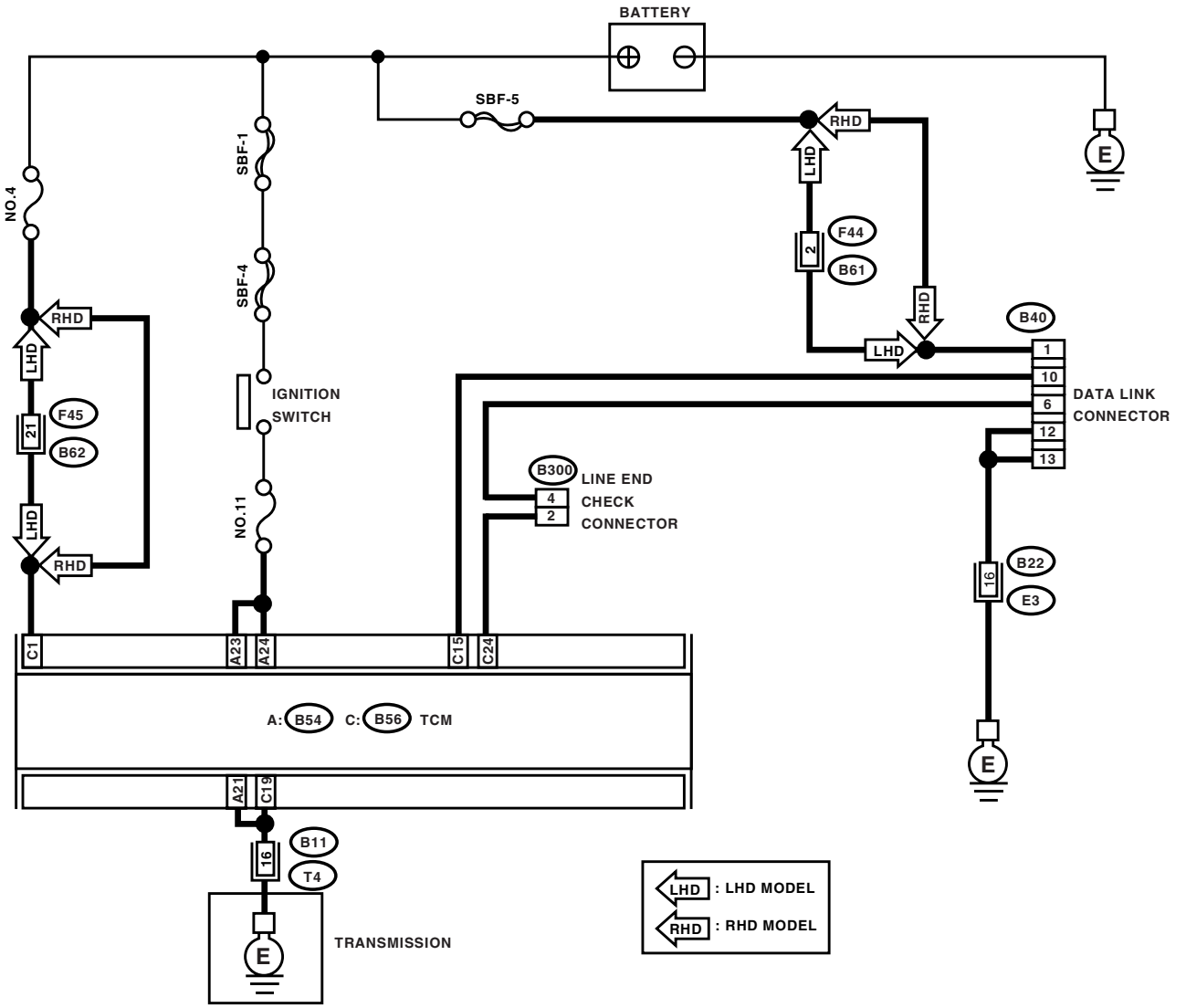
DIAGNOSIS:

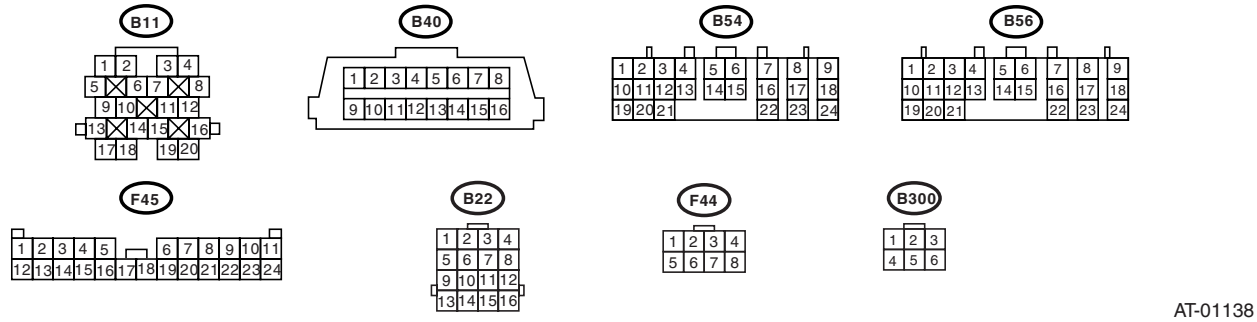
- Faulty harness connector

TROUBLE SYMPTOM:

- Select monitor communication failure

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT.** Measure the voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness and connector between battery and data link connector, and poor contact in coupling connector.
2	**CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.** Measure the resistance of harness between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 12 — Chassis ground:*** ***(B40) No. 13 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the 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 the ignition switch to ON. 2)Using the Subaru Select Monitor, check whether communication to engine systems can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step **8.**	Go to step **4.**
4	**CHECK COMMUNICATION OF SELECT MONITOR.** 1)Turn the ignition switch to OFF. 2)Disconnect the TCM connector. 3)Check whether communication to engine systems can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step **6.**	Go to step **5.**
5	**CHECK COMMUNICATION OF SELECT MONITOR.** 1)Turn the ignition switch to OFF. 2)Connect the TCM connector. 3)Disconnect the ECM connector. 4)Check whether communication to transmission systems can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Inspect the ECM.	Go to step **6.**
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1)Turn the ignition switch to OFF. 2)Disconnect the TCM, ECM, ABSCM&H/U, cruise control module and immobilizer control module connectors. 3)Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:*** ***(B40) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness and connector between each control module and data link connector.
7	**CHECK OUTPUT SIGNAL FOR TCM.** 1)Turn the ignition switch to ON. 2)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (−):*** ***(B40) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 1 V?	Repair the harness and connector between each control module and data link connector.	Go to step **8.**
8	**CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.** Measure the resistance between TCM connector and data link connector. ***Connector & terminal*** ***(B56) No. 15 — (B40) No. 10:***	Is the resistance less than 0.5 Ω?	Go to step **9.**	Repair the harness and connector between TCM and data link connector.

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	Step	Check	Yes	No
9	**CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.** Measure the resistance between TCM and data link connector. ***Connector & terminal*** ***(B56) No. 24 — (B40) No. 6:***	Is the resistance more than 1 MΩ?	Go to step **10.**	Repair the harness and connector between TCM and data link connector.
10	**CHECK INSTALLATION OF TCM CONNECTOR.** Turn the ignition switch to OFF.	Is the TCM connector inserted into TCM?	Go to step **11.**	Insert the TCM connector into TCM.
11	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control module and data link connector?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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14.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 11 ENGINE SPEED SIGNAL

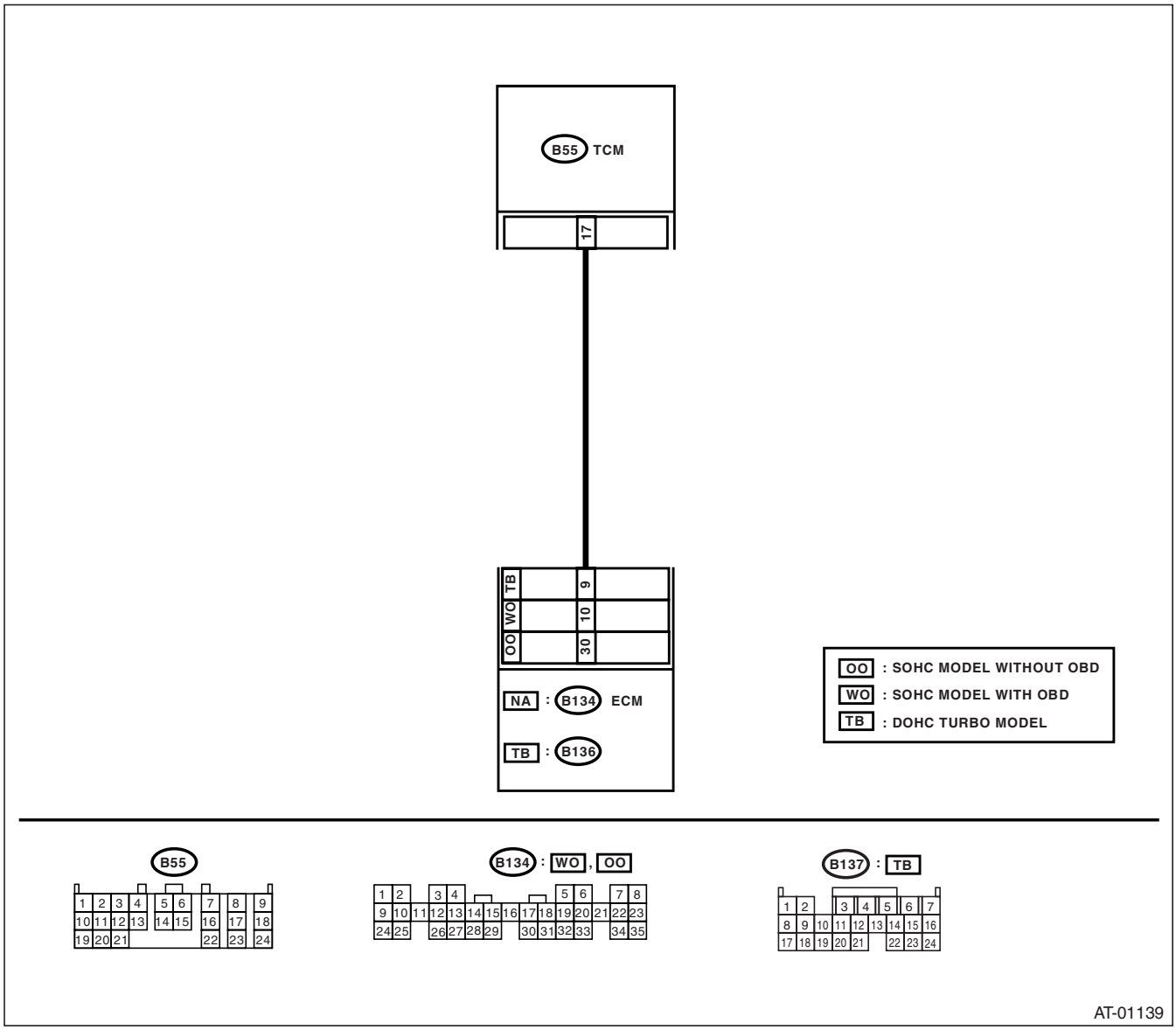
DIAGNOSIS:

The engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up).
- The POWER indicator light remains on when vehicle speed is “0”.

WIRING DIAGRAM:



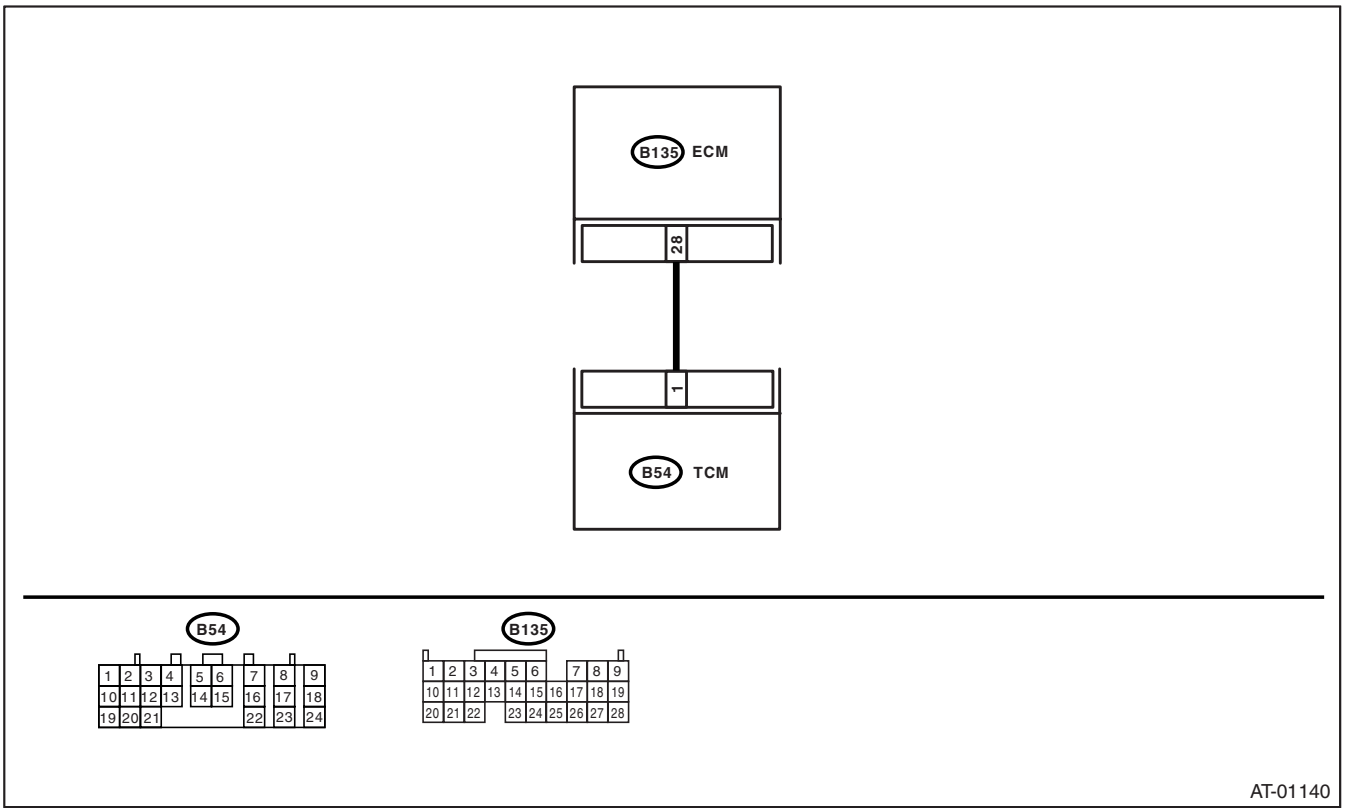
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	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM and ECM. 3)Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***SOHC MODEL WITHOUT OBD*** ***(B55) No. 17 — (B134) No. 30:*** ***SOHC MODEL WITH OBD*** ***(B55) No. 17 — (B134) No. 10:*** ***DOHC TURBO MODEL*** ***(B55) No. 17 — (B136) No. 9:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and ECM connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and ECM connector.
3	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **5.**	Go to step **4.**
4	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connectors to TCM and ECM. 2)Turn the ignition switch to ON (engine OFF). 3)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 17 (+) — Chassis ground (−):***	Is the voltage more than 10.5 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and ECM.	Go to step **6.**
5	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1)Connect the connectors to TCM and ECM. 2)Connect the 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)Idle the engine. 6)Read the data of engine speed using Subaru Select Monitor. •Display shows the engine speed signal value sent from ECM.	Is the revolution value same as tachometer reading shown on combination meter?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and ECM.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in engine speed signal circuit?	Repair the poor contact.	Go to step **7.**
7	**CONFIRM DTC 11.**	Replace the ECM with a new one. Does the DTC appear again, after memory has been cleared?	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>	Replace the ECM.

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B: DTC 23 MASS AIR FLOW SIGNAL (TURBO MODEL)

DIAGNOSIS:
The input signal circuit of TCM from ECM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM.** <Ref. to 4AT-48, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair the ground terminal and/or ground circuit of ECM.	Go to step **2.**
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM and ECM. 3)Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***(B54) No. 1 — (B135) No. 28:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and ECM connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and ECM connector.
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **6.**	Go to step **5.**

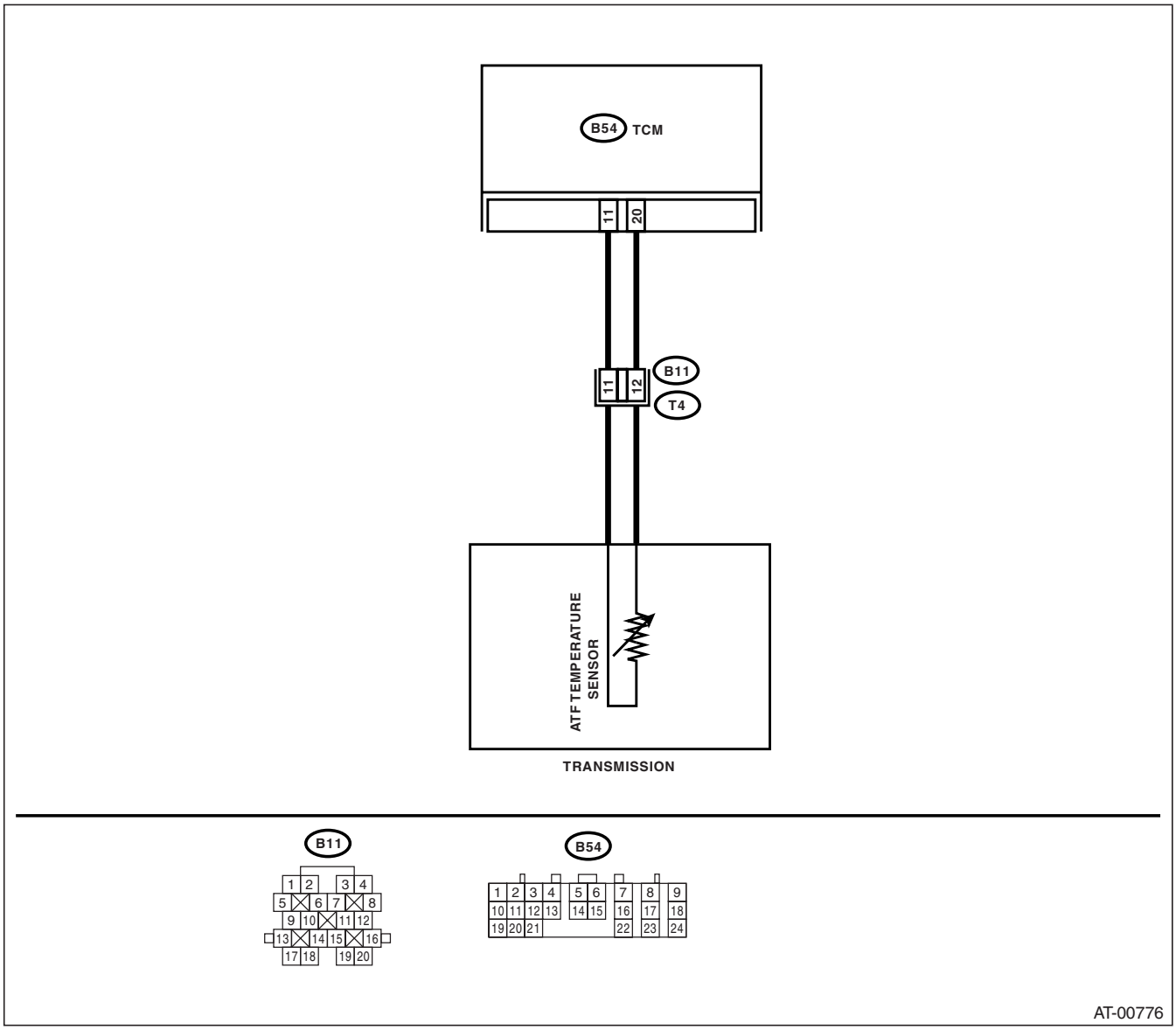
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	Step	Check	Yes	No
5	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connectors to TCM and ECM. 2)Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 3)Idle the engine. 4)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 (+) — Chassis ground (−):***	Is the voltage 0.9 — 1.4 V?	Even if the POWER indicator light up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step **7.**
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1)Connect the connectors to TCM and ECM. 2)Connect the Subaru Select Monitor to data link connector. 3)Start the engine and turn the Subaru Select Monitor switch to ON. 4)Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5)Idle the engine. 6)Read the data of mass air flow sensor signal using Subaru Select Monitor. •Display shows the mass air flow sensor signal value sent from ECM.	Is the value voltage 0.9 — 1.4 V?	Even if the POWER indicator light up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step **7.**
7	**CHECK POOR CONTACT.**	Is there poor contact in intake manifold pressure signal circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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C: DTC 27 ATF TEMPERATURE SENSOR

DIAGNOSIS:
The input signal circuit of TCM to ATF temperature sensor is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from transmission and TCM. 3)Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 20 — (B11) No. 12:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

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	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 11 — (B11) No. 11:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and transmission connector.
5	**CHECK ATF TEMPERATURE SENSOR.** 1)Turn the ignition switch to OFF. 2)Connect the connectors to transmission and TCM. 3)Turn the ignition switch to ON and start engine. 4)Warm-up the transmission until ATF temperature reaches to 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 5)Disconnect the connector from transmission. 6)Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 12:***	Is the resistance 275 — 375 Ω?	Go to step **6.**	Replace the ATF temperature sensor. <Ref. to 4AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
6	**CHECK ATF TEMPERATURE SENSOR.** 1)Turn the ignition switch to ON (engine OFF). 2)Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 12:***	Does the resistance value increase while ATF temperature decreases?	Go to step **7.**	Replace the ATF temperature sensor. <Ref. to 4AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
7	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **9.**	Go to step **8.**

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	Step	Check	Yes	No
8	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the 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 ATF reaches its operating temperature. 3)Measure the voltage between TCM connector terminal. ***Connector & terminal (B54) No. 11 (+) — No. 20 (–):***	Is the voltage 0.4 — 0.9 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in ATF temperature sensor and transmission connector.	Go to step **10.**
9	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1)Connect the connector to transmission. 2)Turn the ignition switch to ON (engine OFF).	Does the ATF temperature gradually decrease?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in ATF temperature sensor and transmission connector.	Go to step **10.**
10	**CHECK POOR CONTACT.**	Is there poor contact in ATF temperature sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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D: DTC 31 THROTTLE POSITION SENSOR

DIAGNOSIS:

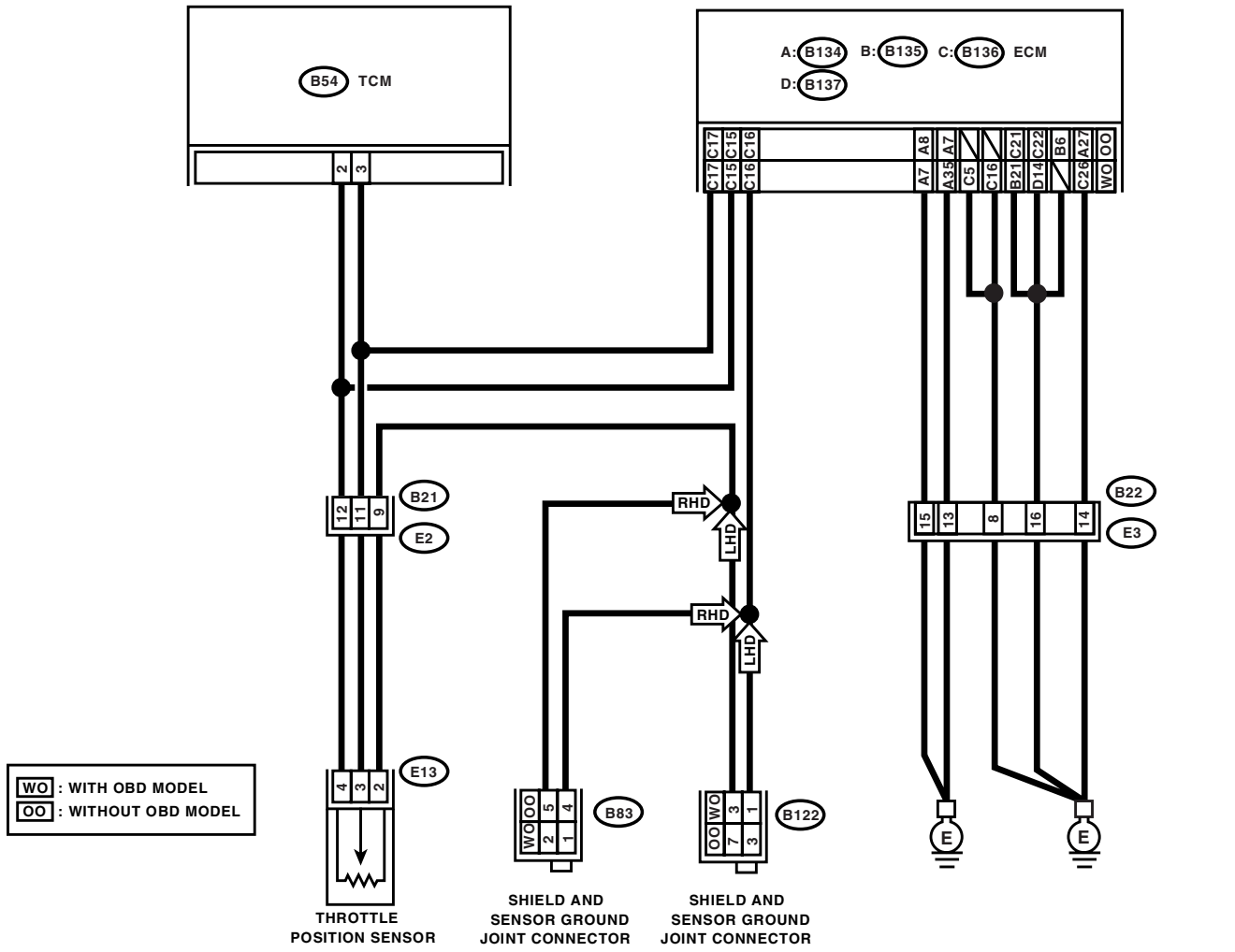
The input signal circuit of throttle position sensor is open or shorted.

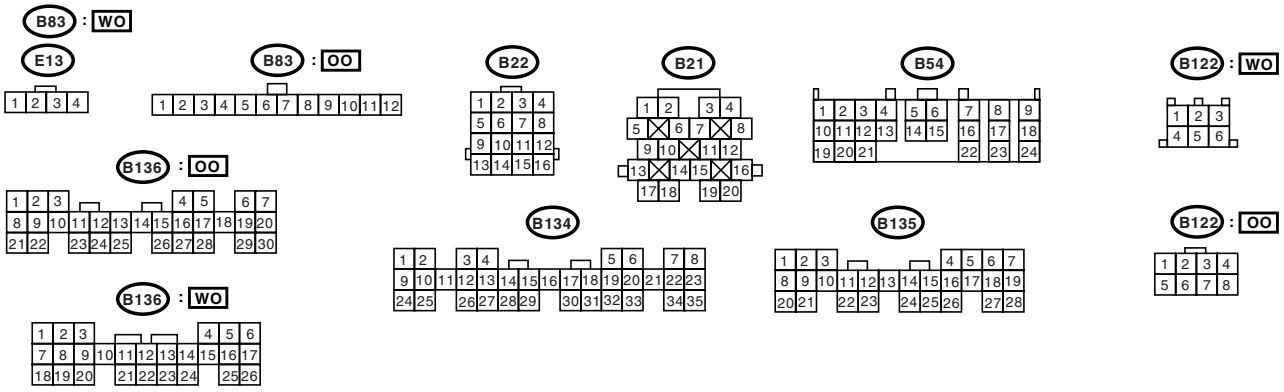
TROUBLE SYMPTOM:

Shift point too high or too low; excessive shift shock; excessive tight corner “braking”.

WIRING DIAGRAM:

SOHC MODEL

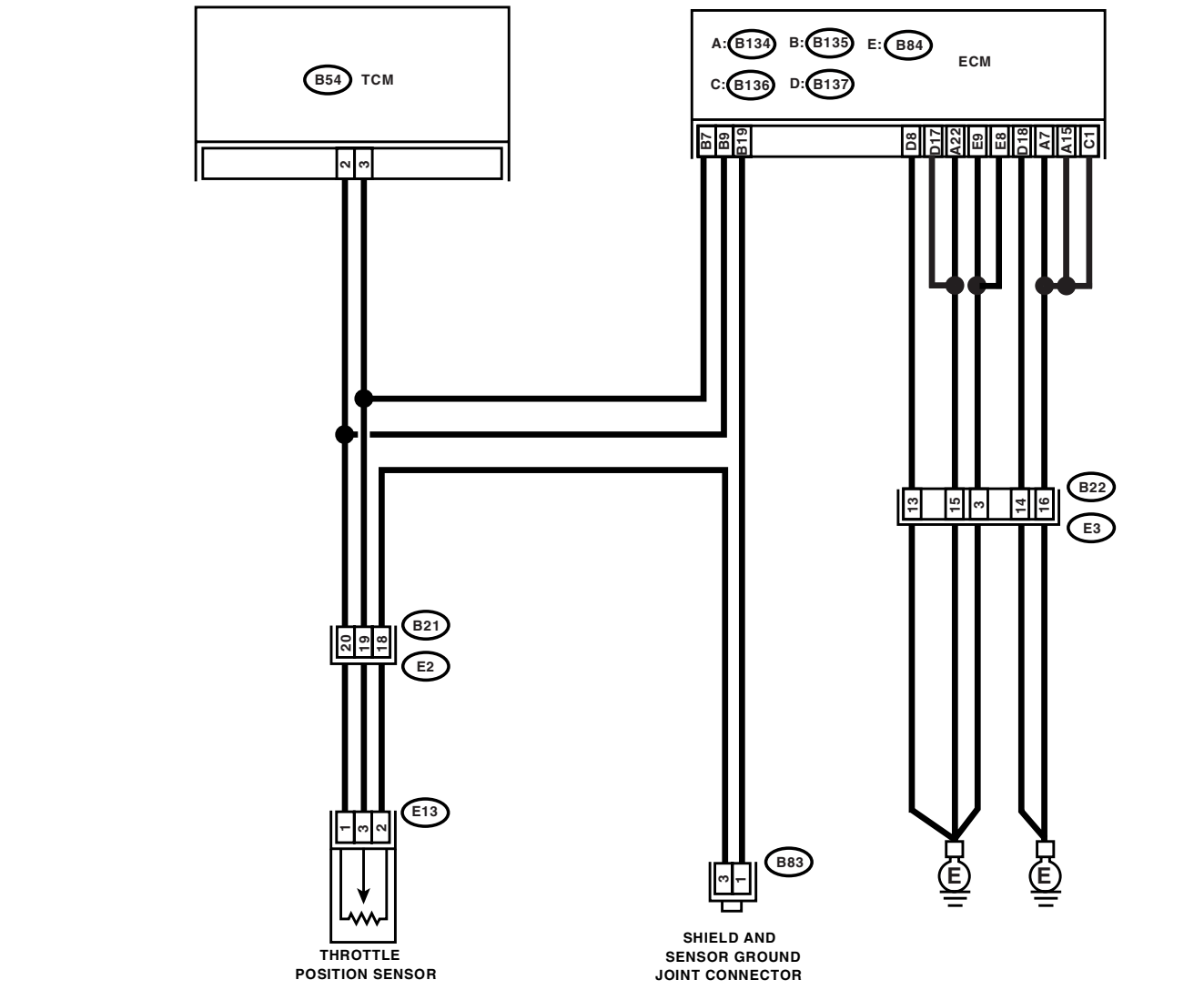


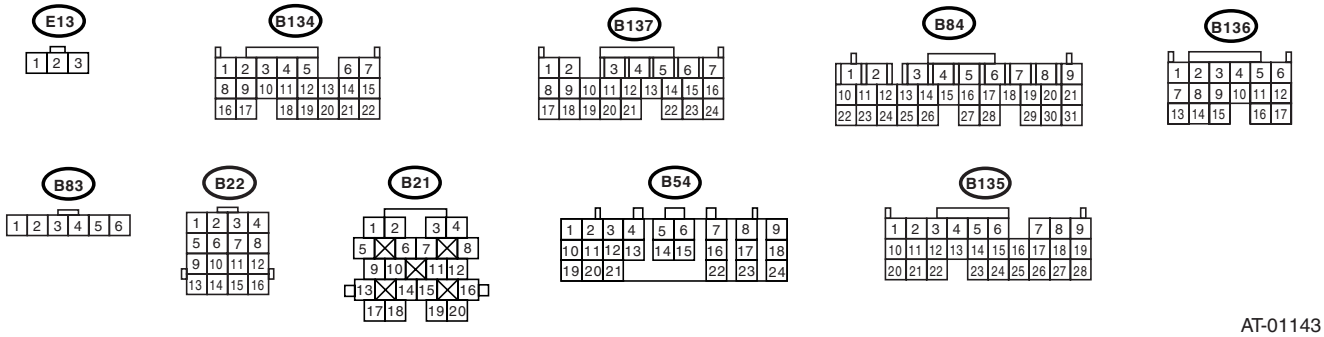


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DOHC TURBO MODEL





AT-01143

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	Step	Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS.**	Have engine ground terminals been tightened?	Go to step **2.**	Tighten the engine ground terminals.
2	**CHECK GROUND CIRCUIT OF ECM.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from ECM. 3)Measure the resistance of harness between ECM and engine ground. ***Connector & terminal*** ***SOHC MODEL WITH OBD*** ***(B134) No. 7 — Engine ground:*** ***(B134) No. 35 — Engine ground:*** ***(B134) No. 7 — Engine ground:*** ***(B135) No. 21 — Engine ground:*** ***(B136) No. 5 — Engine ground:*** ***(B136) No. 16 — Engine ground:*** ***(B137) No. 14 — Engine ground:*** ***SOHC MODEL WITHOUT OBD*** ***(B134) No. 27 — Engine ground:*** ***(B134) No. 8 — Engine ground:*** ***(B134) No. 7 — Engine ground:*** ***(B136) No. 21 — Engine ground:*** ***(B136) No. 22 — Engine ground:*** ***(B135) No. 6 — Engine ground: (RHD MODEL)*** ***DOHC TURBO MODEL*** ***(B134) No. 7 — Engine ground:*** ***(B134) No. 15 — Engine ground:*** ***(B134) No. 22 — Engine ground:*** ***(B137) No. 8 — Engine ground:*** ***(B137) No. 17 — Engine ground:*** ***(B137) No. 18 — Engine ground:*** ***(B84) No. 8 — Engine ground:*** ***(B84) No. 9 — Engine ground:*** ***(B136) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK THROTTLE POSITION SENSOR.** 1)Disconnect the connector from throttle position sensor. 2)Measure the resistance between throttle position sensor connector receptacle's terminals. ***Terminals*** ***SOHC MODEL*** ***No. 4 — No. 2:*** ***DOHC TURBO MODEL*** ***No. 1 — No. 2:***	Is the resistance 3.0 — 4.2 kΩ?	Go to step **4.**	Replace the throttle position sensor.
4	**CHECK THROTTLE POSITION SENSOR.** Measure the resistance between throttle position sensor connector receptacle's terminals. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance 0.35 — 0.5 kΩ?	Go to step **5.**	Replace the throttle position sensor.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** 1)Disconnect the connector from TCM. 2)Measure the resistance of harness between TCM and throttle position sensor connector. ***Connector & terminal*** ***(B55) No. 3 — (E13) No. 3:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.

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	Step	Check	Yes	No
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** Measure the resistance of harness between TCM and throttle position sensor connector. ***Connector & terminal*** ***SOHC MODEL*** ***(B54) No. 2 — (E13) No. 4:*** ***DOHC TURBO MODEL*** ***(B54) No. 2 — (E13) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the 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 the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between TCM and throttle position sensor connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the short circuit in harness between TCM and throttle position sensor connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***SOHC MODEL*** ***(B54) No. 3 — (B136) No. 17:*** ***DOHC TURBO MODEL*** ***(B54) No. 3 — (B135) No. 7:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit in harness between TCM and ECM connector.
10	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***SOHC MODEL*** ***(B54) No. 2 — (B136) No. 15:*** ***DOHC TURBO MODEL*** ***(B54) No. 2 — (B135) No. 9:***	Is the resistance less than 1 Ω?	Go to step **11.**	Repair the open circuit in harness between TCM and ECM connector.
11	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **14.**	Go to step **12.**
12	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connectors to TCM, throttle position sensor and ECM. 2)Turn the ignition switch to ON (engine OFF). 3)Close the throttle completely. 4)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 3 (+) — Chassis ground (−):***	Is the voltage 0.2 — 1.0 V?	Go to step **13.**	Go to step **18.**
13	**CHECK INPUT SIGNAL FOR TCM.** 1)Open the throttle completely and hold it. 2)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 3 (+) — Chassis ground (−):***	Is the voltage 4.2 — 4.7 V?	Go to step **16.**	Go to step **18.**

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	Step	Check	Yes	No
14	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1)Connect the connectors to TCM, throttle position sensor and ECM. 2)Connect the Subaru Select Monitor to data link connector. 3)Turn the ignition switch to ON (engine OFF). 4)Turn the Subaru Select Monitor switch to ON. 5)Throttle fully closed. 6)Read the data of throttle position sensor using Subaru Select Monitor. •Throttle position sensor input signal is indicated.	Is the value voltage 0.2 — 1.0 V?	Go to step **15.**	Go to step **18.**
15	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** Throttle fully open. NOTE: Must be changed correspondingly with the accelerator pedal operation (from “released” to “depressed” position).	Is the value voltage 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 the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 2 (+) — Chassis ground (−):***	Is the voltage 4.8 — 5.3 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the 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 the data of throttle position sensor power supply using Subaru Select Monitor. •Throttle position sensor power supply voltage is indicated.	Is the value voltage 4.8 — 5.3 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in throttle position sensor circuit.	Go to step **18.**
18	**CHECK POOR CONTACT.**	Is there poor contact in throttle position sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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E: DTC 33 FRONT VEHICLE SPEED SENSOR

DIAGNOSIS:

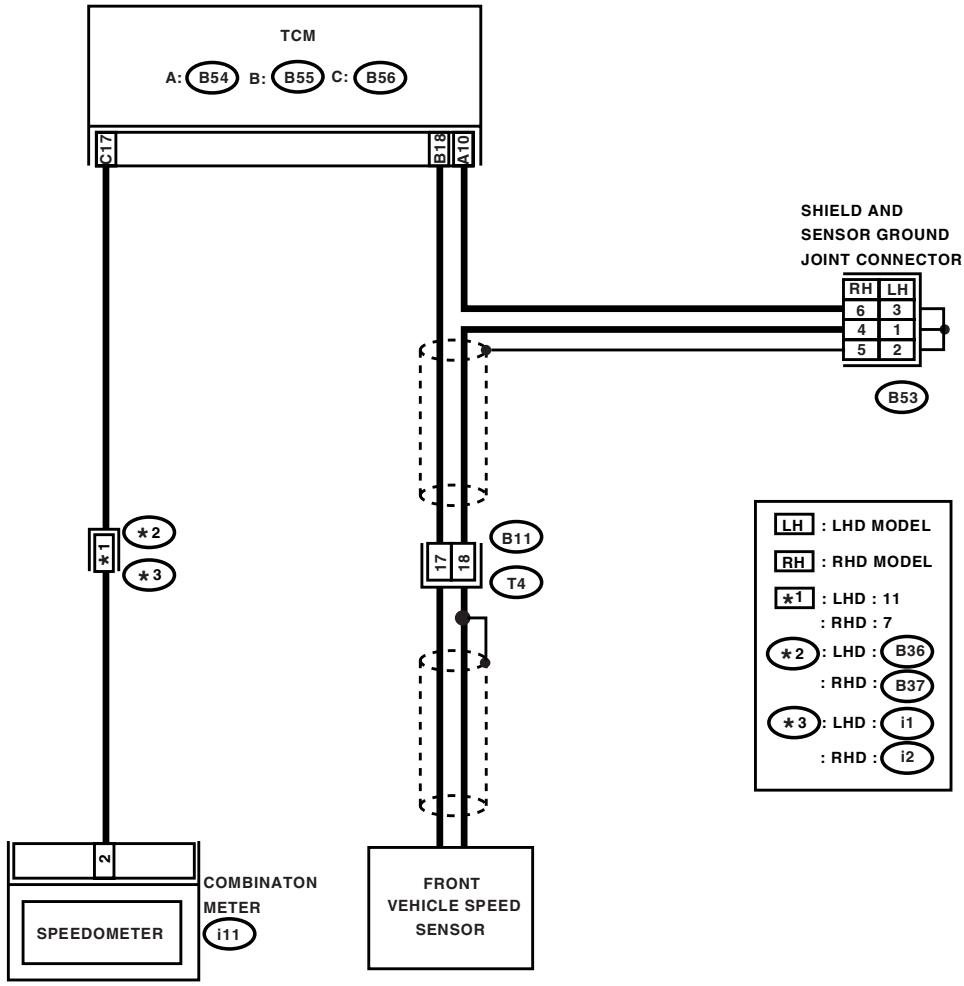
- The vehicle speed signal is abnormal.
- The circuit in combination meter is faulty.
- The harness connector between TCM and vehicle speed sensor is in short or open.

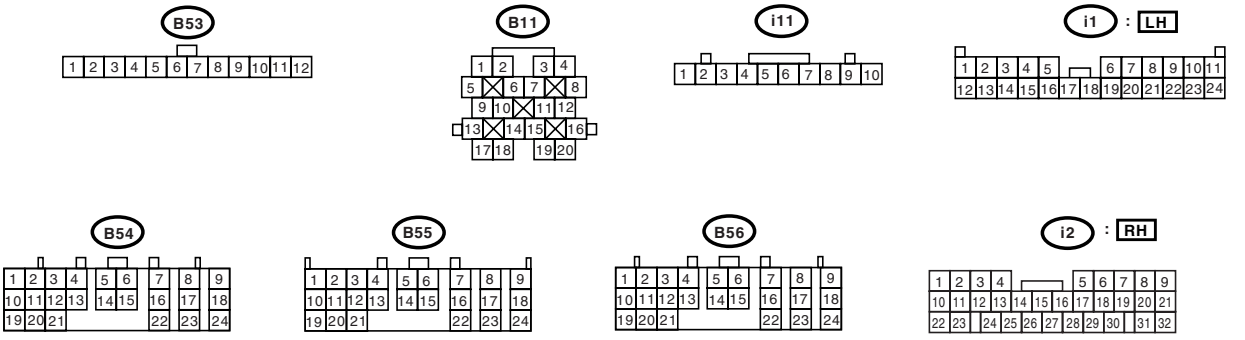
TROUBLE SYMPTOM:

- Erroneous idling.
- Engine stalls.
- Poor driving performance.

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WIRING DIAGRAM:





AT-01144

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	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and transmission. 3)Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 18 — (B11) No. 17:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 10 — (B11) No. 18:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
5	**CHECK FRONT VEHICLE SPEED SENSOR.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 17 — No. 18:***	Is the resistance 450 — 650 Ω?	Go to step **6.**	Replace the front vehicle speed sensor. <Ref. to 4AT-52, Front Vehicle Speed Sensor.>
6	**PREPARE OSCILLOSCOPE.**	Do you have an oscilloscope?	Go to step **9.**	Go to step **7.**
7	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **10.**	Go to step **8.**
8	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect all connectors. 2)Lift-up or raise the vehicle and place safety stands. NOTE: On AWD models, raise all wheels off floor. 3)Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 4)Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 18 (+) — (B54) No. 10 (−):***	Is the voltage more than AC 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact or harness may be the cause. Repair the harness or connector in the front vehicle speed sensor circuit.	Go to step **11.**

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	Step	Check	Yes	No
9	**CHECK FRONT VEHICLE SPEED SENSOR USING OSCILLOSCOPE.** 1)Connect all connectors. 2)Lift-up the vehicle and place safety stand. NOTE: On AWD models, raise all wheels off ground. 3)Set the oscilloscope to TCM connector terminals. ***Connector & terminal*** ***Positive probe; (B55) No. 18*** ***Earth lead; (B54) No. 10*** 4)Start the engine, and drive the wheels slowly. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When AT control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system. <Ref. to ABS-22, Clear Memory Mode.> 5)Measure the signal voltage indicated on oscilloscope.	Is the voltage more than AC 4 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact or harness may be the cause. Repair the harness or connector in front vehicle speed sensor circuit.	Go to step **11.**
10	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1)Connect all connectors. 2)Connect the Subaru Select Monitor to data link connector. 3)Lift-up or raise the vehicle and place safety stands. NOTE: On AWD models, raise all wheels off floor. 4)Turn the ignition switch to ON and turn Subaru Select Monitor switch to ON. 5)Start the engine. 6)Read the data of vehicle speed using Subaru Select Monitor. •Compare the speedometer with Subaru Select Monitor indications. •Vehicle speed is indicated in “km/h” or “MPH”. 7)Slowly increase the 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 Subaru Select Monitor data increases?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the cause. Repair the harness or connector in front vehicle speed sensor circuit.	Go to step **11.**
11	**CHECK POOR CONTACT.**	Is there poor contact in front vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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F: DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR

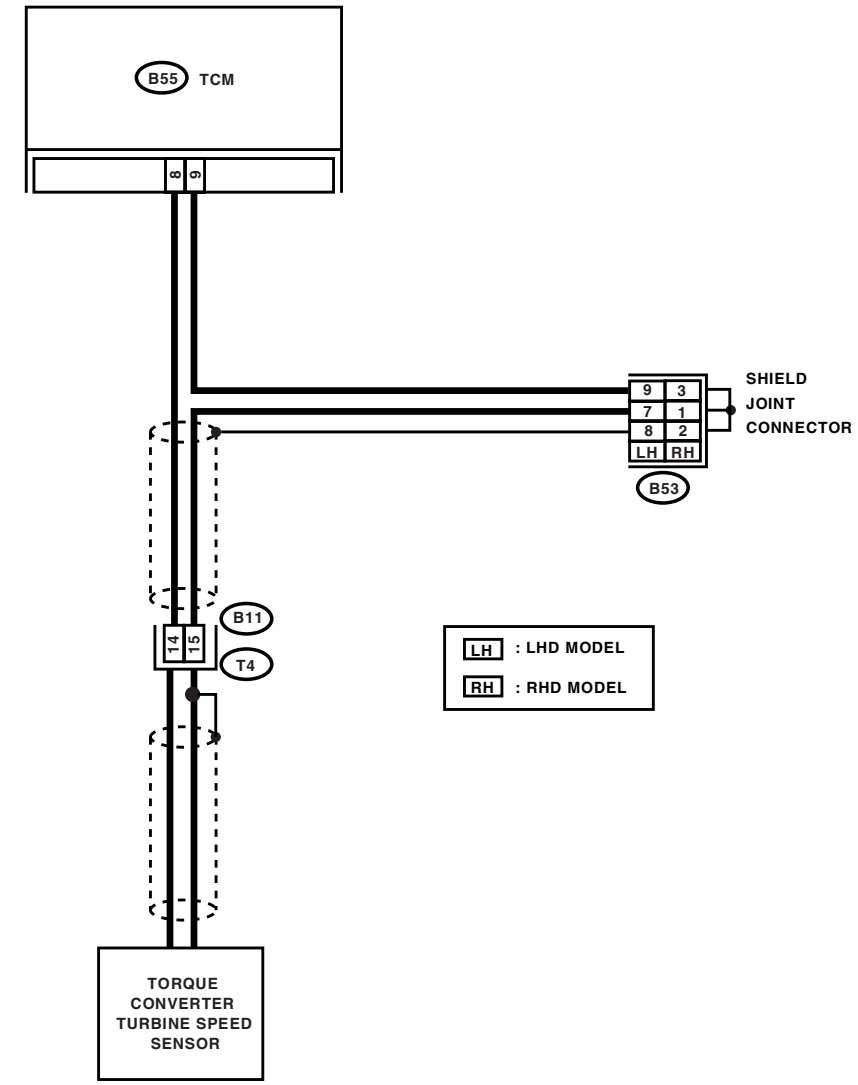
DIAGNOSIS:

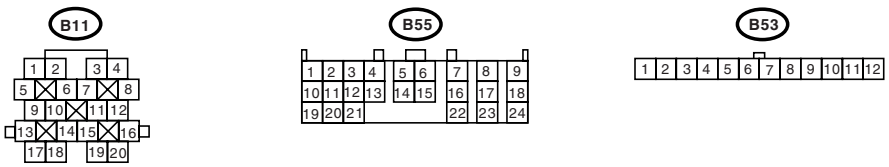
The input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:





AT-01145

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	Step	Check	Yes	No
1	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from transmission. 3)Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 14 — No. 15:***	Is the resistance 450 — 650 Ω?	Go to step **2.**	Replace the turbine speed sensor. <Ref. to 4AT-57, Torque Converter Turbine Speed Sensor.>
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Disconnect the connector from TCM. 2)Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 8 — (B11) No. 14:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 9 — (B11) No. 15:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and transmission connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
6	**PREPARE OSCILLOSCOPE.**	Do you have an oscilloscope?	Go to step **10.**	Go to step **7.**
7	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **9.**	Go to step **8.**
8	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connectors to TCM and transmission. 2)Start the engine and move select lever to “P” or “N” range. 3)Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 8 (+) — No. 9 (–):***	Is the voltage more than AC 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **11.**

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	Step	Check	Yes	No
9	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1)Connect the connectors to TCM and transmission. 2)Connect the Subaru Select Monitor to data link connector. 3)Turn the ignition switch to ON and turn Subaru Select Monitor switch to ON. 4)Start the engine. 5)Move the select lever to “P” or “N” range. 6)Read the data of turbine speed using Subaru Select Monitor. •Compare the tachometer with Subaru Select Monitor indications.	Is the revolution value same as the tachometer reading shown on the combination meter?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **11.**
10	**CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.** 1)Connect the connectors to TCM and transmission. 2)Set the oscilloscope to TCM connector terminals. ***Connector & terminal*** ***Positive probe; (B55) No. 8*** ***Earth lead; (B55) No. 9*** 3)Start the engine and move select lever to “P” or “N” range.	Is the signal voltage more than AC 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **11.**
11	**CHECK POOR CONTACT.**	Is there poor contact in torque converter turbine speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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G: DTC 38 TORQUE CONTROL SIGNAL

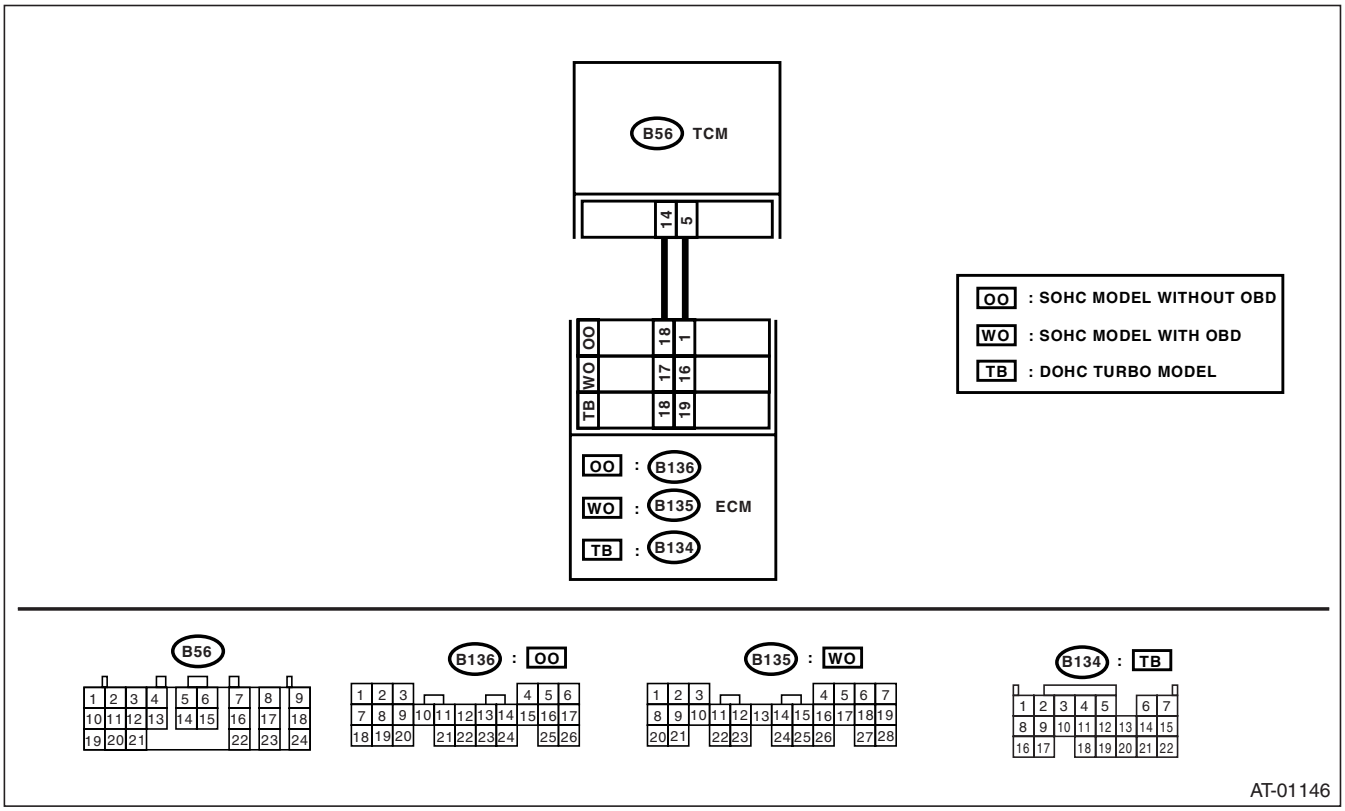
DIAGNOSIS:

- The signal circuit is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM and ECM. 3)Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***SOHC MODEL WITH OBD*** ***(B56) No. 14 — (B136) No. 18:*** ***(B56) No. 5 — (B136) No. 1:*** ***SOHC MODEL WITHOUT OBD*** ***(B56) No. 14 — (B135) No. 17:*** ***(B56) No. 5 — (B135) No. 16:*** ***DOHC TURBO MODEL*** ***(B56) No. 14 — (B134) No. 18:*** ***(B56) No. 5 — (B134) No. 19:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and ECM connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 14 — Chassis ground:*** ***(B56) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and ECM connector.

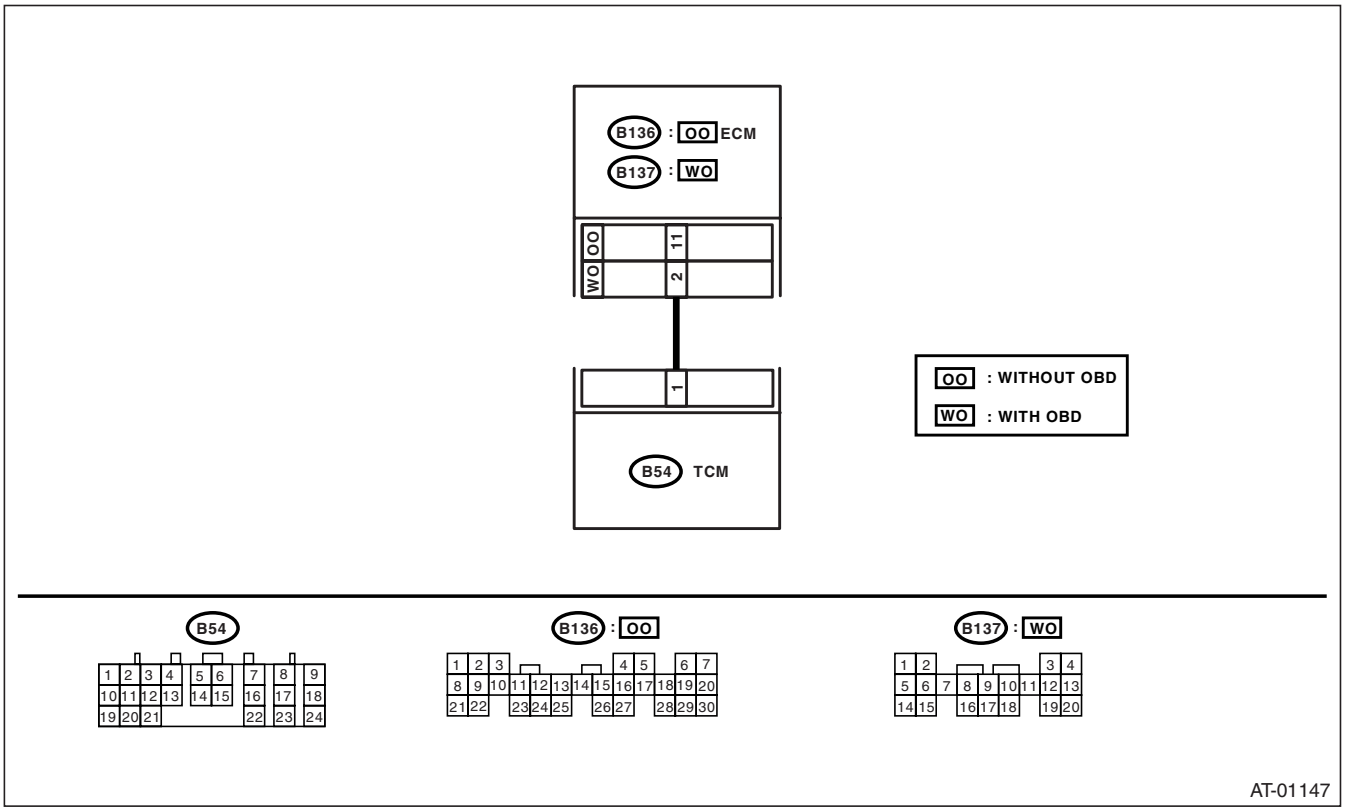
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	Step	Check	Yes	No
3	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Connect the connectors to TCM and ECM. 2)Turn the ignition switch to ON (engine OFF). 3)Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B56) No. 14 (+) — Chassis ground (−):*** ***(B56) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 4.8 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and ECM.	Go to step **4.**
4	**CHECK POOR CONTACT.**	Is there poor contact in torque control signal circuit?	Repair the poor contact.	Go to step **5.**
5	**CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.** Check installing condition of the ground line in transmission and body.	Is there any dirt or rust at the ground line installing point?	Remove dirt and rust.	Go to step **6.**
6	**CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.** Check installing condition of the ground line in transmission and body. ***Tightening torque:*** ***10 — 16 N·m (1.0 — 1.6 kgf-m, 7.2 — 11.6 ft-lb)***	Is the tightening torque value within specification?	Go to step **7.**	Tighten to the specified torque.
7	**CHECK GROUND LINE INSIDE TRANSMISSION.** 1)Drain the ATF and remove oil pan. 2)Check the tightening torque value of ground line installing bolt. ***Tightening torque:*** ***7 — 9 N·m (0.7 — 0.9 kgf-m, 5.1 — 6.5 ft-lb)***	Is the tightening torque value within specification?	Go to step **9.**	Tighten to the specified torque.
8	**CHECK GROUND CIRCUIT OF ECM.** <Ref. to 4AT-48, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair the ground terminal and/or ground circuit of ECM.	Go to step **9.**
9	**RECHECK OUTPUT SIGNAL EMITTED FROM TCM.** Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 14 (+) — Chassis ground (−):*** ***(B56) No. 5 (+) — Chassis ground (−):***	Is each voltage more than 4 V?	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>	Replace the ECM.

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H: DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL (NON-TURBO MODEL)

DIAGNOSIS:
The input signal circuit of TCM from ECM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM** <Ref. to 4AT-48, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair the ground terminal and/or ground circuit of ECM.	Go to step **2.**
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM and ECM. 3)Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***SOHC WITHOUT OBD MODEL*** ***(B54) No. 1 — (B136) No. 11:*** ***SOHC WITH OBD MODEL*** ***(B54) No. 1 — (B137) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and ECM connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and ECM connector.

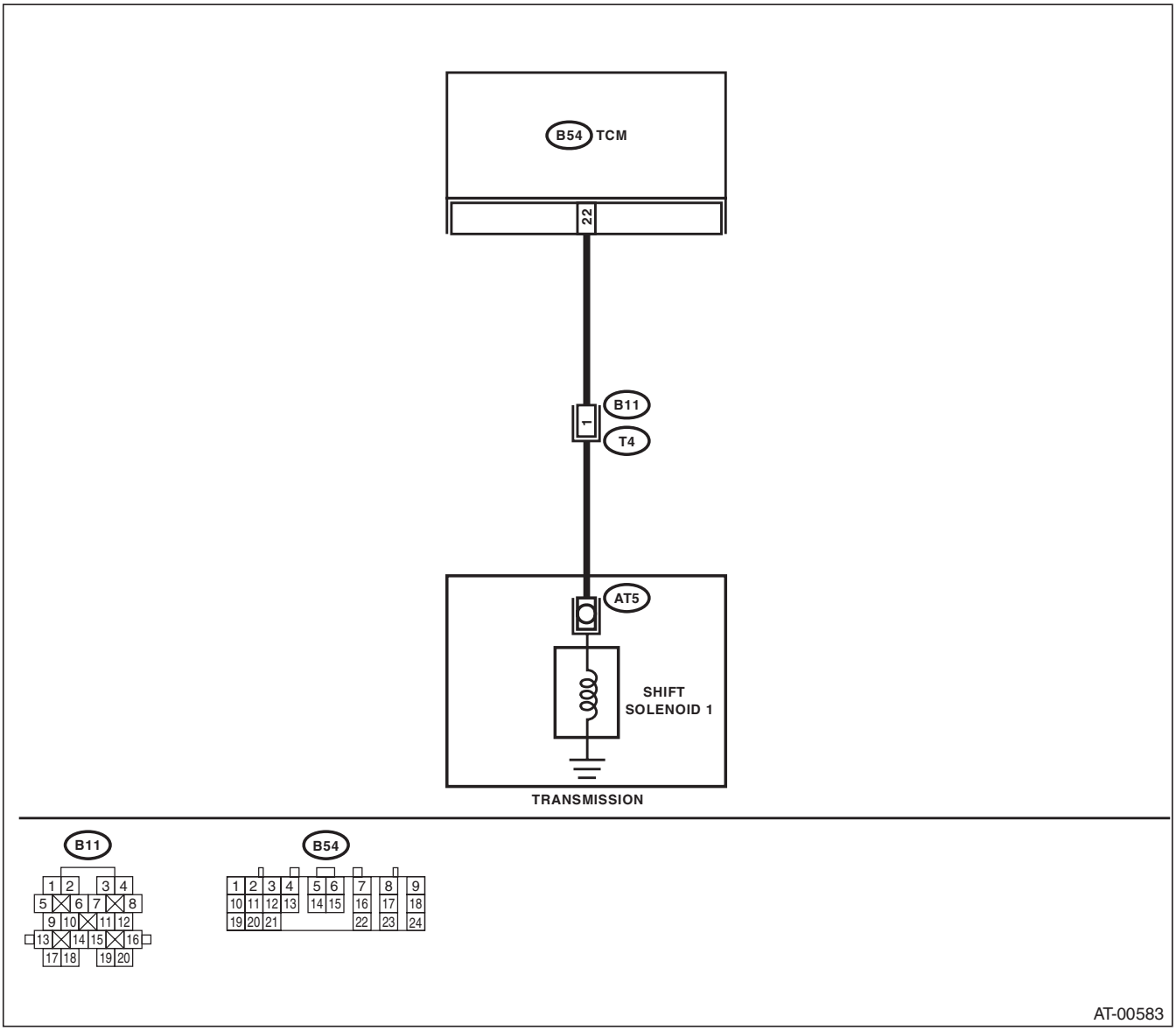
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	Step	Check	Yes	No
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connectors to TCM and ECM. 2)Start the engine, and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 3)Idle the engine. 4)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 (+) — Chassis ground (−):***	Is the voltage 0.4 — 1.6 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and ECM.	Go to step **7.**
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1)Connect the connectors to TCM and ECM. 2)Connect the 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)Idle the engine. 6)Read the data of intake manifold pressure signal using Subaru Select Monitor. •Display shows the intake manifold pressure signal value sent from ECM.	Is the value voltage 0.4 — 1.6 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and ECM.	Go to step **7.**
7	**CHECK POOR CONTACT.**	Is there poor contact in intake manifold pressure signal circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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I: DTC 71 SHIFT SOLENOID 1

DIAGNOSIS:
The output signal circuit of shift solenoid 1 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and transmission. 3)Measure the resistance of harness between TCM and shift solenoid 1 connector. ***Connector & terminal*** ***(B54) No. 22 — (B11) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

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	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK SHIFT SOLENOID 1.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 1 — No. 16:***	Is the resistance 10 — 16 Ω?	Go to step **4.**	Go to step **7.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Connect the connectors to TCM and transmission. 2)Turn the ignition switch to ON (engine OFF). 3)Move the select lever to “D” range. 4)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 22 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Turn the HOLD mode switch to ON. 2)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 22 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in TCM.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in shift solenoid 1 circuit?	Repair poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
7	**CHECK SHIFT SOLENOID 1 (IN TRANSMISSION).** 1)Remove the transmission connector from bracket. 2)Lift-up or raise the vehicle and support with safety stand. NOTE: On AWD models, raise all wheels off ground. 3)Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 4)Remove the oil pan, and disconnect connector from shift solenoid 1. 5)Measure the resistance between shift solenoid 1 connector and transmission ground. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 16 Ω?	Go to step **8.**	Replace the shift solenoid 1. <Ref. to 4AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

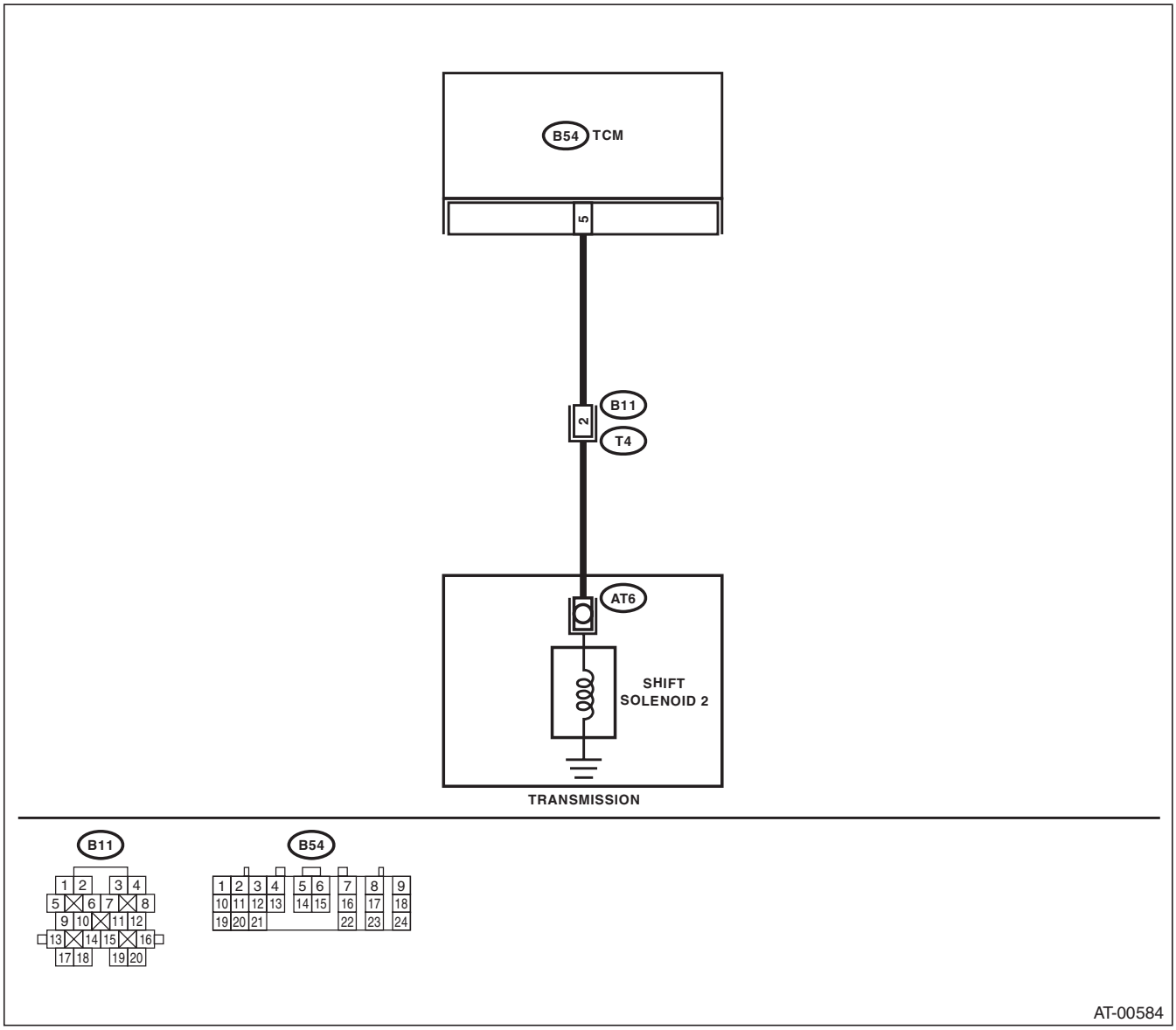
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	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.** Measure the resistance of harness between shift solenoid 1 and transmission connector. ***Connector & terminal*** ***(T4) No. 1 — (AT5) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between shift solenoid 1 and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.** Measure the resistance of harness between shift solenoid 1 connector and transmission ground. ***Connector & terminal*** ***(T4) No. 1 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in shift solenoid 1 and transmission.	Repair the short circuit harness between shift solenoid 1 and transmission connector.

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J: DTC 72 SHIFT SOLENOID 2

DIAGNOSIS:
The output signal circuit of shift solenoid 2 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and transmission. 3)Measure the resistance of harness between TCM and shift solenoid 2 connector. ***Connector & terminal*** ***(B54) No. 5 — (B11) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

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	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B54) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK SHIFT SOLENOID 2.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 2 — No. 16:***	Is the resistance 10 — 16 Ω?	Go to step **4.**	Go to step **6.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Connect the connectors to TCM and transmission. 2)Lift-up or raise the vehicle and support with safety stand. NOTE: On AWD models, raise all wheels off ground. 3)Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 4)Move the selector lever to “D” range, and slowly increase vehicle speed to 50 km/h (31 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 5 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **5.**
5	**CHECK POOR CONTACT.**	Is there poor contact in shift solenoid 2 circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
6	**CHECK SHIFT SOLENOID 2 (IN TRANSMISSION).** 1)Remove the transmission connector from bracket. 2)Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3)Remove the oil pan, and disconnect connector from shift solenoid 2. 4)Measure the resistance between shift solenoid 2 connector and transmission ground. ***Connector & terminal*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 16 Ω?	Go to step **7.**	Replace the shift solenoid 2. <Ref. to 4AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

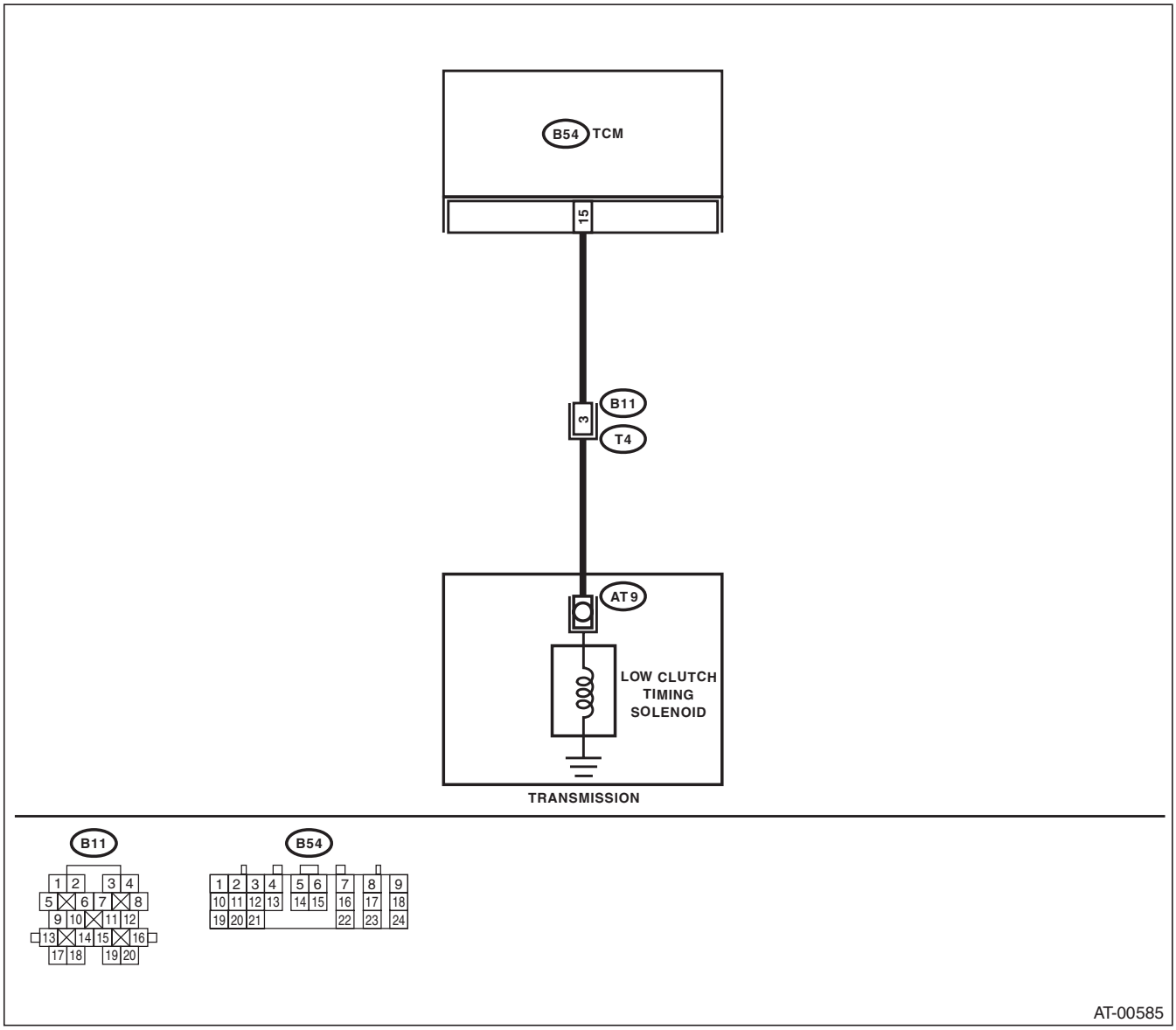
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	Step	Check	Yes	No
7	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.** Measure the resistance of harness between shift solenoid 2 and transmission connector. ***Connector & terminal*** ***(AT6) No. 1 — (T4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between shift solenoid 2 and transmission connector.
8	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.** Measure the resistance of harness between shift solenoid 2 connector and transmission ground. ***Connector & terminal*** ***(T4) No. 2 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in shift solenoid 2 and transmission.	Repair the short circuit harness between shift solenoid 2 and transmission connector.

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K: DTC 73 LOW CLUTCH TIMING SOLENOID

DIAGNOSIS:
The output signal circuit of low clutch timing solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and transmission. 3)Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 15 — (B11) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

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	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B54) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK LOW CLUTCH TIMING SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 3 — No. 16:***	Is the resistance 10 — 16 Ω?	Go to step **4.**	Go to step **7.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Connect the connectors to TCM and transmission. 2)Turn the ignition switch to ON (engine OFF). 3)Move the select lever to "D" range. 4)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 15 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Turn the HOLD mode switch to ON. 2)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 15 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in TCM and transmission.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in low clutch timing solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
7	**CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION).** 1)Remove the transmission connector from bracket. 2)Lift-up or raise the vehicle and support with safety stand. NOTE: On AWD models, raise all wheels off ground. 3)Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 4)Remove the oil pan, and disconnect connector from low clutch timing solenoid. 5)Measure the resistance between low clutch timing solenoid connector and transmission ground. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 16 Ω?	Go to step **8.**	Replace the low clutch timing solenoid. <Ref. to 4AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

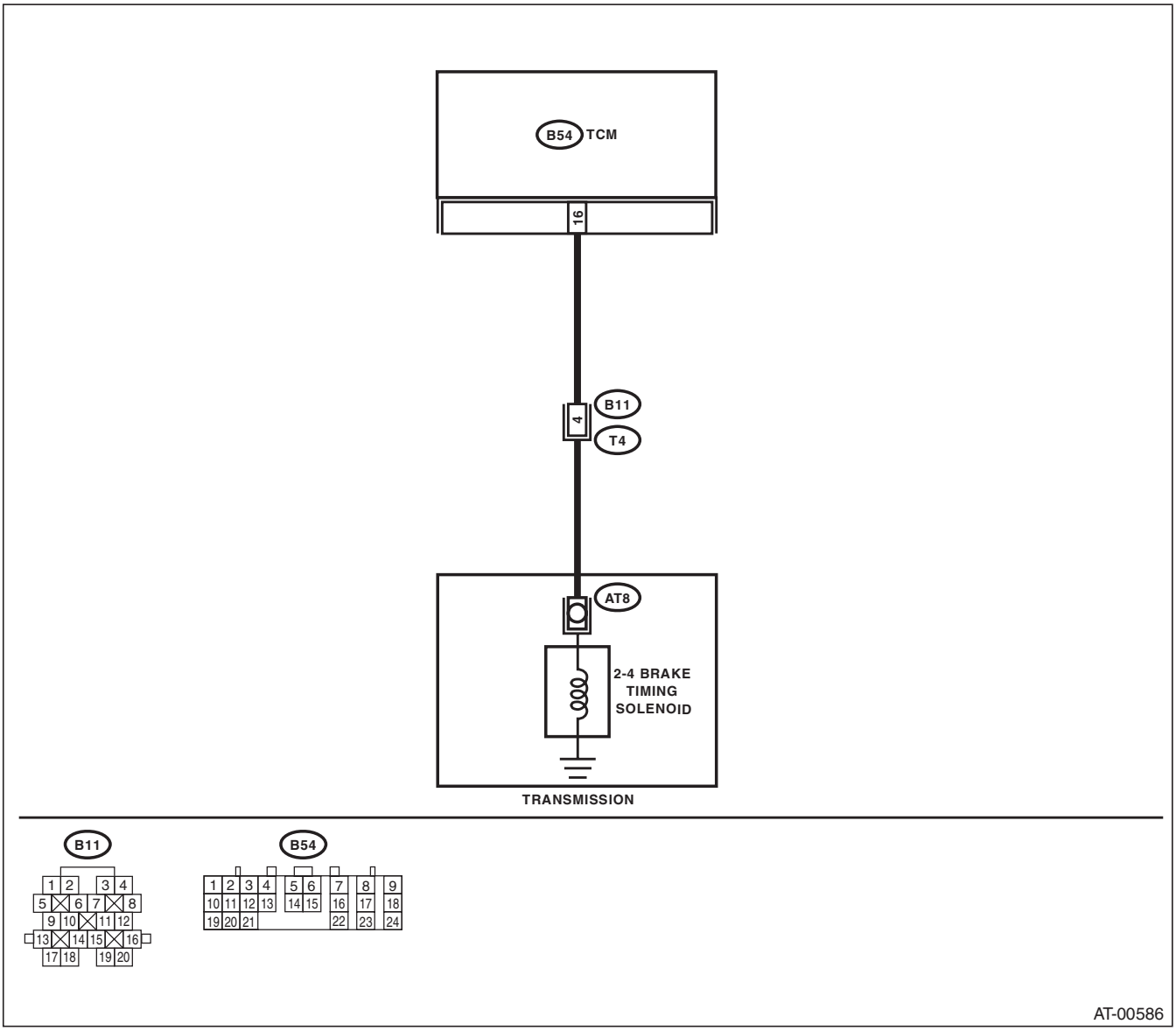
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	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.** Measure the resistance of harness between low clutch timing solenoid and transmission connector. ***Connector & terminal*** ***(AT9) No. 1 — (T4) No. 3:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between low clutch timing solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.** Measure the resistance of harness between low clutch timing solenoid connector and transmission ground. ***Connector & terminal*** ***(T4) No. 3 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in low clutch timing solenoid and transmission.	Repair the short circuit harness between low clutch timing solenoid and transmission connector.

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L: DTC 74 2-4 BRAKE TIMING SOLENOID

DIAGNOSIS:
The output signal circuit of 2-4 brake timing solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and transmission. 3)Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 16 — (B11) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

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	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B54) No. 16 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK 2-4 BRAKE TIMING SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 4 — No. 16:***	Is the resistance 10 — 16 Ω?	Go to step **4.**	Go to step **7.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Connect the connectors to TCM and transmission. 2)Lift-up or raise the vehicle and support with safety stand. NOTE: On AWD models, raise all wheels off ground. 3)Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 4)Move the selector lever to "1" range, and slowly increase vehicle speed to 10 km/h (6 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Move the selector lever to "D" range, and slowly increase vehicle speed to 65 km/h (40 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 2)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in transmission.	Go to step **6.**

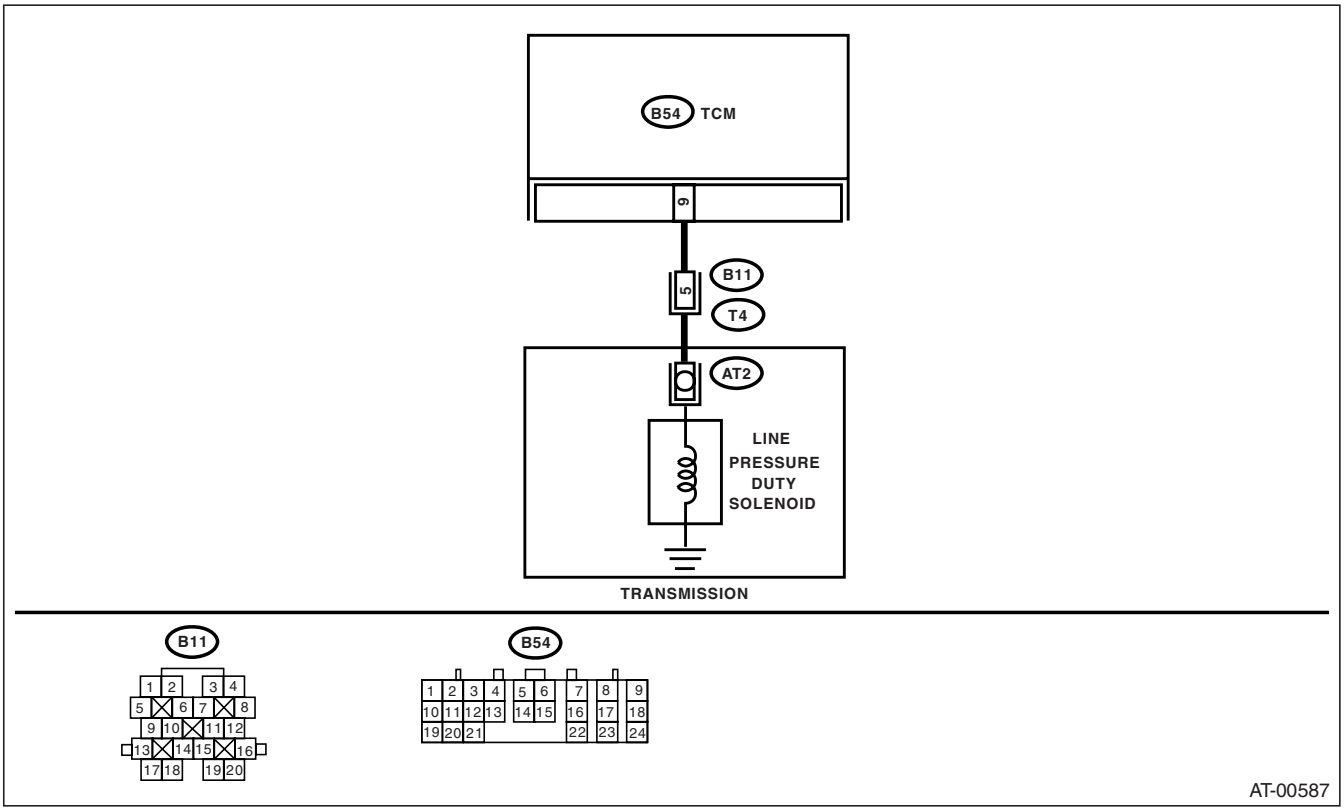
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	Step	Check	Yes	No
6	**CHECK POOR CONTACT.**	Is there poor contact in 2-4 brake timing solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
7	**CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION).** 1)Remove the transmission connector from bracket. 2)Lift-up or raise the vehicle and support with safety stand. NOTE: On AWD models, raise all wheels off ground. 3)Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 4)Remove the oil pan, and disconnect connector from 2-4 brake timing solenoid. 5)Measure the resistance between 2-4 brake timing solenoid connector and transmission ground. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 16 Ω?	Go to step **8.**	Replace the 2-4 brake timing solenoid. <Ref. to 4AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	**CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.** Measure the resistance of harness between 2-4 brake timing solenoid and transmission connector. ***Connector & terminal*** ***(AT8) No. 1 — (T4) No. 4:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the 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 the resistance of harness between 2-4 brake timing solenoid connector and transmission ground. ***Connector & terminal*** ***(T4) No. 4 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in 2-4 brake timing solenoid and transmission.	Repair the short circuit harness between 2-4 brake timing solenoid and transmission connector.

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M: DTC 75 LINE PRESSURE DUTY SOLENOID

DIAGNOSIS:
The output signal circuit of line pressure duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from transmission and TCM. 3)Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 9 — (B11) No. 5:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK LINE PRESSURE DUTY SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Terminals*** ***(T4) No. 5 — No. 16:***	Is the resistance between 2.0 and 4.5 Ω?	Go to step **4.**	Go to step **10.**
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **7.**	Go to step **5.**

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	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Connect all connectors. 2)Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 3)Turn the ignition switch to ON (engine OFF). 4)Move the select lever to "N" range. 5)Throttle fully closed. 6)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 9 (+) — Chassis ground (−):***	Is the voltage 1.5 — 5.0 V?	Go to step **6.**	Go to step **9.**
6	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Throttle fully open and hold it. 2)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 9 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in transmission.	Go to step **9.**
7	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1)Connect the connectors to TCM and transmission. 2)Connect the 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 ATF reaches its operating temperature. 5)Stop the engine and turn ignition switch to ON (engine OFF). 6)Move the select lever to "N" range. 7)Throttle is fully closed. •Line pressure duty solenoid is indicated in "%". 8)Read the data of line pressure duty solenoid using Subaru Select Monitor.	Is the value 100 %?	Go to step **8.**	Go to step **9.**

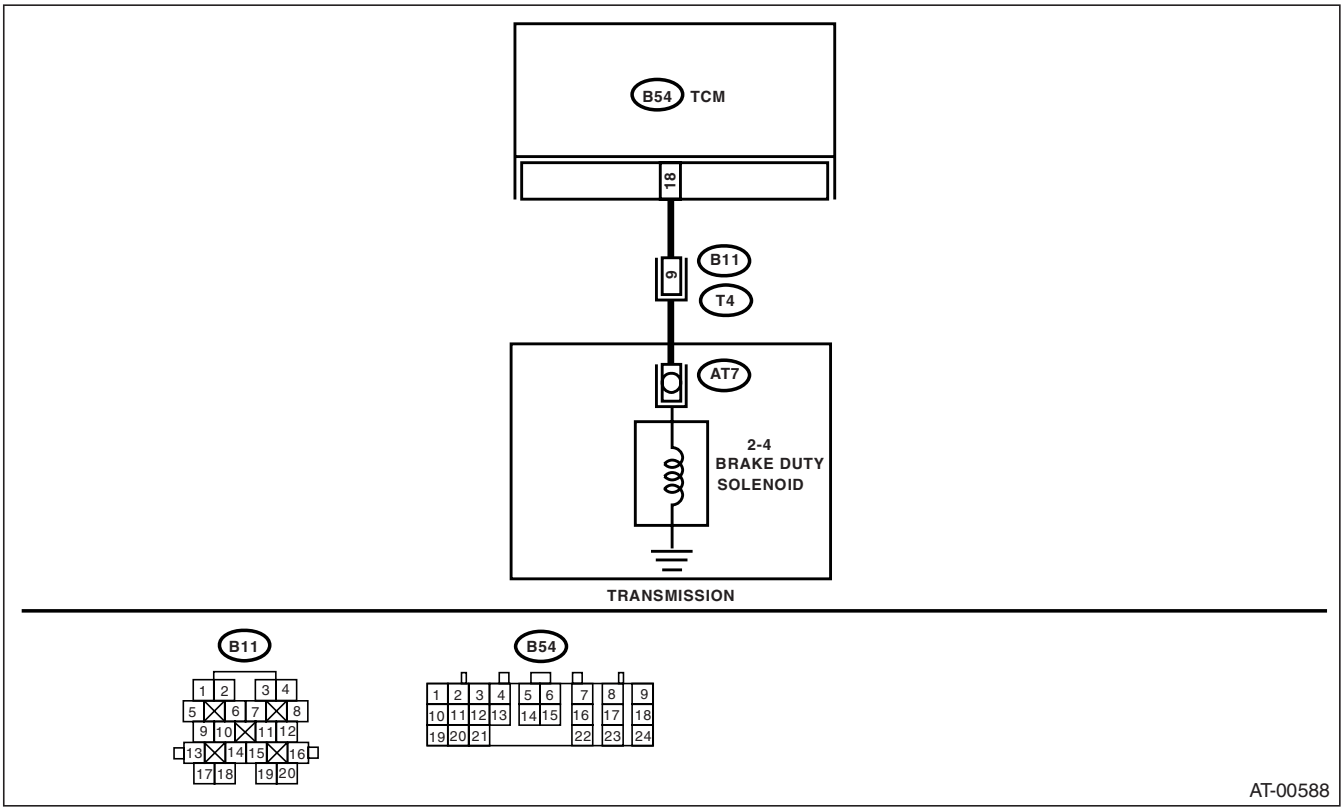
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	Step	Check	Yes	No
8	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1)Turn the ignition switch to ON (engine OFF). 2)Throttle is fully open.	Is the value less than 25 %?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in transmission.	Go to step **9.**
9	**CHECK POOR CONTACT.**	Is there poor contact in line pressure duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
10	**CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION).** 1)Remove the transmission connector from bracket. 2)Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3)Remove the oil pan, and disconnect connector from line pressure duty solenoid. 4)Measure the resistance between line pressure duty solenoid connector and transmission ground. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 2.0 — 4.5 Ω?	Go to step **11.**	Replace the line pressure duty solenoid. <Ref. to 4AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
11	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.** Measure the resistance of harness between line pressure duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 5 — (AT2) No. 1:***	Is the resistance less than 1 Ω?	Go to step **12.**	Repair the open circuit in harness between line pressure duty solenoid and transmission connector.
12	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 5 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in line pressure duty solenoid and transmission.	Repair the short circuit in harness between line pressure duty solenoid and transmission connector.

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N: DTC 76 2-4 BRAKE DUTY SOLENOID

DIAGNOSIS:
The output signal circuit of 2-4 brake duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from transmission and TCM. 3)Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 18 — (B11) No. 9:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK 2-4 BRAKE DUTY SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Terminals*** ***(T4) No. 16 — No. 9:***	Is the resistance 2.0 — 4.5 Ω?	Go to step **4.**	Go to step **10.**
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **7.**	Go to step **5.**

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	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Connect all connectors. 2)Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 3)Turn the ignition switch to ON (engine OFF). 4)Move the select lever to "N" range. 5)Throttle fully closed. 6)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 18 (+) — Chassis ground (−):***	Is the voltage 1.5 — 5.0 V?	Go to step **6.**	Go to step **9.**
6	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Throttle fully open and hold it. 2)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 18 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **9.**
7	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1)Connect all connectors. 2)Connect the 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 ATF reaches its operating temperature. 5)Stop the engine and turn ignition switch to ON (engine OFF). 6)Move the select lever to "N" range. 7)Throttle is fully closed. •2-4 brake duty solenoid is indicated in "%". 8)Read the data of 2-4 brake duty solenoid using Subaru Select Monitor.	Is the value 100 %?	Go to step **8.**	Go to step **9.**

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	Step	Check	Yes	No
8	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1)Turn the ignition switch to ON (engine OFF). 2)Throttle is fully open.	Is the value less than 25 %?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **9.**
9	**CHECK POOR CONTACT.**	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
10	**CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION).** 1)Remove the transmission connector from bracket. 2)Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3)Remove the oil pan, and disconnect connector from 2-4 brake duty solenoid. 4)Measure the resistance between 2-4 brake duty solenoid connector and transmission ground. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 2.0 — 4.5 Ω?	Go to step **11.**	Replace the 2-4 brake duty solenoid. <Ref. to 4AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
11	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.** Measure the resistance of harness between 2-4 brake duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 9 — (AT7) No. 1:***	Is the resistance less than 1 Ω?	Go to step **12.**	Repair the open circuit in harness between 2-4 brake duty solenoid and transmission connector.
12	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 9 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in line pressure duty solenoid and transmission.	Repair the short circuit in harness between 2-4 brake duty solenoid and transmission connector.

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O: DTC 77 LOCK-UP DUTY SOLENOID

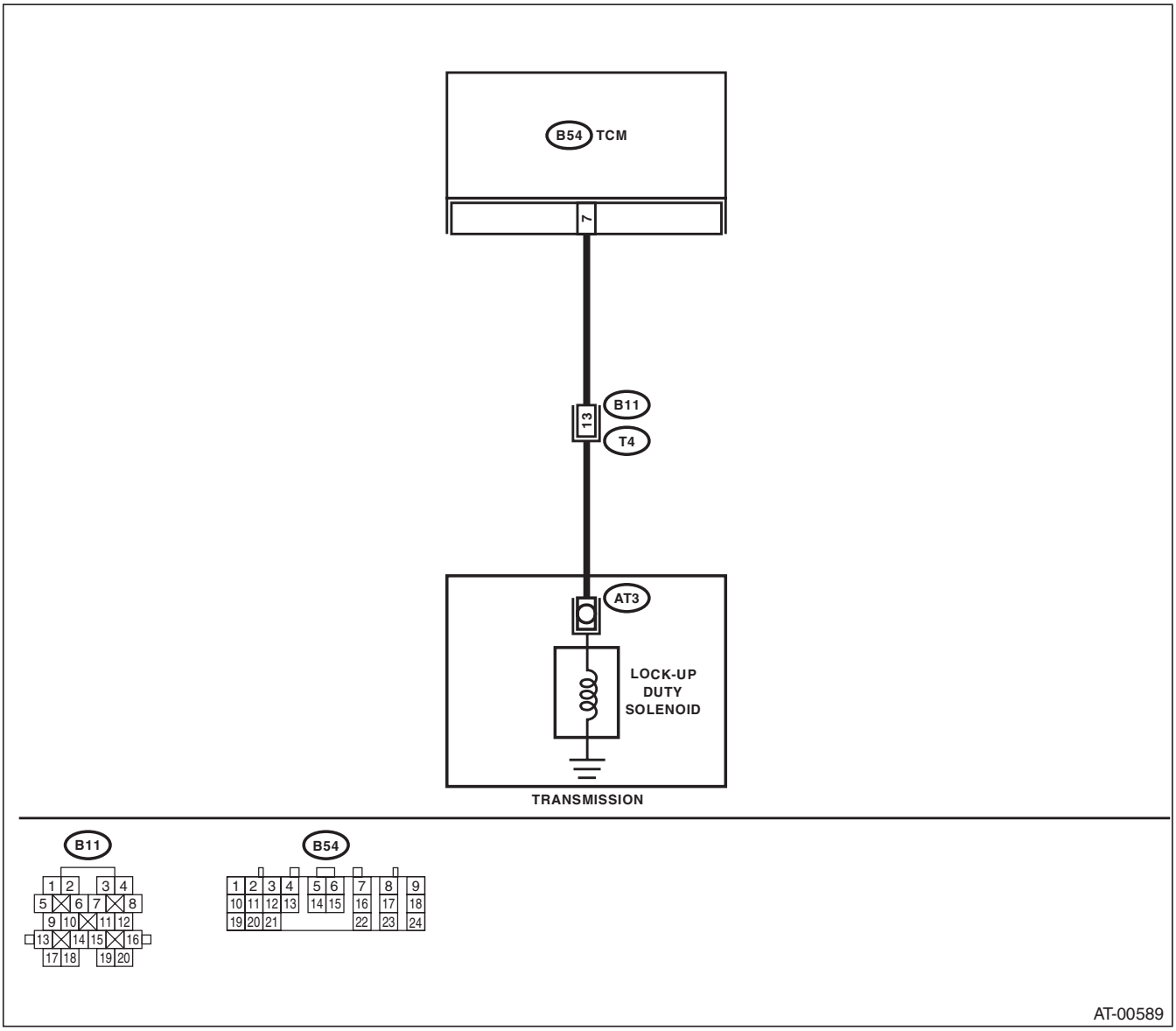
DIAGNOSIS:

The output signal circuit of lock-up duty solenoid is open or shorted.

TROUBLE SYMPTOM:

No “lock-up” (after engine warm-up).

WIRING DIAGRAM:



Step	Check	Yes	No
1 CHECK DTC.	Do multiple DTCs appear in the on-board diagnostics test mode?	Go to another DTC.	Go to step **2.**

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	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and transmission. 3)Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 7 — (B11) No. 13:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK LOCK-UP DUTY SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 13 — No. 16:***	Is the resistance 10 — 17 Ω?	Go to step **5.**	Go to step **11.**
5	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **8.**	Go to step **6.**
6	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Connect the connectors to TCM and transmission. 2)Lift-up the vehicle and place safety stand. NOTE: On AWD models, raise all wheels off ground. 3)Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 4)Move the selector lever to “D” range and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 8.5 V?	Go to step **7.**	Go to step **10.**

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	Step	Check	Yes	No
7	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Return the engine to idling speed and move select lever to "N" range. 2)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 7 (+) — Chassis ground (−):***	Is the voltage less than 0.5 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **10.**
8	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1)Connect the connectors to TCM and transmission. 2)Lift-up the vehicle and place safety stand. NOTE: On AWD models, raise all wheels off ground. 3)Connect the Subaru Select Monitor to data link connector. 4)Start the engine and turn Subaru Select Monitor switch to ON. 5)Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 6)Read the data of lock-up duty solenoid using Subaru Select Monitor. •Lock-up duty solenoid is indicated in "%". 7)Move the selector lever to "D" range and slowly increase vehicle speed to 75 km/h (47 MPH). Wheels will lock-up. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Is the value 95 %?	Go to step **9.**	Go to step **10.**
9	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** Return the engine to idling speed and move selector lever to "N" range. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Is the value 5 %?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **10.**

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	Step	Check	Yes	No
10	**CHECK POOR CONTACT.**	Is there poor contact in lock-up duty solenoid circuit?	Repair poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
11	**CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION).** 1)Remove the transmission connector from bracket. 2)Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3)Remove the oil pan and disconnect connector from lock-up duty solenoid. 4)Measure the resistance between lock-up duty solenoid connector and transmission ground. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 17 Ω?	Go to step **12.**	Replace the lock-up duty solenoid. <Ref. to 4AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
12	**CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between lock-up duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 13 — (AT3) No. 1:***	Is the resistance less than 1 Ω?	Go to step **13.**	Repair the open circuit in harness between TCM and transmission connector.
13	**CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 13 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in lock-up duty solenoid and transmission.	Repair the short circuit in harness between lock-up duty solenoid and transmission connector.

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P: DTC 78 SPORT SHIFT SOLENOID

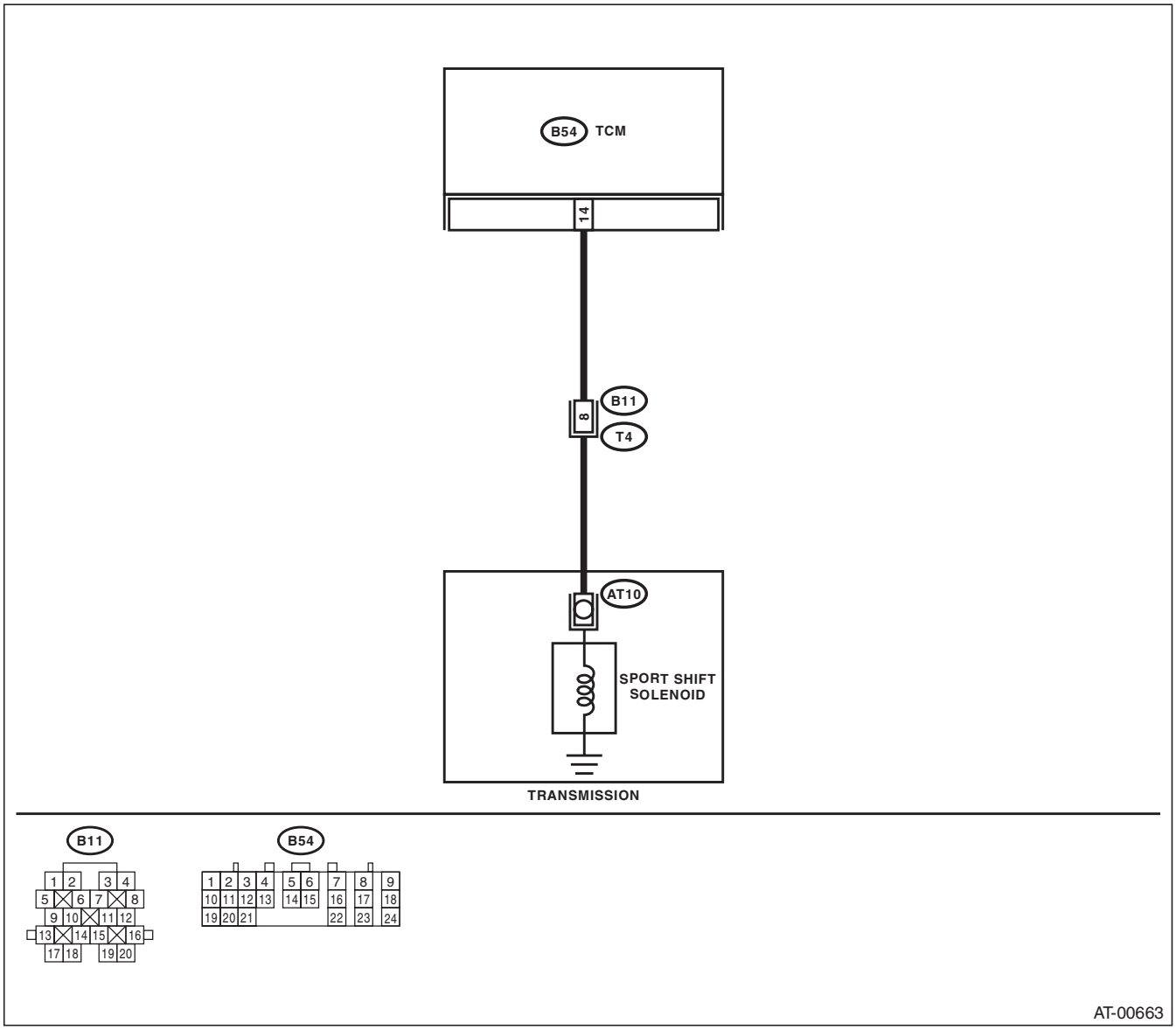
DIAGNOSIS:

Output signal circuit of SPORT shift solenoid is open or shorted.

TROUBLE SYMPTOM:

Engine brake is effective at “D”, “3”, “2”, ranges.

WIRING DIAGRAM:



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	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and transmission. 3)Measure the resistance of harness between TCM and SPORT shift solenoid connector. ***Connector & terminal*** ***(B54) No. 14 — (B11) No. 8:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 14 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK SPORT SHIFT SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 8 — No. 16:***	Is the resistance 10 — 16 Ω?	Go to step **4.**	Go to step **7.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Connect the connectors to TCM and transmission. 2)Turn the ignition switch to ON (engine OFF). 3)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **5.**	Go to step **6.**

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	Step	Check	Yes	No
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Turn the ignition switch OFF. 2)Lift-up the vehicle and place safety stand. NOTE: Raise all wheels off ground. 3)Start the engine, and warm transmission until ATF temperature becomes 80°C (176°F) or more. NOTE: It ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 4)Move the select lever to SPORT shift mode. 5)Increase the speed up to 25 km/h (16 MPH) at 2nd. 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.> 6)Shift down to 1st speed, and effectively use engine brake. 7)Measure the voltage between TCM connector and body ground when engine brake is effective. ***Connector & terminal*** ***(B54) No. 14 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in the TCM.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in SPORT shift solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
7	**CHECK SHIFT SOLENOID 1 (IN TRANSMISSION).** 1)Remove the transmission connector from bracket. 2)Lift-up or raise the vehicle and support with safety stand. 3)Drain the automatic transmission fluid. **CAUTION:** **Do not drain the automatic transmission fluid until it cools down.** 4)Remove the oil pan, and disconnect the connector from SPORT shift solenoid. 5)Measure the resistance between SPORT shift solenoid connector and transmission ground. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 16 Ω?	Go to step **8.**	Replace the SPORT shift solenoid. <Ref. to 4AT-64, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

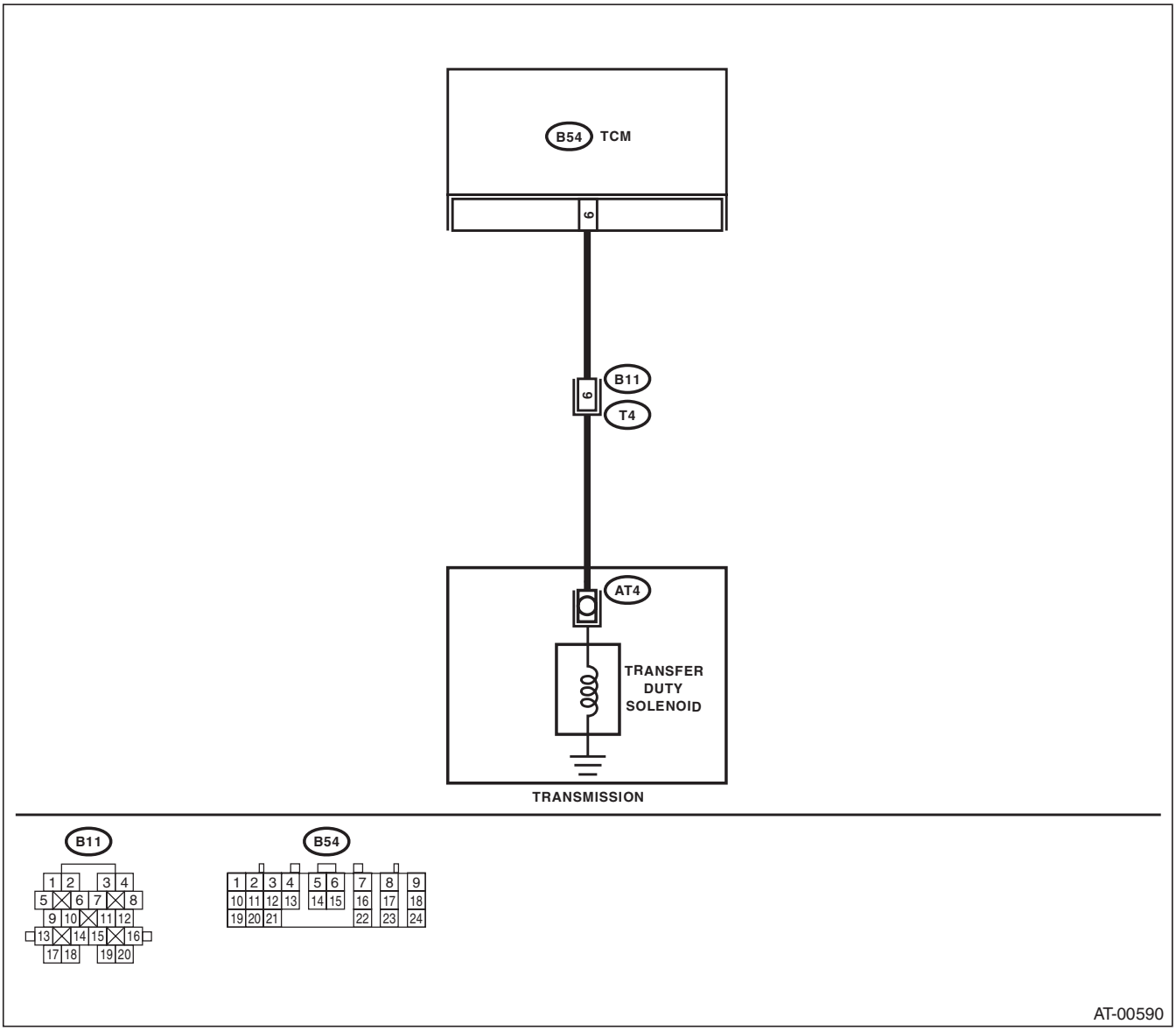
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	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN SPORT SHIFT SOLENOID AND TRANSMISSION.** Measure the resistance of harness between shift solenoid 1 and transmission connector. ***Connector & terminal*** ***(AT10) No. 1 — (T4) No. 8:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between SPORT shift solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN SPORT SHIFT SOLENOID AND TRANSMISSION.** Measure the resistance of harness between SPORT shift solenoid connector and transmission ground. ***Connector & terminal*** ***(T4) No. 8 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if “POWER” indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in SPORT shift solenoid and transmission.	Repair the short circuit harness between SPORT shift solenoid and transmission connector.

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Q: DTC 79 TRANSFER DUTY SOLENOID

DIAGNOSIS:
The output signal circuit of transfer duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive “braking” in tight corners.
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and transmission. 3)Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 6 — (B11) No. 6:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

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	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK TRANSFER DUTY SOLENOID.** Measure the resistance between transmission connector and transmission terminals. ***Connector & terminal*** ***(T4) No. 6 — No. 16:***	Is the resistance 10 — 17 Ω?	Go to step **4.**	Go to step **13.**
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **8.**	Go to step **5.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Connect the connectors to TCM and transmission. 2)Turn the ignition switch to ON (engine OFF). 3)Throttle is fully closed. 4)Move the select lever to “P” range. 5)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **6.**	Go to step **12.**
6	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Move the select lever to “D” range. 2)Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 8.5 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **12.**
7	**CHECK VEHICLE**	Is the target SOHC model?	Go to step **8.**	Go to step **10.**
8	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1)Connect the connectors to TCM and transmission. 2)Connect the Subaru Select Monitor to data link connector. 3)Turn the ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON. 4)Move the select lever to “D” range with throttle fully open (vehicle speed 0 km/h or 0 MPH). 5)Read data of transfer duty solenoid using Subaru Select Monitor. •Transfer duty solenoid is indicated in “%”.	Is the value 5 — 10 %?	Go to step **9.**	Go to step **12.**

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	Step	Check	Yes	No
9	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1)Move the select lever to “N” range with throttle fully closed (vehicle speed 0 km/h or 0 MPH). 2)Read the data of transfer duty solenoid using Subaru Select Monitor. •Transfer duty solenoid is indicated in “%”.	Is the value approx. 60 — 70 %?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **12.**
10	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1)Connect the connectors to TCM and transmission. 2)Connect the Subaru Select Monitor to data link connector. 3)Turn the ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON. 4)Move the select lever to “D” range with throttle fully open (vehicle speed 0 km/h or 0 MPH). 5)Read the data of transfer duty solenoid using Subaru Select Monitor. •Transfer duty solenoid is indicated in “%”.	Is the value 80 — 95 %?	Go to step **11.**	Go to step **12.**
11	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1)Move the select lever to “N” range with throttle fully close (vehicle speed 0 km/h or 0 MPH). 2)Read the data of transfer duty solenoid using Subaru Select Monitor. •Transfer duty solenoid is indicated in “%”.	Is the value approx. 40 %?	Even if the POWER indicator light 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 the harness or connector in transfer duty solenoid and TCM connector.	Go to step **12.**
12	**CHECK POOR CONTACT.**	Is there poor contact in transfer duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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	Step	Check	Yes	No
13	**CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION).** 1)Lift-up the vehicle and place safety stand. NOTE: On AWD models, raise all wheels off ground. 2)Drain the automatic transmission fluid. **CAUTION:** **Do not drain the automatic transmission fluid until it cools down.** 3)Remove the extension case and disconnect connector from transfer duty solenoid. 4)Measure the resistance between transfer duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT4) No. 1 — Transmission ground:***	Is the resistance 10 — 17 Ω?	Go to step **14.**	Replace the transfer duty solenoid.
14	**CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transfer duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 6 — (AT4) No. 1:***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit in harness between transfer duty solenoid and transmission connector.
15	**CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 6 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in transfer duty solenoid and transmission.	Repair the short circuit in harness between transfer duty solenoid and transmission connector.

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R: DTC 93 REAR VEHICLE SPEED SENSOR

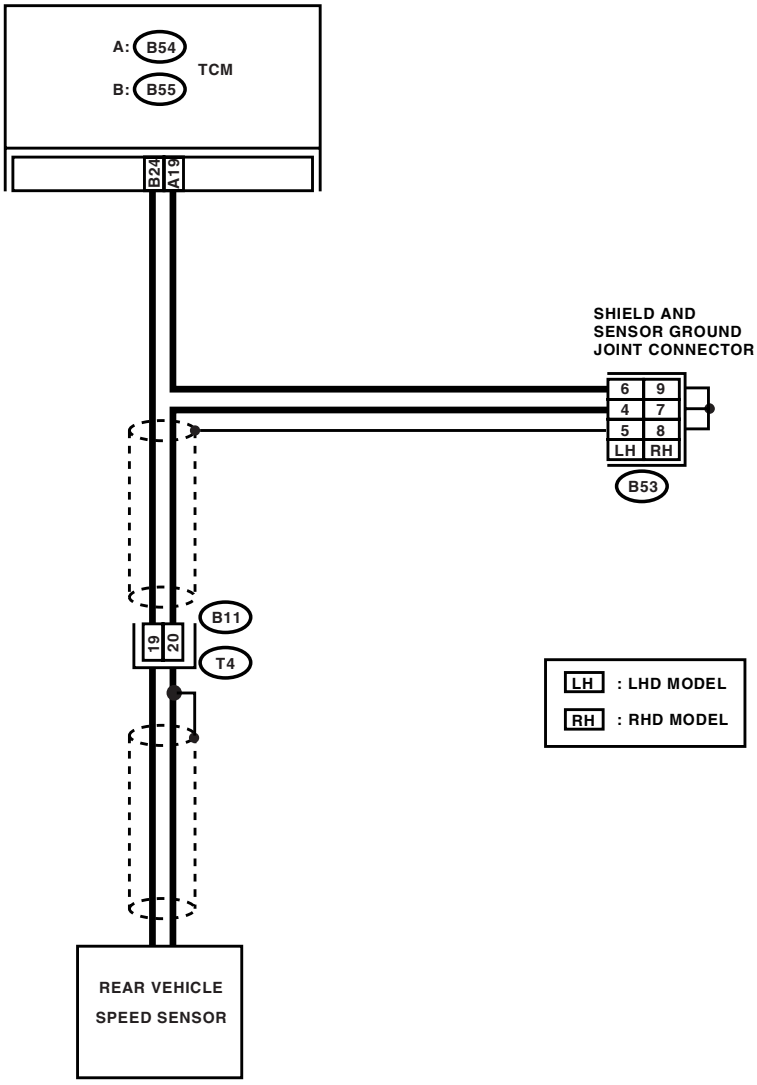
DIAGNOSIS:

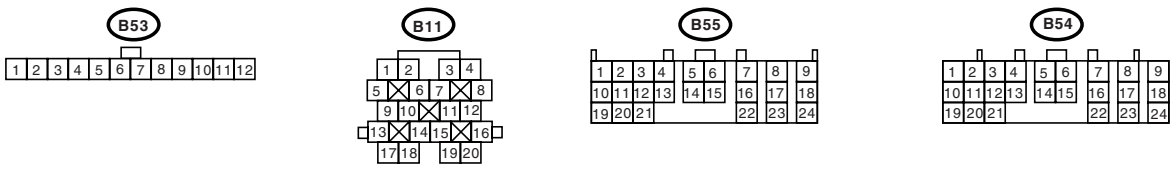
The input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

No lock-up or excessive tight corner “braking”.

WIRING DIAGRAM:





AT-01148

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	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and transmission. 3)Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 24 — (B11) No. 19:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 19 — (B11) No. 20:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission, and poor contact in coupling connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 24 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and transmission connector.
5	**CHECK REAR VEHICLE SPEED SENSOR.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 19 — No. 20:***	Is the resistance 450 — 650 Ω?	Go to step **6.**	Replace the rear vehicle speed sensor. <Ref. to 4AT-56, Rear Vehicle Speed Sensor.>
6	**PREPARE OSCILLOSCOPE.**	Do you have an oscilloscope?	Go to step **10.**	Go to step **7.**
7	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **9.**	Go to step **8.**
8	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connectors to TCM and transmission. 2)Lift-up or raise the vehicle and place safety stands. NOTE: Raise all wheels off floor. 3)Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 4)Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 24 (+) — (B54) No. 19 (−):***	Is the voltage more than AC 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **11.**

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	Step	Check	Yes	No
9	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1)Connect the connectors to TCM and transmission. 2)Connect the 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 the ignition switch to ON and turn Subaru Select Monitor switch to ON. 5)Start the engine. 6)Read the data of vehicle speed using Subaru Select Monitor. •Compare the speedometer with Subaru Select Monitor indications. •Vehicle speed is indicated in “km/h” or “MPH”. 7)Slowly increase the vehicle speed to 60 km/h or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **11.**
10	**CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.** 1)Connect the connectors to TCM and transmission. 2)Lift-up or raise the vehicle and place safety stands. NOTE: Raise all wheels off floor. 3)Set the oscilloscope to TCM connector terminals. ***Connector & terminal*** ***Positive probe; (B55) No. 24*** ***Earth lead; (B54) No. 19*** 4)Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS-22, Clear Memory Mode.> 5)Measure the signal voltage indicated on oscilloscope.	Is the signal voltage more than AC 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **11.**
11	**CHECK POOR CONTACT.**	Is there poor contact in rear vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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15.Diagnostic Procedure without Diagnostic Trouble Code (DTC)

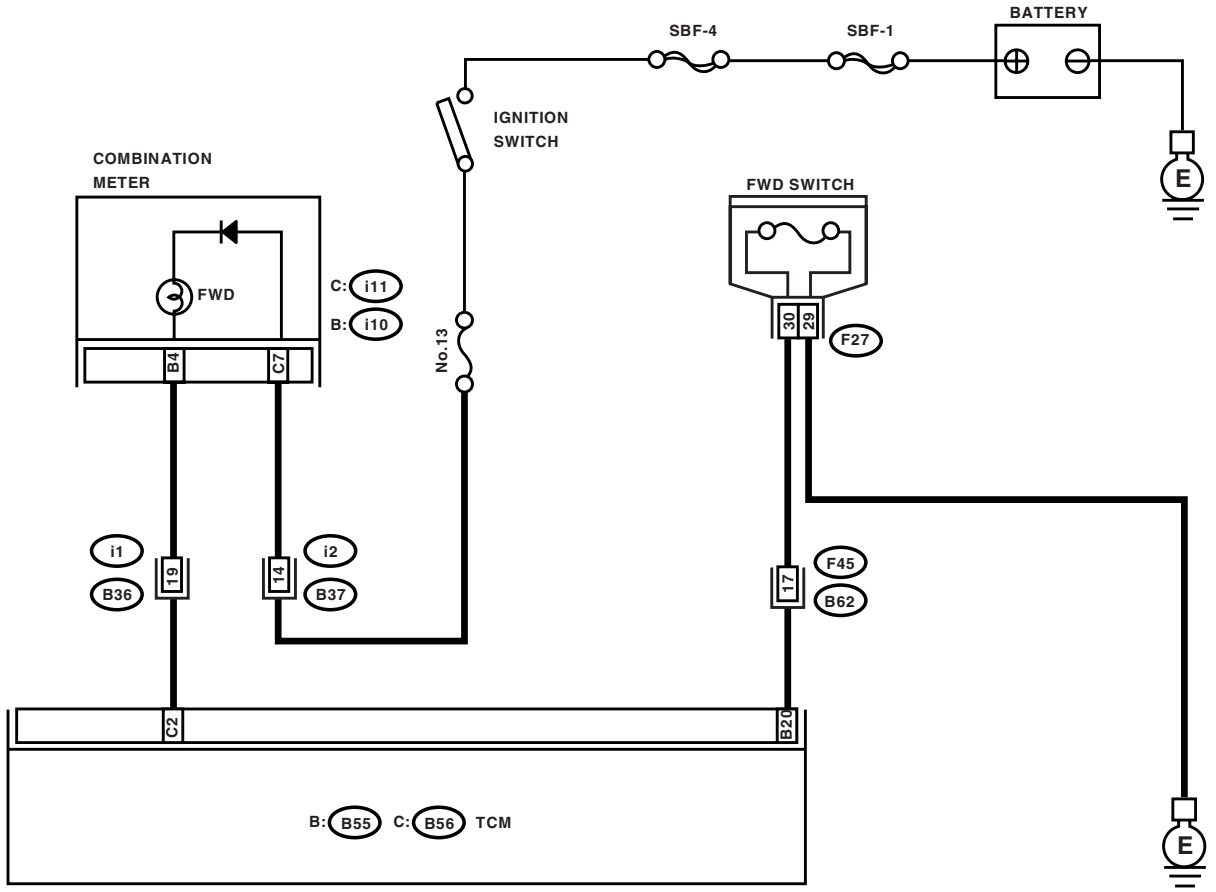
A: CHECK FWD SWITCH

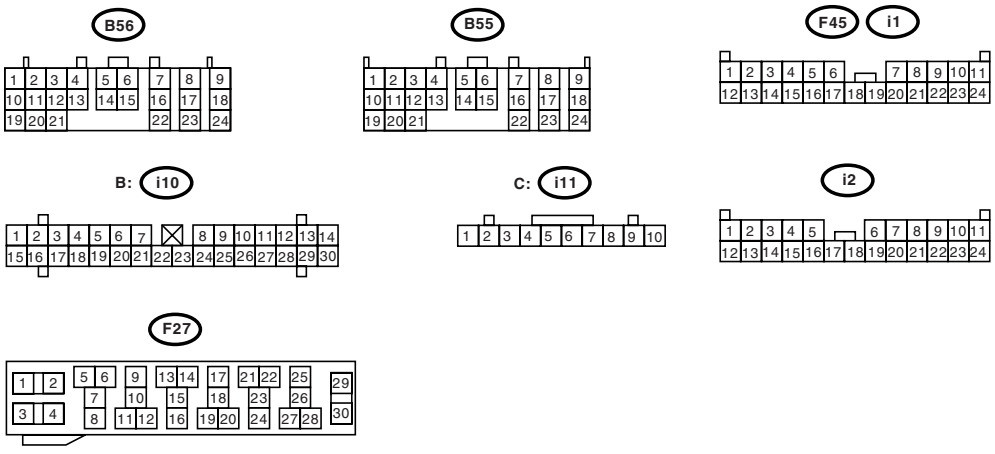
DIAGNOSIS:

- The LED does not come on even if FWD switch is ON.
- The FWD switch circuit is open or short.

WIRING DIAGRAM:

LHD MODEL

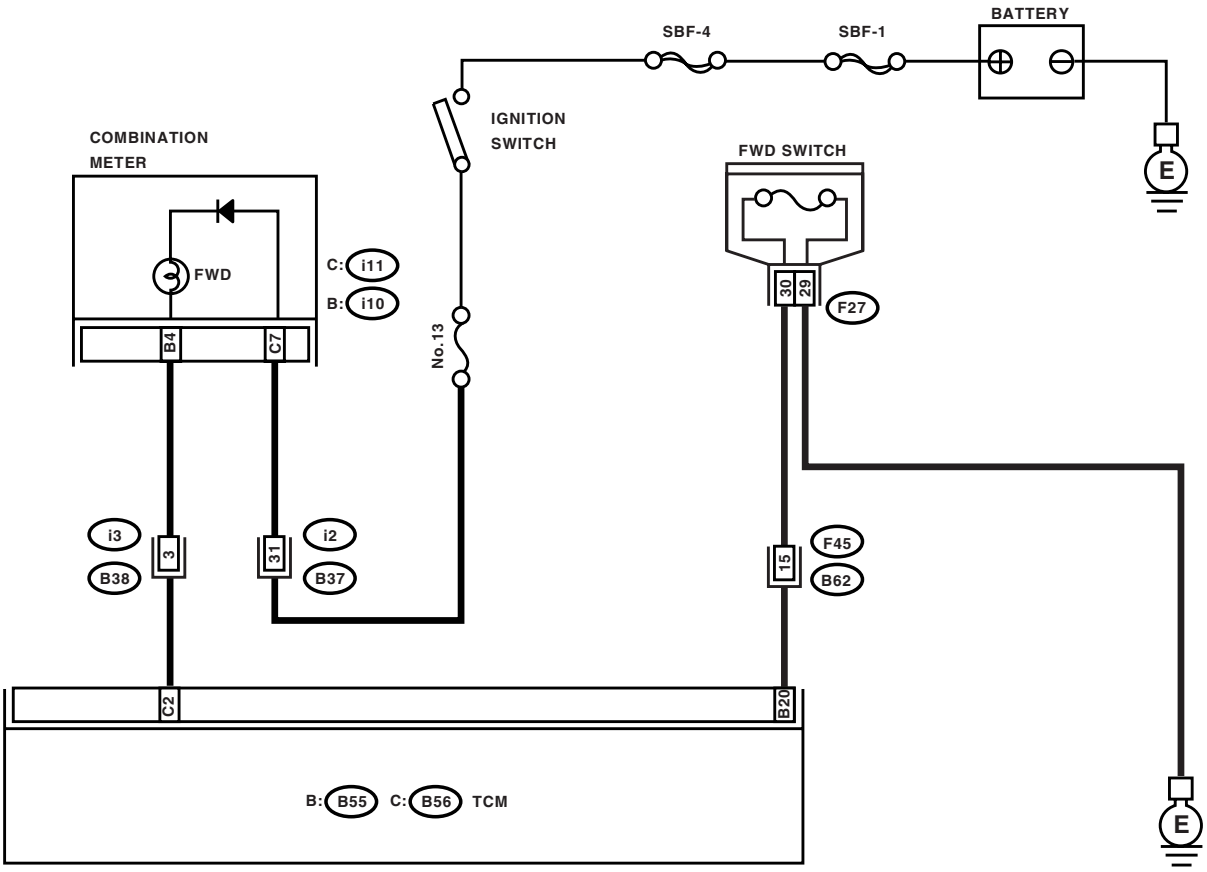


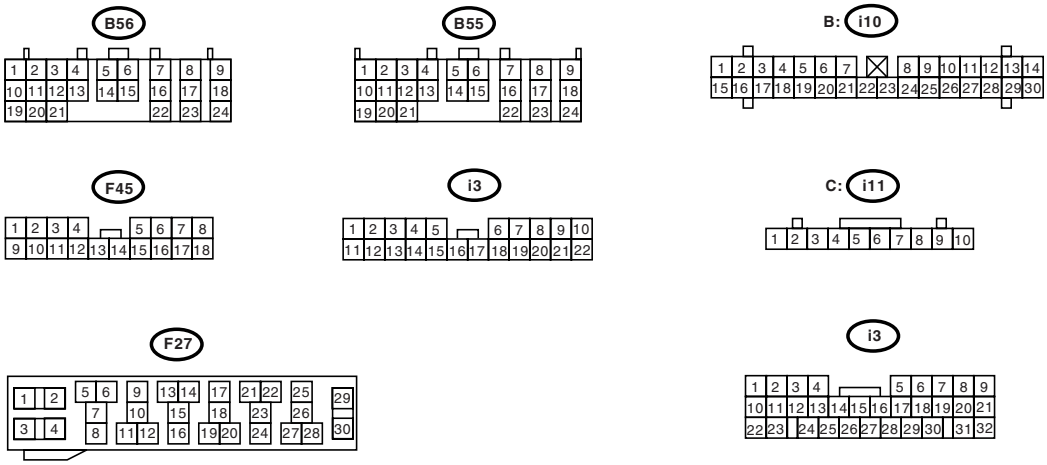


AT-01149

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RHD MODEL





AT-01150

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	Step	Check	Yes	No
1	**CHECK VEHICLE.**	Is the target AWD SOHC model?	Go to step **2.**	Go to step CHECK BRAKE SWITCH. <Ref. to 4AT-101, CHECK BRAKE SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>
2	**CHECK FWD SWITCH.**	When the fuse is inserted to FWD switch, does LED light up?	Go to step CHECK BRAKE SWITCH.<Ref. to 4AT-101, CHECK BRAKE SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK FWD INDICATOR LIGHT.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the FWD indicator light bulb from combination meter.	Is the FWD indicator light bulb OK?	Go to step **4.**	Replace the FWD indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM. 3)Measure the resistance of harness between TCM and FWD switch connector. ***Connector & terminal*** ***(B55) No. 20 — (F27) No. 30:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between TCM and FWD switch connector.
5	**CHECK HARNESS CONNECTOR BETWEEN FWD SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between FWD switch and chassis ground. ***Connector & terminal*** ***(F27) No. 29 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between FWD switch connector and chassis ground.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.** Measure the resistance of harness connector between TCM and body to make sure that circuit does not short. ***Connector & terminal*** ***(B55) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the short circuit in harness between TCM and FWD switch connector.
7	**CHECK INPUT SIGNAL FOR TCM.** 1)Turn the ignition switch to OFF. 2)Connect the connector to TCM. 3)Turn the ignition switch to ON. 4)Measure the signal voltage for TCM while installing the fuse to FWD switch connector. ***Connector & terminal*** ***(B55) No. 20 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Go to step **12.**
8	**CHECK INPUT SIGNAL FOR TCM.** Measure the signal voltage for TCM while removing the fuse from FWD switch connector. ***Connector & terminal*** ***(B55) No. 20 (+) — Chassis ground (−):***	Is the voltage 6 — 9.1 V?	Go to step **9.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and combination meter. 3)Measure the resistance of harness between TCM and diagnosis connector. ***Connector & terminal*** ***(B56) No. 2 — (i10) No. 4:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit in harness between TCM and combination meter and poor contact in coupling connector.
10	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** Measure the resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. ***Connector & terminal*** ***(B56) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11.**	Repair the short circuit in harness between TCM and combination meter connector.
11	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Turn the ignition switch to OFF. 2)Connect the connector to TCM and combination meter. 3)Turn the ignition switch to ON. 4)Measure the signal voltage for TCM while installing the fuse to FWD switch connector. ***Connector & terminal*** ***(B56) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **12.**	Go to step **13.**
12	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** Measure the signal voltage for TCM while removing the fuse from FWD switch connector. ***Connector & terminal*** ***(B56) No. 2 (+) — Chassis ground (−):***	Is the voltage 6 — 9.1 V?	Go to step **13.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
13	**CHECK POOR CONTACT.**	Is there poor contact in FWD switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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B: CHECK BRAKE SWITCH

Step		Check	Yes	No
1	**CHECK BRAKE SWITCH.**	When the brake pedal is depressed, does LED light up?	Go to step CHECK CRUISE CONTROL SWITCH. <Ref. to 4AT-101, CHECK CRUISE CONTROL SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Check the brake switch circuit. <Ref. to EN(H4SO)-211, DTC P0703 — TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: CHECK CRUISE CONTROL SWITCH

Step		Check	Yes	No
1	**CHECK CRUISE CONTROL SWITCH.**	When the cruise control is set, does LED light up?	Go to step CHECK KICK-DOWN SWITCH. <Ref. to 4AT-102, CHECK KICK–DOWN SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Check the cruise control. <Ref. to CC-25, Diagnostic Procedure with DTC.>

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D: CHECK KICK–DOWN SWITCH

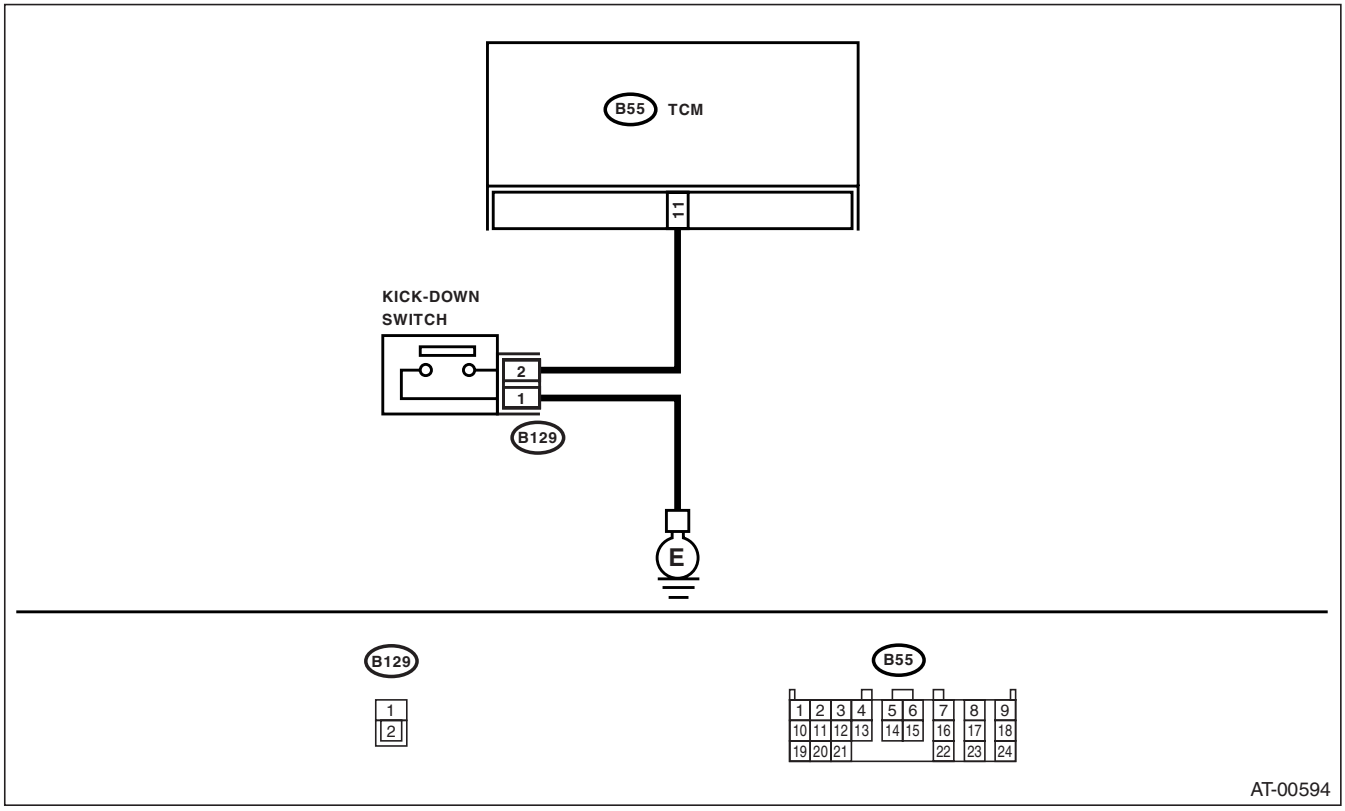
DIAGNOSIS:

- The kick-down switch is OFF when the throttle is partially open or fully closed, but it is not ON when the throttle is fully opened.
- The kick-down switch circuit is open or shorted.

TROUBLE SYMPTOM:

No kick-down occurs (when the throttle is fully opened).

WIRING DIAGRAM:



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	Step	Check	Yes	No
1	**CHECK KICK-DOWN SWITCH OPERATION.**	When the accelerator pedal is depressed, does “ON” displayed?	Go to step CHECK POWER MODE SWITCH. <Ref. to 4AT-105, CHECK POWER MODE SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK KICK-DOWN SWITCH GROUND LINE.** 1)Disconnect the connector from kick-down switch. 2)Measure the resistance of harness connector between kick-down switch and chassis ground. ***Connector & terminal*** ***(B129) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between kick-down switch and TCM.
3	**CHECK KICK-DOWN SWITCH.** Measure the resistance for kick-down switch when depressing the accelerator pedal. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Replace the kick-down switch. <Ref. to SP(H4SO)-4, Accelerator Pedal.>
4	**CHECK KICK-DOWN SWITCH.** Measure the resistance for kick-down switch when pressing the accelerator pedal. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the kick-down switch.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND KICK-DOWN SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from kick-down switch. 3)Measure the resistance of harness connector between TCM and kick-down switch. ***Connector & terminal*** ***(B55) No. 11 — (B129) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between TCM and kick-down switch.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND KICK-DOWN SWITCH.** Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the short circuit in harness between TCM and chassis ground.
7	**CHECK INPUT SIGNAL FOR TCM.** 1)Turn the ignition switch to OFF. 2)Connect the connector to kick-down switch. 3)Turn the ignition switch to ON (engine OFF). 4)Measure the signal voltage for TCM when depressing the accelerator pedal. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Go to step **9.**
8	**CHECK INPUT SIGNAL FOR TCM.** Measure the signal voltage for TCM when pressing the accelerator pedal. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (−):***	Is the voltage more than 6.5 V?	A temporary poor contact of the connector and harness may be the cause. Repair the harness and connector in TCM.	Go to step **9.**

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Step	Check	Yes	No
9 **CHECK POOR CONTACT.**	Is there poor contact?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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E: CHECK POWER MODE SWITCH

DIAGNOSIS:

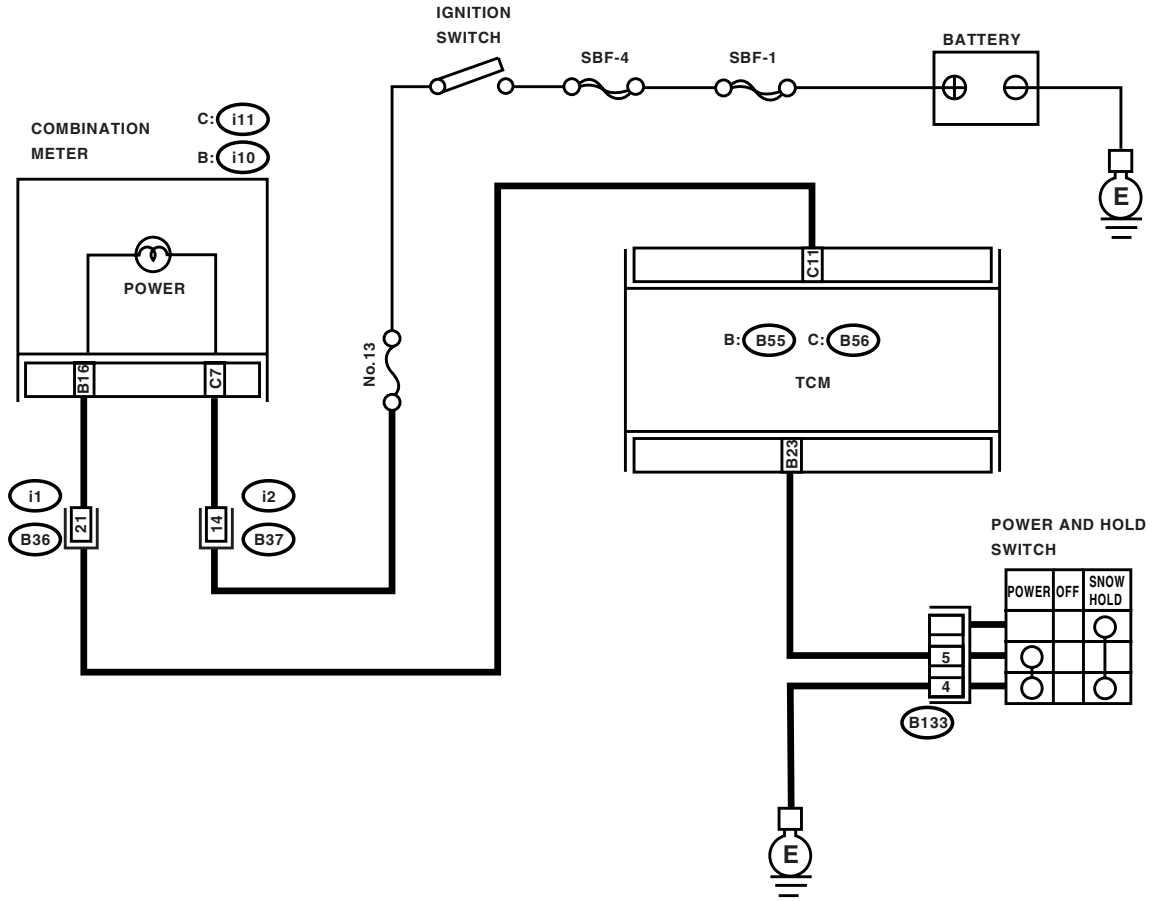
- The LED does not come on when POWER switch is ON.
- The POWER switch circuit is open or shorted.

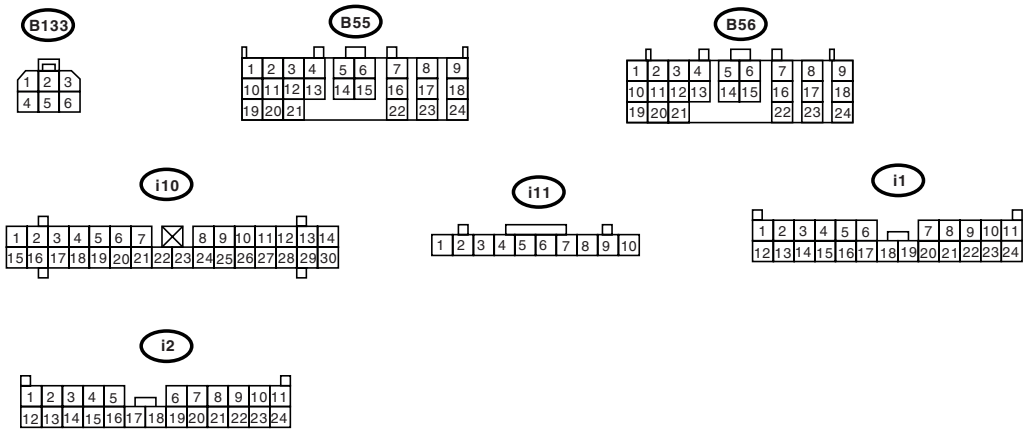
TROUBLE SYMPTOM:

No power mode occurs.

WIRING DIAGRAM:

LHD MODEL

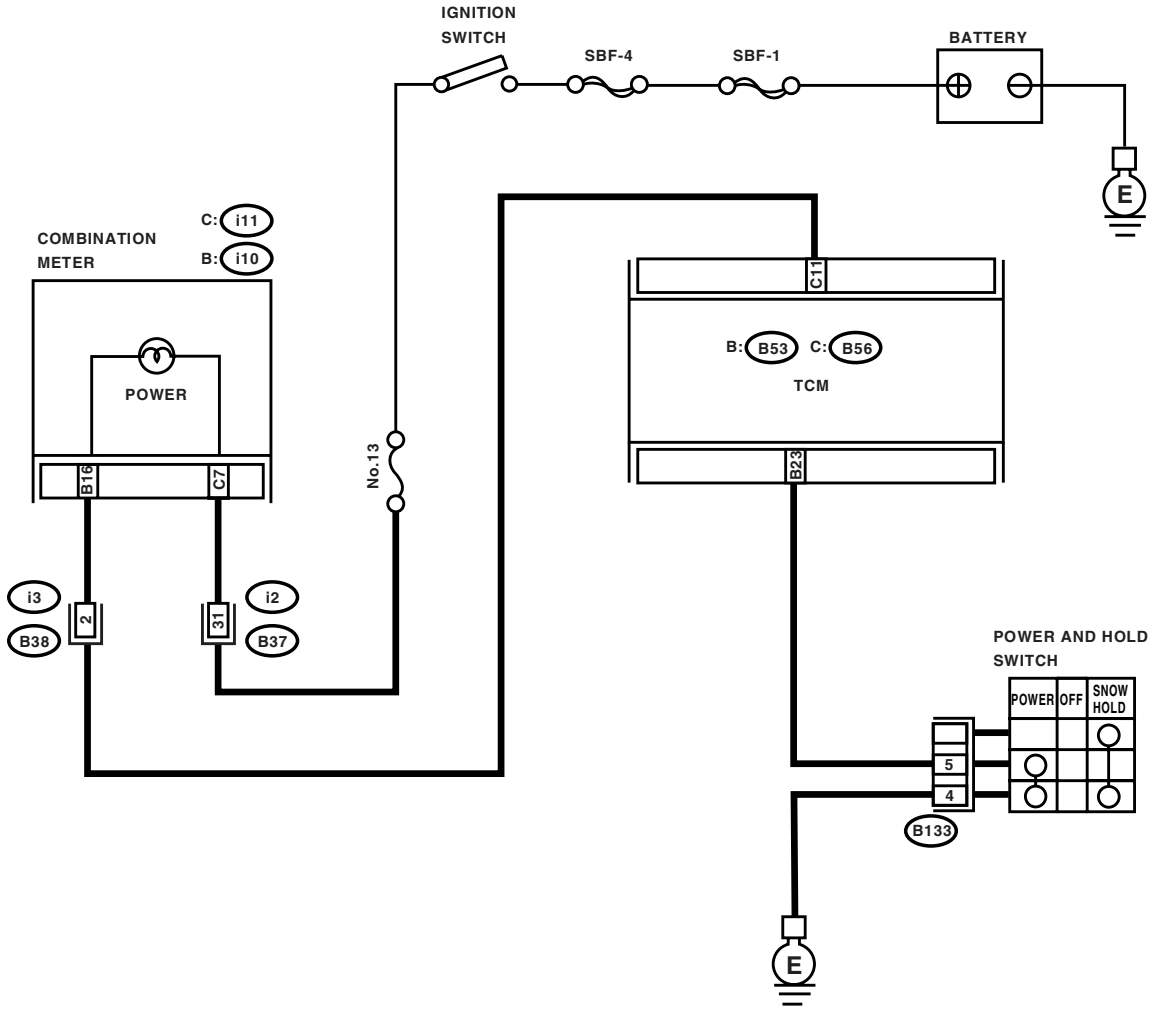


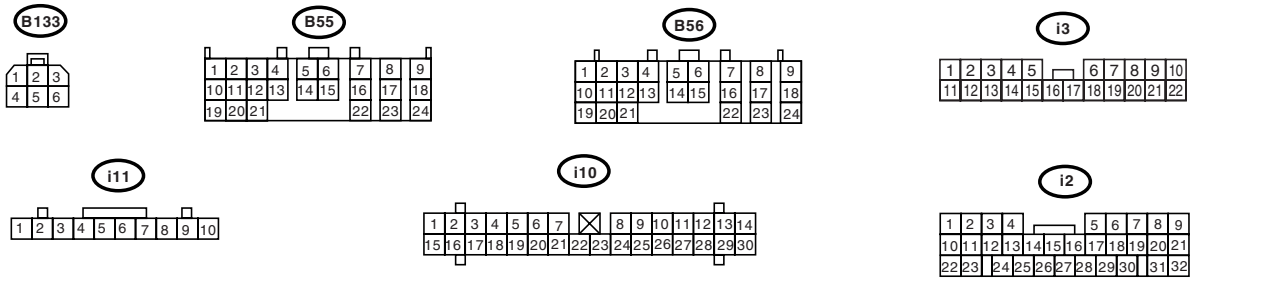


AT-01151

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RHD MODEL





AT-01153

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	Step	Check	Yes	No
1	**CHECK POWER SWITCH OPERATION.**	When the POWER switch is turned to OFF, does LED light up?	Go to step **5.**	Go to step **2.**
2	**CHECK POWER SWITCH OPERATION.**	When the POWER switch is turned to ON, does LED light up?	Go to step CHECK INHIBITOR SWITCH. <Ref. to 4AT-109, CHECK INHIBITOR SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK POWER INDICATOR LIGHT.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the POWER indicator light bulb from combination meter.	Is the POWER indicator light bulb OK?	Go to step **4.**	Replace the POWER indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
4	**CHECK POWER SWITCH GROUND LINE.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from POWER switch. 3)Measure the resistance of harness connector between POWER switch and chassis ground. ***Connector & terminal*** ***(B133) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between POWER switch and chassis ground.
5	**CHECK POWER SWITCH.** 1)Turn the POWER switch to ON. 2)Measure the resistance between terminals of POWER switch. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance less than 1 Ω?	Go to step **6.**	Replace the POWER switch.
6	**CHECK POWER SWITCH.** 1)Turn the POWER switch to OFF. 2)Measure the resistance between terminals of POWER switch. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Replace the POWER switch.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND POWER SWITCH.** Measure the resistance of harness connector between TCM and POWER switch. ***Connector & terminal*** ***(B55) No. 23 — (B133) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between TCM and POWER switch connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND POWER SWITCH.** Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 23 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the short circuit in harness between TCM and POWER switch connector.

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	Step	Check	Yes	No
9	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connectors to TCM and POWER switch. 2)Turn the ignition switch to ON (engine OFF). 3)Measure the signal voltage for TCM while turning POWER switch to OFF. ***Connector & terminal*** ***(B55) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **10.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
10	**CHECK INPUT SIGNAL FOR TCM.** Measure the signal voltage for TCM while turning POWER switch to ON. ***Connector & terminal*** ***(B55) No. 23 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **11.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
11	**CHECK POOR CONTACT.**	Is there poor contact?	Repair the poor contact.	A temporary poor contact of the connector or harness or connector in POWER switch circuit.

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F: CHECK INHIBITOR SWITCH

DIAGNOSIS:

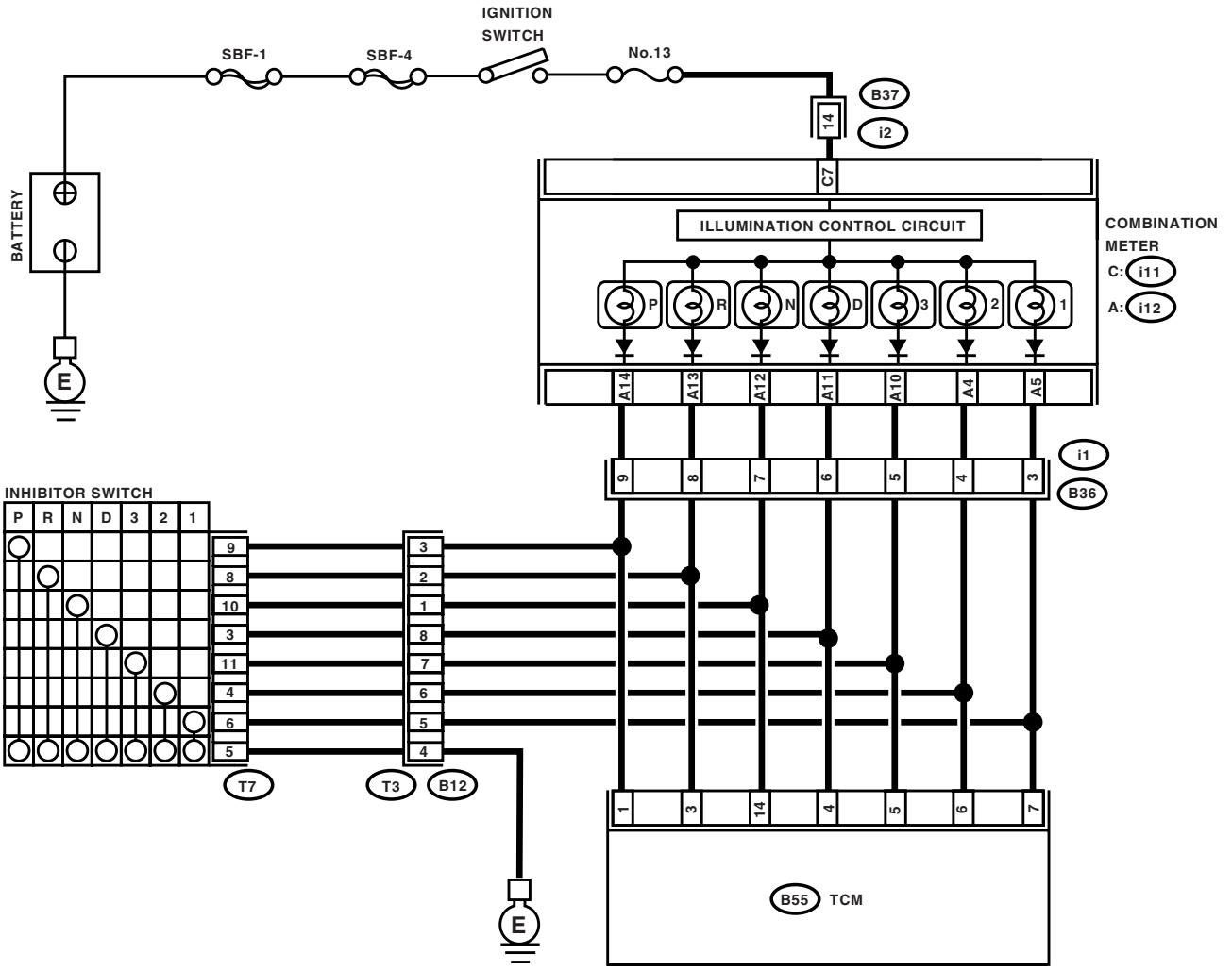
The input signal circuit of inhibitor switch is open or shorted.

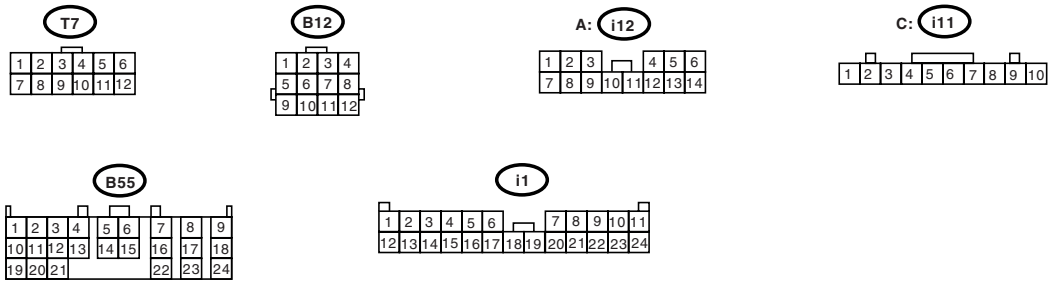
TROUBLE SYMPTOM:

- 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.

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WIRING DIAGRAM:
LHD MODEL

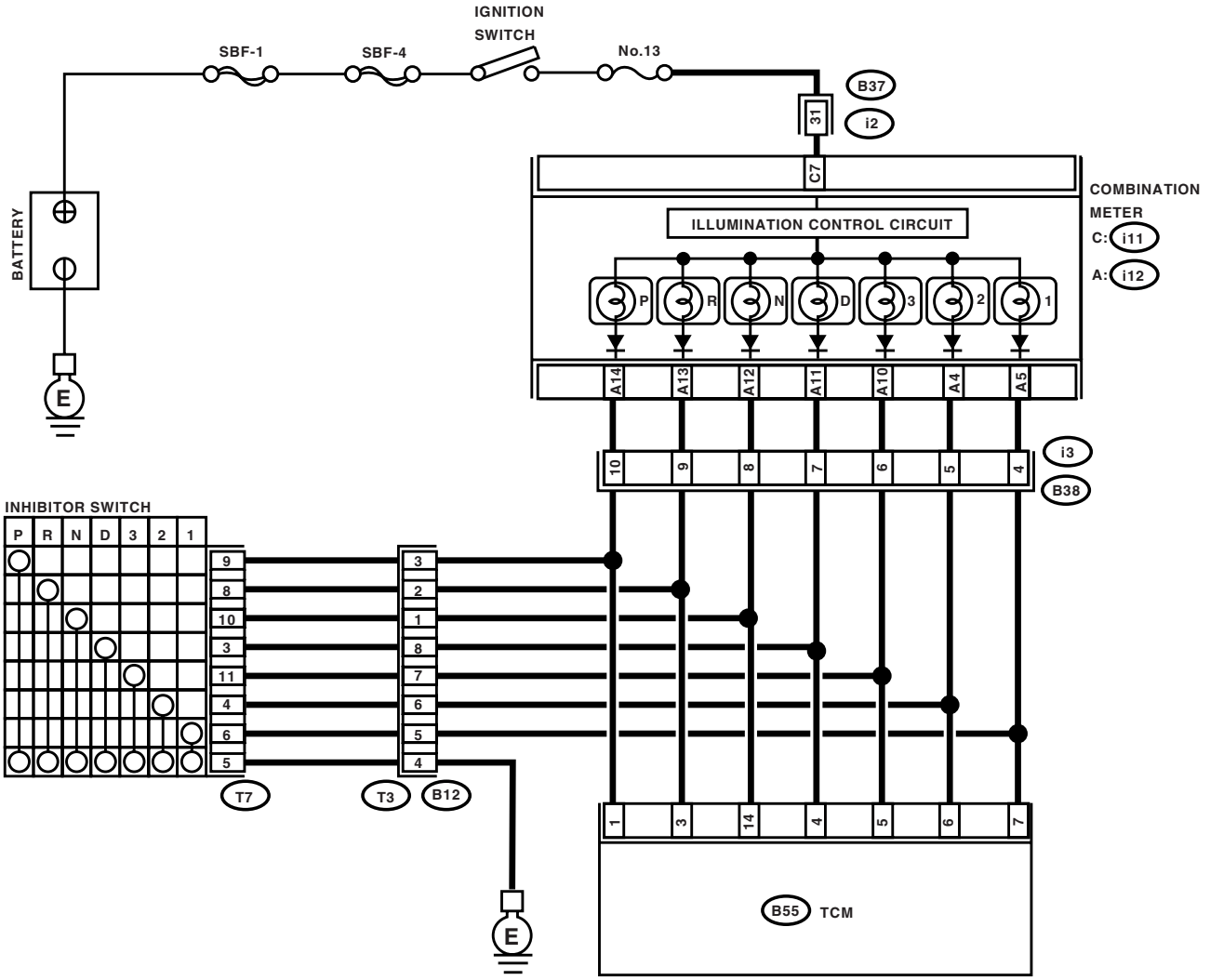


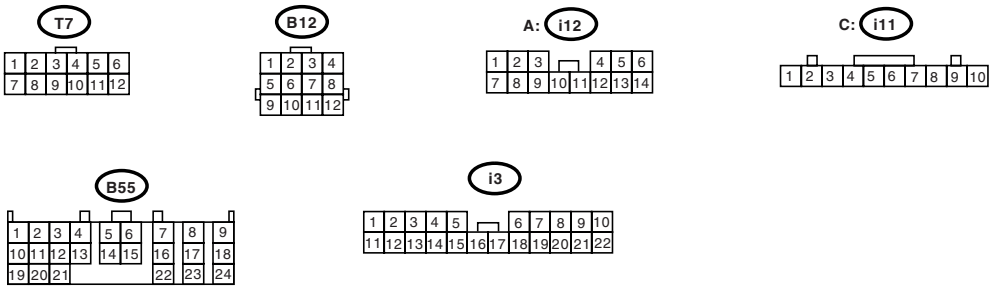


AT-01154

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RHD MODEL





AT-01155

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DIAGNOSTIC PROCEDURE WITHOUT DIAGNOSTIC TROUBLE CODE (DTC)

Step		Check	Yes	No
1	**CHECK "P" RANGE SWITCH.**	When the "P" range is selected, does LED light up?	Go to step **2.**	Go to step **22.**
2	**CHECK INDICATOR LIGHT.**	Does the combination meter "P" range indicator illuminate?	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?	Go to step **28.**	Go to step **4.**
4	**CHECK "R" RANGE SWITCH.**	When the "R" range is selected, does LED light up?	Go to step **5.**	Go to step **29.**
5	**CHECK INDICATOR LIGHT.**	Does the combination meter "R" range indicator illuminate?	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?	Go to step **34.**	Go to step **7.**
7	**CHECK "N" RANGE SWITCH.**	When the "N" range is selected, does LED light up?	Go to step **8.**	Go to step **35.**
8	**CHECK INDICATOR LIGHT.**	Does the combination meter "N" range indicator illuminate?	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?	Go to step **40.**	Go to step **10.**
10	**CHECK "D" RANGE SWITCH.**	When the "D" range is selected, does LED light up?	Go to step **11.**	Go to step **41.**
11	**CHECK INDICATOR LIGHT.**	Does the combination meter "D" range indicator illuminate?	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?	Go to step **46.**	Go to step **13.**
13	**CHECK "3" RANGE SWITCH.**	When the "3" range is selected, does LED light up?	Go to step **14.**	Go to step **47.**
14	**CHECK INDICATOR LIGHT.**	Does the combination meter "3" range indicator illuminate?	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?	Go to step **52.**	Go to step **16.**
16	**CHECK "2" RANGE SWITCH.**	When the "2" range is selected, does LED light up?	Go to step **17.**	Go to step **53.**
17	**CHECK INDICATOR LIGHT.**	Does the combination meter "2" range indicator illuminate?	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?	Go to step **58.**	Go to step **19.**
19	**CHECK "1" RANGE SWITCH.**	When the "1" range is selected, does LED light up?	Go to step **20.**	Go to step **59.**
20	**CHECK INDICATOR LIGHT.**	Does the combination meter "1" range indicator illuminate?	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?	Go to step **64.**	Go to step CHECK HOLD SWITCH. <Ref. to 4AT-120, CHECK HOLD SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>

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	Step	Check	Yes	No
22	**CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from inhibitor switch. 3)Measure the resistance of harness between inhibitor switch and chassis ground. ***Connector & terminal*** ***(T7) No. 5 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **23.**	Repair the 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 the ignition switch to OFF. 2)Disconnect the connectors from TCM and inhibitor switch. 3)Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 1 — (T7) No. 9:***	Is the resistance less than 1 Ω?	Go to step **24.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
24	**CHECK INPUT SIGNAL FOR TCM.** 1)Turn the ignition switch to OFF. 2)Connect the connector to TCM and inhibitor switch. 3)Turn the ignition switch to ON. 4)Move the select lever to “P” range. 5)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 1 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **25.**	Go to step **65.**
25	**CHECK INPUT SIGNAL FOR TCM.** 1)Position the select lever to any other than “P” range. 2)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
26	**CHECK “P” RANGE INDICATOR LIGHT BULB.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the “P” range indicator light bulb from combination meter.	Is the “P” range indicator light bulb OK?	Go to step **27.**	Replace the “P” range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
27	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1)Disconnect the connectors from TCM and combination meter. 2)Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 1 — (i12) No. 14:***	Is the resistance more than 1 Ω?	Go to step **65.**	Repair the open circuit in harness between TCM connector and combination meter, and poor contact in coupling connector.
28	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM, inhibitor switch and combination meter. 3)Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 1 — Chassis ground:***	Is the resistance less than 1 MΩ?	Go to step **29.**	Repair the ground short circuit in “P” range circuit.

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	Step	Check	Yes	No
29	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM and inhibitor switch. 3)Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 3 — (T7) No. 8:***	Is the resistance less than 1 Ω?	Go to step **30.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
30	**CHECK INPUT SIGNAL FOR TCM.** 1)Turn the ignition switch to OFF. 2)Connect the connector to TCM and inhibitor switch. 3)Turn the ignition switch to ON. 4)Move the select lever to “R” range. 5)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 3 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **31.**	Go to step **65.**
31	**CHECK INPUT SIGNAL FOR TCM.** 1)Position the select lever to any other than “R” range. 2)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
32	**CHECK “R” RANGE INDICATOR LIGHT BULB.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the “R” range indicator light bulb from combination meter.	Is “R” range indicator light bulb OK?	Go to step **33.**	Replace the “R” range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
33	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1)Disconnect the connectors from TCM and combination meter. 2)Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 3 — (i12) No. 13:***	Is the resistance less than 1 Ω?	Go to step **65.**	Repair the 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 the ignition switch to OFF. 2)Disconnect the connectors from TCM, inhibitor switch and combination meter. 3)Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **35.**	Repair the ground short circuit in “R” range circuit.
35	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM and inhibitor switch. 3)Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 14 — (T7) No. 10:***	Is the resistance less than 1 Ω?	Go to step **36.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

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	Step	Check	Yes	No
36	**CHECK INPUT SIGNAL FOR TCM.** 1)Turn the ignition switch to OFF. 2)Connect the connector to TCM and inhibitor switch. 3)Turn the ignition switch to ON. 4)Move the select lever to “N” range. 5)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 14 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **37.**	Go to step **65.**
37	**CHECK INPUT SIGNAL FOR TCM.** 1)Position the select lever to any other than “N” range. 2)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 14 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
38	**CHECK “N” RANGE INDICATOR LIGHT BULB.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the “N” range indicator light bulb from combination meter.	Is the “N” range indicator light bulb OK?	Go to step **39.**	Replace the “N” range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
39	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1)Disconnect the connectors from TCM and combination meter. 2)Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 14 — (i12) No. 12:***	Is the resistance less than 1 Ω?	Go to step **65.**	Repair the open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
40	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM, inhibitor switch and combination meter. 3)Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 14 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **41.**	Repair the ground short circuit in “N” range circuit.
41	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM and inhibitor switch. 3)Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 4 — (T7) No. 3:***	Is the resistance less than 1 Ω?	Go to step **42.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
42	**CHECK INPUT SIGNAL FOR TCM.** 1)Turn the ignition switch to OFF. 2)Connect the connector to TCM and inhibitor switch. 3)Turn the ignition switch to ON. 4)Move the select lever to “D” range. 5)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 4 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **43.**	Go to step **65.**

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	Step	Check	Yes	No
43	**CHECK INPUT SIGNAL FOR TCM.** 1)Position select lever to any other than "D" range. 2)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
44	**CHECK "D" RANGE INDICATOR LIGHT BULB.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the "D" range indicator light bulb from combination meter.	Is the "D" range indicator light bulb OK?	Go to step **45.**	Replace the "D" range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
45	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1)Disconnect the connectors from TCM and combination meter. 2)Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 4 — (i12) No. 11:***	Is the resistance less than 1 Ω?	Go to step **65.**	Repair the open circuit in harness between TCM connector and combination meter, and TCM connector.
46	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM, inhibitor switch and combination meter. 3)Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **47.**	Repair the ground short circuit in "D" range circuit.
47	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and inhibitor switch. 3)Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 5 — (T7) No. 11:***	Is the resistance less than 1 Ω?	Go to step **48.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
48	**CHECK INPUT SIGNAL FOR TCM.** 1)Turn the ignition switch to OFF. 2)Connect the connector to TCM and inhibitor switch. 3)Turn the ignition switch to ON. 4)Move the select lever to "3" range. 5)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 5 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **49.**	Go to step **65.**
49	**CHECK INPUT SIGNAL FOR TCM.** 1)Position the select lever to any other than "3" range. 2)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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	Step	Check	Yes	No
50	**CHECK "3" RANGE INDICATOR LIGHT BULB.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the "3" range indicator light bulb from combination meter.	Is the "3" range indicator light bulb OK?	Go to step **51.**	Replace the "3" range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
51	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1)Disconnect the connectors from TCM and combination meter. 2)Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 5 — (i12) No. 10:***	Is the resistance more than 1 Ω?	Go to step **65.**	Repair the 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 the ignition switch to OFF. 2)Disconnect the connectors from TCM, inhibitor switch and combination meter. 3)Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **53.**	Repair the ground short circuit in "3" range circuit.
53	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and inhibitor switch. 3)Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 6 — (T7) No. 4:***	Is the resistance less than 1 Ω?	Go to step **54.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
54	**CHECK INPUT SIGNAL FOR TCM.** 1)Turn the ignition switch to OFF. 2)Connect the connector to TCM and inhibitor switch. 3)Turn the ignition switch to ON. 4)Move the select lever to "2" range. 5)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 6 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **55.**	Go to step **65.**
55	**CHECK INPUT SIGNAL FOR TCM.** 1)Position the select lever to any other than "2" range. 2)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
56	**CHECK "2" RANGE INDICATOR LIGHT BULB.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the "2" range indicator light bulb from combination meter.	Is the "2" range indicator light bulb OK?	Go to step **57.**	Replace the "2" range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>

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	Step	Check	Yes	No
57	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1)Disconnect the connectors from TCM and combination meter. 2)Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 6 — (i12) No. 4:***	Is the resistance less than 1 Ω?	Go to step **65.**	Repair the 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 the ignition switch to OFF. 2)Disconnect the connectors from TCM, inhibitor switch and combination meter. 3)Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **59.**	Repair the ground short circuit in "2" range circuit.
59	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM and inhibitor switch. 3)Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 7 — (T7) No. 6:***	Is the resistance less than 1 Ω?	Go to step **60.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
60	**CHECK INPUT SIGNAL FOR TCM.** 1)Turn the ignition switch to OFF. 2)Connect the connector to TCM and inhibitor switch. 3)Turn the ignition switch to ON. 4)Move the select lever to "1" range. 5)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **61.**	Go to step **65.**
61	**CHECK INPUT SIGNAL FOR TCM.** 1)Position the select lever to any other than "1" range. 2)Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 7 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
62	**CHECK "1" RANGE INDICATOR LIGHT BULB.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the "1" range indicator light bulb from combination meter.	Is the "1" range indicator light bulb OK?	Go to step **63.**	Replace the "1" range indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
63	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1)Disconnect the connectors from TCM and combination meter. 2)Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 7 — (i12) No. 5:***	Is the resistance less than 1Ω?	Go to step **65.**	Repair the open circuit in harness between TCM and combination meter, poor contact in TCM connector.

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	Step	Check	Yes	No
64	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connectors from TCM, inhibitor switch and combination meter. 3)Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **65.**	Repair the ground short circuit in “1” range circuit.
65	**CHECK POOR CONTACT.**	Is there poor contact in inhibitor switch circuit?	Repair the poor contact.	Adjust the inhibitor switch and select cable. <Ref. to 4AT-49, ADJUSTMENT, Inhibitor Switch.> and <Ref. to CS-13, Select Cable.>

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G: CHECK HOLD SWITCH

DIAGNOSIS:

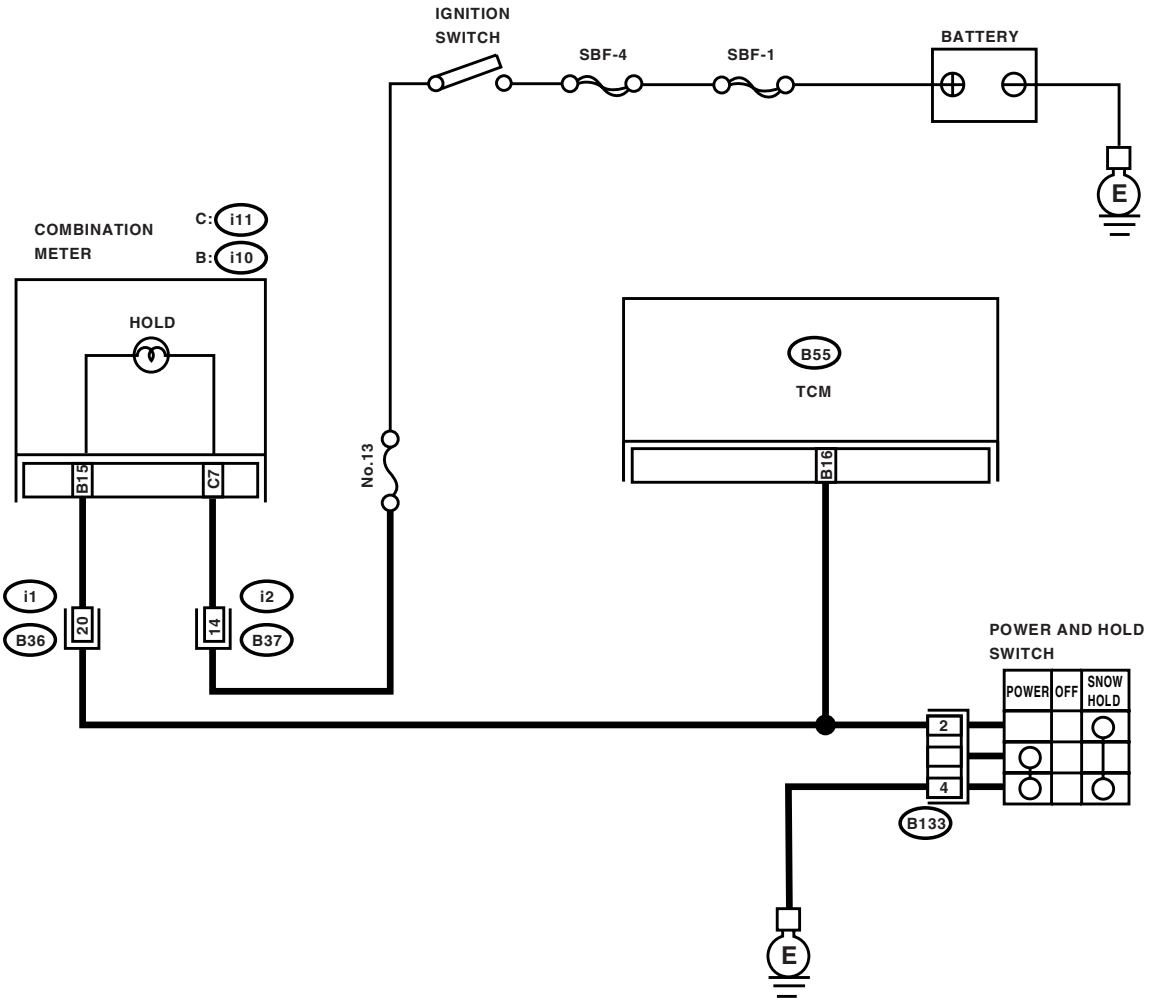
- The LED does not come on when HOLD switch is ON.
- The HOLD switch circuit is open or shorted.

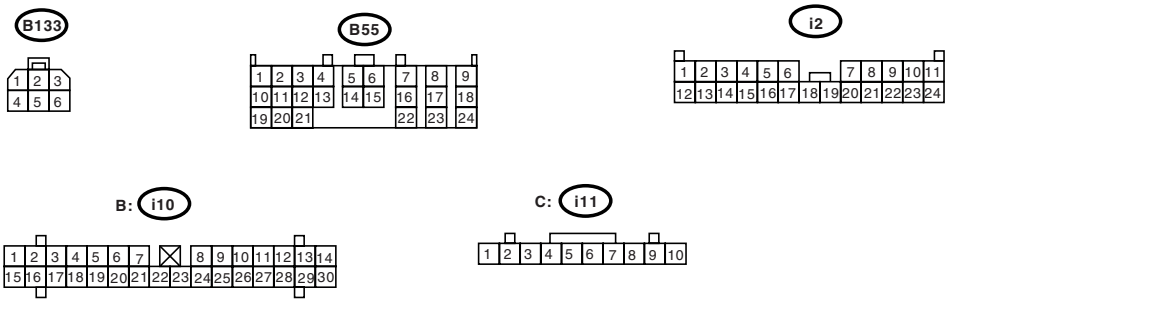
TROUBLE SYMPTOM:

- The 2nd gear is not held.
- Failure of vehicle to start in 2nd gear at “2”, “3”, “D” ranges.

WIRING DIAGRAM:

LHD MODEL

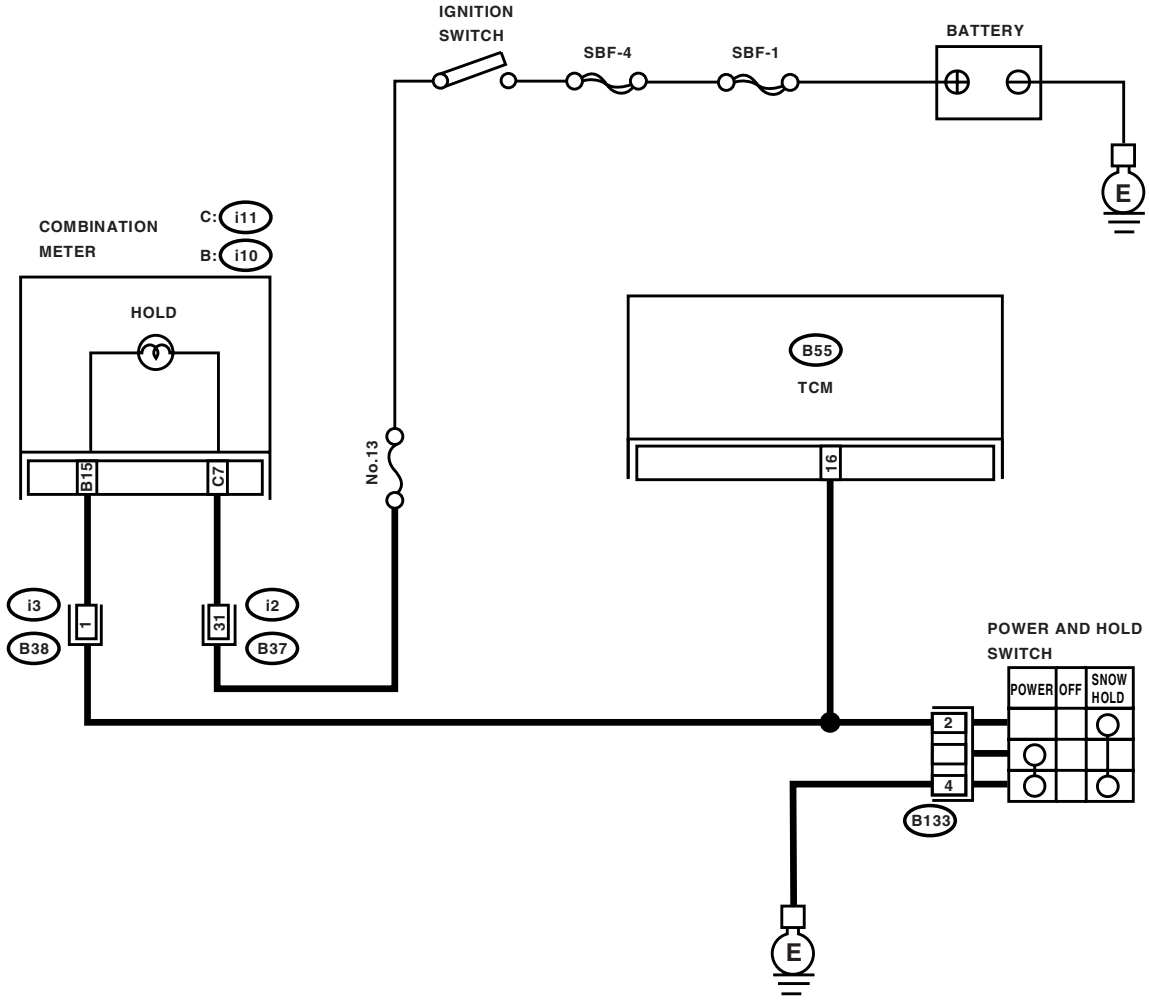


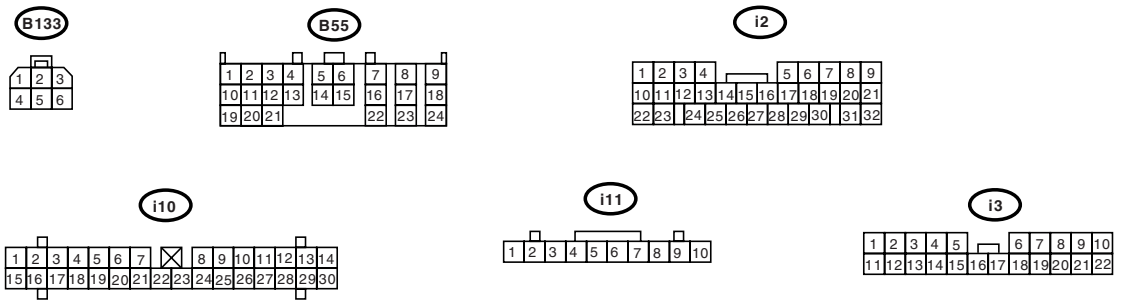


AT-01156

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RHD MODEL





AT-01157

Step		Check	Yes	No
1	**CHECK HOLD SWITCH OPERATION.**	When the HOLD switch is turned to OFF, does LED light up?	Go to step **5.**	Go to step **2.**

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	Step	Check	Yes	No
2	**CHECK HOLD SWITCH OPERATION.**	When the HOLD switch is turned to ON, does LED light up?	Go to step CHECK SPORT SHIFT SWITCH. <Ref. to 4AT-124, CHECK SPORT SHIFT SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK HOLD INDICATOR LIGHT.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Remove the HOLD indicator light bulb from combination meter.	Is the HOLD indicator light bulb OK?	Go to step **4.**	Replace the HOLD indicator light bulb. <Ref. to IDI-11, Combination Meter Assembly.>
4	**CHECK HOLD SWITCH GROUND LINE.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from HOLD switch. 3)Measure the resistance of harness connector between HOLD switch and chassis ground. ***Connector & terminal*** ***(B133) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between HOLD switch and chassis ground.
5	**CHECK HOLD SWITCH.** 1)Turn the HOLD switch to ON. 2)Measure the resistance between terminals of HOLD switch. ***Terminals*** ***No. 4 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the HOLD switch.
6	**CHECK HOLD SWITCH.** 1)Turn the HOLD switch to OFF. 2)Measure the resistance between terminals of HOLD switch. ***Terminals*** ***No. 4 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the HOLD switch.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND HOLD SWITCH.** 1)Disconnect the connector TCM and combination meter. 2)Measure the resistance of harness connector between TCM and HOLD switch. ***Connector & terminal*** ***(B55) No. 16 — (B133) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between TCM and HOLD switch connector and poor contact in coupling connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** Measure the resistance of harness connector TCM and combination meter. ***Connector & terminal*** ***(B55) No. 16 — (i10) No. 15:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between TCM and combination meter, and poor contact in coupling connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND HOLD SWITCH.** Measure the resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. ***Connector & terminal*** ***(B55) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10.**	Repair the short circuit in harness between TCM and HOLD switch connector.

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	Step	Check	Yes	No
10	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connectors to TCM and HOLD switch. 2)Turn the ignition switch to ON (engine OFF). 3)Measure the signal voltage for TCM while turning HOLD switch to OFF. ***Connector & terminal*** ***(B55) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **11.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
11	**CHECK INPUT SIGNAL FOR TCM.** Measure the signal voltage for TCM while turning HOLD switch to ON. ***Connector & terminal*** ***(B55) No. 16 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **12.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
12	**CHECK POOR CONTACT.**	Is there poor contact?	Repair the poor contact.	A temporary poor contact of the connector or harness or connector in HOLD switch circuit.

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H: CHECK SPORT SHIFT SWITCH

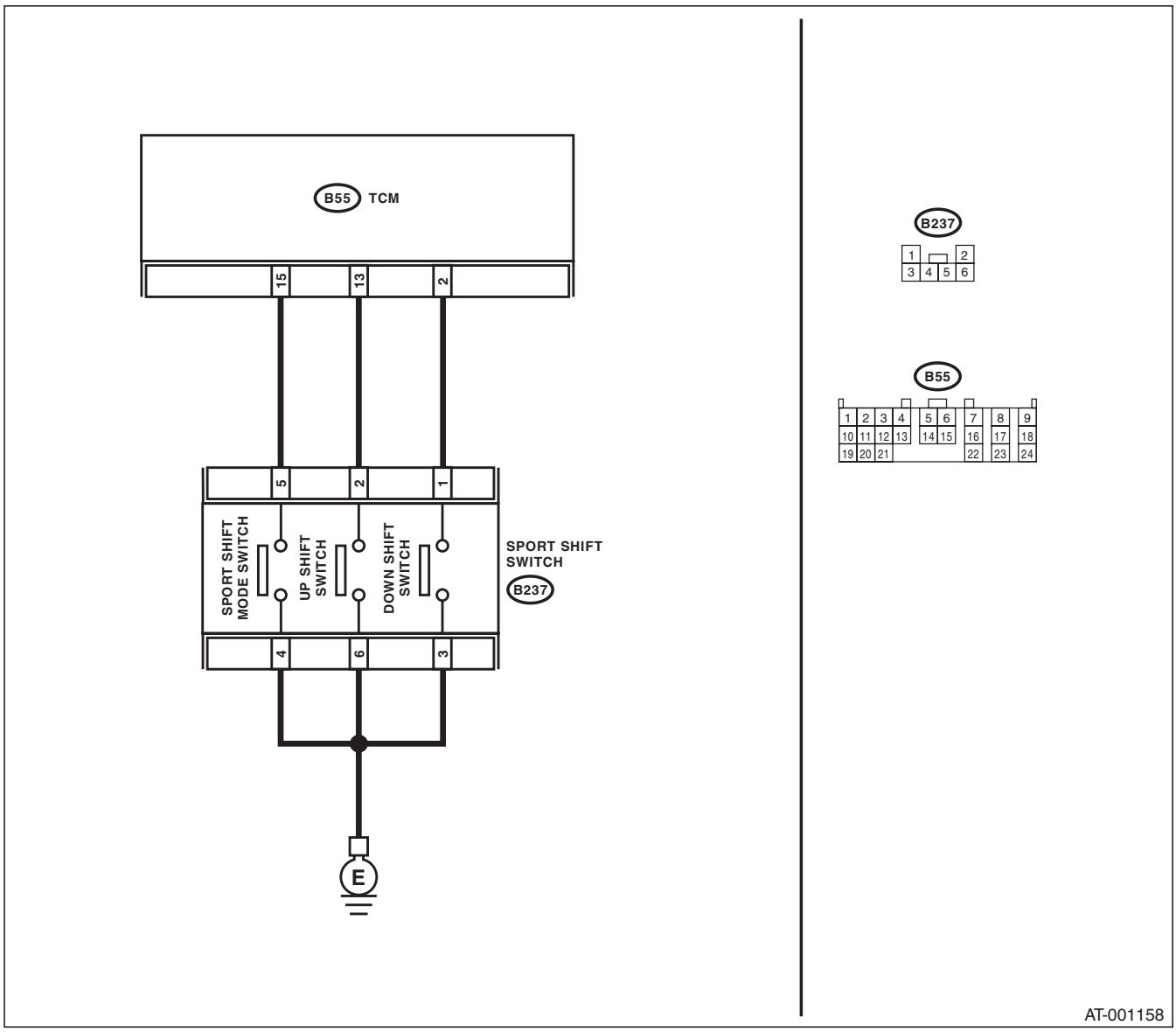
DIAGNOSIS:

The 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:



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	Step	Check	Yes	No
1	**CHECK VEHICLE.**	Is the target model equipped with SPORT shift?	Go to step **2.**	Go to step SYMPTOM RELATED DIAGNOSTIC. <Ref. to 4AT-133, Symptom Related Diagnostic.>
2	**CHECK SPORT SHIFT SWITCH.**	Does the LED light up when select lever is moved to SPORT shift mode?	Go to step **3.**	Go to step **5.**
3	**CHECK SPORT SHIFT SWITCH.**	Does the LED light up when select lever is moved to shift up side?	Go to step **4.**	Go to step **12.**
4	**CHECK SPORT SHIFT SWITCH.**	Does the LED light up when select lever is moved to shift down side?	Go to "Inspection of SPORT shift indicator" procedures. <Ref. to 4AT-129, CHECK SPORT SHIFT INDICATOR, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **19.**
5	**CHECK SPORT SHIFT SWITCH GROUND LINE.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from SPORT shift switch. 3)Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B237) No. 4 —- Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between SPORT shift switch and chassis ground.
6	**CHECK SPORT SHIFT SWITCH.** Measure the resistance between SPORT shift switch terminals. ***Terminals*** ***No. 4 —- No. 5:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Replace the lever plate assembly.
7	**CHECK SPORT SHIFT SWITCH.** 1)Move the select lever to SPORT shift mode. 2)Measure the resistance between SPORT shift switch terminals. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **8.**	Replace the lever plate assembly.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH.** 1)Disconnect the connector from TCM. 2)Measure the resistance of harness between TCM connector and SPORT shift switch connector. ***Connector & terminal*** ***(B237) No. 5 — (B55) No. 15:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between SPORT shift switch connector and TCM connector and poor contact in coupling connector.

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	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH.** 1)Disconnect the connector from TCM. 2)Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B237) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10.**	Repair the short circuit in harness between SPORT shift switch connector and TCM connector.
10	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the connector to TCM and SPORT shift switch. 2)Turn the ignition switch to ON. (Engine is stopped.) 3)Move the select lever to normal mode. 4)Measure the signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 15 (+) — Chassis ground (–):***	Is the voltage more than 9 V?	Go to step **11.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
11	**CHECK INPUT SIGNAL FOR TCM.** 1)Move the select lever to SPORT shift mode. 2)Measure the signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in sport shift switch circuit.	Go to step **26.**
12	**CHECK SPORT SHIFT SWITCH GROUND LINE.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from SPORT shift switch. 3)Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B237) No. 6 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **13.**	Repair the open circuit in harness between SPORT shift switch and chassis ground.
13	**CHECK SPORT SHIFT SWITCH.** 1)Measure the resistance between SPORT shift switch terminals. ***Terminals*** ***No. 6 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **14.**	Replace the guide plate assembly.
14	**CHECK SPORT SHIFT SWITCH.** 1)Move the select lever to SPORT shift mode. 2)Measure the resistance between SPORT shift switch terminals. ***Terminals*** ***No. 6 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **15.**	Replace the guide plate assembly.

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	Step	Check	Yes	No
15	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH.** 1)Disconnect the connector from TCM. 2)Measure the resistance of harness between TCM connector and SPORT shift switch connector. ***Connector & terminal*** ***(B237) No. 2 — (B55) No. 13:***	Is the resistance less than 1 Ω?	Go to step **16.**	Repair the 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 the connector from steering roll connector. 2)Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B237) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **17.**	Repair the short circuit in harness between SPORT shift switch connector and TCM connector.
17	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the all connectors. 2)Turn the ignition switch to ON. (Engine is stopped.) 3)Measure signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 13 (+) — Chassis ground (–):***	Is the voltage more than 9 V?	Go to step **18.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
18	**CHECK INPUT SIGNAL FOR TCM.** 1)Move the select lever to shift up side. 2)Measure the signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in sport shift switch circuit.	Go to step **26.**
19	**CHECK SPORT SHIFT SWITCH GROUND LINE.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from SPORT shift switch. 3)Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B237) No. 3 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **20.**	Repair the open circuit in harness between SPORT shift switch and chassis ground.
20	**CHECK SPORT SHIFT SWITCH.** Measure the resistance between SPORT shift switch terminals. ***Terminals*** ***No. 3 — No. 1:***	Is the resistance more than 1 MΩ?	Go to step **21.**	Replace the guide plate assembly.
21	**CHECK SPORT SHIFT SWITCH.** 1)Move the select lever to SPORT shift mode. 2)Measure the resistance between SPORT shift switch terminals. ***Terminals*** ***No. 3 — No. 1:***	Is the resistance less than 1 Ω?	Go to step **22.**	Replace the guide plate assembly.

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	Step	Check	Yes	No
22	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH.** 1)Disconnect the connector from TCM. 2)Measure the resistance of harness between TCM connector and SPORT shift switch connector. ***Connector & terminal*** ***(B237) No. 1 — (B55) No. 2:***	Is the resistance less than 1 Ω?	Go to step **23.**	Repair the 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 the steering roll connector. 2)Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B237) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **24.**	Repair the short circuit in harness between SPORT shift switch connector and TCM connector.
24	**CHECK INPUT SIGNAL FOR TCM.** 1)Connect the all connectors. 2)Turn the ignition switch to ON. (Engine is stopped.) 3)Measure the signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 9 V?	Go to step **25.**	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>
25	**CHECK INPUT SIGNAL FOR TCM.** 1)Move the select lever to shift up side. 2)Measure the signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 2 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in sport shift switch circuit.	Go to step **26.**
26	**CHECK POOR CONTACT.**	Is there poor contact in SPORT shift switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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I: CHECK SPORT SHIFT INDICATOR

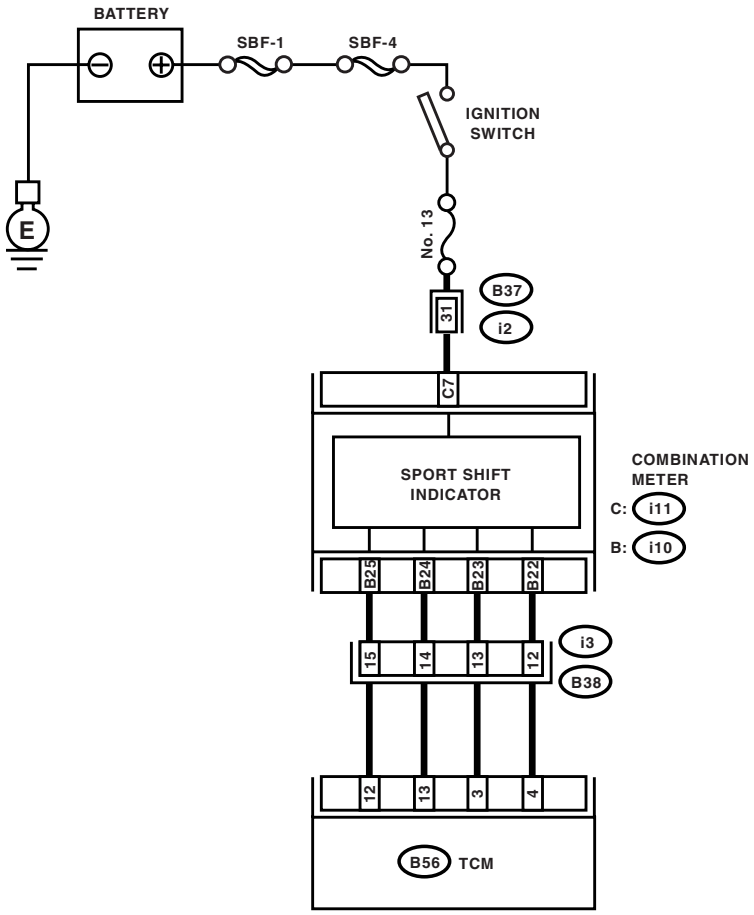
DIAGNOSIS:

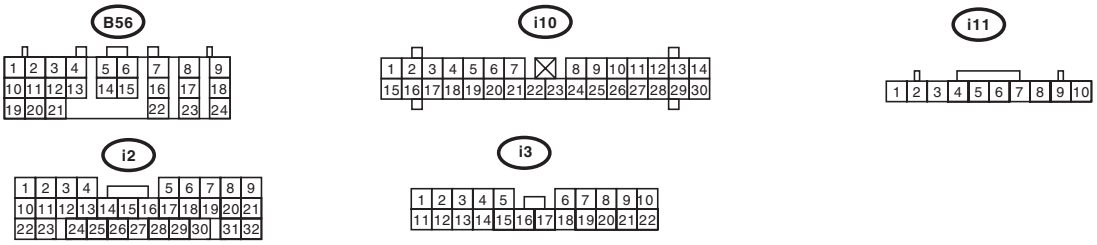
The SPORT shift indicator output signal circuit is open or shorted.

TROUBLE SYMPTOM:

- The SPORT shift indicator does not illuminate or remains illuminated.
- The SPORT shift indicator display does not change.

WIRING DIAGRAM:





AT-01159

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DIAGNOSTIC PROCEDURE WITHOUT DIAGNOSTIC TROUBLE CODE (DTC)

	Step	Check	Yes	No
1	**CHECK SPORT SHIFT INDICATOR.**	Does the SPORT shift indicator operate normally when driving in SPORT shift mode?	<Ref. to 4AT-131, CHECK BUZZER, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK COMBINATION METER.**	Do the meters and indicators other than SPORT shift indicator operate normally?	Go to step **3.**	Check the combination meter.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from TCM and combination meter. 3)Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B56) No. 3 — (i10) No. 23:*** ***(B56) No. 4 — (i10) No. 22:*** ***(B56) No. 12 — (i10) No. 25:*** ***(B56) No. 13 — (i10) No. 24:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the 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 the 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:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and combination meter connector.
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1)Connect the connector to TCM and combination meter. 2)Turn the ignition switch to ON. (Engine is stopped.) 3)Measure the 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 (–):***	Is the voltage more than 4 V?	Go to step **6.**	Replace the combination meter.
6	**CHECK POOR CONTACT.**	Is there poor contact in SPORT shift indicator circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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J: CHECK BUZZER

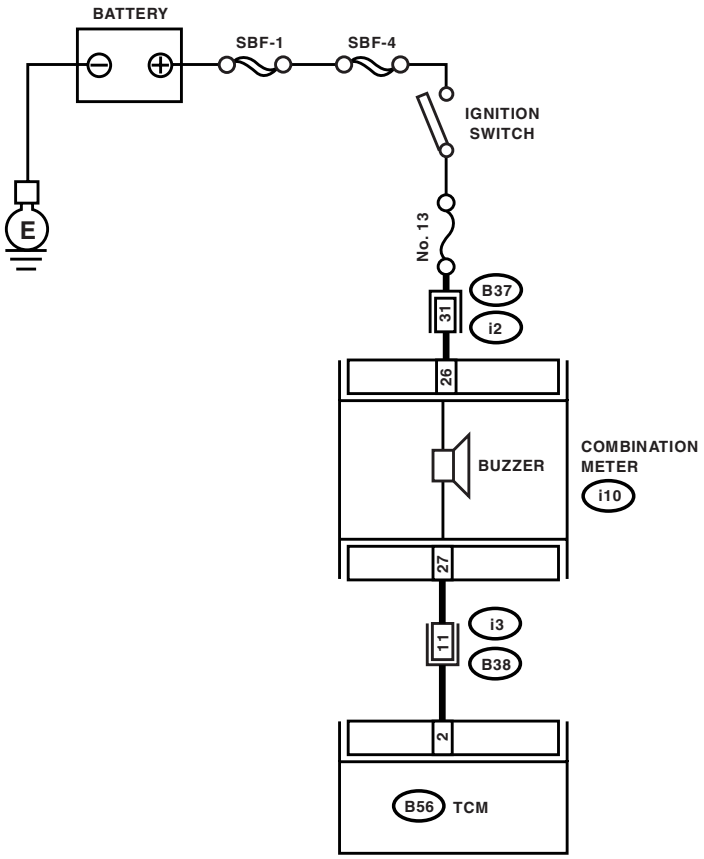
DIAGNOSIS:

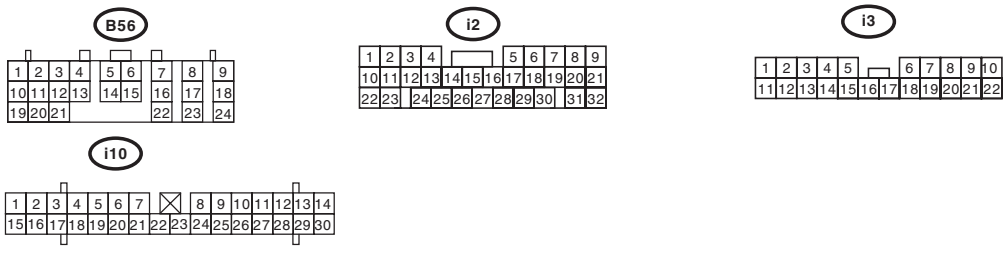
The Buzzer output signal circuit is open or shorted.

TROUBLE SYMPTOM:

The Buzzer remains sounded.

WIRING DIAGRAM:





AT-01160

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	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN TCM AND COMBINATION METER.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from combination meter and TCM. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 21 — Chassis ground:***	Is the resistance more than1 MΩ?	Go to step **2.**	Repair the short circuit in harness between TCM and combination meter connector.
2	**CHECK COMBINATION METER.** 1)Connect the connector to combination meter. 2)Turn the ignition switch to ON. (Engine is stopped.)	Does the buzzer sound?	Replace the combination meter.	Go to step **3.**
3	**CHECK POOR CONTACT.**	Is there poor contact in buzzer circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-70, Transmission Control Module (TCM).>

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16.Symptom Related Diagnostic

A: INSPECTION

Symptom	Problem parts
Starter does not rotate when select lever is in “P” or “N” range; starter rotates when select lever is in “R”, “D”, “3” or “2” range.	• Inhibitor switch • Select cable • Select lever • Starter motor and harness
Abnormal noise when select lever is in “P” or “N” range.	• Strainer • Transfer duty solenoid • Oil pump • Drive plate • ATF level too high or too low
Hissing noise occurs during standing start.	• Strainer • ATF level too high or too low
Noise occurs while driving in “D1”.	• Final gear • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in “D2”.	
Noise occurs while driving in “D3”.	• Final gear • Low & reverse brake • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in “D4”.	• Final gear • Low & reverse brake • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Engine stalls while shifting from one range to another.	• Control valve • Lock-up damper • Engine performance • Input shaft
Vehicle moves when select lever is in “N” range.	• TCM • Low clutch
Shock occurs when select lever is moved from “N” to “D” range.	• TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is moved from “N” to “D” range.	• 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” range.	• TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is moved from “N” to “R” range.	• Control valve • Low & reverse clutch • Reverse clutch • Line pressure duty solenoid • Seal ring • Front gasket transmission case
Vehicle does not start in any shift range (engine stalls).	• Parking brake mechanism • Planetary gear

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Symptom	Problem parts
Vehicle does not start in any shift range (engine revving up).	• Strainer • Line pressure duty solenoid • Control valve • Drive pinion • Hypoid gear • Axle shaft • Differential gear • Oil pump • Input shaft • Output shaft • Planetary gear • Drive plate • ATF level too low • Front gasket transmission case
Vehicle does not start in “R” range only (engine revving up).	• Select cable • Select lever • Control valve • Low & reverse clutch • Reverse clutch
Vehicle does not start in “R” range only (engine stalls).	• Low clutch • 2-4 brake • Planetary gear • Parking brake mechanism
Vehicle does not start in “D”, “3” range only (engine revving up).	• Low clutch • One-way clutch
Vehicle does not start in “D”, “3” or “2” range only (engine revving up).	• Low clutch
Vehicle does not start in “D”, “3” or “2” range only (engine stalls).	• Reverse clutch
Vehicle starts in “R” range only (engine revving up).	• Control valve
Acceleration during standing starts is poor (high stall rpm).	• Control valve • Low clutch • Reverse clutch • ATF level too low • Front gasket transmission case • Differential gear oil level too high or too low
Acceleration during standing starts is poor (low stall rpm).	• Oil pump • Torque converter one-way clutch • Engine performance
Acceleration is poor when select lever is in “D”, “3” or “2” range (normal stall rpm).	• TCM • Control valve • High clutch • 2-4 brake • Planetary gear
Acceleration is poor when select lever is in “R” (normal stall rpm).	• Control valve • High clutch • 2-4 brake • Planetary gear
No shift occurs from 1st to 2nd gear.	• TCM • Rear vehicle speed sensor • Front vehicle speed sensor • Throttle position sensor • Shift solenoid 1 • Control valve • 2-4 brake
No shift occurs from 2nd to 3rd gear.	• TCM • Control valve • High clutch • Shift solenoid 2

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Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	• TCM • Shift solenoid 1 • ATF temperature sensor • Control valve • 2-4 brake
Engine brake is not effected when select lever is in “3” range.	• Inhibitor switch • TCM • Throttle position sensor • Control valve
Engine brake is not effected when select lever is in “3” or “2” range.	• Control valve
Engine brake is not effected when select lever is in “1” range.	• Control valve • Low & reverse brake
Shift characteristics are erroneous.	• Inhibitor switch • TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Throttle position sensor • Control valve • Ground earth
No lock-up occurs.	• TCM • Throttle position sensor • ATF temperature sensor • Control valve • Lock-up facing • Engine speed signal
Parking brake is not effected.	• Select cable • Select lever • Parking mechanism
Shift lever cannot be moved or is hard to move from “P” range.	
ATF spurts out.	• ATF level too high
Differential oil spurts out.	• Differential gear oil too high
Differential oil level changes excessively.	• Seal pipe • Double oil seal
Odor is produced from ATF supply pipe.	• High clutch • 2-4 brake • Low & reverse clutch • Reverse clutch • Lock-up facing • ATF deterioration
Shock occurs from 1st to 2nd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • ATF deterioration • Engine performance • 2-4 brake timing solenoid
Slippage occurs from 1st to 2nd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • 2-4 brake timing solenoid • High clutch

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Symptom	Problem parts
Shock occurs from 2nd to 3rd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • High clutch • 2-4 brake • ATF deterioration • Engine performance • 2-4 brake timing solenoid
Slippage occurs from 2nd to 3rd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • High clutch • 2-4 brake • 2-4 brake timing solenoid
Shock occurs from 3rd to 4th gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake timing solenoid • 2-4 brake • ATF deterioration • Engine performance • Low clutch timing solenoid • Low clutch
Slippage occurs from 3rd to 4th gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • 2-4 brake timing solenoid
Shock occurs when select lever is moved from “3” to “2” range.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake duty solenoid • 2-4 brake • ATF deterioration • 2-4 brake timing solenoid
Shock occurs when select lever is moved from “D” to “1” range.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • ATF deterioration • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid

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Symptom	Problem parts
Shock occurs when select lever is moved from “2” to “1” range.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • Low & reverse clutch • ATF deterioration • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid
Shock occurs when accelerator pedal is released at medium speeds.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • Lock-up damper • Engine performance • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid
Vibration occurs during straight-forward operation.	• TCM • Lock-up duty solenoid • Lock-up facing • Lock-up damper • HOLD switch
Vibration occurs during turns (tight corner “braking” phenomenon).	• TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Throttle position sensor • ATF temperature sensor • Transfer clutch • Transfer valve • Transfer duty solenoid • ATF deterioration • Harness • HOLD switch
Front wheel slippage occurs during standing starts.	• TCM • Front vehicle speed sensor • FWD switch • Throttle position sensor • ATF temperature sensor • Control valve • Transfer clutch • Transfer valve • Transfer pipe • Transfer duty solenoid
Vehicle is not set in FWD mode.	• TCM • FWD switch • Transfer clutch • Transfer valve • Transfer duty solenoid
Select lever is hard to move.	• Select cable • Select lever • Detente spring • Manual plate

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Symptom	Problem parts
Select lever is too high to move (unreasonable resistance).	• Detente spring • Manual plate
Select lever slips out of operation during acceleration or while driving on rough terrain.	• Select cable • Select lever • Detente spring • Manual plate

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MANUAL TRANSMISSION AND DIFFERENTIAL

5MT

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1. General Description

A: SPECIFICATIONS

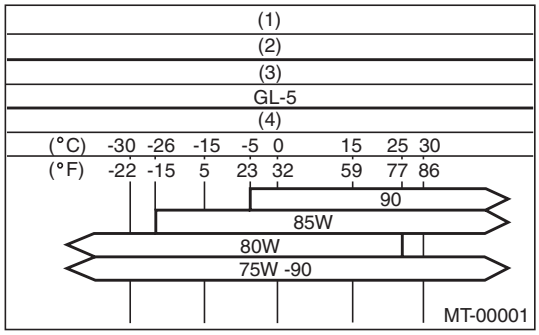
1. MANUAL TRANSMISSION AND DIFFERENTIAL

Model			1.6 L		2.0 L Non-turbo	2.0 L Turbo		2.5 L Non-turbo
			FWD	AWD		Except Australia	Australia	
Type			5-forward speeds with synchromesh and 1-reverse 5×2-forward speeds with synchromesh and 2-reverse*					
Transmission gear ratio		1st	3.454			3.454	3.166	3.454
		2nd	2.062			1.947	1.882	2.062
		3rd	1.448			1.366	1.296	1.448
		4th	1.088			0.972		1.088
		5th	0.825			0.738		0.780
		Reverse	3.333					
Auxiliary transmission gear ratio*		High	—	1.000		—		
		Low	—	1.447		—		
Front reduction gear	Final	Type of gear	Hypoid					
		Gear ratio	4.111		3.900	3.900	4.444	4.111
Rear reduction gear	Transfer	Type of gear	—	Helical				
		Gear ratio	—	1.000		1.100	1.000	
	Final	Type of gear	—	Hypoid				
		Gear ratio	—	4.111	3.900	3.545	4.444	4.111
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)					
Center differential	Type and number of gear		—	Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)				
Transmission gear oil			GL-5					
Transmission oil capacity			3.3 ℓ (3.5 US qt, 2.9 Imp qt)	3.5 ℓ (3.7 US qt, 3.1 Imp qt) 4.0 ℓ (4.2 US qt, 3.5 Imp qt)*				

*: Dual-range model only

2. TRANSMISSION GEAR OIL

Recommended oil



(1) Item
(2) Transmission gear oil
(3) API classification
(4) SAE viscosity No. and applicable temperature

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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

Snap ring to counter washer clearance
0.05 — 0.35 mm (0.0020 — 0.0138 in)

Snap ring (Outer-19)	
Part No.	Thickness mm (in)
031319000	1.50 (0.0591)
805019010	1.72 (0.0677)

Input shaft holder adjustment

Dimension "D" mm (in)	Number of shim
52.50 — 53.11 (2.0669 — 2.0909)	—
52.00 — 52.49 (2.0472 — 2.0665)	1
51.26 — 51.99 (2.0181 — 2.0468)	2

4. DRIVE PINION ASSEMBLY

• AWD model

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)

• FWD model

Selection of 1st driven gear

1st driven gear	
Part No.	Outer diameter of bushing mm (in)
32231AA840	42.019 — 42.033 (1.6543 — 1.6548)
32231AA850	42.005 — 42.018 (1.6537 — 1.6543)
32231AA860	41.990 — 42.004 (1.6531 — 1.6537)

5. INPUT SHAFT ASSEMBLY

Snap ring (Outer-28) to ball bearing clearance
0 — 0.12 mm (0 — 0.0047 in)

Snap ring (Outer-28)	
Part No.	Thickness mm (in)
805028050	2.48 (0.0976)
805028060	2.56 (0.1008)
805028070	2.64 (0.1039)

Snap ring (Inner-68) to bearing clearance
0 — 0.12 mm (0 — 0.0047 in)

Snap ring (Inner-68)	
Part No.	Thickness mm (in)
805168020	1.84 (0.0724)
805168030	1.92 (0.0756)
805168040	2.00 (0.0787)

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6. MAIN SHAFT

Snap ring (Outer-25) to synchronizer hub clearance
0.060 — 0.100 mm (0.0024 — 0.0039 in)

Snap ring (Outer-25)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805025051	2.42 (0.0953)	805025055	2.62 (0.1031)
805025052	2.47 (0.0972)	805025056	2.67 (0.1051)
805025053	2.52 (0.0992)	805025057	2.72 (0.1071)
805025054	2.57 (0.1012)	805025058	2.37 (0.0933)

7. REVERSE IDLER GEAR

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 the reverse idler gear to transmission case wall clearance to within 0 to 0.5 mm (0 to 0.020 in) using washers.

Washer (20.5 × 26 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803020151	0.4 (0.016)	803020154	1.9 (0.075)
803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

8. SHIFTER FORK AND ROD

Select the 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 (Non-turbo model)		
Part No.	Mark	Remarks
32812AA201	4	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA211	5	Standard
32812AA221	6	Become distant from 5th gear by 0.2 mm (0.008 in)

5th shifter fork (Turbo model)		
Part No.	Mark	Remarks
32812AA231	7	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA241	No mark	Standard
32812AA251	9	Become distant from 5th gear by 0.2 mm (0.008 in)

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9. TRANSFER CASE OR REAR 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.

Reverse check plate adjustment

Reverse check plate			
Part No.	Mark	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

10.EXTENSION ASSEMBLY

Thrust washer (50 × 61 × t) to taper roller bearing table outer race side clearance
0.2 — 0.3 mm T (0.0008 — 0.012 in T)

NOTE:
T: Tight

Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

Thrust washer to center differential side clearance
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

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11.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)

12.TRANSFER DRIVE GEAR

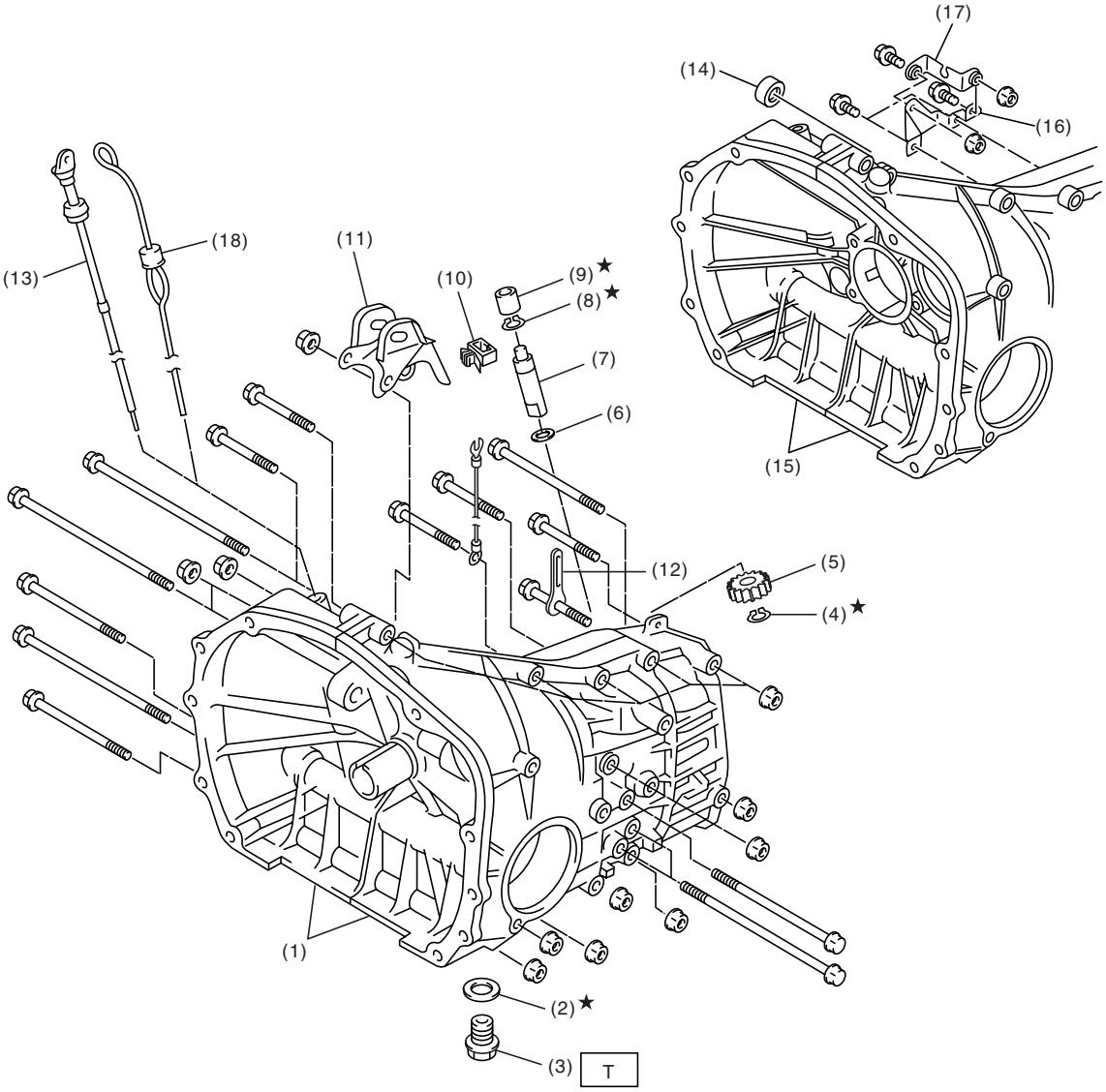
Snap ring (Outer-30) to ball bearing clearance
0.01 — 0.15 mm (0.0004 — 0.0059 in)

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

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B: COMPONENT

1. TRANSMISSION CASE



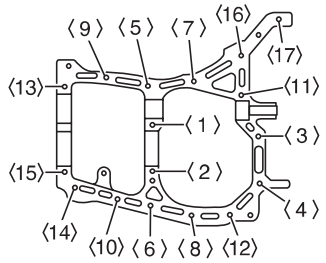
MT-00002

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(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) Clip
(13) Oil level gauge (Non-turbo model)
(14) Oil seal (Dual-range)
(15) Transmission case ASSY (Dual-range)
(16) High-low cable bracket A (Dual-range)
(17) High-low cable bracket B (Dual-range)
(18) Oil level gauge (Turbo model)

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

• Transmission case tightening torque



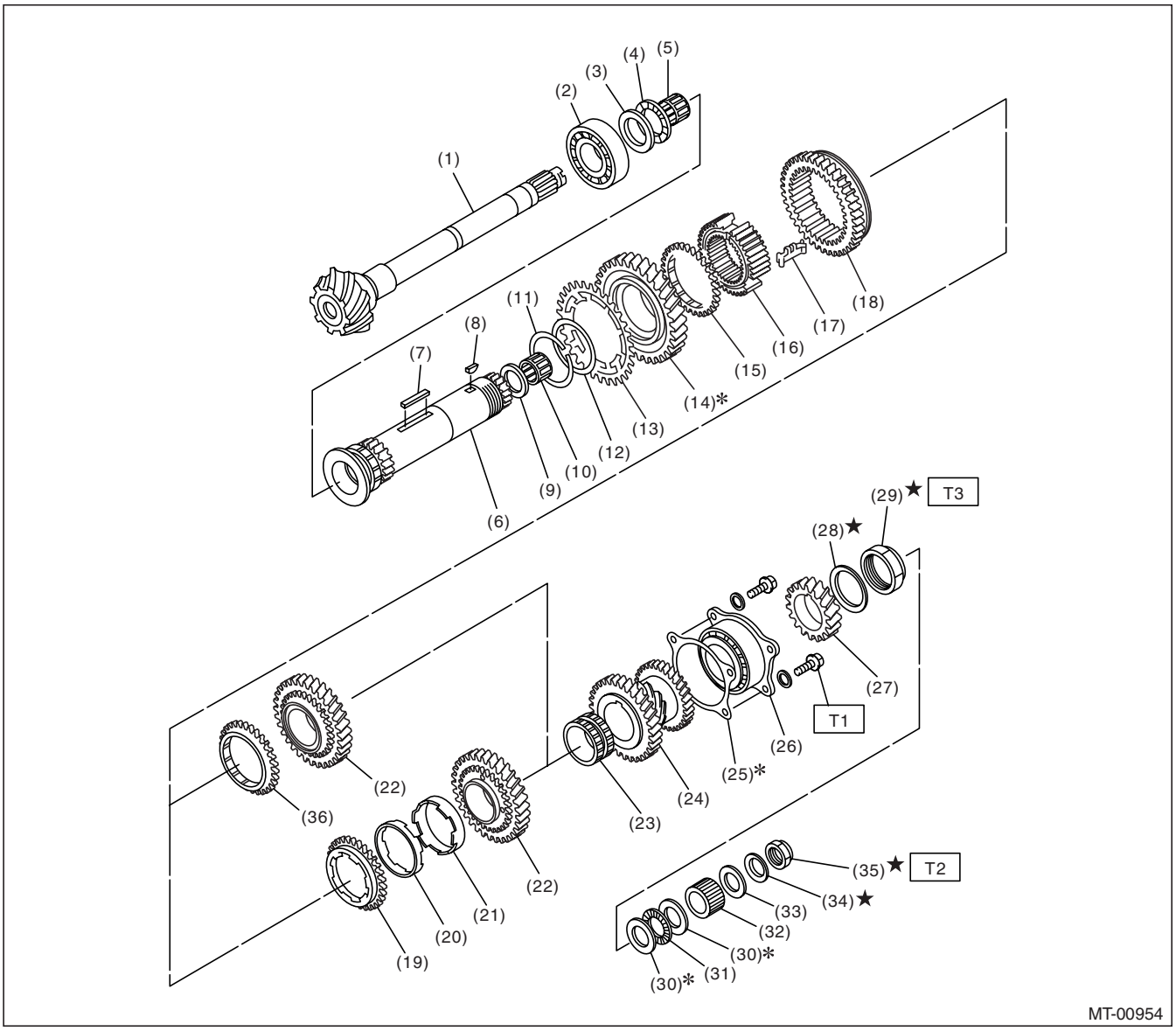
MT-00003

Bolt No.	Bolt size	Tightening torque: N·m (kgf-m, ft-lb)
<5> to <15>	8 mm	25 (2.5, 18.1)
<1> to <4> <16>, <17>	10 mm	39 (4.0, 28.9)

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2. DRIVE PINION ASSEMBLY

• AWD MODEL



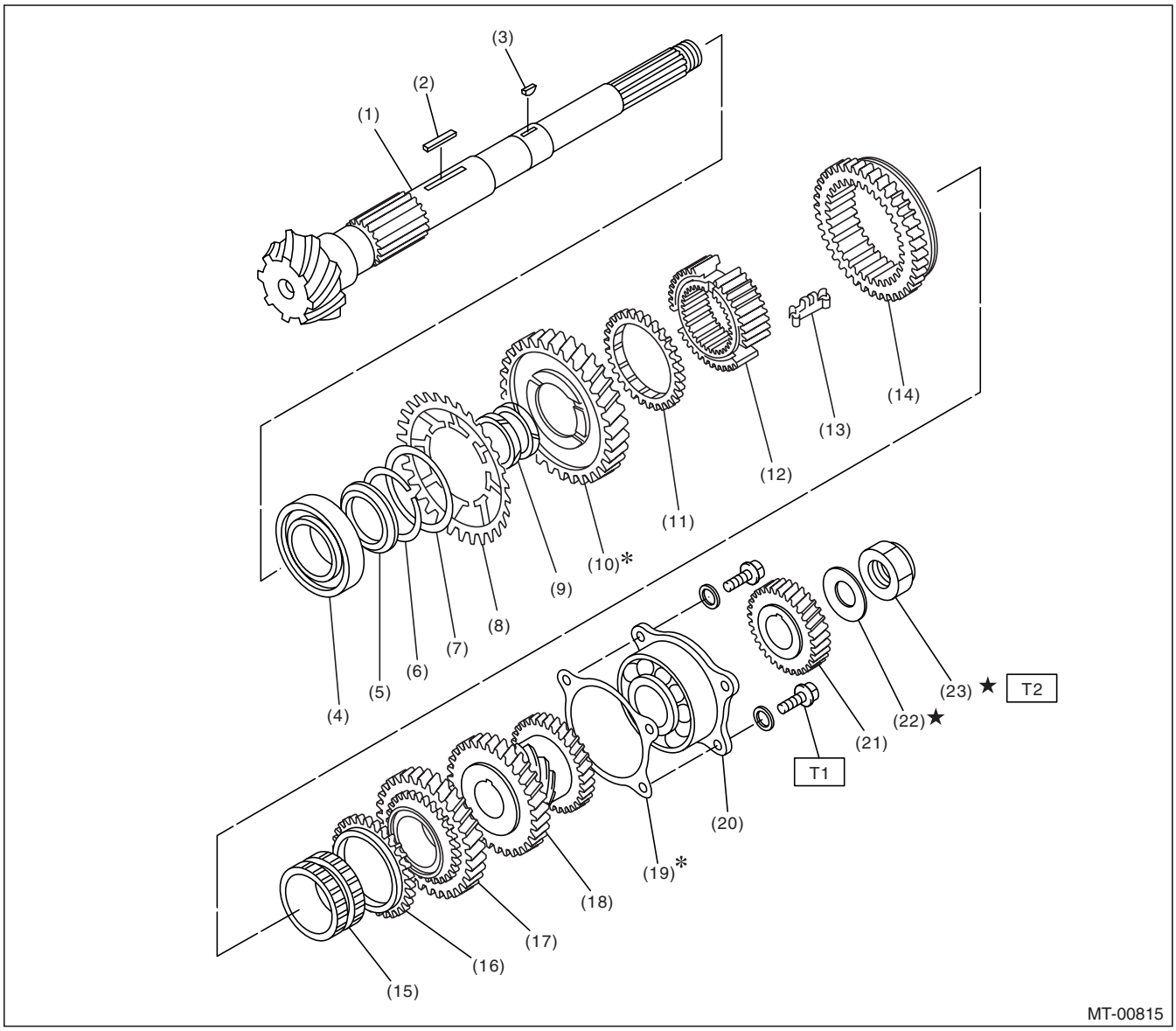
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(1) Drive pinion shaft
(2) Roller bearing
(3) Washer
(4) Thrust bearing
(5) Needle bearing
(6) Driven shaft
(7) Key
(8) Woodruff key
(9) Drive pinion collar
(10) Needle bearing
(11) Snap ring (Outer)
(12) Washer
(13) Sub gear
(14) 1st driven gear
(15) Baulk ring
(16) 1st-2nd synchronizer hub
(17) Insert key
(18) Reverse driven gear
(19) Outer baulk ring (Except 1.6 L model)
(20) Synchro cone (Except 1.6 L model)
(21) Inner baulk ring (Except 1.6 L model)
(22) 2nd driven gear
(23) 2nd driven gear bush
(24) 3rd-4th driven gear
(25) Driven pinion shim
(26) Roller bearing
(27) 5th driven gear
(28) Lock washer
(29) Lock nut
(30) Washer
(31) Thrust bearing
(32) Differential bevel gear sleeve
(33) Washer
(34) Lock washer
(35) Lock nut
(36) 2nd baulk ring (1.6 L model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 30 (3.1, 22.1)
T2: 120 (12.2, 88.5)
T3: 260 (26.5, 191.7)

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• FWD MODEL



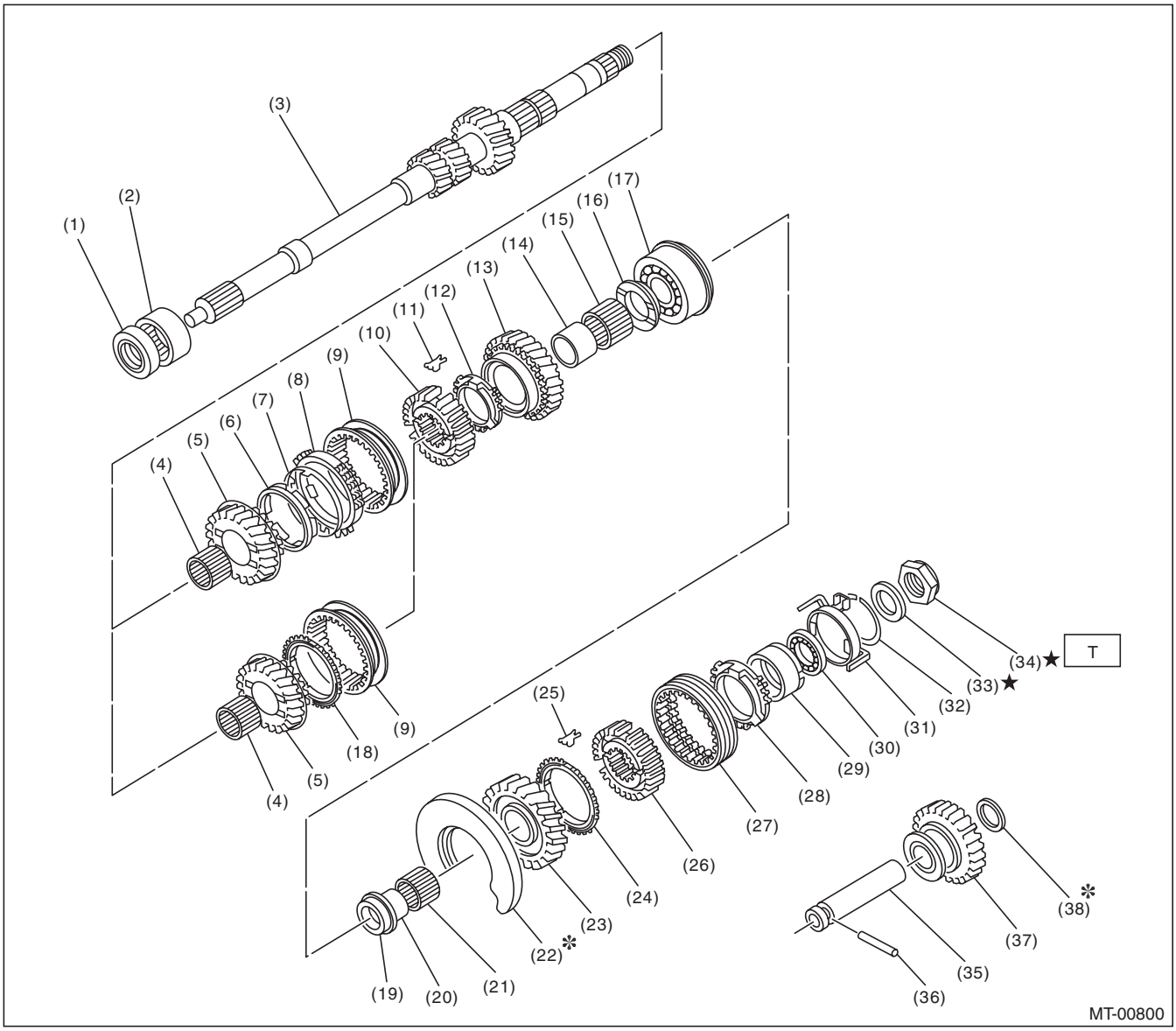
(1) Drive pinion shaft
(2) Key
(3) Woodruff key
(4) Roller bearing
(5) 1st gear trust plate
(6) Outer snap ring
(7) Washer
(8) 1st sub gear
(9) 1st gear bushing
(10) 1st driven gear
(11) 1st baulk ring
(12) 1st-2nd synchronizer hub
(13) Insert key
(14) Reverse driven gear
(15) 2nd baulk ring
(16) 2nd driven gear
(17) 2nd gear bushing
(18) 3rd-4th driven gear
(19) Driven pinion shim
(20) Ball bearing
(21) 5th driven gear
(22) Lock washer
(23) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 29.4 (3.0, 21.7)
T2: 120 (12.2, 88.5)

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3. MAIN SHAFT ASSEMBLY

• SINGLE RANGE AWD MODEL



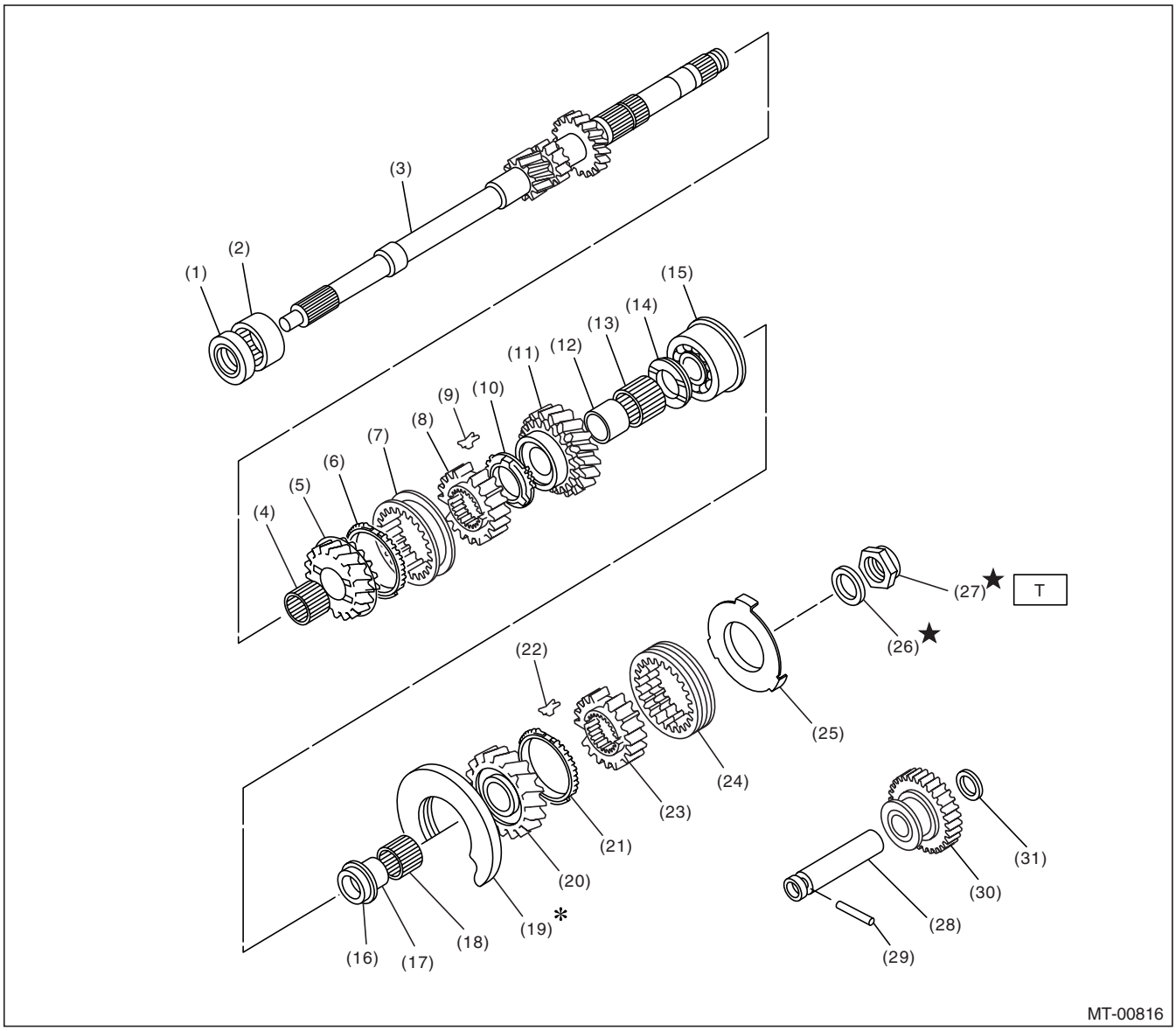
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(1) Oil seal
(2) Needle bearing
(3) Transmission main shaft
(4) Needle bearing
(5) 3rd drive gear
(6) Inner baulk ring (Turbo and 2.5 L model)
(7) 3rd synchro cone (Turbo and 2.5 L model)
(8) Outer baulk ring (Turbo and 2.5 L model)
(9) 3rd-4th coupling sleeve
(10) 3rd-4th synchronizer hub
(11) 3rd-4th shifting insert key
(12) 4th baulk ring
(13) 4th drive gear
(14) 4th needle bearing race
(15) Needle bearing
(16) 4th gear thrust washer
(17) Ball bearing
(18) Baulk ring (Except turbo and 2.5 L model)
(19) 5th gear thrust washer
(20) 5th needle bearing race
(21) Needle bearing
(22) Main shaft rear plate
(23) 5th drive gear
(24) 5th baulk ring
(25) 5th-Rev shifting insert key
(26) 5th-Rev synchronizer hub
(27) 5th-Rev coupling sleeve
(28) Rev baulk ring
(29) Rev synchro cone
(30) Ball bearing
(31) Synchro cone stopper
(32) Snap ring
(33) Lock washer
(34) Lock nut
(35) Reverse idler gear shaft
(36) Straight pin
(37) Reverse idler gear
(38) Washer

Tightening torque: N·m (kgf-m, ft-lb)
T: 120 (12.2, 88.5)

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• FWD MODEL

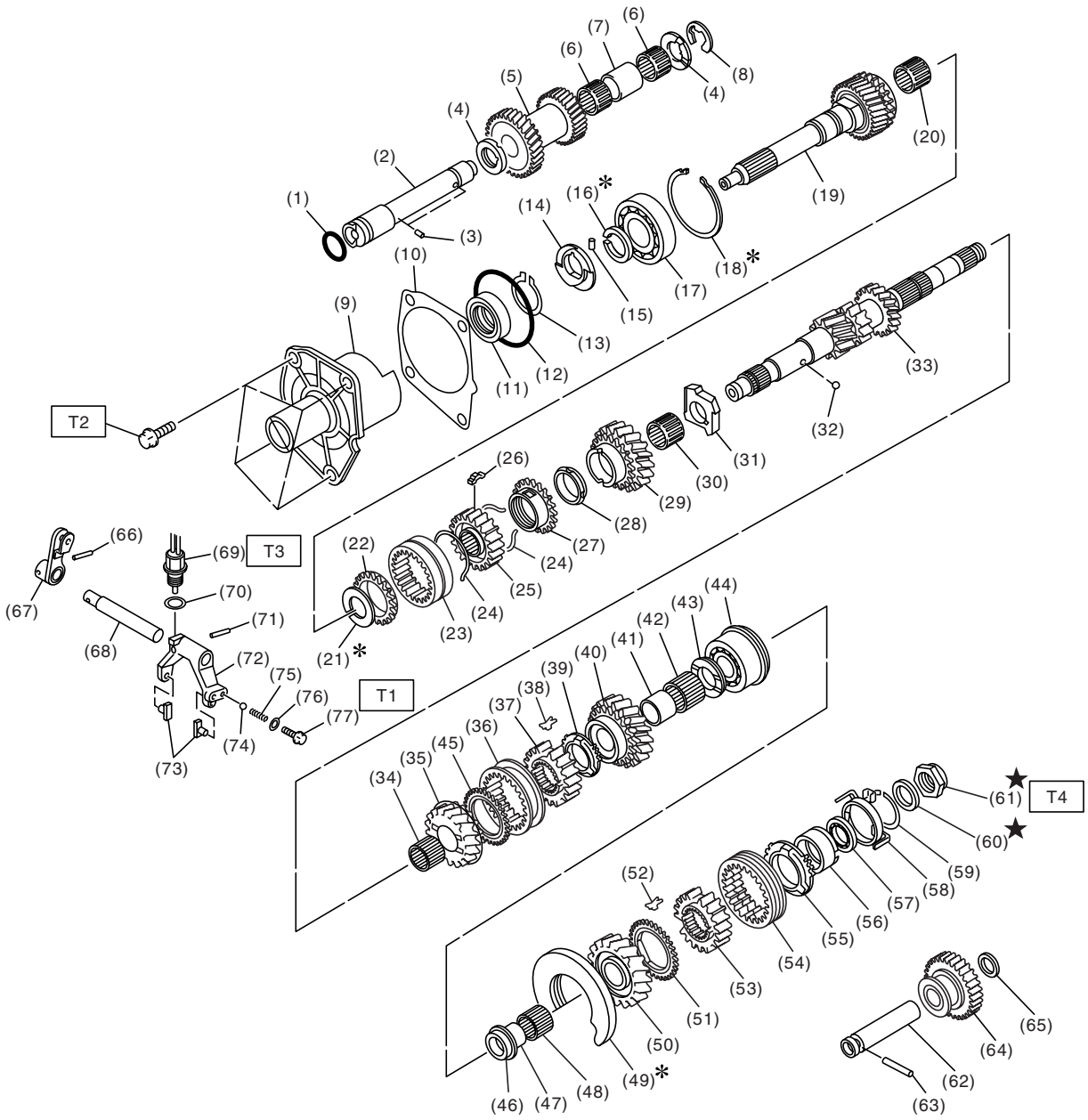


(1) Oil seal
(2) Needle bearing
(3) Transmission main shaft
(4) Needle bearing
(5) 3rd drive gear
(6) 3rd baulk ring
(7) Coupling sleeve
(8) Synchronizer hub
(9) Shifting insert key
(10) 4th baulk ring
(11) 4th drive gear
(12) 4th needle bearing race
(13) Needle bearing
(14) 4th gear thrust washer
(15) Ball bearing
(16) 5th gear thrust washer
(17) 5th needle bearing race
(18) Needle bearing
(19) Main shaft rear plate
(20) 5th drive gear
(21) 5th baulk ring
(22) 5th-Rev shifting insert key
(23) 5th-Rev synchronizer hub
(24) 5th-Rev coupling sleeve
(25) Insert stopper plate
(26) Lock washer
(27) Lock nut
(28) Straight pin
(29) Reverse idler gear shaft
(30) Reverse idler gear
(31) Washer

Tightening torque: N·m (kgf-m, ft-lb)
T: 120 (12.2, 88.5)

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• DUAL RANGE AWD MODEL



MT-00006

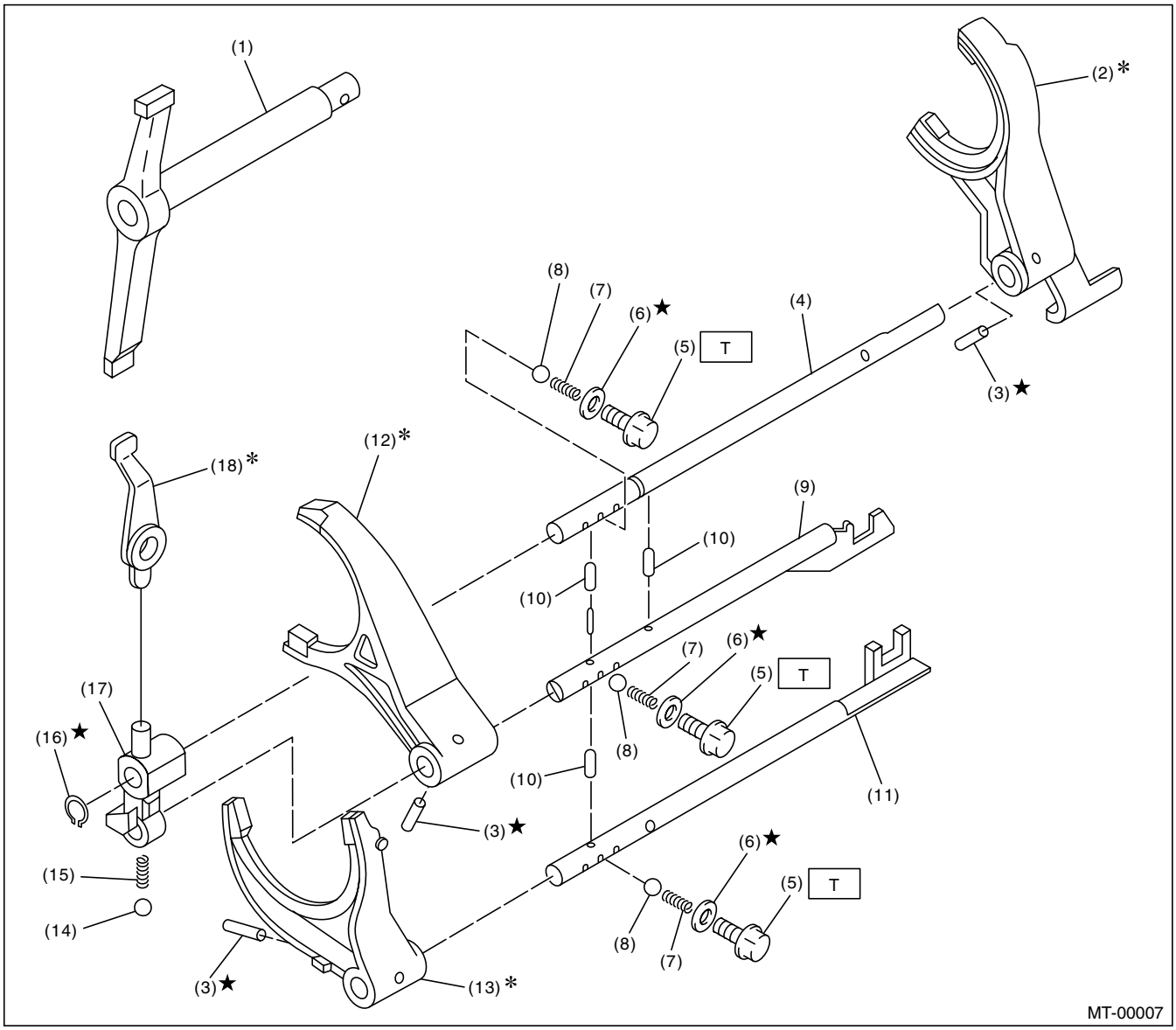
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(1) O-ring
(2) High-low counter shaft
(3) Knock pin
(4) High-low counter washer
(5) Counter gear
(6) Needle bearing
(7) Counter gear collar
(8) Snap ring (Outer-19)
(9) Input shaft holder
(10) Input shaft shim
(11) Oil seal
(12) O-ring
(13) Snap ring (Outer-28)
(14) Oil squeeze
(15) Straight pin
(16) Snap ring (Outer-28)
(17) Ball bearing
(18) Snap ring (Inner-68)
(19) Input shaft
(20) Needle bearing
(21) Snap ring (Outer-25)
(22) High-low baulk ring
(23) High-low coupling sleeve
(24) High-low synchronizer spring
(25) High-low synchronizer hub
(26) Shifting insert key
(27) High-low baulk ring
(28) Friction damper
(29) Input low gear
(30) Needle bearing
(31) Input low gear spacer
(32) Ball
(33) Main shaft
(34) Needle bearing
(35) 3rd drive gear
(36) 3rd-4th coupling sleeve
(37) 3rd-4th synchronizer hub
(38) 3rd-4th shifting insert key
(39) 4th baulk ring
(40) 4th drive gear
(41) 4th needle bearing race
(42) Needle bearing
(43) 4th gear thrust washer
(44) Ball bearing
(45) Baulk ring
(46) 5th gear thrust washer
(47) 5th needle bearing race
(48) Needle bearing
(49) Main shaft rear plate
(50) 5th drive gear
(51) 5th baulk ring
(52) 5th-Rev shifting insert key
(53) 5th-Rev synchronizer hub
(54) 5th-Rev coupling sleeve
(55) Rev baulk ring
(56) Rev synchro cone
(57) Ball bearing
(58) Synchro cone stopper
(59) Snap ring
(60) Lock washer
(61) Lock nut
(62) Reverse idler gear shaft
(63) Straight pin
(64) Reverse idler gear
(65) Washer
(66) Straight pin
(67) High-low shifter lever
(68) High-low shifter shaft
(69) Low switch
(70) Gasket
(71) Straight pin
(72) High-low shifter fork
(73) High-low shifter piece
(74) Ball
(75) Spring
(76) Gasket
(77) Plug

Tightening torque: N·m (kgf-m, ft-lb)
T1: 9.75 (1.0, 7.2)
T2: 20 (2.0, 14.5)
T3: 25 (2.5, 18.1)
T4: 120 (12.2, 88.5)

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4. SHIFTER FORK AND SHIFTER ROD

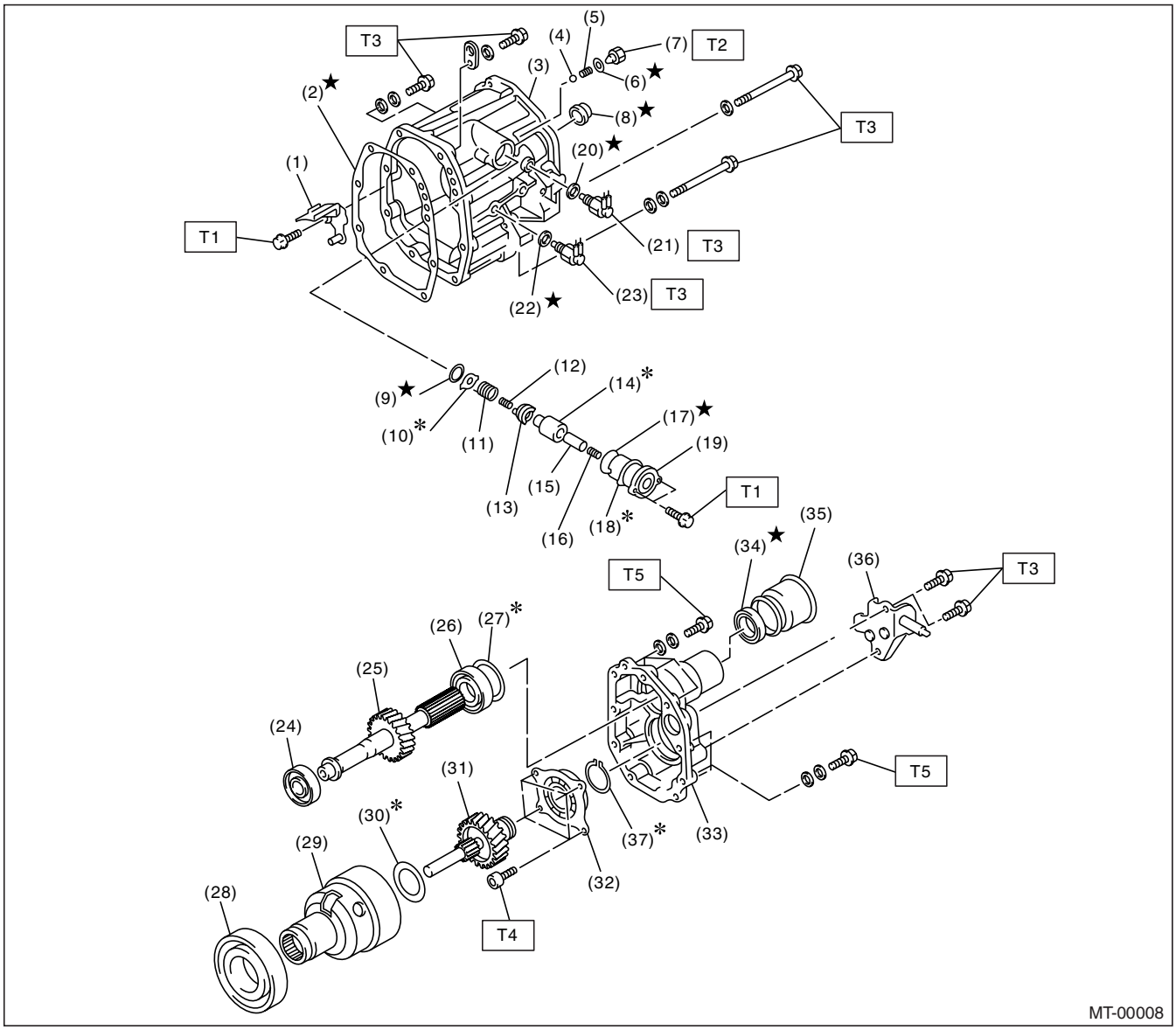


(1) Shifter arm
(2) 5th shifter fork
(3) Straight pin
(4) Reverse fork rod
(5) Checking ball plug
(6) Gasket
(7) Checking ball spring
(8) Ball
(9) 3rd-4th fork rod
(10) Interlock plunger
(11) 1st-2nd fork rod
(12) 3rd-4th shifter fork
(13) 1st-2nd shifter fork
(14) Ball
(15) Spring
(16) Snap ring (Outer)
(17) Reverse fork rod arm
(18) Reverse shifter lever

Tightening torque: N·m (kgf-m, ft-lb)
T: 20 (2.0, 14.5)

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5. TRANSFER CASE AND EXTENSION

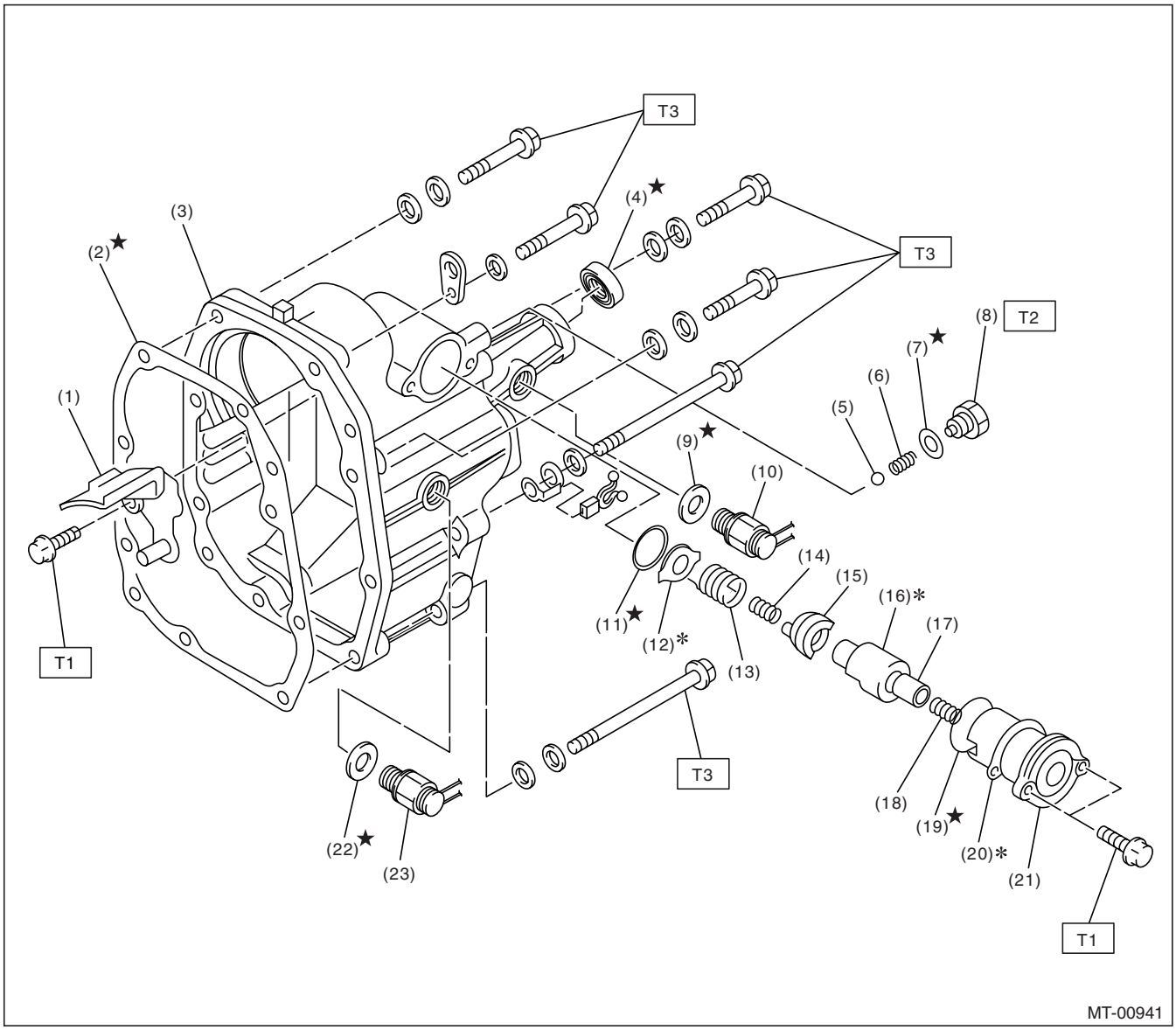


(1) Oil guide
(2) Gasket
(3) Transfer case
(4) Ball
(5) Reverse accent spring
(6) Gasket
(7) Plug
(8) Oil seal
(9) Snap ring (Inner)
(10) Reverse check plate
(11) Reverse check spring
(12) Reverse return spring
(13) Reverse check cam
(14) Reverse accent shaft
(15) Return spring cap
(16) Return spring
(17) O-ring
(18) Adjusting select shim
(19) Reverse check sleeve
(20) Gasket
(21) Neutral switch
(22) Gasket
(23) Back-up light switch
(24) Roller bearing
(25) Transfer driven gear
(26) Roller bearing
(27) Adjusting washer
(28) Ball bearing
(29) Center differential
(30) Adjusting washer
(31) Transfer drive gear
(32) Ball bearing
(33) Extension case
(34) Oil seal
(35) Dust cover
(36) Shift bracket
(37) Snap ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 10 (1.0, 7.2)
T3: 25 (2.5, 18.1)
T4: 26 (2.7, 20)
T5: 40 (4.1, 29.7)

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6. REAR CASE

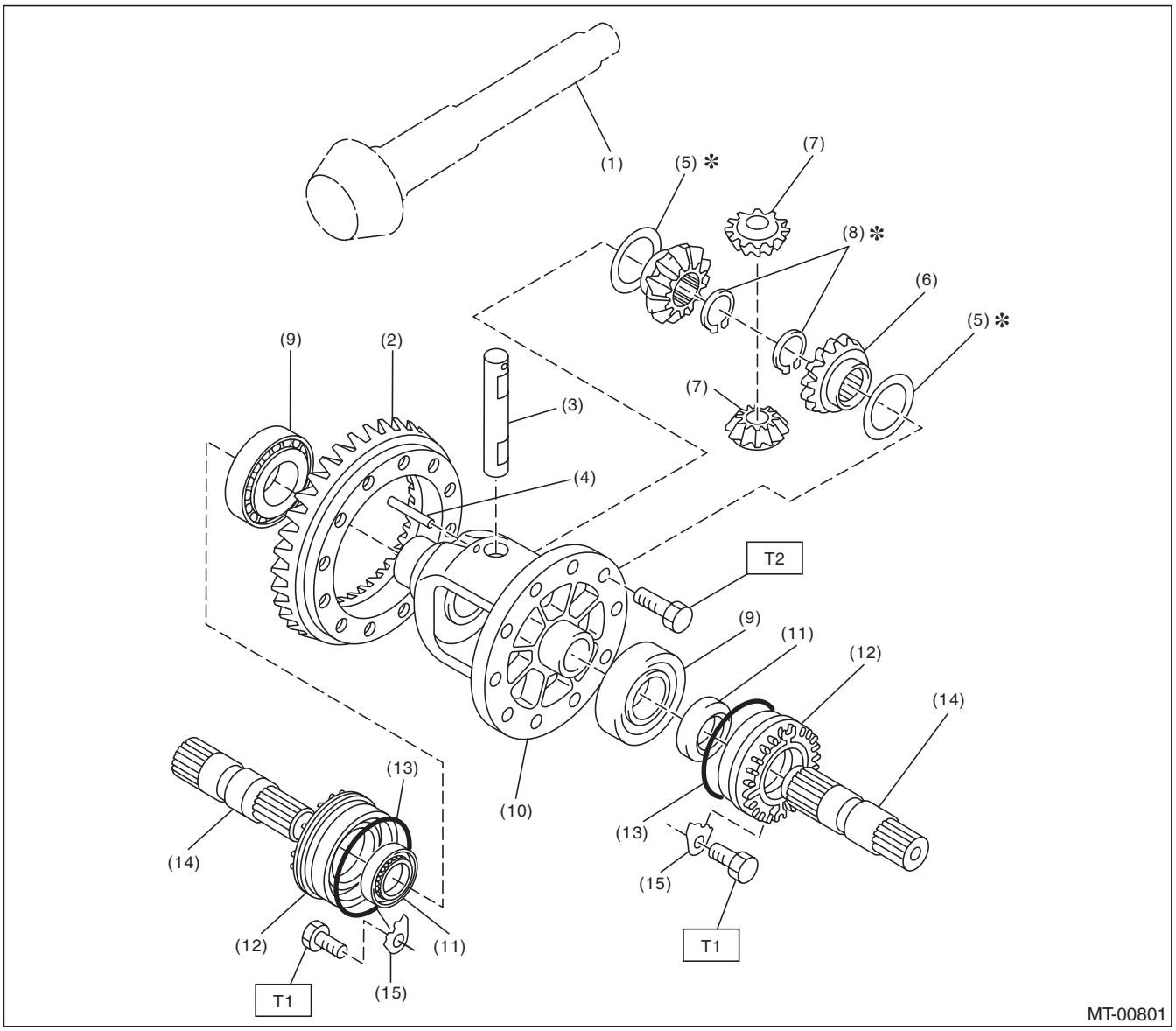


(1) Oil guide
(2) Case gasket
(3) Rear case
(4) Oil seal
(5) Ball
(6) Reverse accent spring
(7) Washer
(8) Plug
(9) Gasket
(10) Neutral switch
(11) Snap ring
(12) Reverse check plate
(13) Reverse check spring
(14) Reverse return spring
(15) Reverse check cam
(16) Reverse accent shaft
(17) Return spring cap
(18) Return spring
(19) O-ring
(20) Adjusting select shim
(21) Reverse check sleeve
(22) Gasket
(23) Back-up light switch

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 10 (1.0, 7.2)
T3: 24.5 (2.5, 18.1)

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7. FRONT DIFFERENTIAL



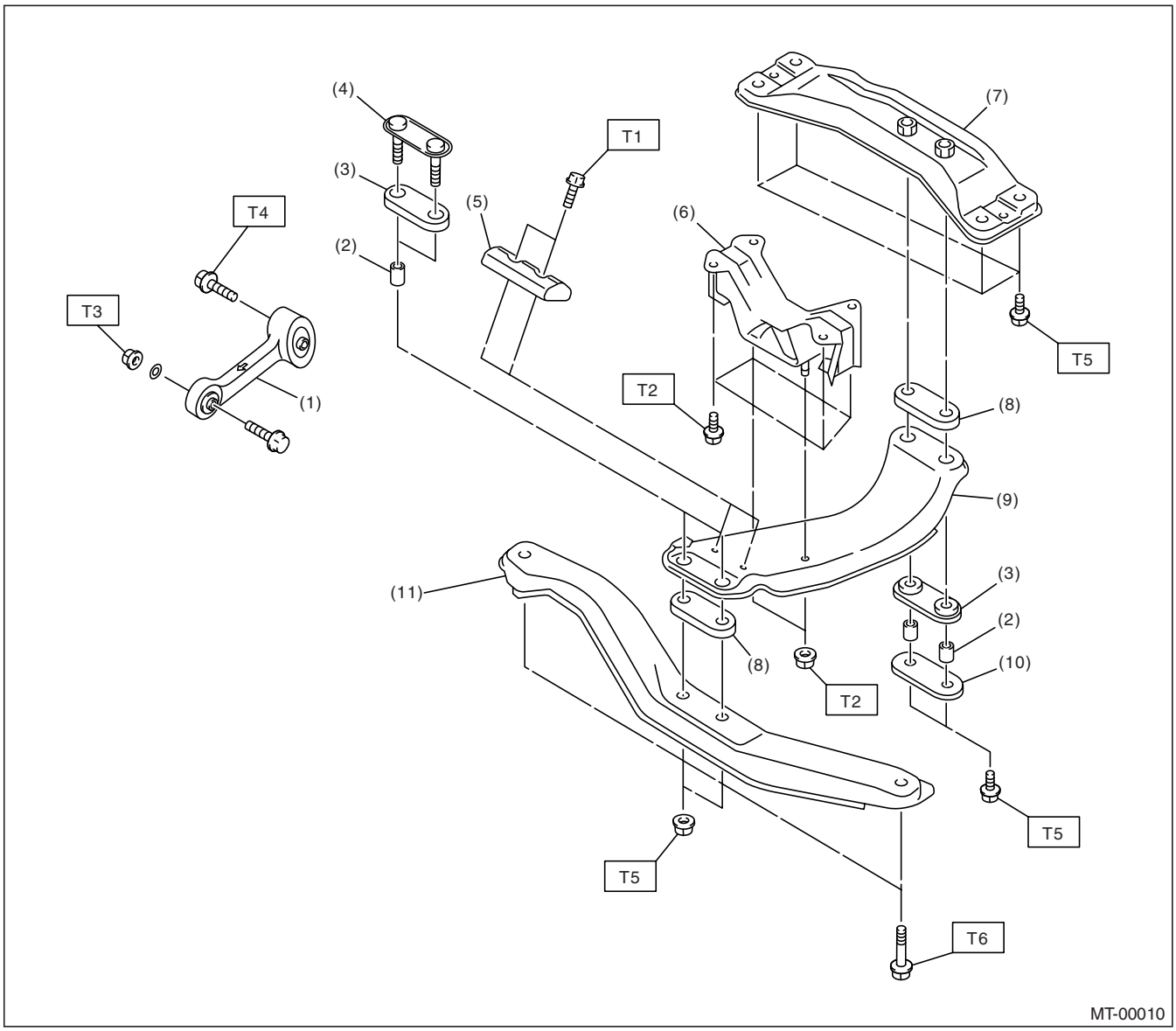
(1) Drive pinion shaft
(2) Hypoid driven gear
(3) Pinion shaft
(4) Straight pin
(5) Washer
(6) Differential bevel gear
(7) Differential bevel pinion
(8) Snap ring (Outer)
(9) Roller bearing
(10) Differential case
(11) Oil seal
(12) Differential side retainer
(13) O-ring
(14) Axle drive shaft
(15) Retainer lock plate

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 62 (6.3, 45.6)

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8. TRANSMISSION MOUNTING

• Except 1.6 L FWD MODEL

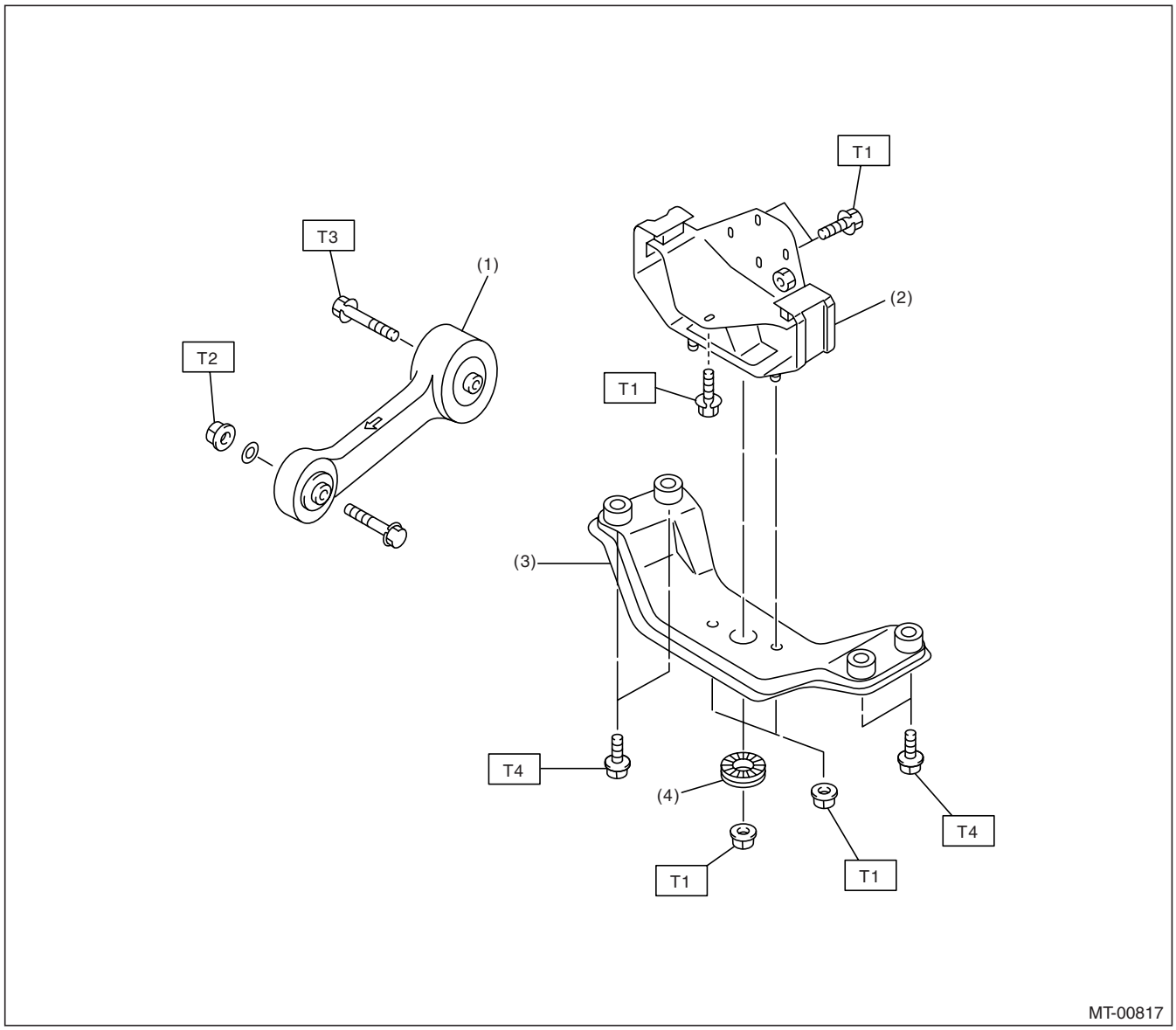


(1)	Pitching stopper	(7)	Rear crossmember
(2)	Spacer	(8)	Cushion D
(3)	Cushion C	(9)	Center crossmember
(4)	Front plate	(10)	Rear plate
(5)	Dynamic damper (Except 1.6 L model)	(11)	Front crossmember
(6)	Rear cushion rubber		

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: 140 (14.3, 103)

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• 1.6 L FWD MODEL



(1) Pitching stopper
(2) Rear cushion rubber
(3) Rear crossmember
(4) Rubber cushion

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.57, 25.8)
T2: 50 (5.1, 36.9)
T3: 58 (5.9, 42.8)
T4: 70 (7.1, 51.6)

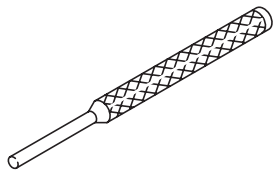
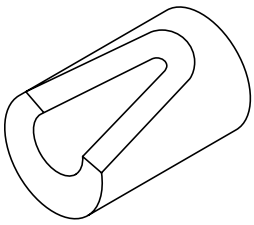
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C: CAUTION

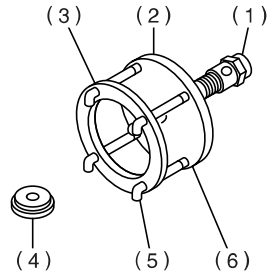
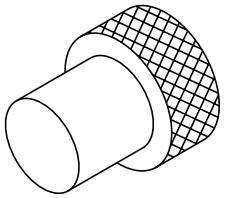
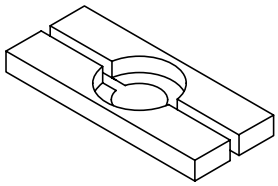
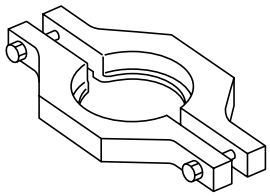
• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation, and disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation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

D: PREPARATION TOOL

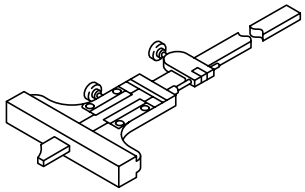
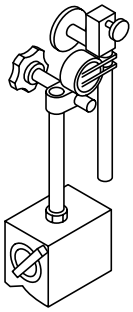
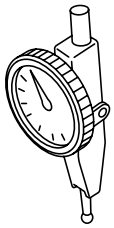
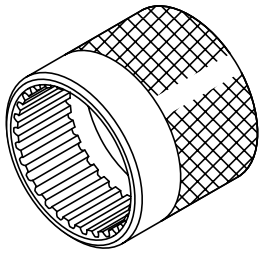
1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398791700	398791700	REMOVER	Used for removing and installing spring pin (6 mm).
 ST-399411700	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.

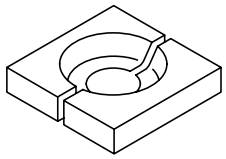
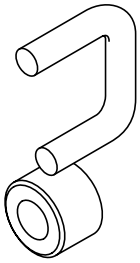
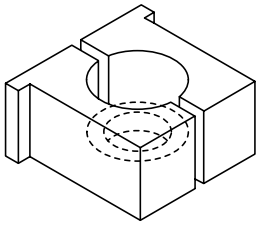
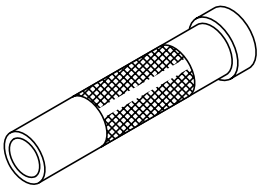
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399527700	399527700	PULLER SET	Used for removing and installing roller bearing (Differential). (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000)
 ST-399780104	399780104	WEIGHT	Used for measuring preload on roller bearing.
 ST-498077000	498077000	REMOVER	Used for removing roller bearing of drive pinion shaft.
 ST-498077300	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.

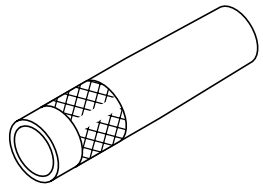
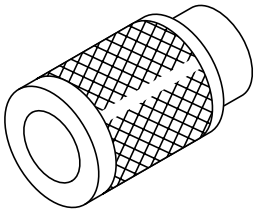
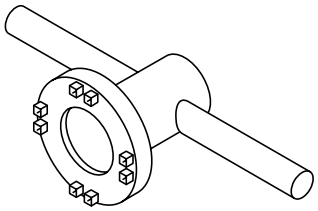
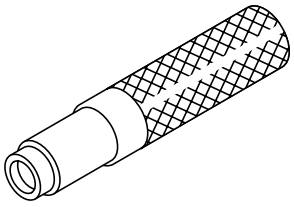
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498147000	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with MAGNET BASE (498247001).
 ST-498427100	498427100	STOPPER	Used for securing the drive pinion shaft assembly and driven gear assembly when removing the drive pinion shaft assembly lock nut.

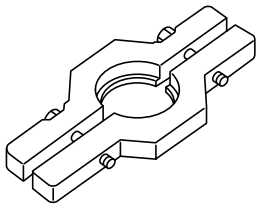
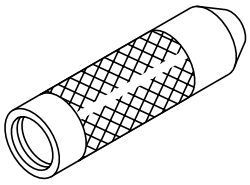
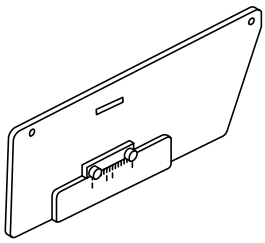
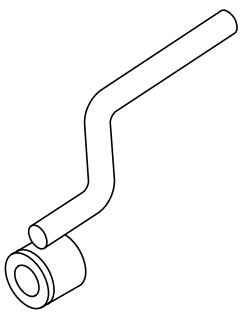
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498517000	498517000	REPLACER	• Used for removing drive pinion thrust plate and roller bearing race. • For FWD.
 ST-498787100	498787100	MAIN SHAFT STOPPER	Used for removing and installing transmission main shaft lock nut.
 ST-498937000	498937000	TRANSMISSION HOLDER	Used for removing and installing transmission main shaft lock nut.
 ST-499277100	499277100	BUSH 1-2 INSTALLER	• Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bush. • Used for installing roller bearing outer races to differential case.

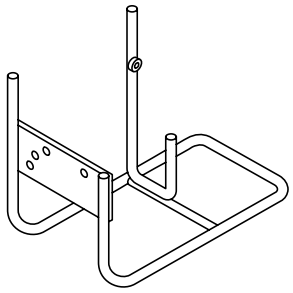
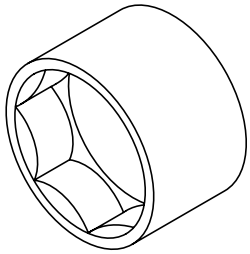
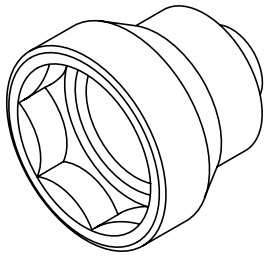
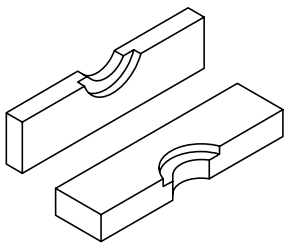
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499277200	499277200	INSTALLER	Used for press-fitting the 2nd driven gear, roller bearings and 5th driven gear onto the driven shaft.
 ST-499757002	499757002	INSTALLER	• Used for installing snap ring (OUT 25) and ball bearing (25 × 26 × 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.

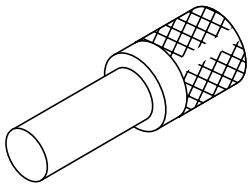
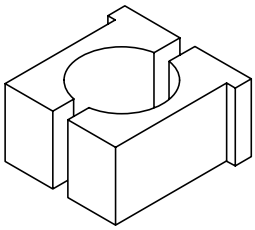
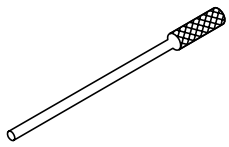
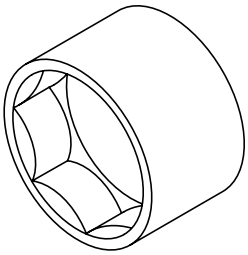
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499857000	499857000	5TH DRIVEN GEAR REMOVER	Used for removing 5th driven gear.
 ST-499877000	499877000	RACE 4-5 INSTALLER	• Used for installing 4th needle bearing race and ball bearing onto transmission main shaft. • Used with REMOVER (899714110).
 ST-499917500	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting drive pinion shim.
 ST-499927100	499927100	HANDLE	Used for fitting transmission main shaft.

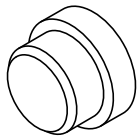
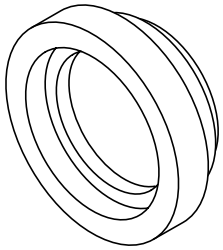
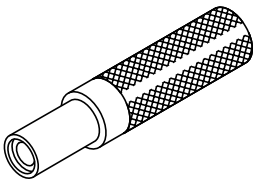
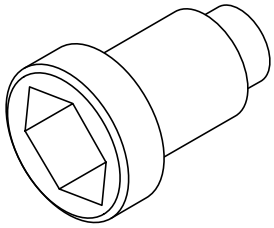
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499937100	499937100	TRANSMISSION STAND SET	Stand used for transmission disassembly and assembly.
 ST-499987003	499987003	SOCKET WRENCH (35)	Used for removing and installing driven pinion lock nut and main shaft lock nut.
 ST-499987300	499987300	SOCKET WRENCH (50)	Used for removing and installing driven gear assembly lock nut.
 ST-899714110	899714110	REMOVER	Used for fixing transmission main shaft, drive pinion and rear drive shaft.

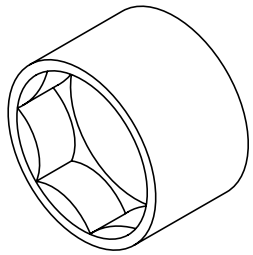
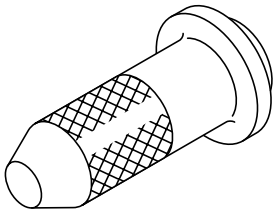
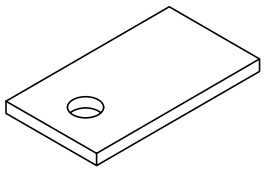
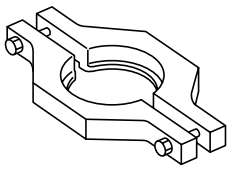
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899864100	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.
 ST-899884100	899884100	HOLDER	Used for tightening lock nut on sleeve.
 ST-899904100	899904100	REMOVER	Used for removing and installing straight pin.
 ST-899988608	899988608	SOCKET WRENCH (27)	Used for removing and installing drive pinion lock nut.

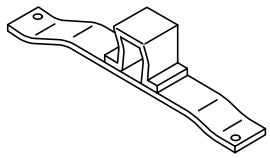
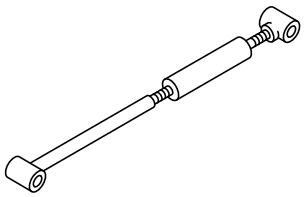
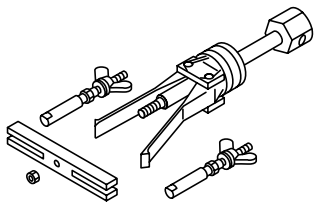
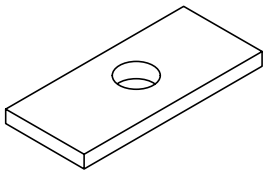
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398497701	398497701	ADAPTER	• Used for installing roller bearing onto differential case. • Used with INSTALLER (499277100).
 ST-499587000	499587000	INSTALLER	Used for installing driven gears to driven 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.

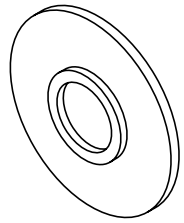
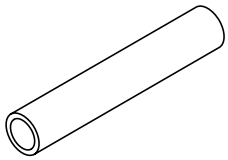
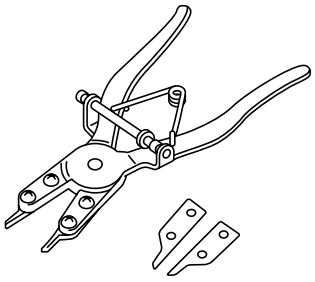
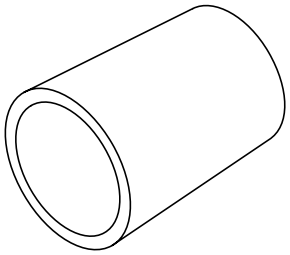
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899984103	899984103	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST-498255400	498255400	PLATE	Used for measuring backlash.
 ST-498077400	498077400	SYNCHRONIZER CONE REMOVER	• Used for removing synchronizer cone of main shaft. • Used for removing 5th driven gear of drive pinion shaft.

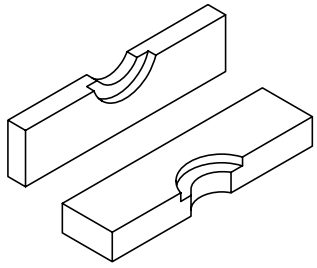
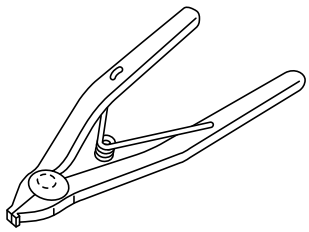
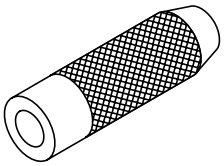
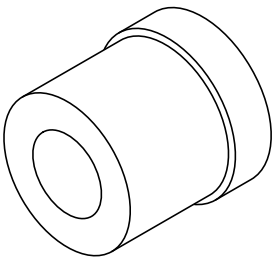
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41099AA010	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 ST41099AA020	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 ST-398527700	398527700	PULLER ASSY	Used for removing extension case roller bearing.
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.

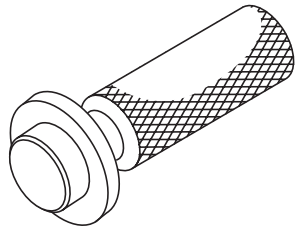
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398177700	38177700	INSTALLER	• Used for installing bearing cone of transfer driven gear (transfer case side). • Used for installing ball bearing of transfer drive gear.
 ST-398507703	398507703	DUMMY COLLAR	• Used for installing input shaft holder oil seal. • For dual-range model.
 ST-398663600	398663600	PLIERS	• Used for removing and installing input shaft snap ring. • For dual-range model.
 ST-499757001	499757001	SNAP RING GUIDE	• Used for installing snap ring (OUT 25). • For dual-range model.

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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899858600	899858600	RETAINER	• Used for removing ball bearing. • For dual-range model.
 ST-899474100	899474100	EXPANDER	• Used for removing and installing snap ring. • For dual-range model.
 ST-899580100	899580100	INSTALLER	• Used when pressing ball bearings into input shaft. • For dual-range model.
 ST-399513600	399513600	INSTALLER	• Used when pressing ball bearings into input shaft. • For dual-range model.

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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499797000	499797000	INSTALLER	Used for installing differential side retainer oil seal.

2. GENERAL PURPOSE TOOLS

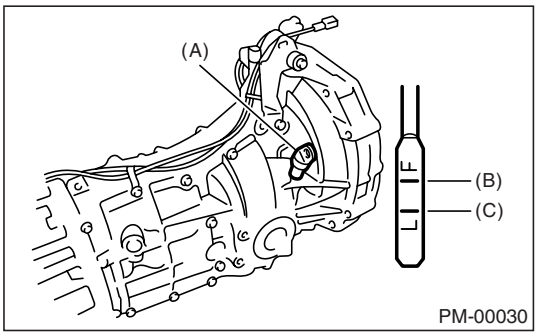
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

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2. Transmission Gear Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Turn the ignition switch to OFF, and then wait until the engine cools.
3) Remove the oil level gauge and wipe it clean.
4) Reinsert the level gauge all the way. Be sure the level gauge is correctly inserted and in the proper direction.
5) Pull out the oil level gauge again and check the oil level on it. If it is below the lower level, add oil through the oil level gauge hole to bring the level up to the upper level.



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

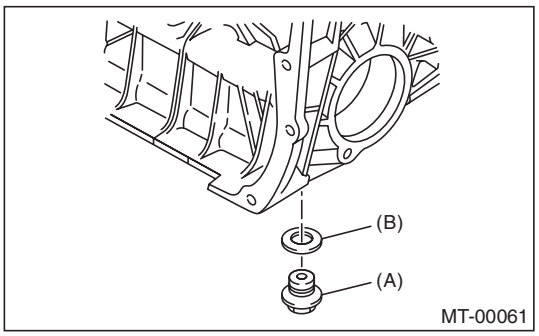
B: REPLACEMENT

1) Pull out the oil level gauge.
2) Lift-up the vehicle.
3) Drain the transmission gear oil completely.

CAUTION:
Directly after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.

NOTE:
Tighten the transmission gear oil drain plug after draining the transmission gear oil.

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



(A) Drain plug
(B) Gasket

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

Recommended gear oil:
Use GL-5 or equivalent.

Gear oil capacity:
FWD model
3.3 ℓ (3.5 US qt, 2.9 Imp qt)
AWD model
Single-range model;
3.5 ℓ (3.7 US qt, 3.1 Imp qt)
Dual-range model;
4.0 ℓ (4.2 US qt, 3.5 Imp qt)

6) Check the level of the transmission gear oil.

CAUTION:
When inserting the level gauge into transmission gear, align the protrusion on the side of the top part of level gauge with the notch in the gauge hole.

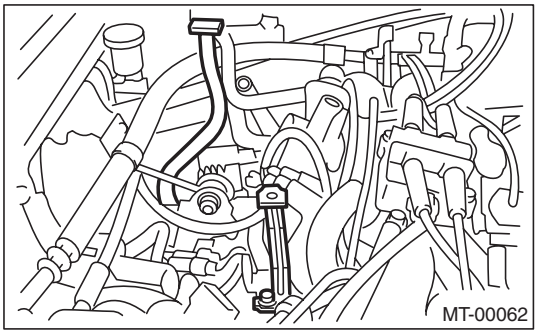
NOTE:
The level should be within the specified range marked on the gauge.

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3. Manual Transmission Assembly

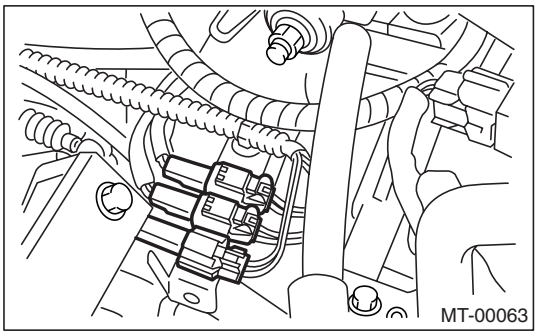
A: REMOVAL

1) Open the front hood fully, and support with stay.
2) Disconnect the ground cable from battery.
3) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.> and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Remove the air cleaner case stay. (Non-turbo model)

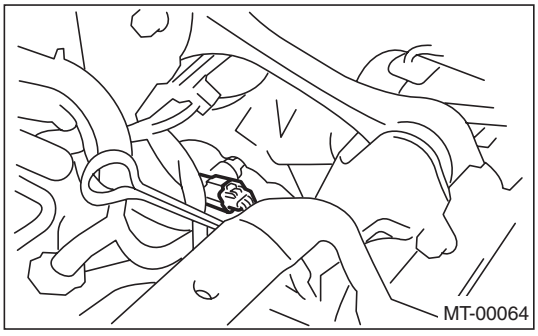


5) Remove the intercooler (Turbo model) <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
6) Disconnect the following connectors:
   (1) Neutral position switch connector
   (2) Back-up light switch connector
   (3) High-low switch connector (Dual-range model)

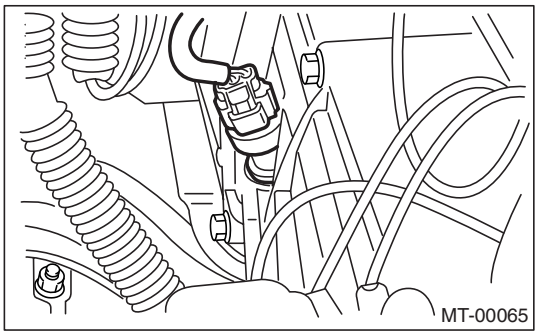
• NON-TURBO MODEL



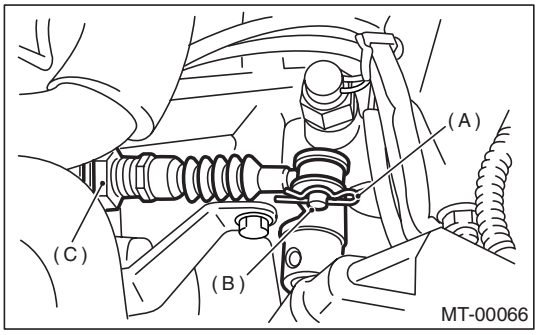
• TURBO MODEL



(4) Vehicle speed sensor



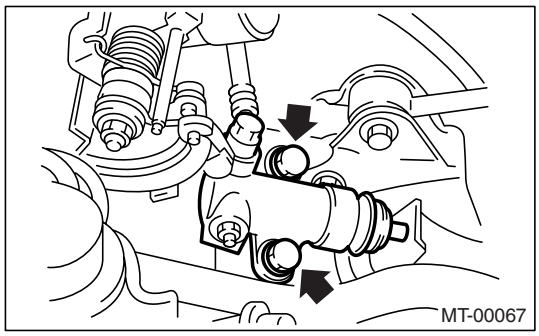
7) Remove the snap pin and clevis pin from drive select cable.
8) Remove the drive select cable on transmission. (Dual-range model)



(A) Snap pin
(B) Clevis pin
(C) Drive select cable

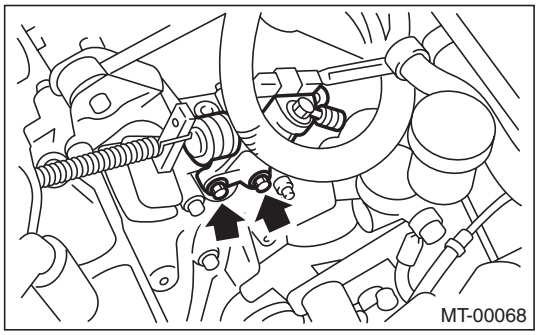
9) Remove the starter. <Ref. to SC(H4SO)-7, REMOVAL, Starter.>
10) Remove the operating cylinder from transmission. (2.0 L and 2.5 L model)

• Non-turbo MODEL

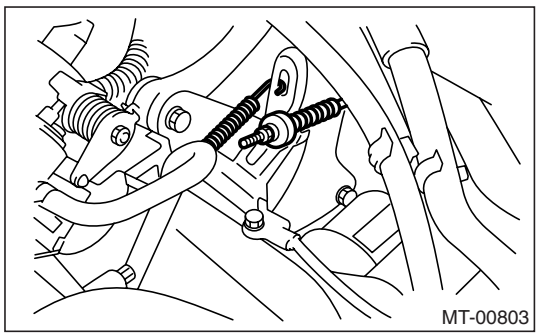


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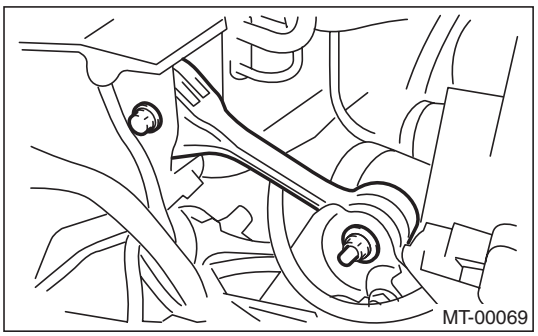
• Turbo MODEL



11) Disconnect the return spring and clutch cable. (1.6 L model)



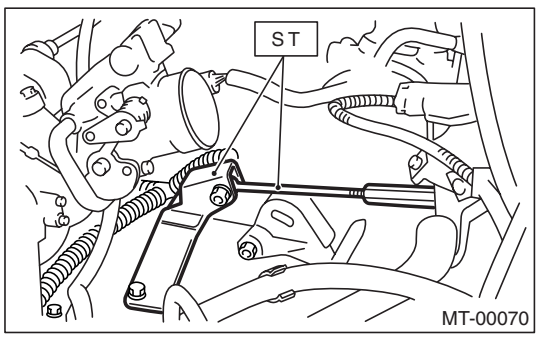
12) Remove the pitching stopper.



13) Set the ST.

NOTE:
Also is available Part No. 41099AA010.

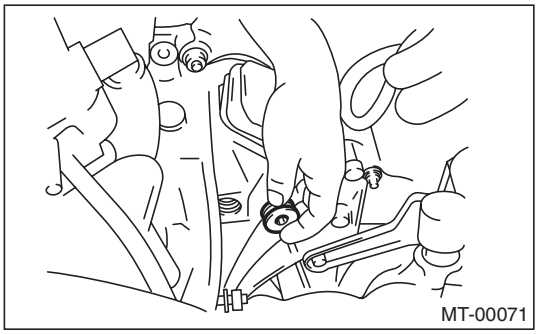
ST 41099AA020 ENGINE SUPPORT ASSY



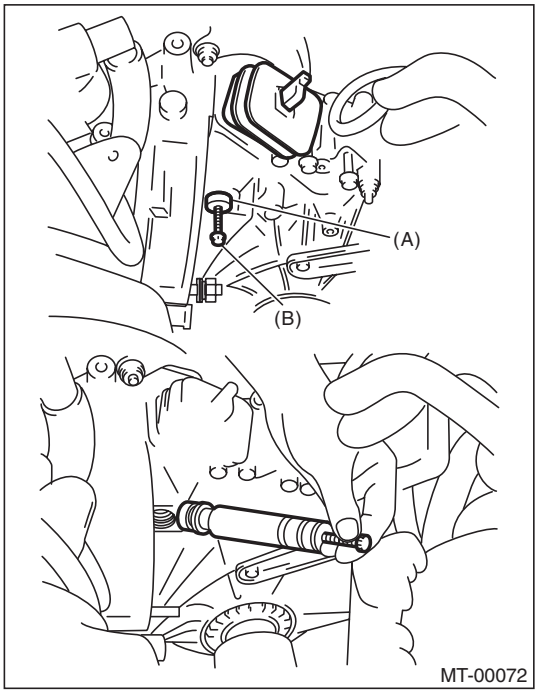
14) Separate the clutch release fork from release bearing. (Turbo model)

(1) Remove the clutch operating cylinder from transmission.

(2) Remove the plug using 10 mm hexagon wrench.



(3) Screw the 6 mm dia. bolt into release fork shaft, and then remove it.



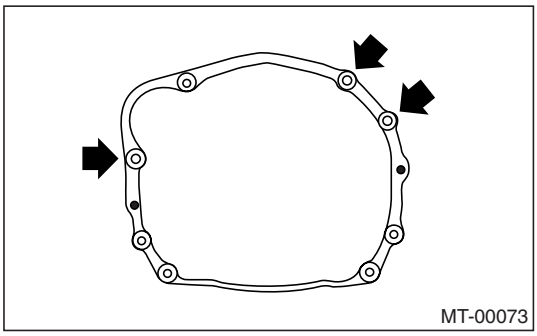
(A) Shaft
(B) Bolt

(4) Raise the release fork and unfasten the release bearing tabs to free release fork.

NOTE:
Step (4) is required to prevent interference with engine when removing the engine from transmission.

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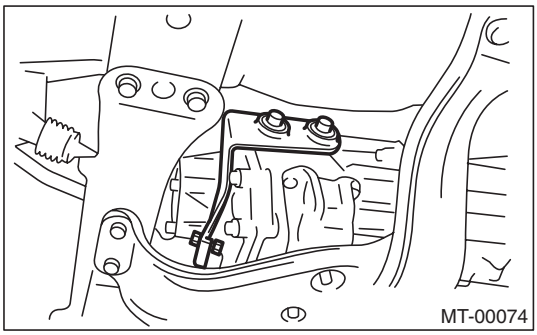
15) Remove the bolt which holds the right upper side of transmission to engine.



16) Remove the front and center exhaust pipes. (Non-turbo model) <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>
17) Remove the center exhaust pipe. (Turbo model). <Ref. to EX(H4DOTC)-9, REMOVAL, Center Exhaust Pipe.>
18) Remove the rear exhaust pipe and muffler.

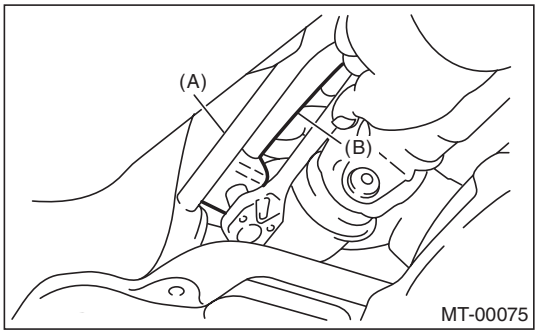
CAUTION:
When removing the exhaust pipes, be careful each exhaust pipe does not drop out.

19) Remove the heat shield cover. (If equipped)
20) Remove the hanger bracket from right side of transmission.



21) Remove the propeller shaft. <Ref. to DS-15, REMOVAL, Propeller Shaft.>

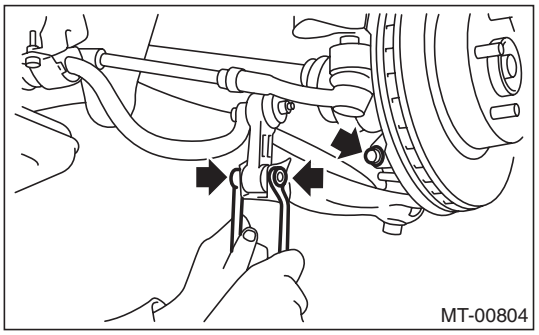
22) Remove the gear shift rod and stay from transmission.
(1) Disconnect the stay from transmission.
(2) Disconnect the rod from transmission.



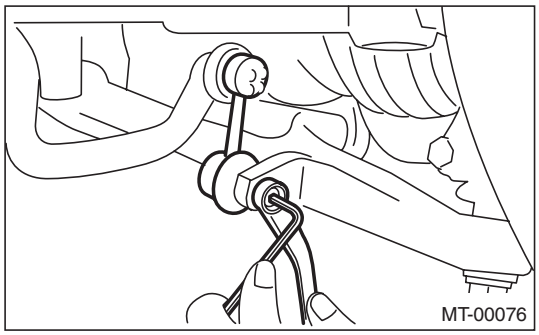
(A) Stay
(B) Rod

23) Disconnect the stabilizer link from transverse link.
24) Remove the bolt securing ball joint of transverse link to housing.

- WAGON MODEL



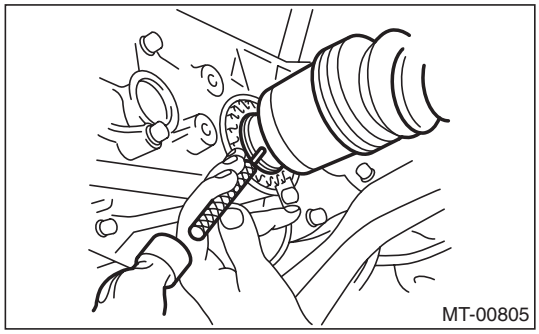
- SEDAN MODEL



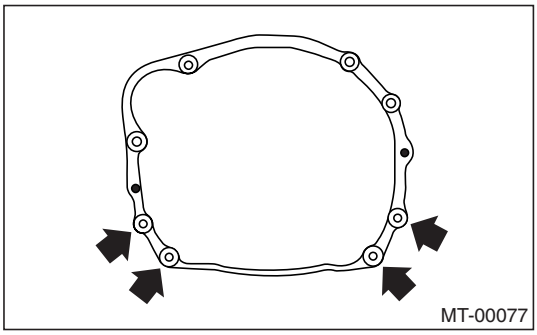
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25) Remove the spring pins and separate the front drive shafts from each side of transmission.

NOTE:
Discard the removing spring pin. Replace with a new one.

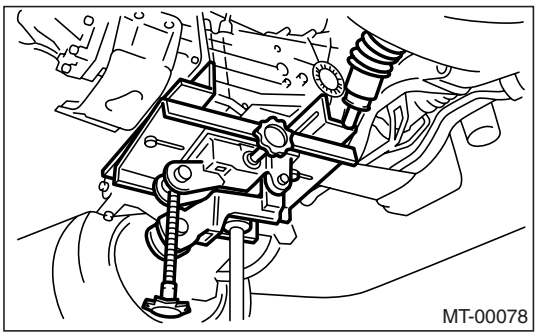


26) Remove the nuts which hold the lower side of transmission to engine.

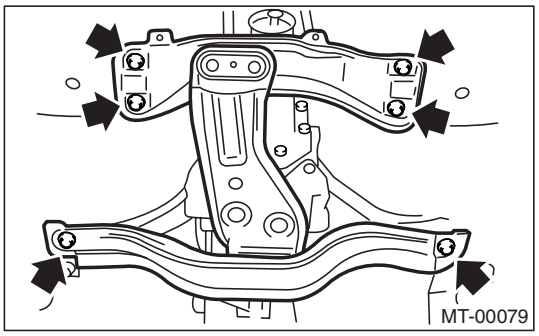


27) Place the transmission jack under transmission.

CAUTION:
Always support the transmission case with a transmission jack.



28) Remove the transmission rear crossmember from vehicle.



29) Remove the transmission.

NOTE:
Move the transmission jack toward rear until main shaft is withdrawn from clutch cover.

30) Separate the transmission assembly and rear cushion rubber.

B: INSTALLATION

1) Install the rear cushion rubber to transmission assembly.

Tightening torque:
35 N·m (3.57 kgf-m, 25.8 ft-lb)

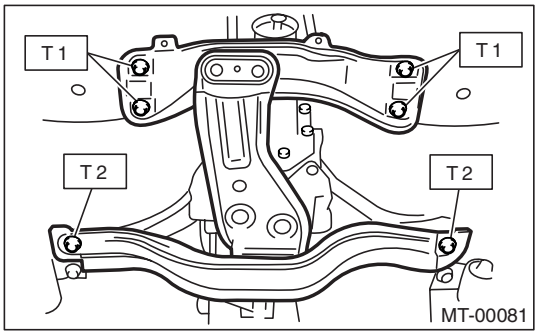
2) Install the clutch release lever and bearing onto transmission. (Turbo model) <Ref. to CL-26, INSTALLATION, Release Bearing and Lever.>

3) Install the transmission onto engine.
   (1) Gradually raise the transmission with transmission jack.
   (2) Engage them at splines.

NOTE:
Be careful not to strike the main shaft against clutch cover.

4) Install the transmission rear crossmember.

Tightening torque:
T1: 70 N·m (7.1 kgf-m, 51 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)

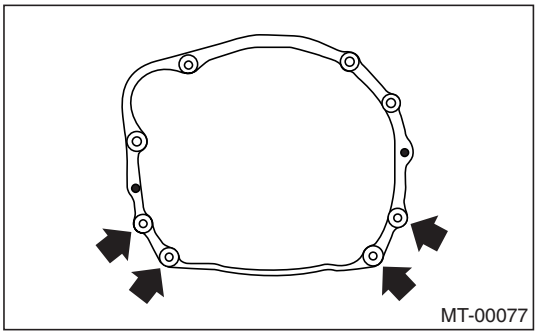


5) Take off the transmission jack.

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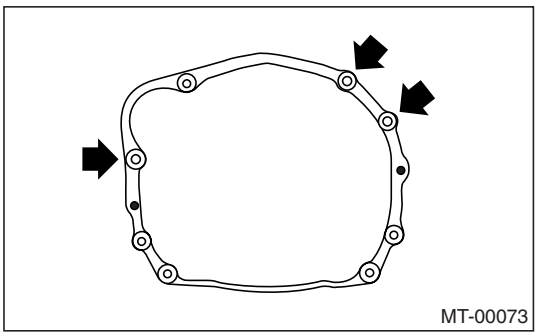
6) Tighten the nuts which hold the lower side of transmission to engine.

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

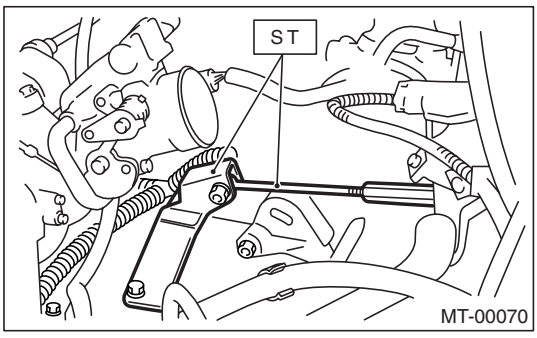


7) Connect the engine and transmission.
(1) Install the starter.
<Ref. to SC(H4SO)-7, INSTALLATION, Starter.>
(2) Tighten the bolt which holds right upper side of transmission to engine.

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

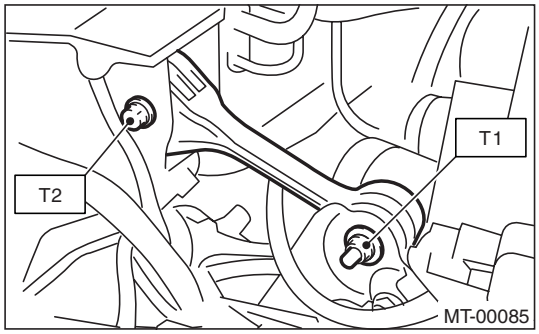


8) Remove the ST.



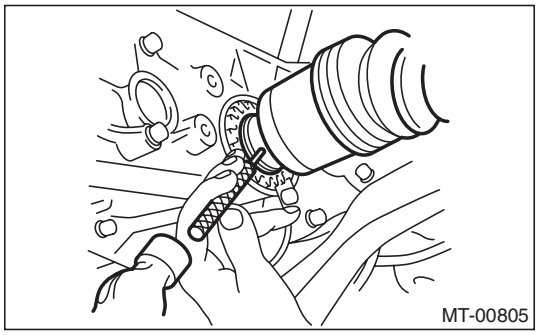
9) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



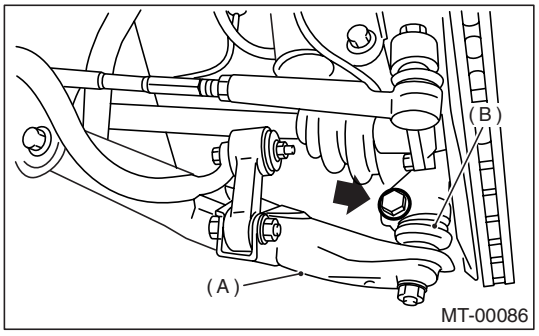
10) Lift-up the vehicle.
11) Install the front drive shaft into transmission.
12) Drive the spring pin into chamfered hole of drive shaft.

NOTE:
Always use a new spring pin.



13) Install the ball joints of lower arm into knuckle arm of housing, and tighten the installing bolts.

Tightening torque:
49 N·m (5.0 kgf-m, 36 ft-lb)

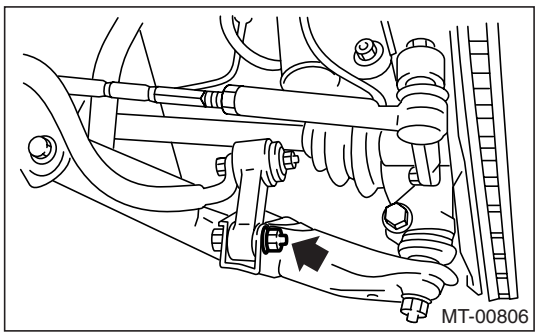


(A) Transverse link
(B) Ball joint

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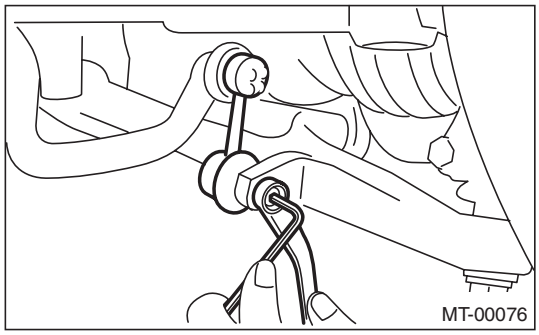
14) Install the stabilizer link from transverse link.
• WAGON MODEL

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)

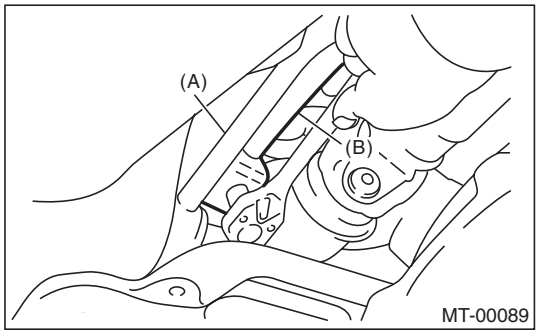


• SEDAN MODEL

Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)

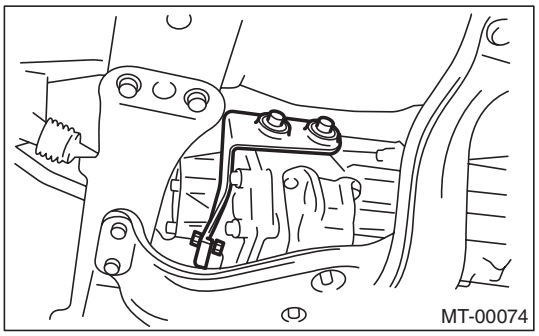


15) Install the gear shift rod and stay.
(1) Install the gear shift rod onto transmission.



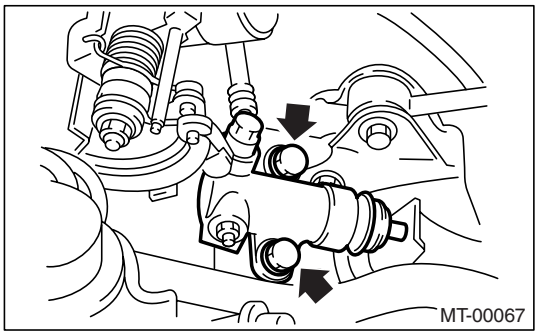
(A) Stay
(B) Rod

(2) Install the stay onto transmission.
16) Install the propeller shaft. <Ref. to DS-16, INSTALLATION, Propeller Shaft.>
17) Install the heat shield cover. (If equipped)
18) Install the hanger bracket on right side of transmission.

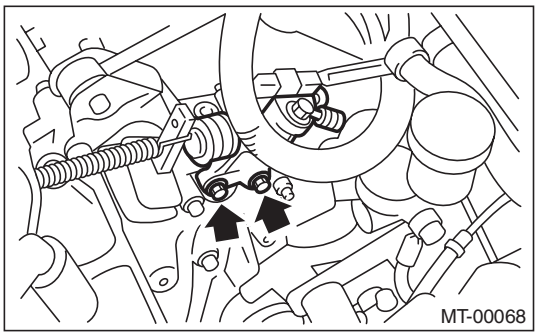


19) Install the rear exhaust pipe and muffler.
20) Install the front exhaust pipe and center exhaust pipe. (Non-turbo model)
<Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>
21) Install the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-10, INSTALLATION, Center Exhaust Pipe.>
22) Install the under cover.
23) Install the operating cylinder. (2.0 L and 2.5 L model)

Tightening torque:
37 N·m (3.8 kgf-m, 27.5 ft-lb)
• NON-TURBO MODEL

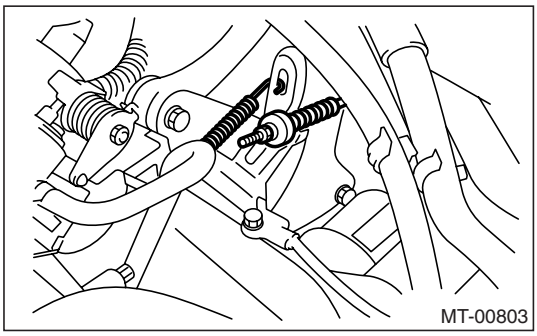


• TURBO MODEL

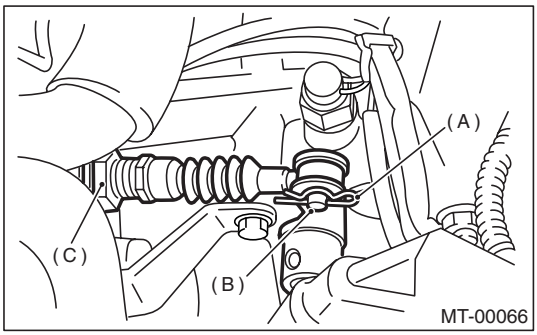


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24) Connect the return spring and clutch cable.
(1.6 L model)



25) Install the drive select cable on transmission.
(Dual-range model)



(A) Snap pin
(B) Clevis pin
(C) Drive select cable

26) Connect the following connectors:
(1) Transmission ground cable

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

(2) Vehicle speed sensor connector
(3) Neutral position switch connector
(4) Back-up light switch connector
(5) High-low switch connector (Dual-range model)

27) Install the air cleaner case stay.

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

28) Install the air cleaner case and duct.
29) Connect the battery ground cable to battery.
30) Take off the vehicle from lift arms.

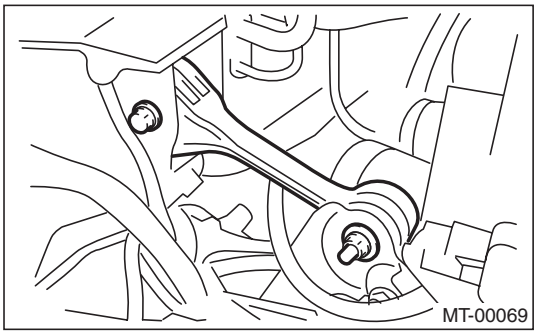
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4. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the air intake duct (Non-turbo model). <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Remove the air cleaner case (Non-turbo model). <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Remove the intercooler (Turbo model). <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
5) Remove the pitching stopper.

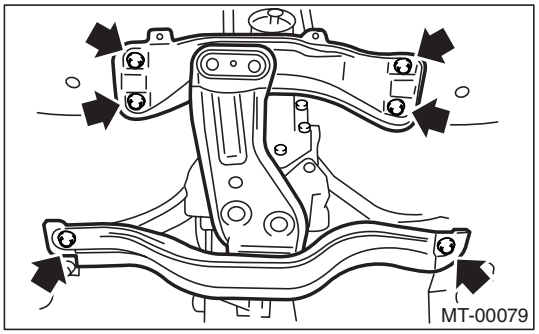


2. CROSSMEMBER AND CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Jack-up the vehicle and support it with sturdy racks.
3) Remove the front and center exhaust pipes. (Non-turbo model)
Without OBD
<Ref. to EX(H4SOw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
With OBD
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>
4) Remove the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-9, REMOVAL, Center Exhaust Pipe.>
5) Remove the rear exhaust pipe and muffler.
6) Remove the heat shield cover. (If equipped)
7) Set the transmission jack under the transmission body.

CAUTION:
Always support the transmission case with a transmission jack.

8) Remove the rear crossmember.



9) Remove the rear cushion rubber.

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 intake duct and cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
3) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>
4) Connect the battery ground cable to battery.

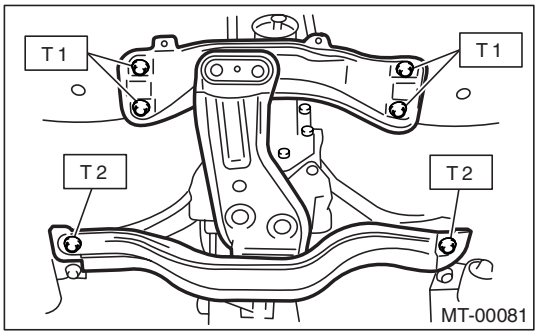
2. CROSSMEMBER AND CUSHION RUBBER

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: 70 N·m (7.1 kgf-m, 51 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover. (If equipped)

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5) Install the front and center exhaust pipes. (Non-turbo model)
Without OBD
<Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>
With OBD
<Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>
6) Install the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-10, INSTALLATION, Center Exhaust Pipe.>
7) Install the rear exhaust pipe and muffler.

C: INSPECTION

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

1. PITCHING STOPPER

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

2. CROSSMEMBER AND CUSHION RUBBER

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

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5. Oil Seal

A: INSPECTION

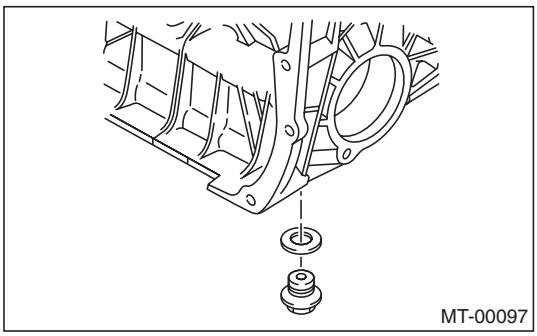
Check the oil seal portion for leakage. If leakage is found, replace the oil seal with a new one.

B: REPLACEMENT

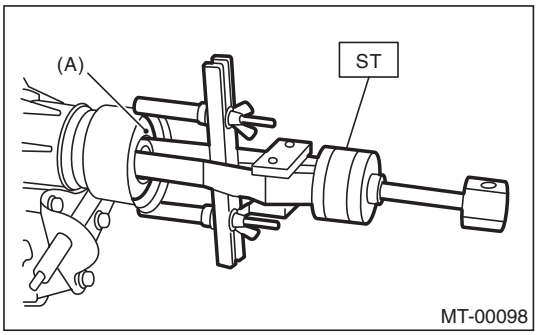
1) Clean the transmission exterior.
2) Drain the gear oil completely.

NOTE:
Tighten the drain plug after draining gear oil.

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

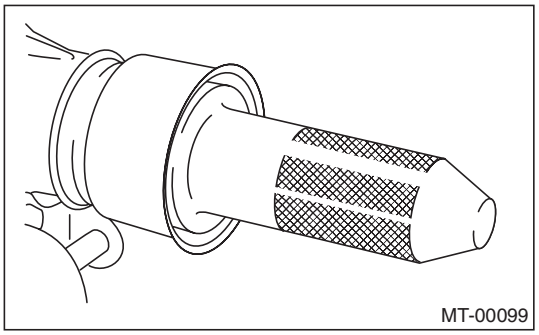


3) Remove the rear exhaust pipe and muffler.
4) Remove the heat shield cover. (If equipped)
5) Remove the propeller shaft. <Ref. to DS-15, REMOVAL, Propeller Shaft.>
6) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY



(A) Oil seal

7) Using the ST, install the oil seal.
ST 498057300 INSTALLER



8) Install the propeller shaft. <Ref. to DS-16, INSTALLATION, Propeller Shaft.>
9) Install the heat shield cover.
10) Install the rear exhaust pipe and muffler.
11) Pour gear oil and check the oil level. <Ref. to 5MT-37, REPLACEMENT, Transmission Gear Oil.>

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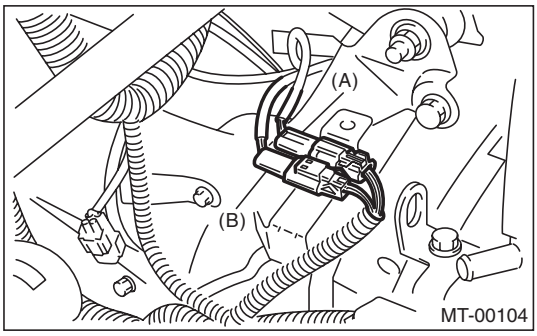
6. Switches and Harness

A: REMOVAL

1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH

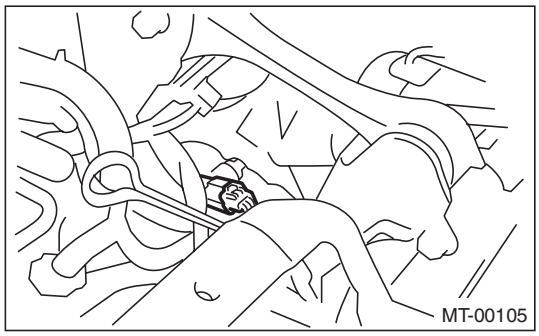
1) Disconnect the ground cable from battery.
2) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Remove the intercooler (Turbo model). <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
4) Disconnect the connector of back-up light switch and neutral position switch.

- Non-turbo MODEL

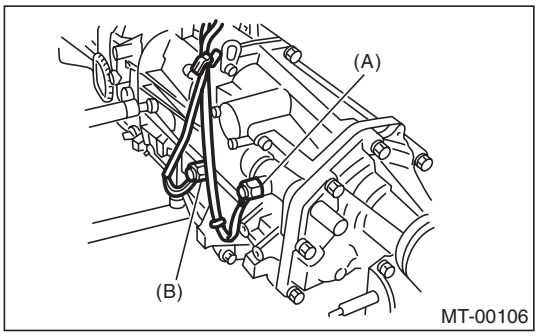


(A) Neutral switch (Brown)
(B) Back-up light switch (Gray)

- Turbo MODEL



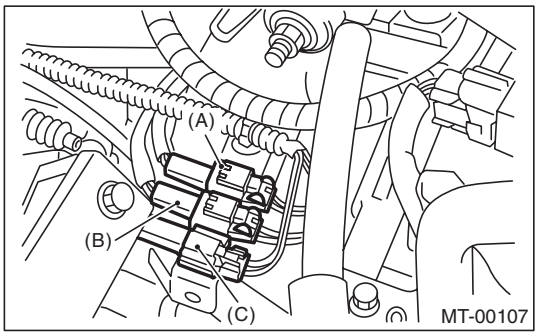
5) Lift-up the vehicle.
6) Remove the back-up light switch and neutral position switch with harness.



(A) Neutral switch (Brown)
(B) Back-up light switch (Gray)

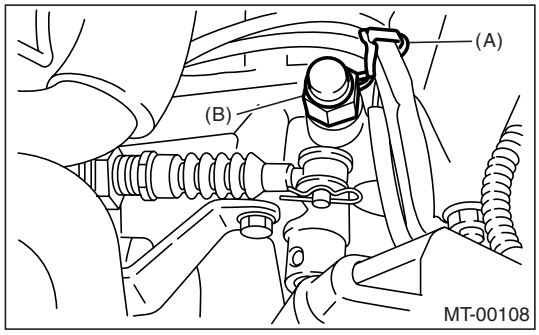
2. HIGH-LOW SWITCH

1) Disconnect the ground cable from battery.
2) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Disconnect the connector of high-low switch.



(A) Neutral switch (Brown)
(B) Back-up light switch (Gray)
(C) High-low switch (Black)

4) Remove the high-low switch cable from clamp.
5) Remove the high-low switch.



(A) Clamp
(B) High-low switch

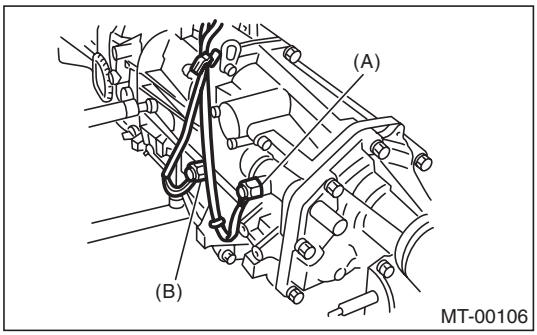
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B: INSTALLATION

1. BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH

1) Install the 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 the connector of back-up light switch and neutral position switch.
3) Install the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
4) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>
5) Connect the battery ground cable to battery.

2. HIGH-LOW SWITCH

1) Install the high-low switch.

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

2) Install the high-low switch cable to clamp.
3) Connect the connector of high-low switch.
4) Install the air intake duct and cleaner case. <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
5) Connect the battery ground cable to battery.

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 the ignition switch to OFF.
2) Disconnect the connector of neutral position switch.
3) Measure the resistance between neutral position switch terminals.

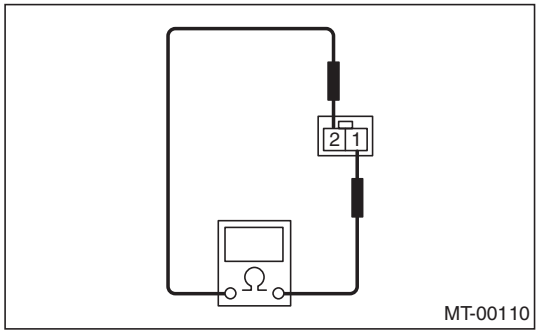
Non-turbo model:

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	Less than 1 Ω
Other positions		More than 1 MΩ

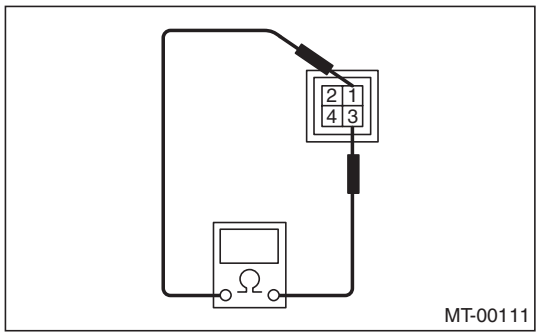
Turbo model:

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 3	Less than 1 Ω
Other positions		More than 1 MΩ

- NON-TURBO MODEL



- TURBO MODEL



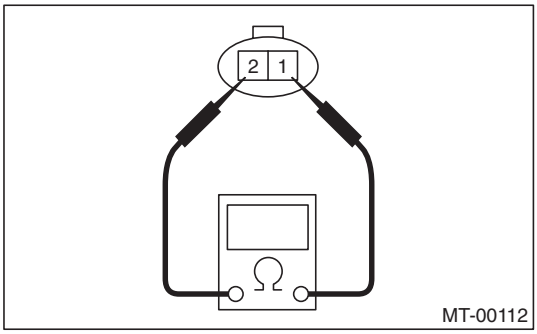
4) Replace defective parts.

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3. HIGH-LOW SWITCH

1) Turn ignition switch to OFF.
2) Disconnect connector high-low switch.
3) Measure the resistance between high-low switch terminals.

Gear shift position	Terminal No.	Specified resistance
LO position	1 and 2	Less than 1 Ω
HIGH position		More than 1 MΩ



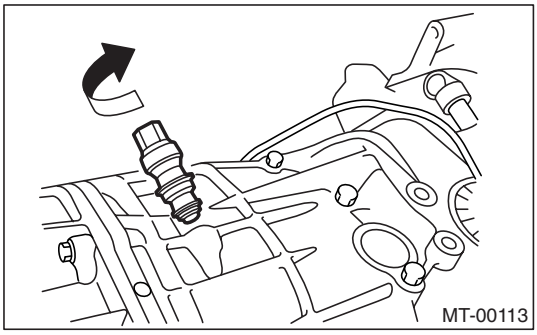
4) Replace defective parts.

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7. Vehicle Speed Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle.
3) Remove the front, center rear exhaust pipes and muffler.
4) Disconnect the connector from vehicle speed sensor.
5) Turn and remove the vehicle speed sensor.



B: INSTALLATION

NOTE:
• Discard the vehicle speed sensor and after removal, replace with a new one.
• Ensure the sensor mounting hole is clean and free of foreign matter.
• Align the tip end of key with key groove on end of speedometer shaft during installation.

1) Hand tighten the vehicle speed sensor.
2) Tighten the vehicle speed sensor using suitable tool.

Tightening torque:
5.9 N·m (0.6 kgf-m, 4.3 ft-lb)

3) Connect the connector to vehicle speed sensor.
4) Install the front, center exhaust pipes and muffler.
5) Lower the vehicle.
6) Connect the battery ground cable to battery.

C: INSPECTION

Inspect the vehicle speed sensor.
Without OBD
<Ref. to EN(H4SOw/oOBD)-79, DTC 33 VEHICLE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
With OBD Non-turbo model
<Ref. to EN(H4SO)-182, DTC P0502 — VEHICLE SPEED SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>, <Ref. to EN(H4SO)-183, DTC P0503 — VEHICLE SPEED SENSOR INTERMITTENT/ERRATIC/HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
Turbo model
<Ref. to EN(H4DOTC)-202, DTC P0502 — VEHICLE SPEED SENSOR CIRCUIT LOW INPUT —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>, <Ref. to EN(H4DOTC)-204, DTC P0503 — VEHICLE SPEED SENSOR INTERMITTENT/ERRATIC/HIGH —, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

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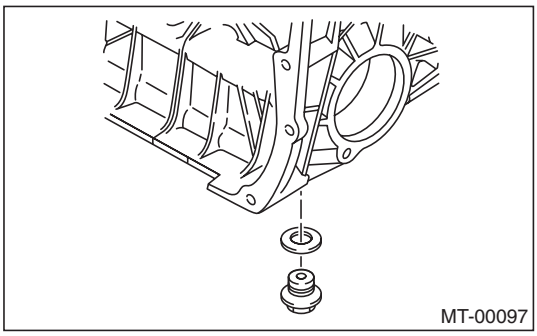
8. Preparation for Overhaul

A: PROCEDURE

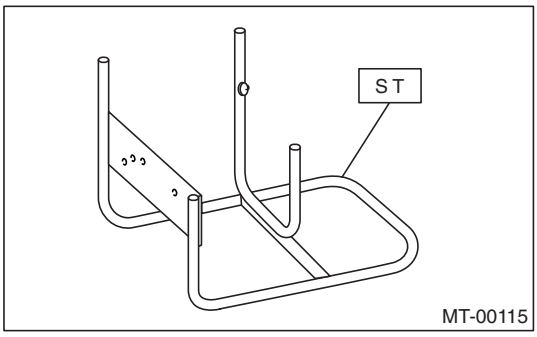
1) Clean oil, grease, dirt and dust from transmission.
2) Remove the drain plug to drain oil. After draining, retighten it as before.

NOTE:
Replace the gasket with a new one.

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



3) Attach the transmission to ST.
ST 499937100 TRANSMISSION STAND



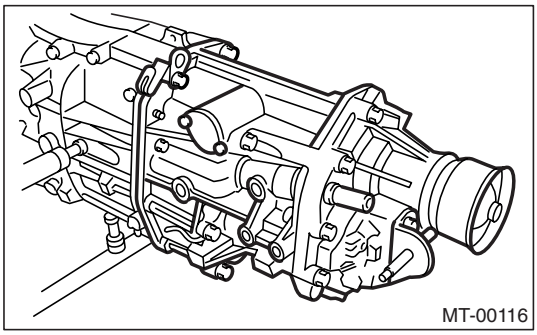
4) Rotating parts should be coated with oil prior to assembly.
5) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
6) Gaskets, lock washers and lock nut must be replaced with new ones.
7) Liquid gasket should be used where specified to prevent leakage.

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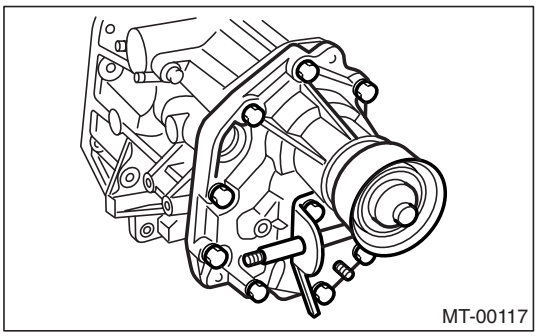
9. Transfer Case and Extension Case Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly.

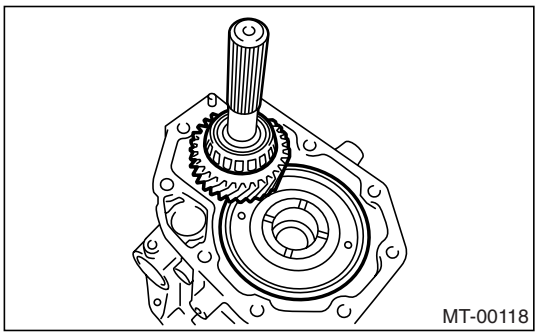

MT-00116

4) Remove the shifter arm.
5) Remove the extension case assembly.

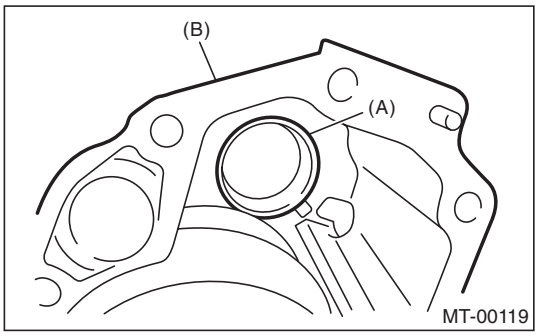

MT-00117

B: INSTALLATION

1) Install the center differential and transfer driven gear into transfer case.


MT-00118

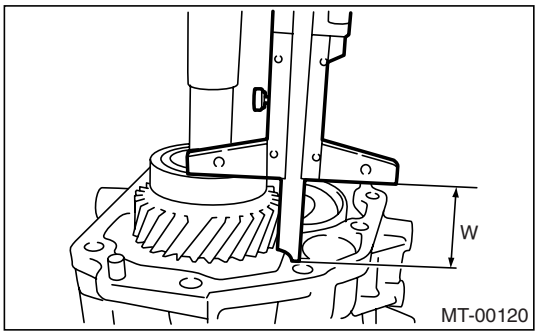
2) Remove the bearing outer race from extension case.



MT-00119

(A) Bearing outer race
(B) Extension case

3) While pressing the bearing outer race horizontally, turn the driven shaft ten rotations.
4) Measure the height “W” between transfer case and taper roller bearing on the transfer driven gear.

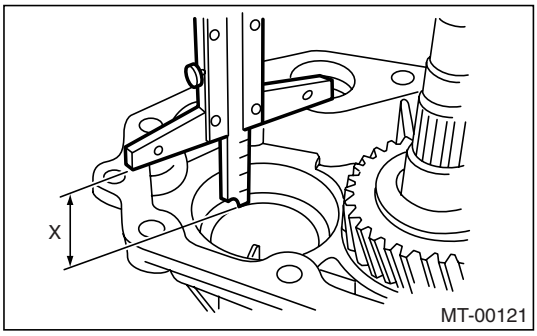


MT-00120

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5) Measure the depth “X”.

NOTE:
Measure with bearing cone and thrust washer removed.



6) Calculate the space “t” using the following equation: t = X − W + 0.2 to 0.3 mm (0.008 to 0.012 in)
7) Select the nearest washer in the following table:

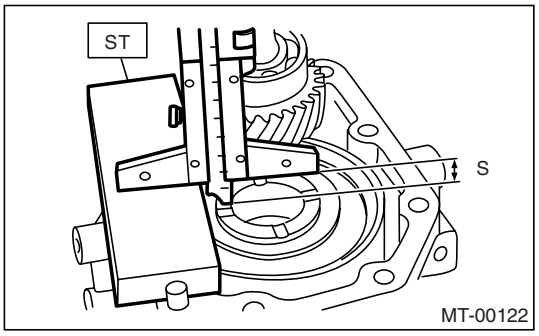
Standard clearance between thrust washer and taper roller bearing:
0.2 — 0.3 mm T (0.008 — 0.012 in T)

NOTE:
T: Tight

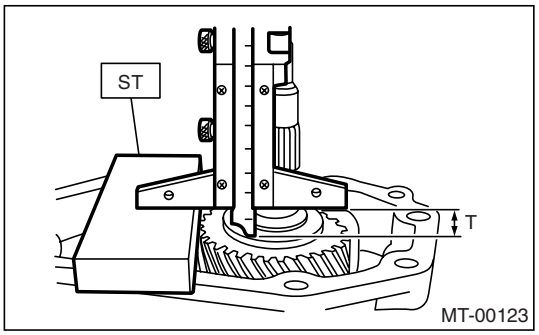
Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

8) Fit the thrust washers on transfer drive shaft.
9) Install the bearing cone into extension case.

10) Measure the depth “S” between transfer case and center differential.
ST 398643600 GAUGE



11) Measure the depth “T” between extension case and transfer drive gear.
ST 398643600 GAUGE



12) Calculate the space “U” using the following equation: U = S + T − 30 mm (1.18 in) [Thickness of ST]
13) Select the suitable washer in the following table:

Standard clearance:
0.15 — 0.35 mm (0.0059 — 0.0138 in)

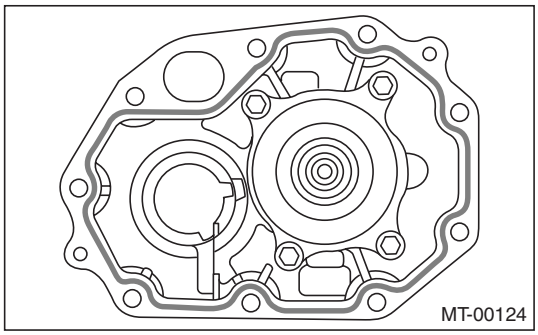
Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

14) Fit the thrust washer on center differential.

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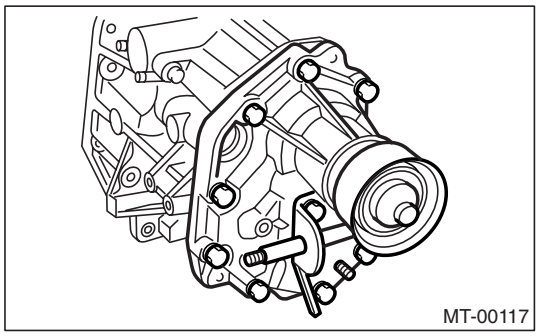
15) Apply proper amount of liquid gasket to the transfer case mating surface.

Liquid gasket:
THREE BOND 1215

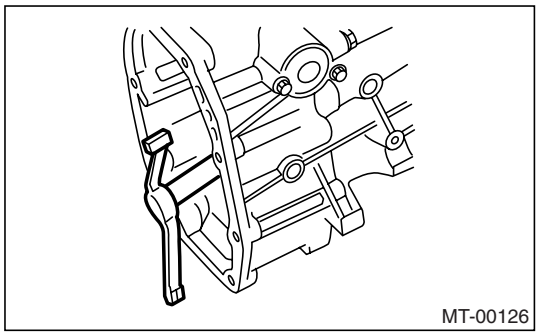


16) Install the extension assembly into transfer case.

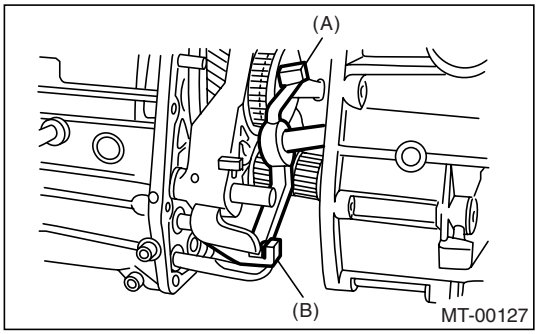
Tightening torque:
40 N·m (4.1 kgf-m, 29.7 ft-lb)



17) Install the shifter arm to transfer case.



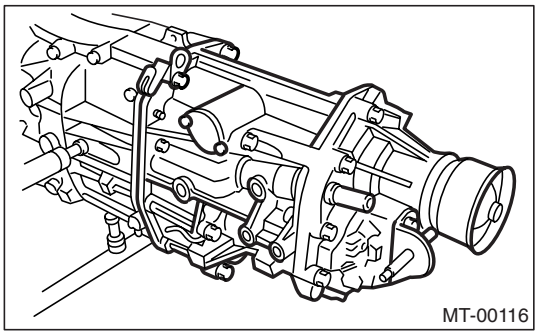
18) Hang the shifter arm on 3rd-4th fork rod.



(A) Shifter arm
(B) 3rd-4th fork rod

19) Install the transfer case with extension case assembly to transmission case.

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

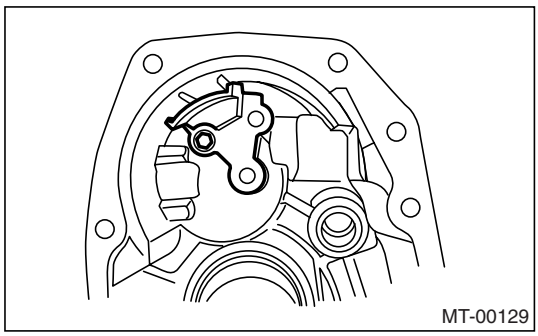


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C: DISASSEMBLY

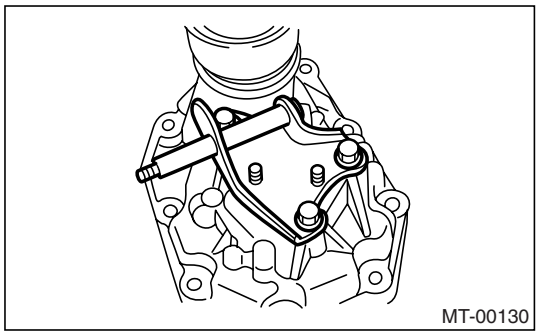
1. TRANSFER CASE

1) Remove the reverse check assembly. <Ref. to 5MT-63, REMOVAL, Reverse Check Sleeve.>
2) Remove the oil guide.


MT-00129

2. EXTENSION CASE

1) Remove the transfer drive gear assembly. <Ref. to 5MT-58, REMOVAL, Transfer Drive Gear.>
2) Remove the shift bracket.


MT-00130

3) Remove the oil seal from extension case. <Ref. to 5MT-47, Oil Seal.>

D: ASSEMBLY

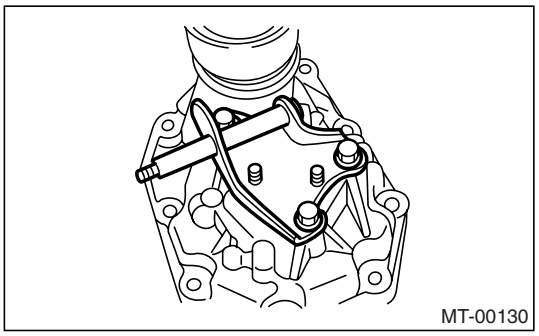
1. EXTENSION CASE

1) Using the ST, install the oil seal to extension case. <Ref. to 5MT-47, Oil Seal.>

NOTE:
Use a new oil seal.

2) Install the shift bracket to extension case.

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

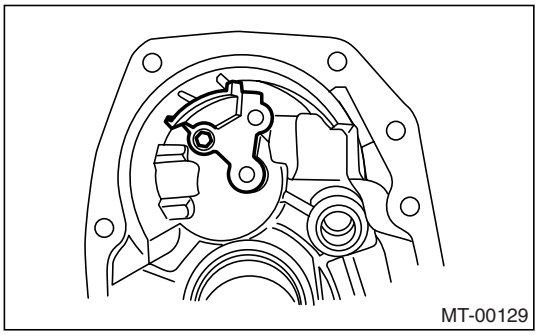

MT-00130

3) Install the transfer drive gear to extension case. <Ref. to 5MT-58, INSTALLATION, Transfer Drive Gear.>

2. TRANSFER CASE

1) Install the oil guide to transfer case.

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


MT-00129

2) Install the reverse check sleeve assembly to transfer case. <Ref. to 5MT-63, INSTALLATION, Reverse Check Sleeve.>

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10.Rear Case

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>
3) Remove rear case.

B: INSTALLATION

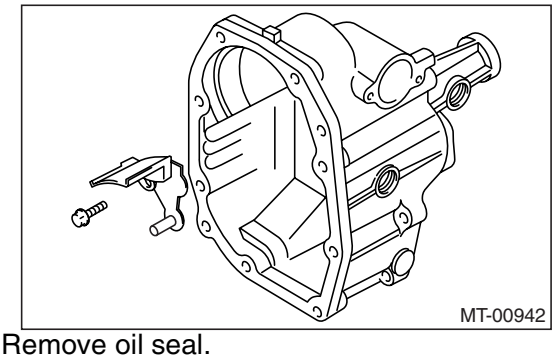
1) Install rear case.

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

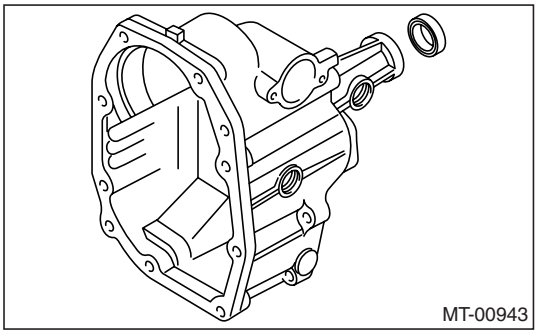
2) Install back-up light switch and neutral position switch. <Ref. to 5MT-49, INSTALLATION, Switches and Harness.>
3) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Remove the reverse check assembly. <Ref. to 5MT-63, REMOVAL, Reverse Check Sleeve.>
2) Remove oil guide.


MT-00942

3) Remove oil seal.


MT-00943

D: ASSEMBLY

1) Install oil seal.
2) Install oil guide.

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

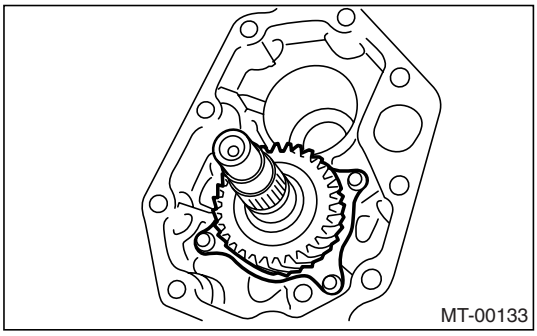
Install the reverse check assembly. <Ref. to 5MT-63, INSTALLATION, Reverse Check Sleeve.>

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11.Transfer Drive Gear

A: REMOVAL

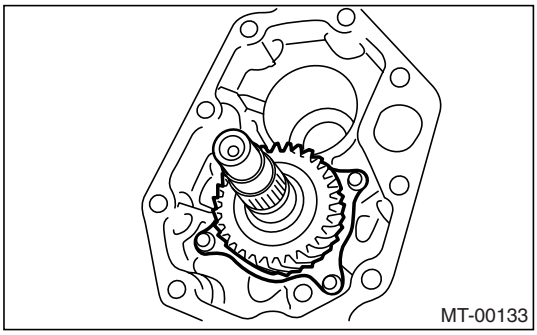
1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly.
5) Remove the transfer driven gear.
6) Remove the transfer drive gear.



B: INSTALLATION

1) Install the transfer drive gear.

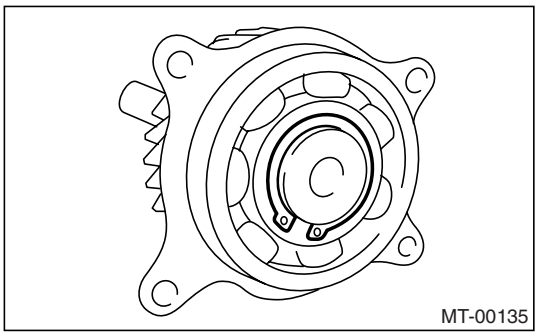
Tightening torque:
26 N·m (2.7 kgf-m, 20 ft-lb)



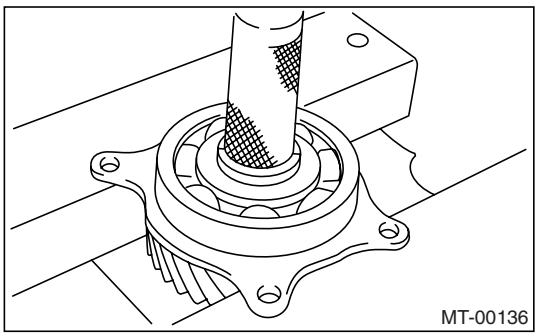
2) Install the transfer driven gear.
3) Install the extension case assembly.
4) Install the transfer case and extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the back-up light switch and neutral position switch. <Ref. to 5MT-49, INSTALLATION, Switches and Harness.>
6) Install the manual transmission assembly from vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Remove the snap ring.



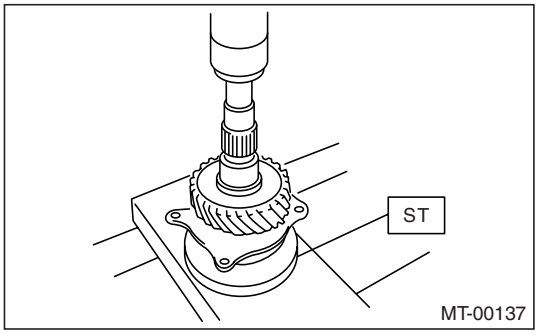
2) Remove the ball bearing.



D: ASSEMBLY

1) Set the ST applying to inner race of bearing and install to drive shaft.
ST 398177700 INSTALLER

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



2) Install the snap ring on transfer drive shaft.
3) Check the clearance between snap ring and ball bearing. <Ref. to 5MT-59, INSPECTION, Transfer Drive Gear.>

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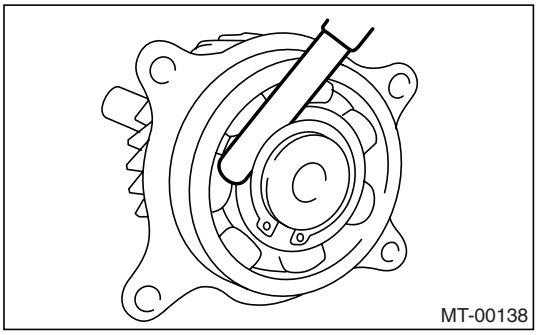
E: INSPECTION

1) Bearings
Replace the 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 the drive gear in the following cases:
- If their tooth surfaces and shaft are excessively broken or damaged.

3) Measure the 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 specification, select a suitable snap ring.

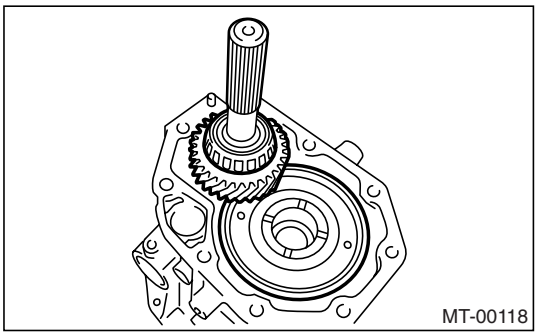
Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

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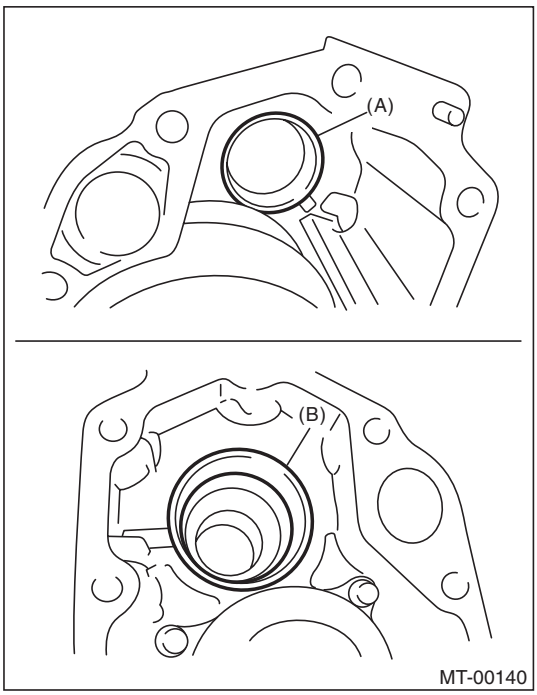
12.Transfer Driven Gear

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly.
5) Remove the transfer driven gear.



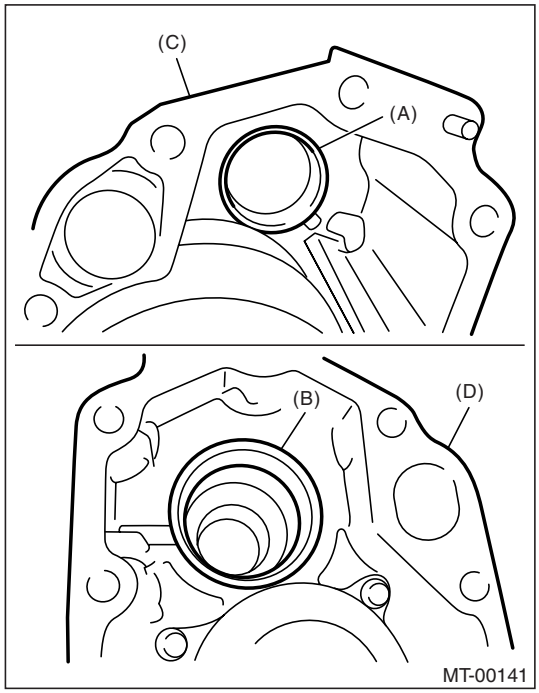
6) Remove the bearing outer race from extension case and transfer case.



(A) Bearing outer race (transfer case)
(B) Bearing outer race (extension case)

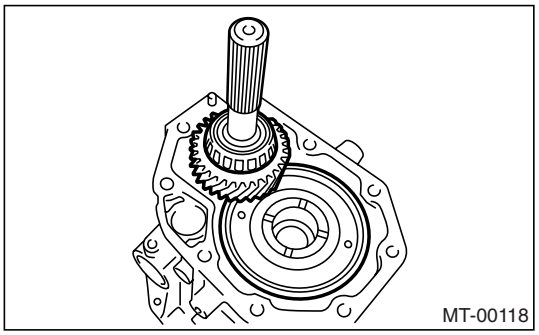
B: INSTALLATION

1) Install the bearing outer race to extension case and transfer case.



(A) Bearing outer race
(B) Bearing outer race
(C) Transfer case
(D) Extension case

2) Install the transfer driven gear.

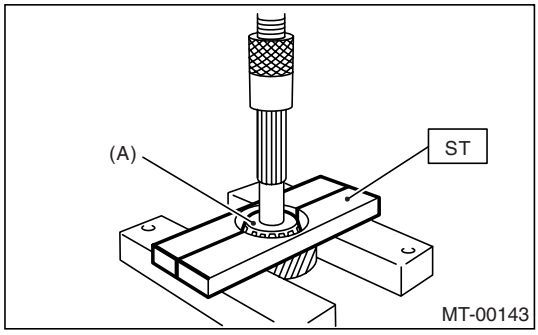


3) Install the transfer case and extension case assembly.<Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
4) Install the back-up light switch and neutral position switch. <Ref. to 5MT-49, INSTALLATION, Switches and Harness.>
5) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

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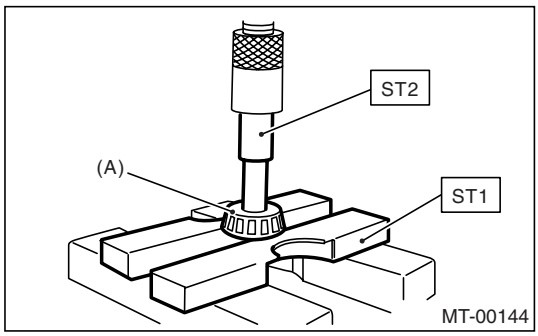
C: DISASSEMBLY

1) Using the ST, remove the roller bearing (extension case side).
ST 498077000 REMOVER



(A) Roller bearing

2) Using the ST1 and ST2, remove the roller bearing (transfer case side).
ST1 498077000 REMOVER
ST2 899864100 REMOVER

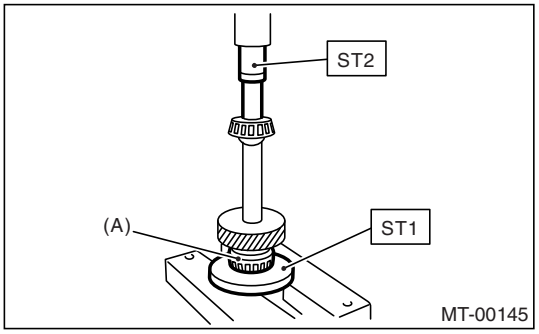


(A) Roller bearing

D: ASSEMBLY

1) Using the ST, install the roller bearing (extension case side).
ST1 398177700 INSTALLER
ST2 899864100 REMOVER

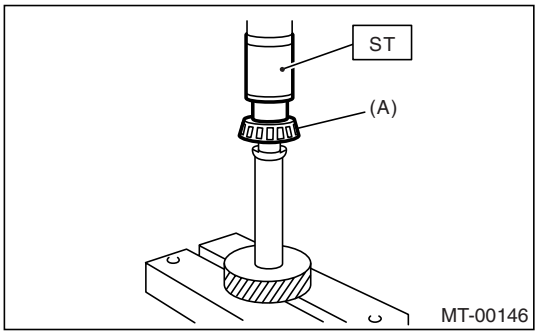
NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton)



(A) Roller bearing

2) Using the ST, install the 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 the 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 the drive gear in the following cases:
- If their tooth surfaces and shaft are excessively broken or damaged.

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13.Center Differential

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly.<Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transfer driven gear. <Ref. to 5MT-60, 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 5MT-60, INSTALLATION, Transfer Driven Gear.>
3) Install the extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
4) Install the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
5) Install the back-up light switch and neutral position switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>
6) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

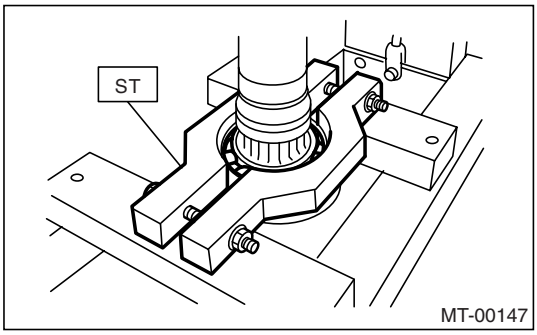
C: DISASSEMBLY

NOTE:
Do not disassemble the center differential because it is a non-disassemble part.

Remove the ball bearing using ST.

NOTE:
Do not reuse the ball bearing.

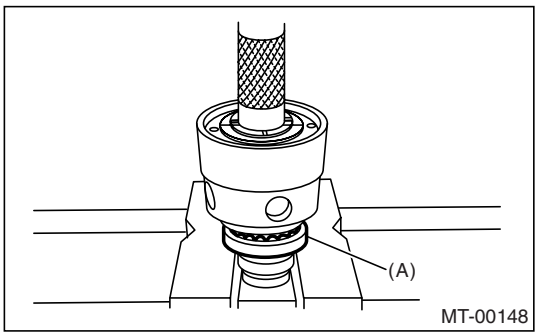
ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



D: ASSEMBLY

Install the 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 the 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

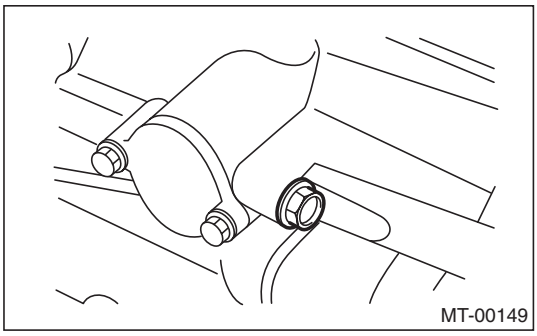
2) Center differential
Replace the center differential assembly in the following case:
- Worn or damaged

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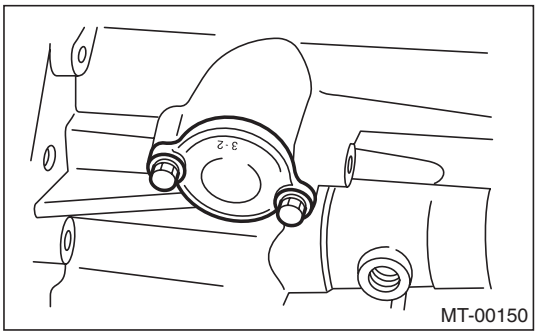
14.Reverse Check Sleeve

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the shifter arm.
4) Remove the plug, spring, washer and reverse check ball.


MT-00149

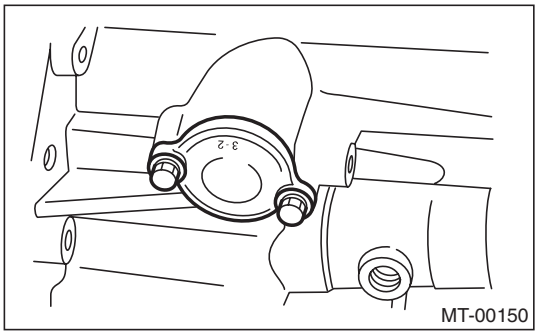
5) Remove the reverse check sleeve.


MT-00150

B: INSTALLATION

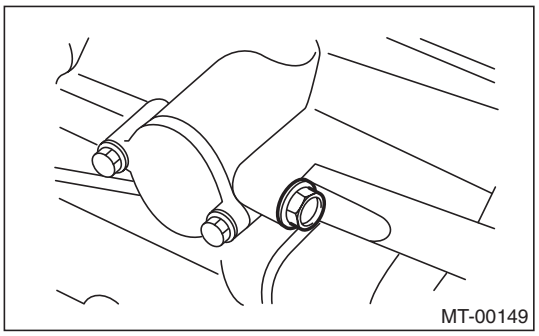
1) Install the reverse check sleeve.

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


MT-00150

2) Install the ball, spring, washer and plug to transfer case.

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


MT-00149

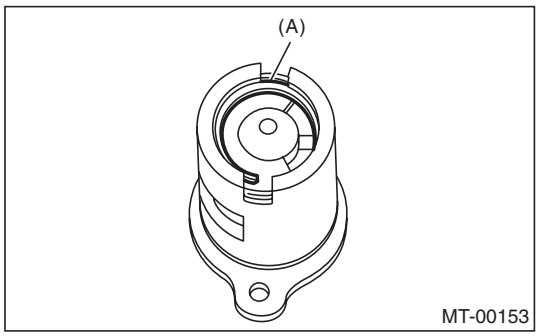
3) Install the shifter arm to transfer case assembly.
4) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

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C: DISASSEMBLY

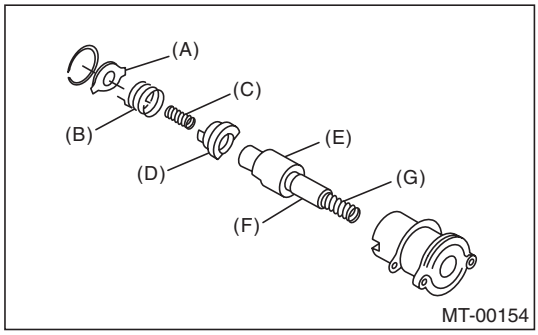
1) Cover the reverse check sleeve with a rag, and remove the snap ring using a screwdriver.

NOTE:
Replace the snap ring with a new one if deformed or weakened.



(A) Snap ring

2) Remove the 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)

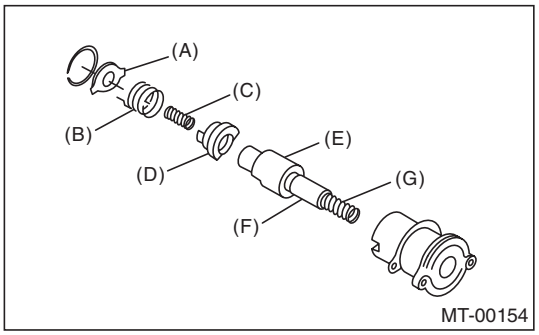
3) Remove the O-ring.

NOTE:
• Reverse check sleeve assembly uses an O-ring which should not be scratched.
• Be careful not to break the adjustment shim placed between reverse check sleeve assembly and case.

D: ASSEMBLY

1) Install the 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.



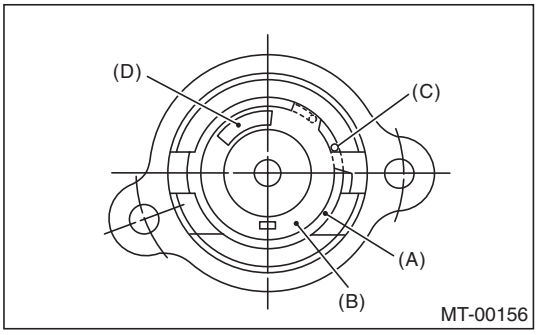
(A) Reverse check plate
(B) Reverse check spring
(C) Return spring (5th-Rev)
(D) Reverse check cam
(E) Reverse accent shaft
(F) Return spring cap
(G) Return spring (1st-2nd)

2) Hook the bent section of reverse check spring over reverse check plate.
3) Rotate the cam so that the protrusion of reverse check cam is at the opening in plate.
4) With the cam held in that position, install the plate onto reverse check sleeve and hold with snap ring.
5) Position the O-ring in groove in sleeve.

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E: INSPECTION

• Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.
• Spin the cam by hand for smooth rotation.
• Move the cam and shaft all the way toward plate and release.
If the cam does not return properly, replace the reverse check spring; if shaft does not, check for scratches on the inner surface of sleeve. If sleeve is in good order, replace the 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 5MT-65, ADJUSTMENT, Reverse Check Sleeve.>

F: ADJUSTMENT

1. NEUTRAL POSITION ADJUSTMENT

1) Shift the 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 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 the bolts holding reverse check sleeve assembly to the case, move the sleeve assembly outward, and place adjustment shim (0 to 1 ea.) between sleeve assembly and case to adjust the clearance.

CAUTION:
Be careful not to break the O-ring when placing shim(s).

NOTE:
• When the 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 the shims alone cannot adjust clearance, replace the reverse accent shaft and re-adjust.

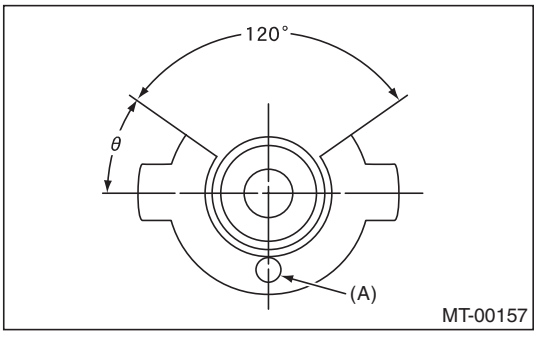
Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

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 the shifter arm to “5th” and then to reverse to see if reverse check mechanism operates properly.
2) Also check to see if the arm returns to neutral when released from reverse position. If the arm does not return properly, replace the 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.



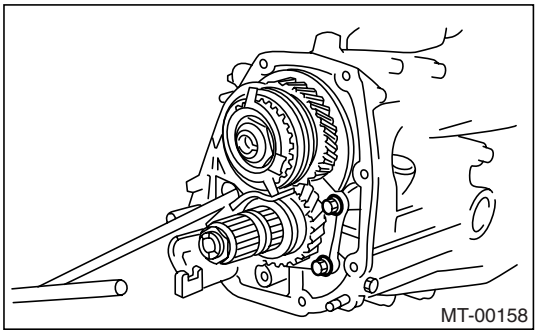
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15.Transmission Case

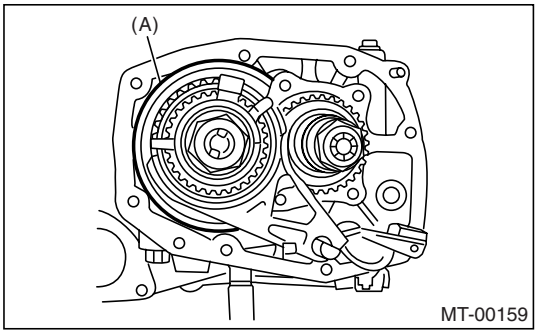
A: REMOVAL

1. SINGLE-RANGE

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch release lever. <Ref. to CL-26, REMOVAL, Release Bearing and Lever.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the bearing mounting bolts.


MT-00158

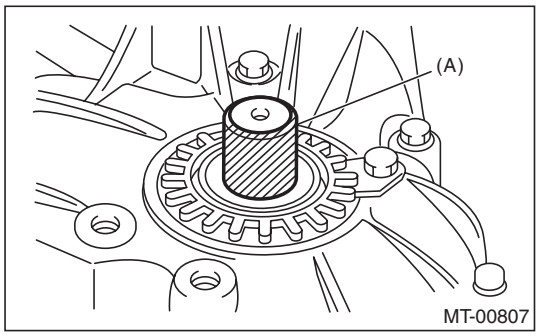
5) Remove the main shaft rear plate.



MT-00159

(A) Main shaft rear plate

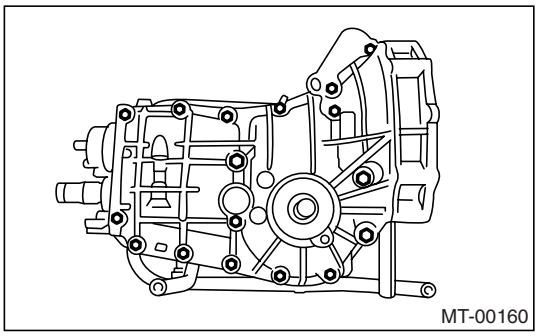
6) Put vinyl tape around the splines of right and left axle drive shafts to prevent damage to oil seal.



MT-00807

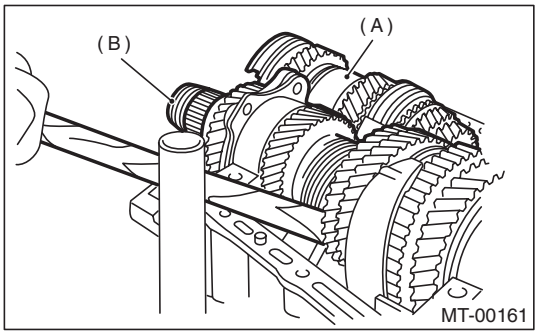
(A) Vinyl tape

7) Separate the transmission case into right and left cases by loosening the coupling bolts and nuts.


MT-00160

8) Remove the drive pinion shaft assembly from left side transmission case.

NOTE:
Use a hammer handle, etc. to remove if too tight.

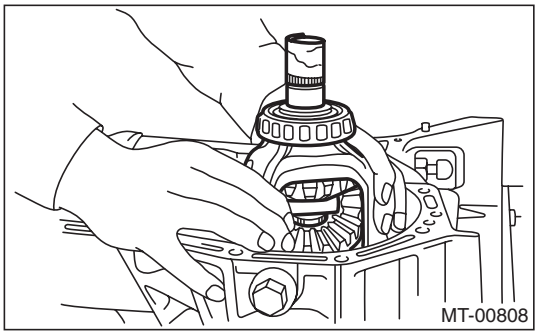


MT-00161

(A) Main shaft assembly
(B) Drive pinion shaft assembly

9) Remove the main shaft assembly.
10) Remove the differential assembly.

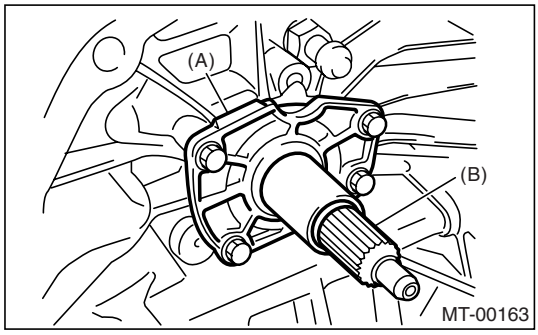
NOTE:
• Be careful not to confuse the right and left roller bearing outer races.
• Be careful not to damage the retainer oil seal.


MT-00808

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2. DUAL-RANGE

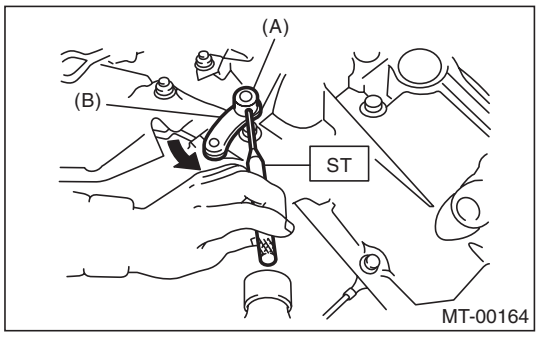
1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch release lever. <Ref. to CL-26, REMOVAL, Release Bearing and Lever.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the input shaft holder.



(A) Input shaft holder
(B) Input shaft

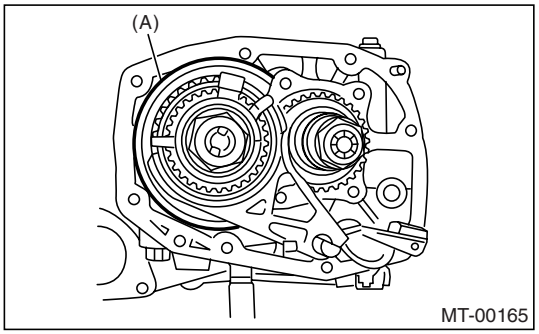
5) Remove the high-low switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>
6) Using the ST, drive out the straight pin, and remove high-low shifter lever.
ST 398791700 STRAIGHT PIN REMOVER 2

NOTE:
When driving out the straight pin, remove it in the direction that it does not butt against transmission case.



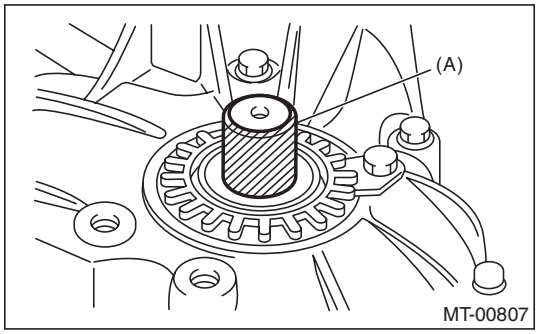
(A) Straight pin
(B) High-low shifter lever

7) Remove the main shaft rear plate.



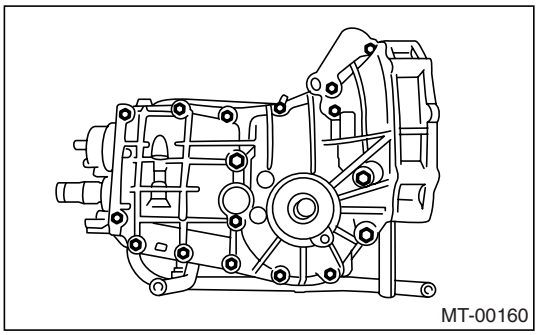
(A) Main shaft rear plate

8) Put vinyl tape around the splines of right and left axle drive shafts to prevent damage to oil seals.



(A) Vinyl tape

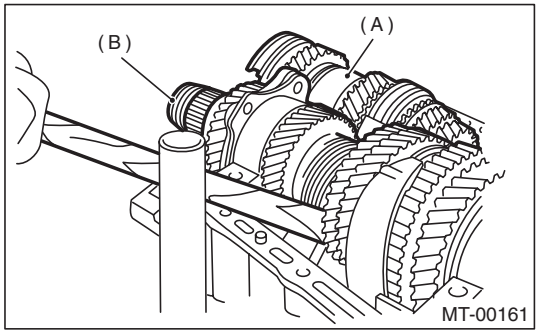
9) Separate the transmission case into right and left cases by loosening the seventeen coupling bolts and nuts.



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10) Remove the drive pinion shaft assembly from left side transmission case.

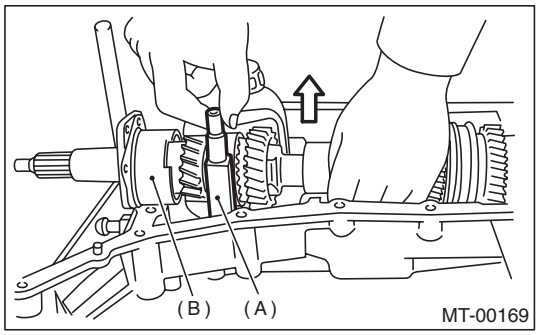
NOTE:
Use a hammer handle, etc. to remove if too tight.



(A) Main shaft assembly
(B) Drive pinion shaft assembly

11) Removing high-low shifter fork:
Raise the main shaft assembly slightly, and remove the high-low shifter fork together with high-low shifter shaft and washer.

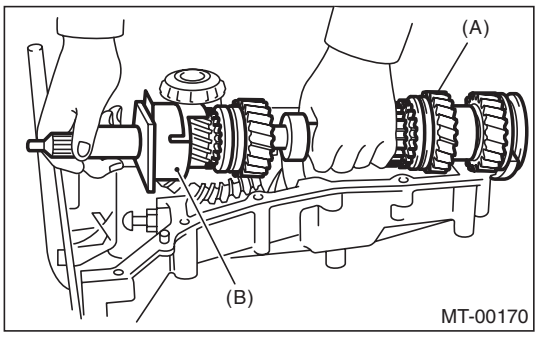
NOTE:
Be careful not to drop the two high-low shifter pieces.



(A) High-low shifter fork
(B) Input shaft ASSY

12) Remove the main shaft assembly and input shaft assembly.

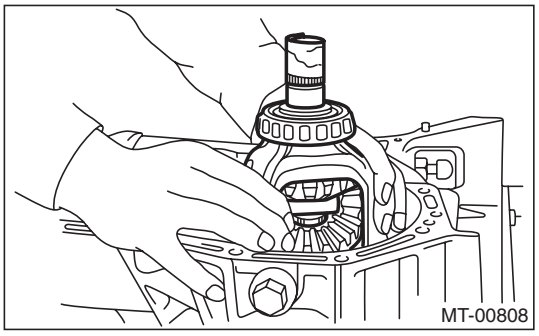
CAUTION:
Be careful not to drop the input shaft and main shaft as they are separable.



(A) Main shaft ASSY
(B) Input shaft ASSY

13) Remove the differential assembly.

NOTE:
• Be careful not to confuse the right and left roller bearing outer races.
• Be careful not to damage the retainer oil seal.



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B: INSTALLATION

1. SINGLE-RANGE

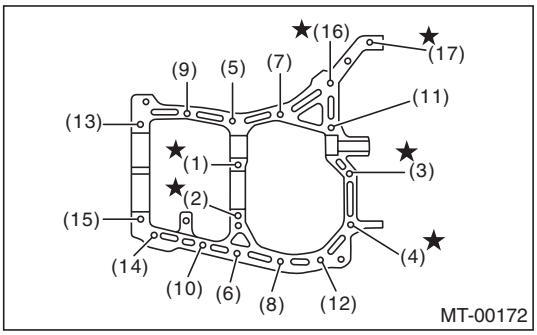
1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
2) Install the front differential assembly.
3) Install the main shaft assembly.
Install the transmission case knock pin into needle bearing knock pin hole.
4) Install the drive pinion shaft assembly.
Install the transmission case knock pin into roller bearing knock pin hole.
5) Apply liquid gasket, and then put the case right side and left side together.

Liquid gasket:
THREE BOND 1215 or equivalent

6) Tighten the seventeen bolts with bracket, clip, etc. as shown in the figure.

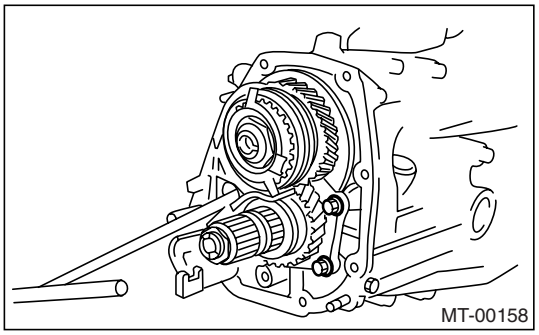
NOTE:
• Insert the bolts from bottom and tighten the nuts at top.
• Put the cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
• Confirm that the speedometer gear is meshed.

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)



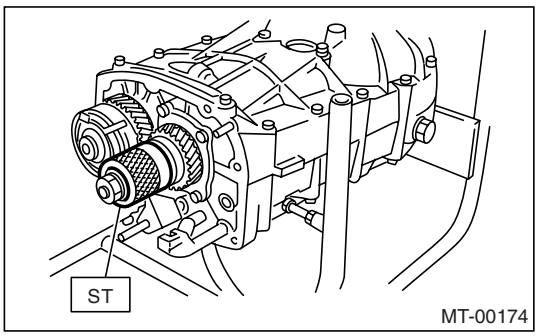
7) Tighten the ball bearing attachment bolts.

Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)

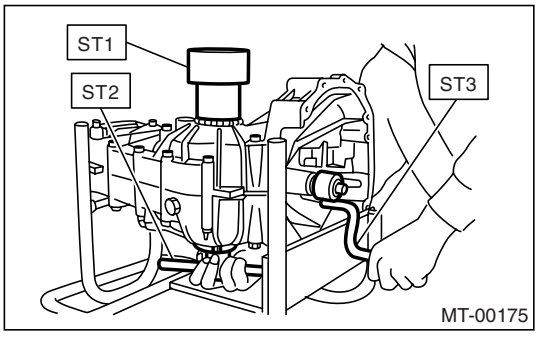


8) Backlash adjustment of hypoid gear and preload adjustment of roller bearing:

NOTE:
Support the 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 the retainer assembly into left case from the bottom using ST2. Fit the ST3 on transmission main shaft. Shift the 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

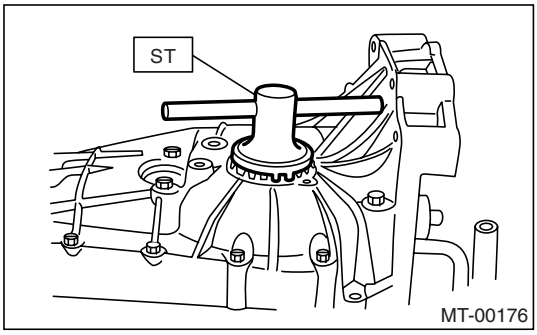


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11) Remove the weight and screw in the retainer without O-ring on upper side and stop at the point where slight resistance is felt.

NOTE:
At this point, the backlash between hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



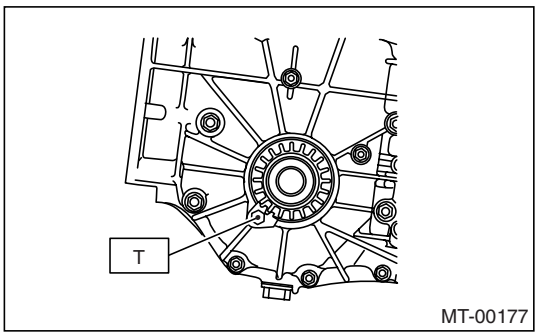
12) Loosen the retainer on the lower side by 3 notches and turn in the retainer on the upper side by the same amount in order to obtain the backlash.
13) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.
14) Install temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

NOTE:
Install the lock plate upside down if it is hard to install.

15) Turn the transmission main shaft several times while tapping around the retainer lightly with plastic hammer.
16) Inspect and adjust the backlash and tooth contact of hypoid gear. <Ref. to 5MT-107, INSPECTION, Front Differential Assembly.>
17) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen the retainer until the O-ring groove appears. Fit O-ring into the groove and tighten the retainer to the original position.
Install the lock plate.

NOTE:
• Record how many times the retainer is turned while loosening.
• Carry out this job on both upper and lower retainers.

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



18) Selecting of main shaft rear plate. <Ref. to 5MT-82, ADJUSTMENT, Main Shaft Assembly for Single-Range.>
19) Install the clutch release lever and bearing. <Ref. to CL-26, INSTALLATION, Release Bearing and Lever.>
20) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
21) Install the manual transmission assembly into the vehicle.<Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

2. DUAL-RANGE

1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
2) Install the front differential assembly.
3) Install the main shaft assembly and input shaft assembly.
Connect the main shaft assembly and input the shaft assembly, and install needle bearing knock pin hole into transmission case knock pin.
4) Install the drive pinion shaft assembly.
Install the roller bearing knock pin hole into transmission case knock pin.
5) Apply liquid gasket, and then put the case right side and left side together.

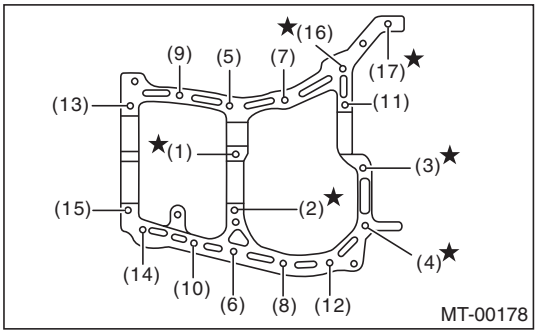
Liquid gasket:
THREE BOND 1215 or equivalent

6) Tighten the seventeen bolts with bracket, clip, etc. as shown in the figure.

NOTE:
• Insert the bolts from bottom and tighten the nuts at top.
• Put the cases together so that the drive pinion shim and input shaft holder shim are not caught up in between.
• Confirm that the speedometer gear is meshed.

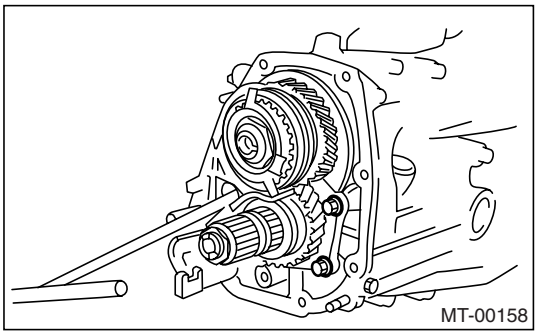
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Tightening torque:
8 mm bolt
25 N·m (2.5 kgf-m, 18.1 ft-lb)
★ 10 mm bolt
39 N·m (4.0 kgf-m, 28.9 ft-lb)



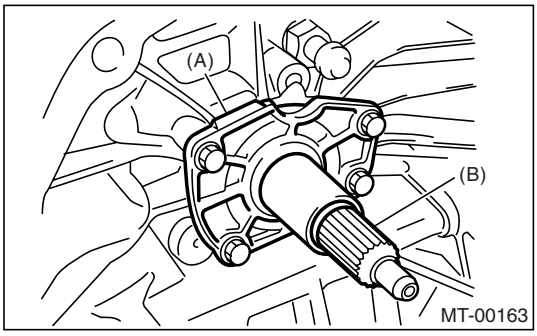
7) Tighten the ball bearing attachment bolts.

Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)



8) Tighten the input shaft holder attaching bolts.

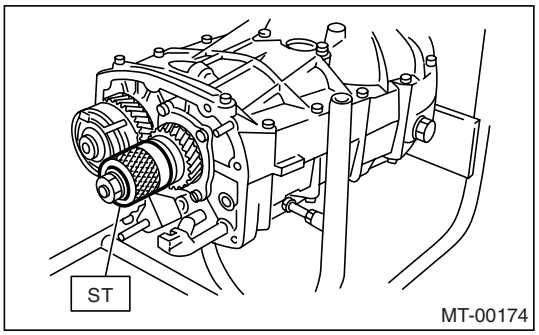
Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)



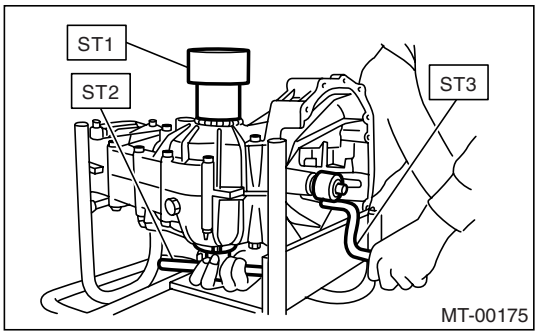
(A) Input shaft holder
(B) Input shaft

9) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

NOTE:
Support the drive pinion assembly with ST.
ST 498427100 STOPPER



10) Place the transmission with case left side facing downward and put ST1 on bearing cup.
11) Screw the retainer assembly into left case from the bottom using ST2. Fit the ST3 on transmission main shaft. Shift the 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

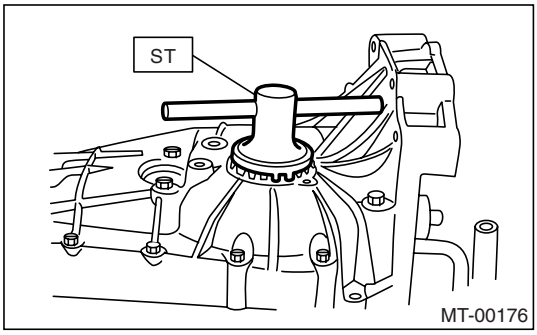


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12) Remove the weight and screw in the retainer without O-ring on upper side and stop at the point where slight resistance is felt.

NOTE:
At this point, the backlash between hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



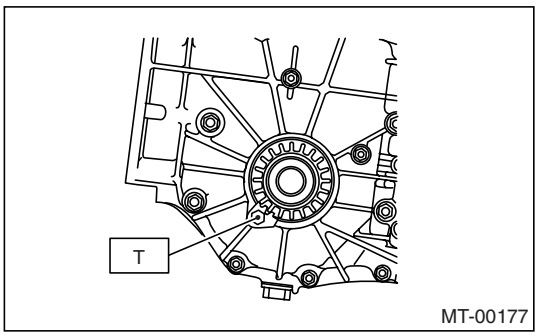
13) Loosen the retainer on the lower side by 3 notches and turn in the retainer on the upper side by the same amount in order to obtain the backlash.
14) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.
15) Install temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

NOTE:
Install the lock plate upside down if it is hard to install.

16) Turn the transmission main shaft several times while tapping around the retainer lightly with plastic hammer.
17) Inspect and adjust the backlash and tooth contact of hypoid gear. <Ref. to 5MT-107, INSPECTION, Front Differential Assembly.>
18) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen the retainer until the O-ring groove appears. Fit O-ring into the groove and tighten the retainer to the original position.
Install the lock plate.

NOTE:
• Record how many times the retainer is turned while loosening.
• Carry out this job on both upper and lower retainers.

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



19) Selection of main shaft rear plate <Ref. to 5MT-82, ADJUSTMENT, Main Shaft Assembly for Single-Range.>
20) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
21) Install the clutch release lever and bearing. <Ref. to CL-26, INSTALLATION, Release Bearing and Lever.>
22) Install the manual transmission assembly into the vehicle.<Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

Check the transmission case for cracks, damage, and oil leaks.

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16.Main Shaft Assembly for Single-Range

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the drive pinion shaft assembly. <Ref. to 5MT-93, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly.

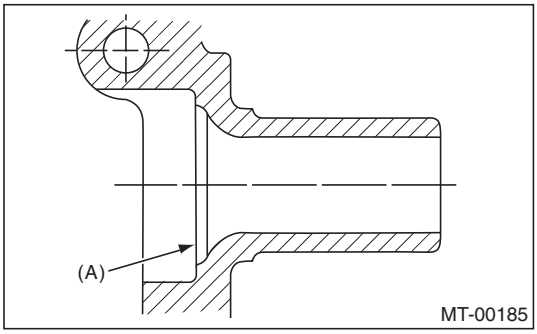
B: INSTALLATION

1) Install the needle bearing and oil seal onto the front of transmission main shaft assembly.

NOTE:
• Wrap the 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 the 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 5MT-93, INSTALLATION, Drive Pinion Shaft Assembly.>
4) Install the transmission case. <Ref. to 5MT-69, INSTALLATION, Transmission Case.>
5) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

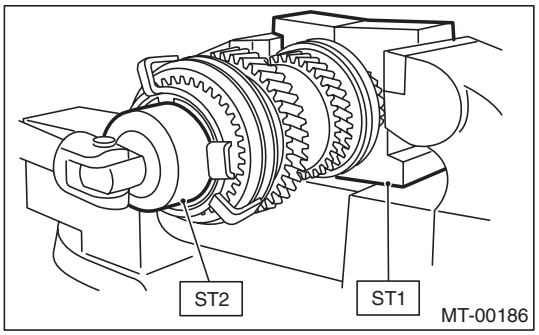
C: DISASSEMBLY

1. AWD MODEL

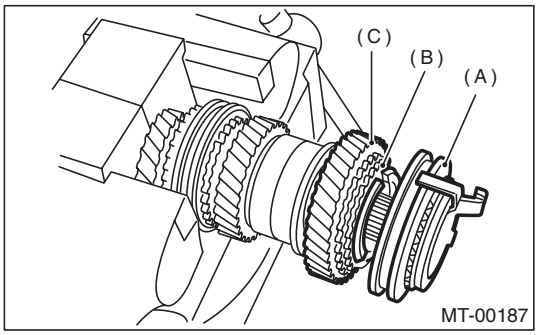
1) Put vinyl tape around the main shaft splines to protect oil seal from damage. Then pull out the oil seal and needle bearing by hand.
2) Remove the lock nut from transmission main shaft assembly.

NOTE:
Remove the caulking before removing lock nut.

ST1 499987000 TRANSMISSION HOLDER
ST2 498937003 SOCKET WRENCH (35)



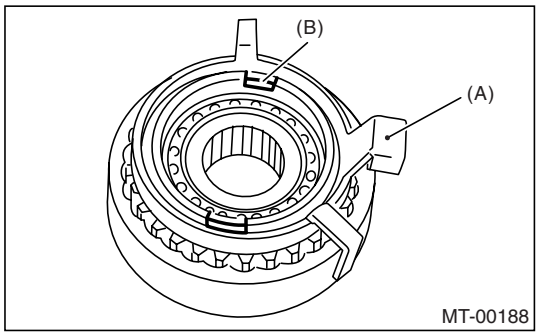
3) Remove the 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.



(A) 5th-Rev sleeve and hub ASSY
(B) Baulk ring
(C) 5th drive gear

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4) Remove the snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.

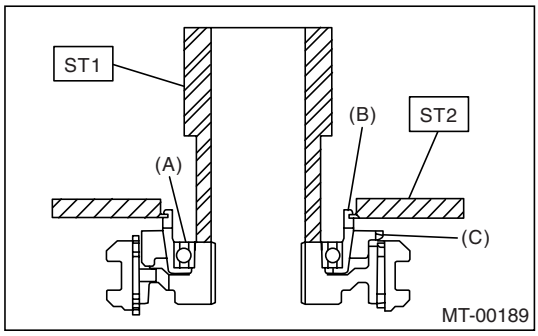


(A) Synchro cone stopper
(B) Snap ring

5) Using the ST1, ST2 and a press, remove the ball bearing, synchro cone and baulk ring (Rev).

NOTE:
• Replace the 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 the ball bearing.

ST1 499757002 INSTALLER
ST2 498077400 SYNCHRO CONE REMOVER

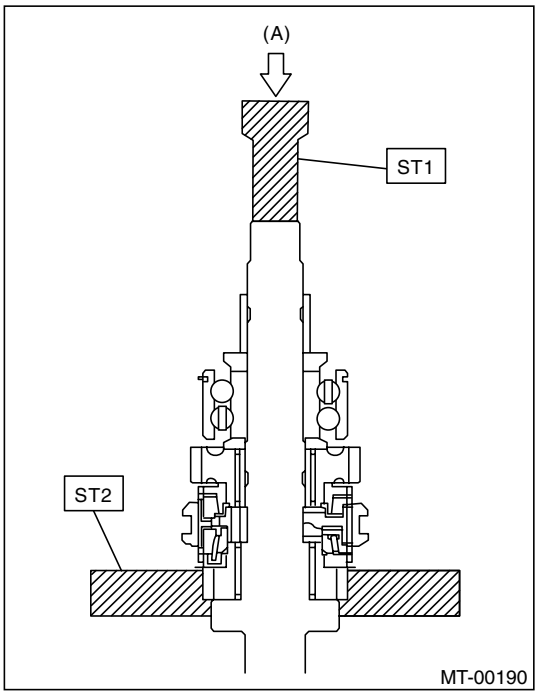


(A) Ball bearing
(B) Synchro cone
(C) Baulk ring

6) Using the ST1 and ST2, remove rest of the parts.

NOTE:
Replace the 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.

ST1 899864100 REMOVER
ST2 899714110 REMOVER



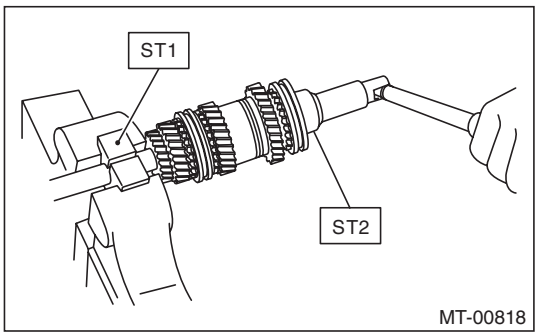
(A) Press

2. FWD MODEL

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.

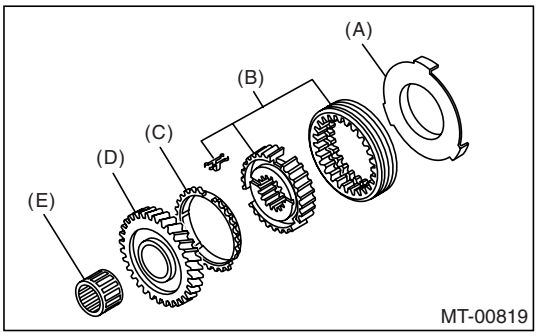
NOTE:
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



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3) Remove the insert stopper plate, sleeve and hub assembly No. 2, baulk ring, 5th drive gear and needle bearing.

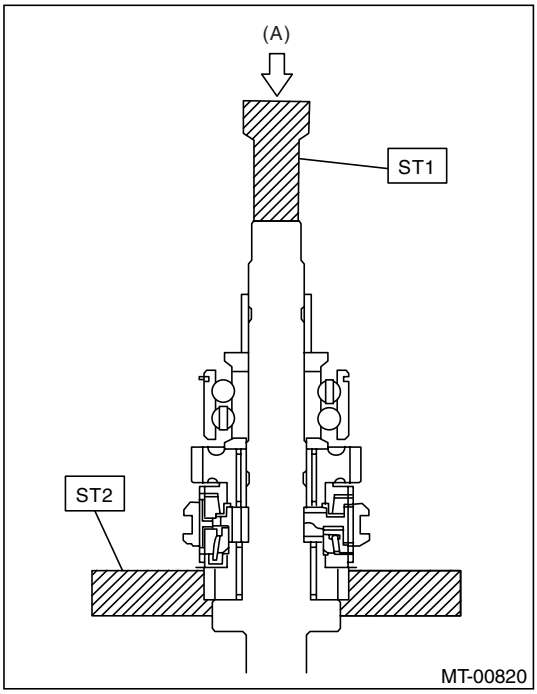


(A) Insert stopper plate
(B) Sleeve and hub ASSY No. 2
(C) Baulk ring
(D) 5th drive gear
(E) Needle bearing

4) Using ST1, ST2 and a press, remove the rest of parts.

NOTE:
Replace sleeve and hub with ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines before hand.

ST1 899864100 REMOVER
ST2 899714110 REMOVER



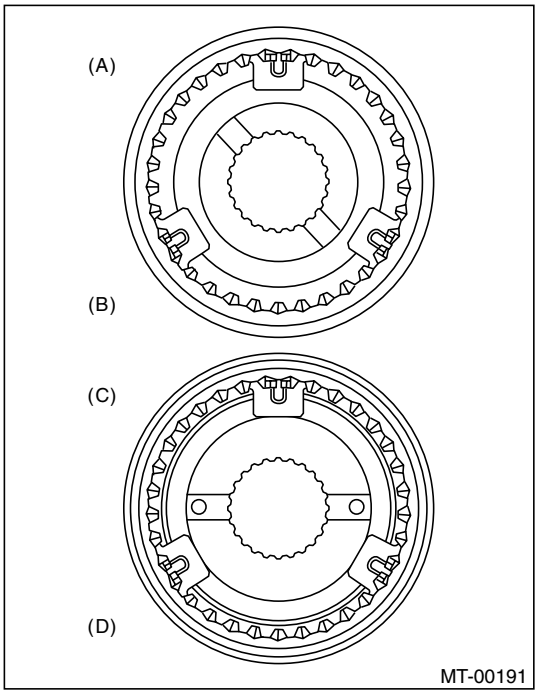
(A) Press

D: ASSEMBLY

1. AWD NON-TURBO MODEL

1) Assemble when each sleeve and hub assembly are disassembled.

NOTE:
Position the open ends of spring 120° apart.



(A) 3rd-4th hub ASSY
(B) 3rd gear side
(C) 5th-Rev hub ASSY
(D) 5th gear side

2) Install the 3rd drive gear, baulk ring, sleeve and hub assembly for 3rd needle bearing on transmission main shaft.

NOTE:
Align the groove in baulk ring with shifting insert.

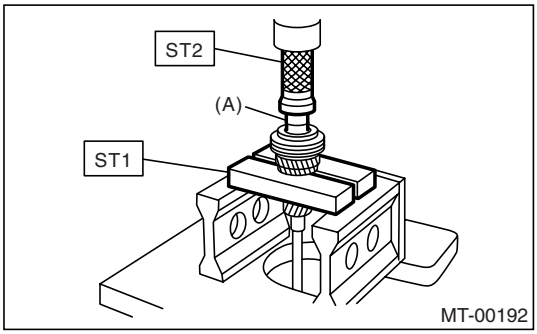
3) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

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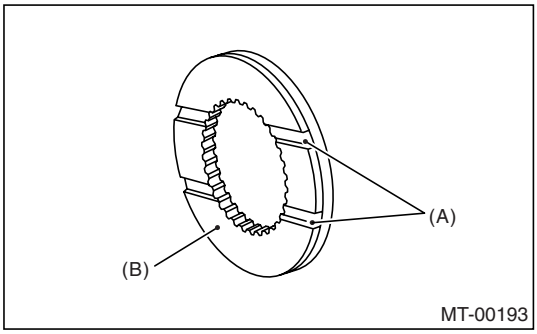
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race

4) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

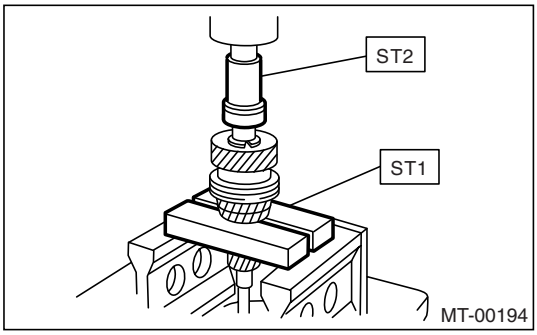
NOTE:
Align the baulk ring and gear & hub assembly with key groove.



(A) Groove
(B) 4th gear side

5) Drive the ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

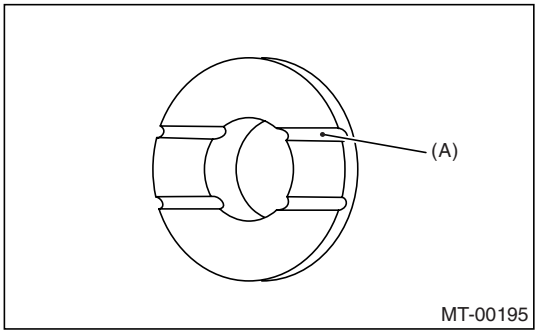
NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using the 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 the thrust washer in correct direction.

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

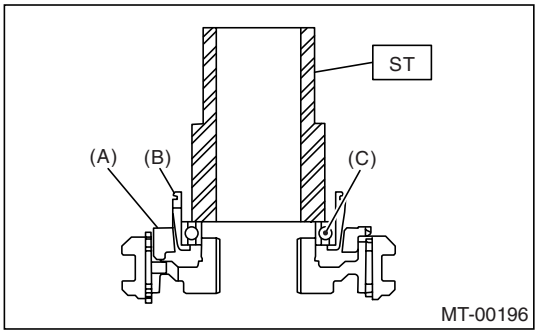


(A) Face this surface to 5th gear side.

7) Install the bearing onto synchro cone.
8) Install the 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 a new ball bearing.
• After press fitting, make sure the synchro cone rotates freely.

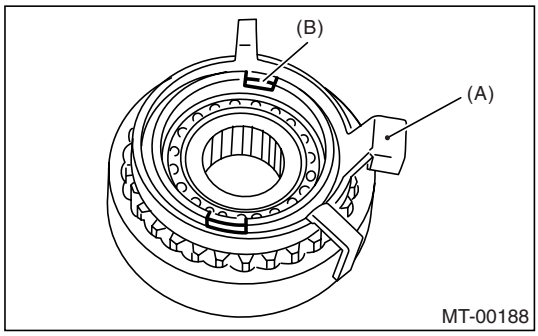
ST 499757002 INSTALLER



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

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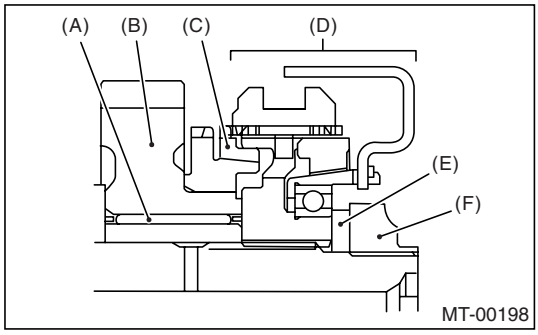
9) Install the synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(A) Synchro cone stopper
(B) Snap ring

10) Install rest of the parts to the rear section of transmission main shaft.

NOTE:
Align the groove in baulk ring with shifting insert.



(A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) 5th-Rev sleeve and hub ASSY
(E) Lock washer
(F) Lock nuts

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

NOTE:
Secure the lock nuts in two places after tightening.

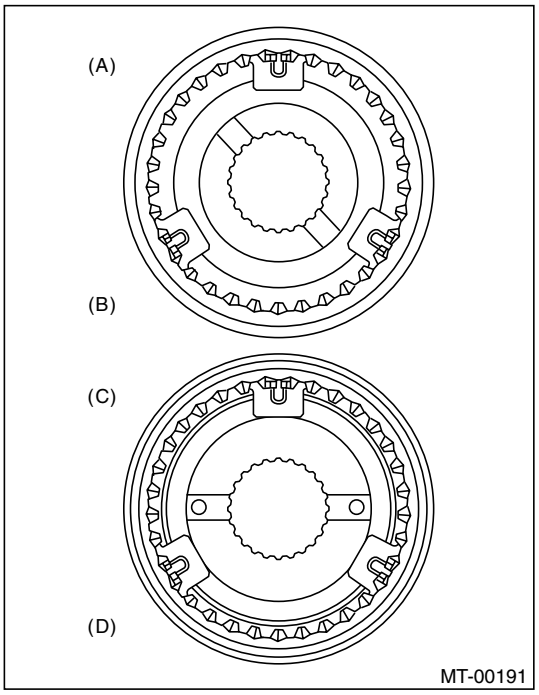
ST1 499987003 SOCKET WRENCH
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

2. AWD TURBO MODEL

1) Assemble each sleeve and hub assembly.

NOTE:
Position the open ends of spring 120° apart.

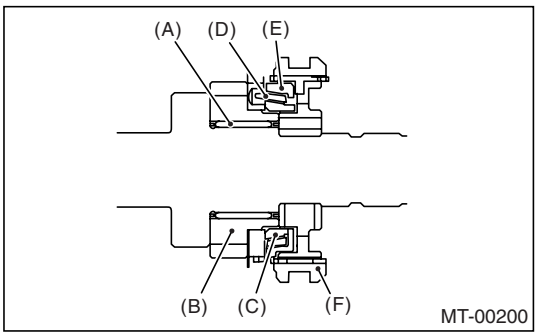


(A) 3rd-4th hub ASSY
(B) 3rd gear side
(C) 5th-Rev hub ASSY
(D) 5th gear side

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2) Install the 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 the groove in baulk ring with shifting insert.

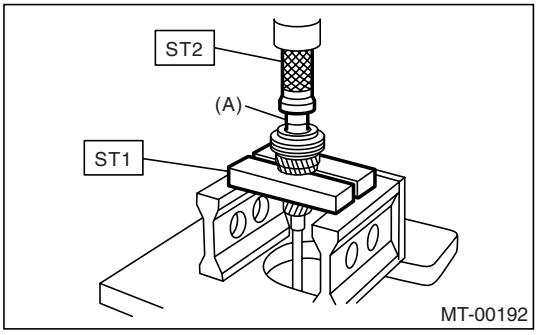


(A) 3rd needle bearing
(B) 3rd drive gear
(C) Inner baulk ring
(D) Synchro cone
(E) Outer baulk ring
(F) Sleeve and hub ASSY

3) Install the 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).

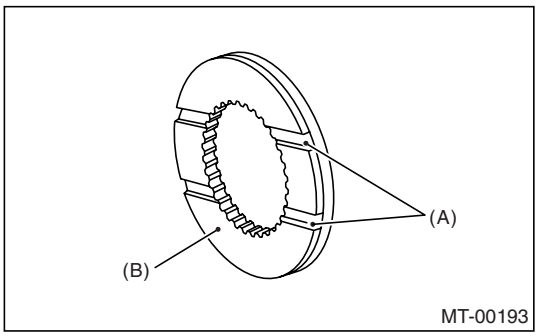
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race

4) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Align the baulk ring and gear & hub assembly with key groove.

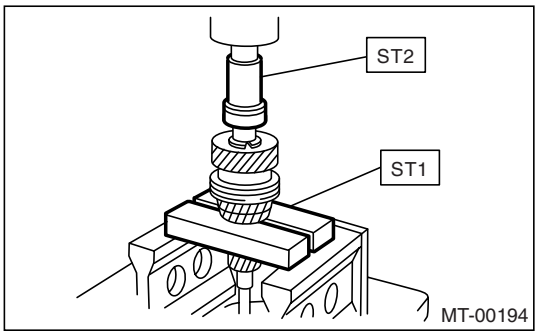


(A) Groove
(B) 4th gear side

5) Drive the 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

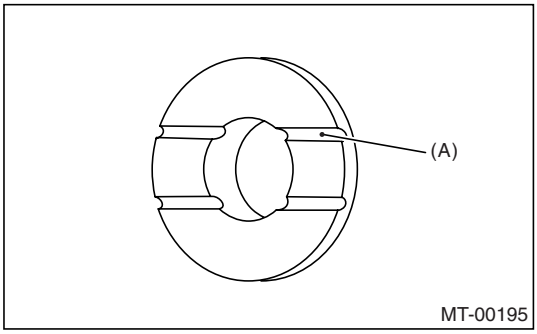


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6) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Face the thrust washer in correct direction.

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

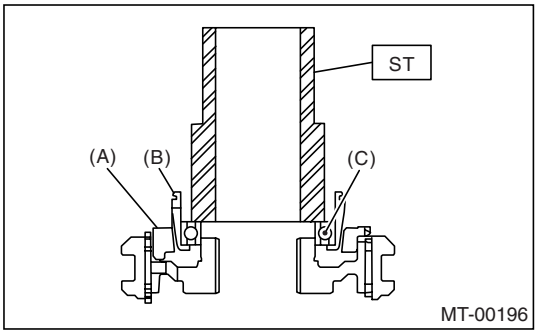


(A) Face this surface to 5th gear side.

7) Install the bearing onto synchro cone.
8) Install the baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

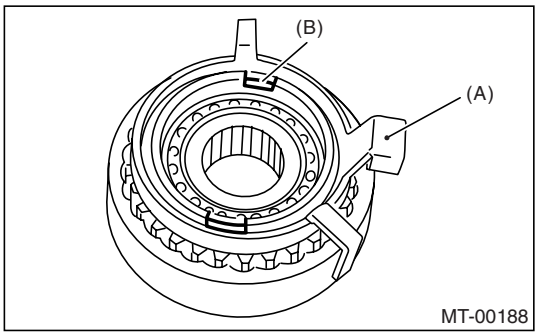
NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Use a new ball bearing.
• After press fitting, make sure the synchro cone rotates freely.

ST 499757002 INSTALLER



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

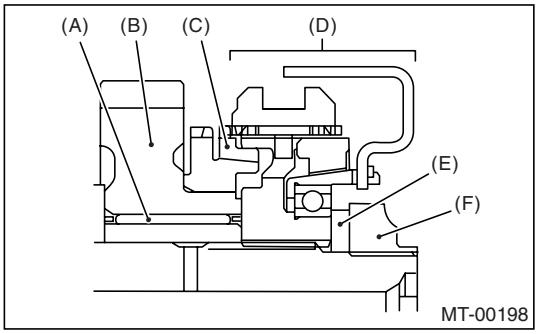
9) Install the synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(A) Synchro cone stopper
(B) Snap ring

10) Install the rest parts to the rear section of transmission main shaft.

NOTE:
Align the groove in baulk ring with shifting insert.



(A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) 5th-Rev sleeve and hub ASSY
(E) Lock washer
(F) Lock nuts

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

NOTE:
Secure the lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH
ST2 498937000 TRANSMISSION HOLDER

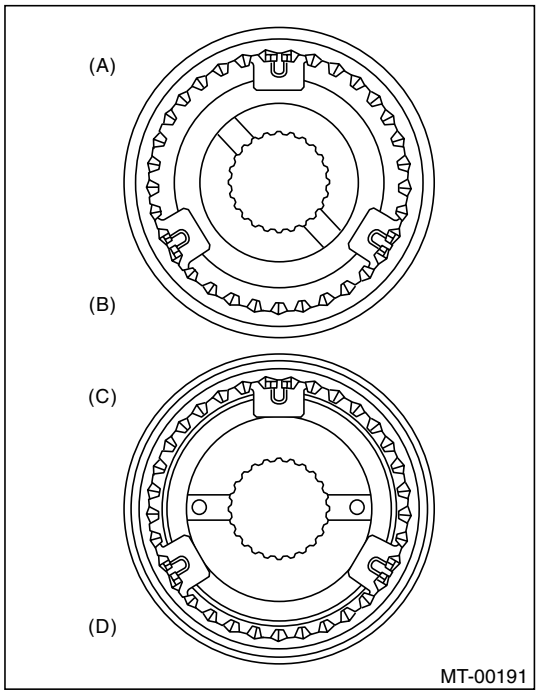
Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

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3. FWD MODEL

1) Assemble sleeve and hub assembly for 3rd-4th and 5th-Rev.

NOTE:
Position open ends of spring 120° apart.

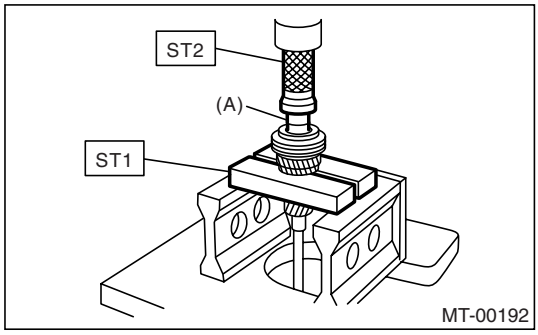


(A) 3rd-4th hub ASSY
(B) 3rd gear side
(C) 5th-Rev hub ASSY
(D) 5th gear side

2) Install 3rd drive gear, baulk ring and sleeve and hub assembly for 3rd-4th needle bearing (32 × 36 × 25.7) on transmission main shaft.

NOTE:
Align groove in baulk ring with shifting insert.

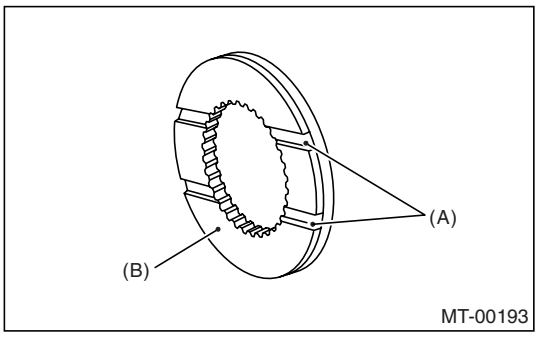
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing

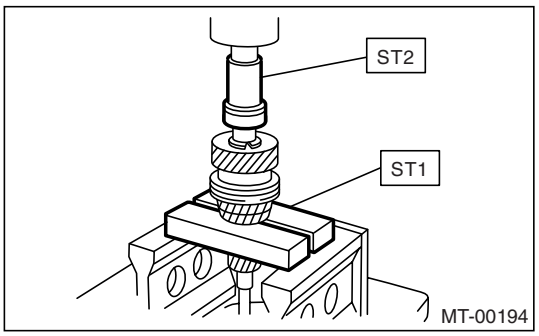
4) Install baulk ring, needle bearing (32 × 30 × 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Face thrust washer in the correct direction.



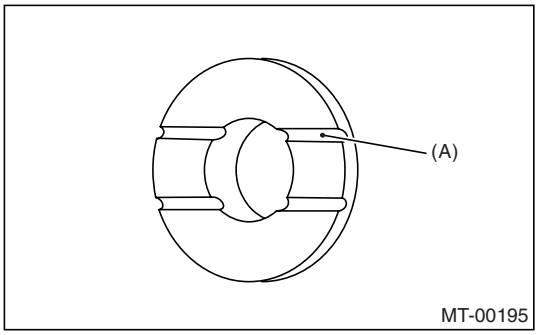
(A) Groove
(B) 4th gear side

5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using the same tools as in step 5) above, install the following parts onto the rear section of transmission main shaft.

NOTE:
Face thrust washer in the correct direction.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

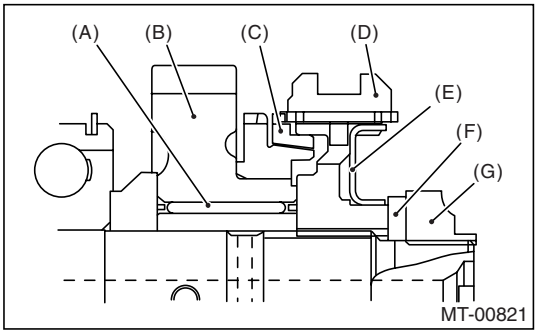


(A) Face this surface to 5th gear side.

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7) Install the following parts to the rear section transmission main shaft.
ST1 499987003 SOCKET WRENCH
ST2 498937000 TRANSMISSION HOLDER

NOTE:
• Align groove in baulk ring with shifting insert.
• Be sure to fit pawl of insert stopper plate into 4 mm (0.16 in) dia. hole in the boss section of synchronizer hub.



(A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) Sleeve and hub ASSY
(E) Insert stopper plate
(F) Lock washer
(G) Lock nut

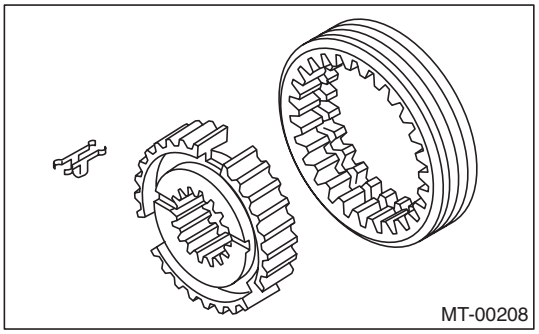
8) Tighten lock nuts (22 × 13) to the specified torque using ST1 and ST2.

NOTE:
Secure lock nuts in two places after tightening.

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace the 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 the 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.

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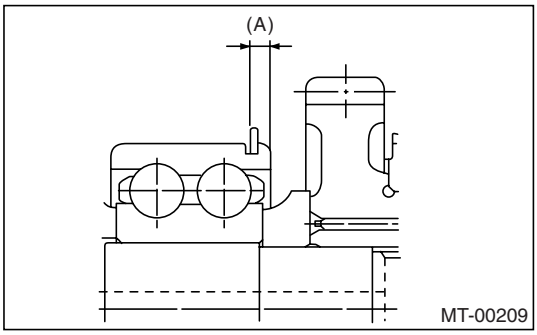
F: ADJUSTMENT

Selection of main shaft rear plate:
Using the ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:

NOTE:
Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and the moving flange of bearing.

ST 498147000 DEPTH GAUGE

Dimension (A) mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2



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17.Main Shaft Assembly for Dual-Range

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. <Ref. to 5MT-93, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly and input shaft assembly.

B: INSTALLATION

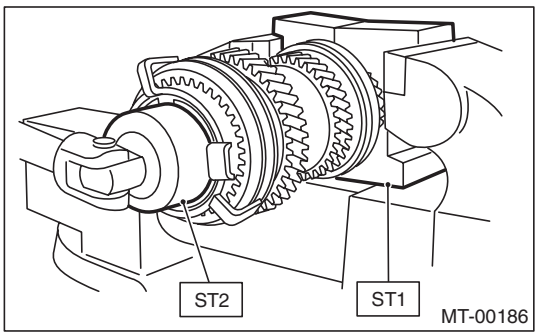
1) Install the needle bearing onto the front of transmission main shaft assembly.
2) Connect the main shaft assembly and input shaft assembly.
3) Install the needle bearing outer race knock pin hole into transmission case knock pin.
4) Install the drive pinion assembly. <Ref. to 5MT-93, INSTALLATION, Drive Pinion Shaft Assembly.>
5) Install the transmission case. <Ref. to 5MT-69, INSTALLATION, Transmission Case.>
6) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
7) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

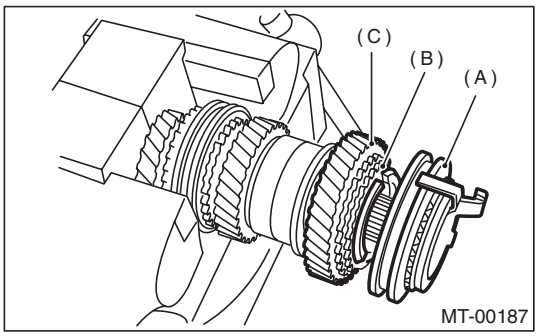
1) Put vinyl tape around the main shaft splines to protect oil seal from damage. Then pull out the oil seal and needle bearing by hand.
2) Remove the lock nut from transmission main shaft assembly.

NOTE:
Remove the caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)

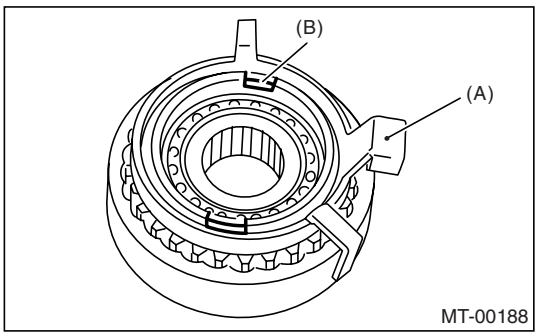


3) Remove the 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.



(A) 5th-Rev sleeve and hub ASSY
(B) Baulk ring
(C) 5th drive gear

4) Remove the snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.



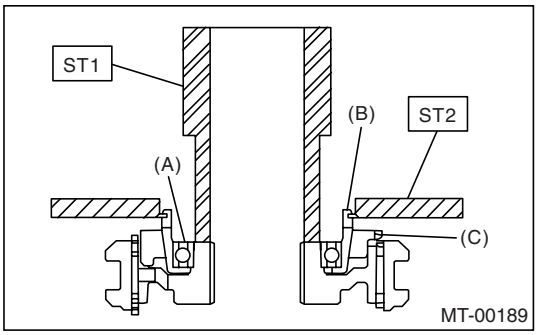
(A) Synchro cone stopper
(B) Snap ring

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5) Using the ST1, ST2 and a press, remove the ball bearing, synchro cone and baulk ring (Rev).

NOTE:
• Replace the 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 the ball bearing.

ST1 499757002 INSTALLER
ST2 498077400 SYNCHRO CONE REMOVER

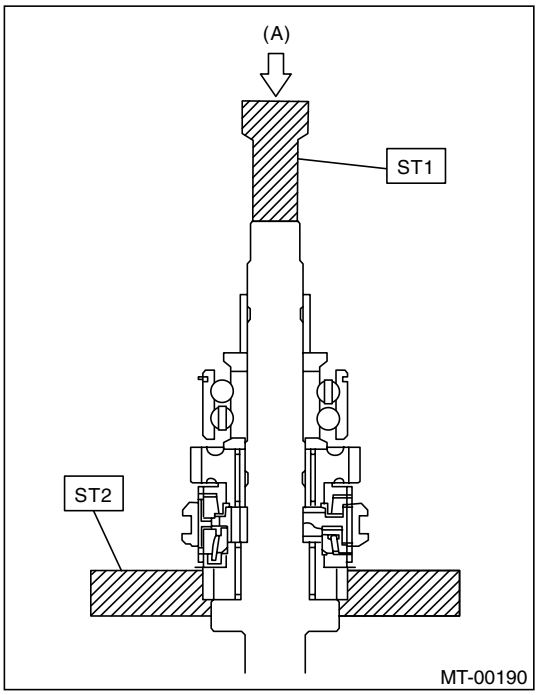


(A) Ball bearing
(B) Synchro cone
(C) Baulk ring

6) Using the ST1 and ST2, remove rest of the parts.

NOTE:
Replace the 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.

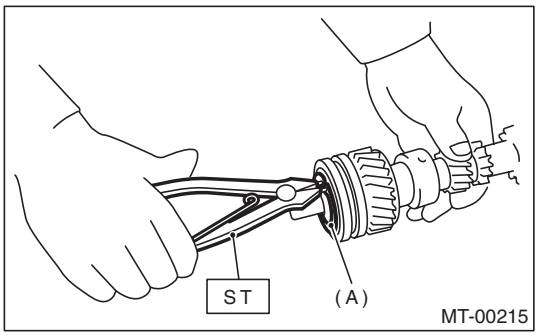
ST1 899864100REMOVER
ST2 899714110 REMOVER



(A) Press

7) Remove the snap ring from main shaft.

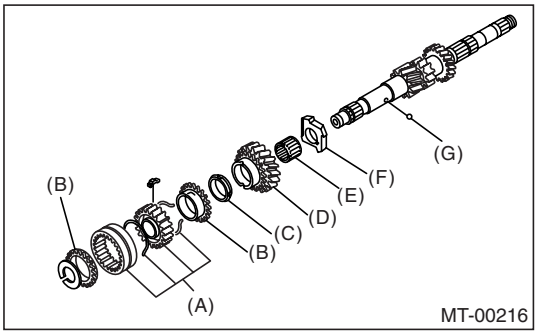
ST 899474100 EXPANDER



(A) Snap ring

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8) Remove rest of the parts.

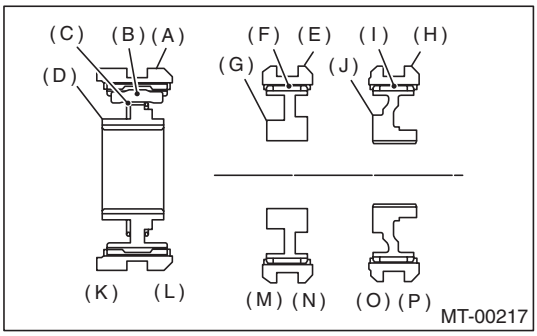


(A) Sleeve and hub ASSY
(B) High-low baulk ring
(C) Friction damper
(D) Low input gear
(E) Needle bearing
(F) Input low gear spacer
(G) Ball

D: ASSEMBLY

1) Assemble when each sleeve and hub assembly are disassembled.

NOTE:
Position the open ends of spring 120° apart.

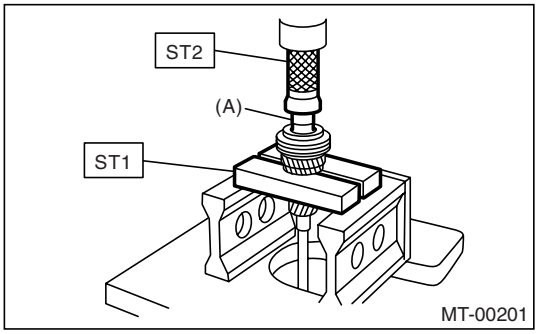


(A) High-low coupling sleeve
(B) Shifting insert
(C) High-low synchronizer spring
(D) High-low synchronizer hub
(E) Sleeve
(F) Insert key
(G) 3rd-4th synchronizer hub
(H) Sleeve
(I) Insert key
(J) 5th-Rev synchronizer hub
(K) High side
(L) Low side
(M) 3rd side
(N) 4th side
(O) 5th side
(P) Rev side

2) Install the 3rd drive gear, baulk ring, sleeve and hub assembly for 3rd-4th needle bearing on transmission main shaft.

NOTE:
Align the groove in baulk ring with shifting insert.

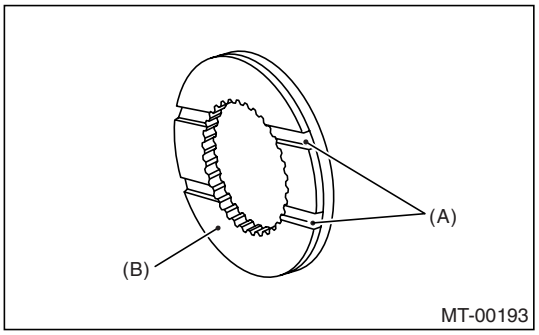
3) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.
ST1 899714110REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race

4) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

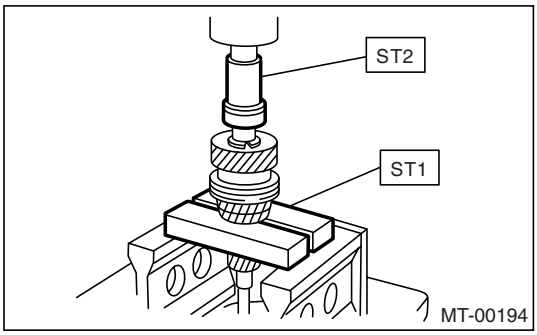
NOTE:
Face the thrust washer in correct direction.



(A) Groove
(B) 4th gear side

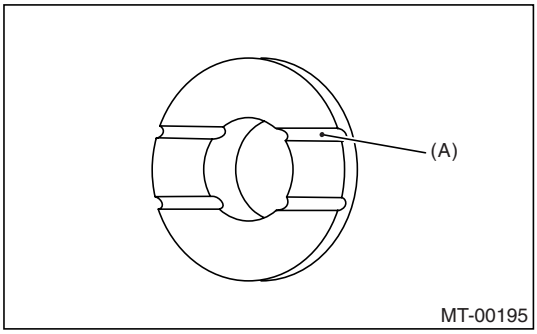
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5) Drive the ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.
ST1 899714110REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
Face the thrust washer in correct direction.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

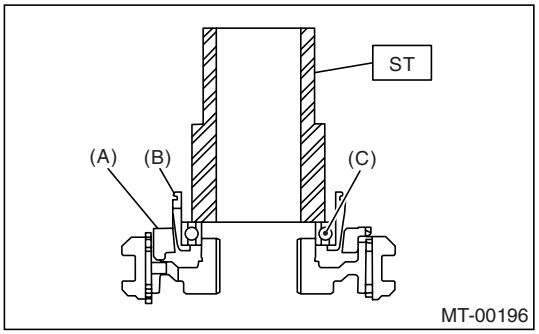


(A) Face this surface to 5th gear side.

7) Install the bearing onto synchro cone.
8) Install the baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

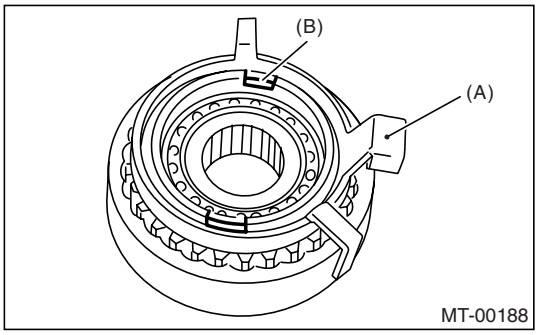
NOTE:
- Use a new ball bearing.
- After press fitting, make sure the synchro cone rotates freely.

ST 499757002 INSTALLER



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

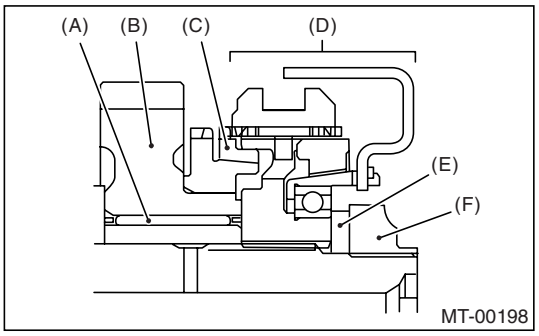
9) Install the synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(A) Synchro cone stopper
(B) Snap ring

10) Install rest of the parts to the rear section of transmission main shaft.

NOTE:
Align the 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

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

NOTE:
Secure the lock nuts in two places after tightening.

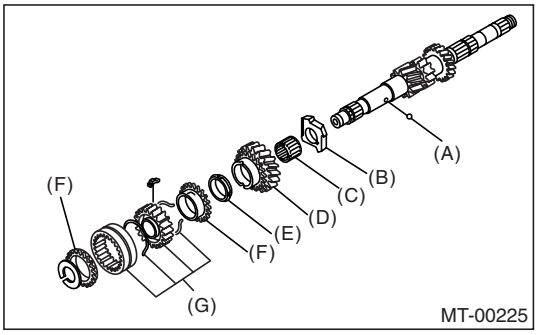
ST1 499987003 SOCKET WRENCH
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

12) Install the needle bearing on main shaft.
13) Install rest of the parts to the front section of transmission main shaft.

NOTE:
Be careful not to damage the graded section of transmission main shaft when installing the needle bearing.

NOTE:
- Face the grooved side toward input gear.
- Align the high-low baulk ring's groove with shifting insert.



(A) Ball
(B) Input low gear spacer
(C) Needle bearing
(D) Low input gear
(E) Friction damper
(F) High-low baulk ring
(G) Sleeve and hub ASSY

14) Install a new snap ring to the rod section of transmission main shaft using ST1 and ST2.

NOTE:
Select a suitable outer snap ring so that axial clearance between snap ring and hub is held within 0.060 to 0.100 mm (0.0024 to 0.0039 in).

ST1 499757002 INSTALLER
ST2 499757001 SNAP RING GUIDE

Snap ring	
Part No.	Thickness mm (in)
805025051	2.42 (0.0953)
805025052	2.47 (0.0972)
805025053	2.52 (0.0992)
805025054	2.57 (0.1012)
805025055	2.62 (0.1031)
805025056	2.67 (0.1051)
805025057	2.72 (0.1071)
805025058	2.37 (0.0933)

E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace the 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 the 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.

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F: ADJUSTMENT

Choose the main shaft rear plate. <Ref. to 5MT-82, ADJUSTMENT, Main Shaft Assembly for Single-Range.>

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18.Input Shaft Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. <Ref. to 5MT-93, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly and input shaft assembly.

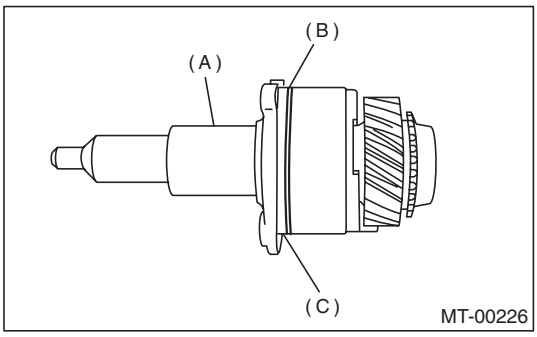
B: INSTALLATION

1) Install the needle bearing onto the front of transmission main shaft assembly.
2) Connect the main shaft assembly and input shaft assembly.
3) Install the needle bearing outer race knock pin hole into transmission case knock pin.
4) Install the drive pinion assembly. <Ref. to 5MT-93, INSTALLATION, Drive Pinion Shaft Assembly.>
5) Install the transmission case. <Ref. to 5MT-69, INSTALLATION, Transmission Case.>
6) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
7) Install the manual transmission assembly on vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

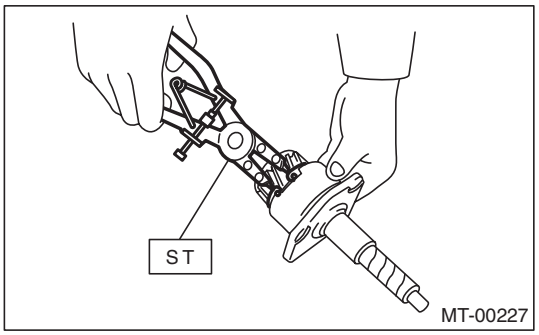
1) Remove the O-ring from input shaft holder. Also, remove the input shaft holder shim.

NOTE:
- Use a new O-ring.
- Number of shims used varies from zero to two.

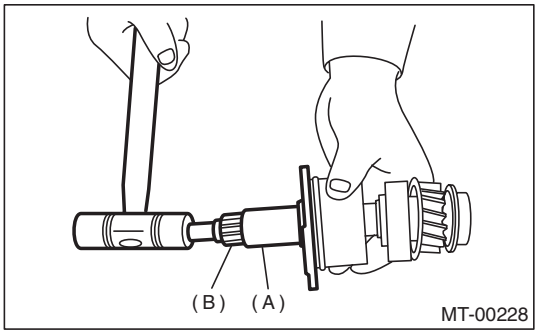


(A) Input shaft holder
(B) O-ring
(C) Input shaft holder shim

2) Put vinyl tape around the input shaft splines to protect oil seal from damage.
3) Remove the inner snap ring.
ST 398663600 PLIERS

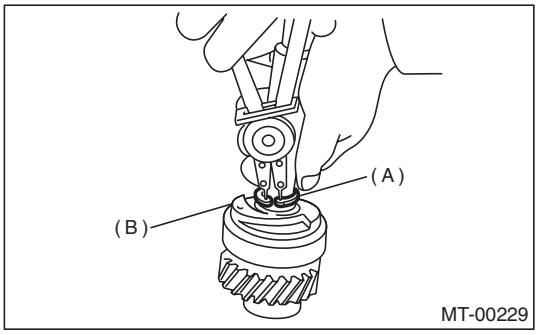


4) Hold the input shaft holder stationary and remove the input shaft by tapping its end with a plastic hammer.



(A) Input shaft holder
(B) Input shaft

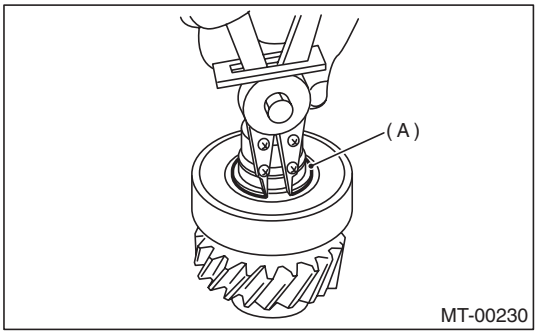
5) Remove the outer snap ring. Then remove the oil squeeze plate and straight pin.



(A) Snap ring
(B) Oil squeeze plate

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6) Remove the snap ring.

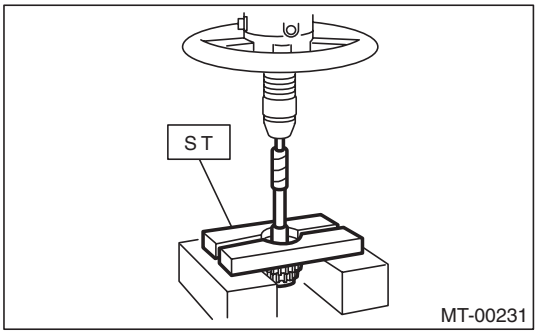


(A) Snap ring

7) Using a press and ST, remove the ball bearing.

NOTE:
Remove the inner snap ring before pressing.

ST 498077000 REMOVER



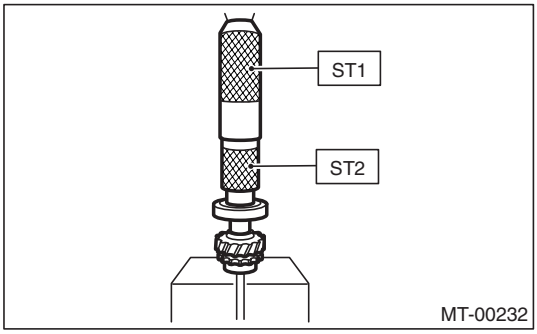
8) Remove the oil seal from input shaft holder.

D: ASSEMBLY

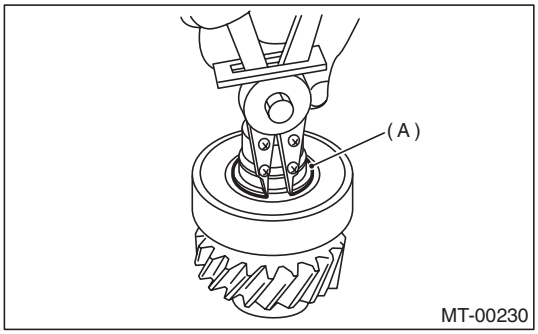
1) Install the ball bearing onto input shaft.

NOTE:
Place the snap ring between input shaft gear and ball bearing beforehand. Use the table at 8) as a guide in selecting a suitable snap ring.

ST1 899580100 INSTALLER
ST2 399513600 INSTALLER



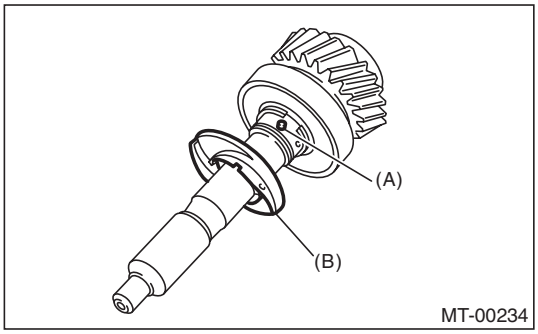
2) Install the snap ring on input shaft.



(A) Snap ring

3) Inspect the clearance between ball bearing and snap ring. <Ref. to 5MT-91, INSPECTION, Input Shaft Assembly.>

4) Install the straight pin and oil squeeze plate to input shaft.



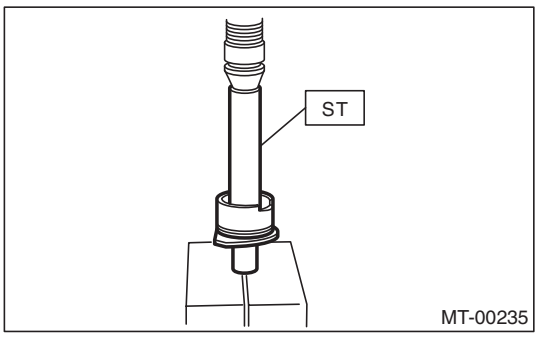
(A) Straight pin
(B) Oil squeeze plate

5) Install the snap ring.

6) Drive the oil seal into input shaft holder.

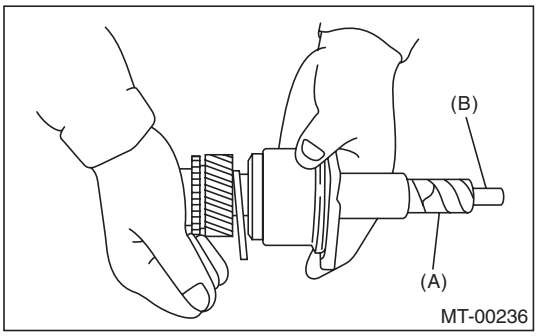
NOTE:
Apply a coat of grease to sealing lips before installing oil seal.

ST 398507703 DUMMY COLLAR



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7) Wind vinyl tape around the shaft splines and insert input shaft into holder by lightly tapping it by hand.

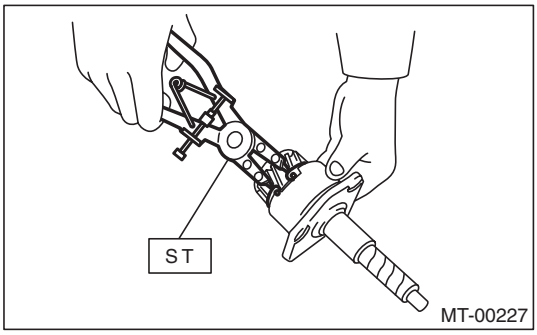


(A) Vinyl tape
(B) Input shaft

8) Install the snap ring to input shaft holder.

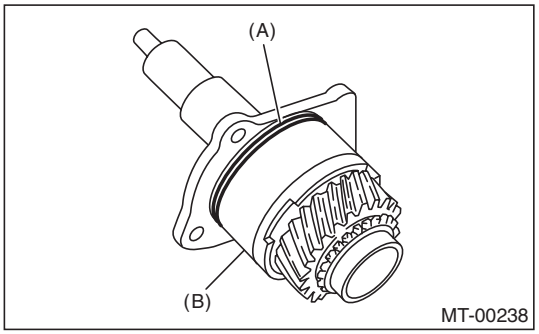
NOTE:
Select a suitable snap ring so that clearance between snap ring and bearing is held within 0 to 0.12 mm (0 to 0.0047 in).

ST 398663600 PLIERS



Snap ring	
Part No.	Thickness mm (in)
805168020	1.84 (0.0724)
805168030	1.92 (0.0756)
805168040	2.00 (0.0787)

9) Install the O-ring to input shaft holder.



(A) O-ring
(B) Input shaft holder

E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearings

Replace the 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 the 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.

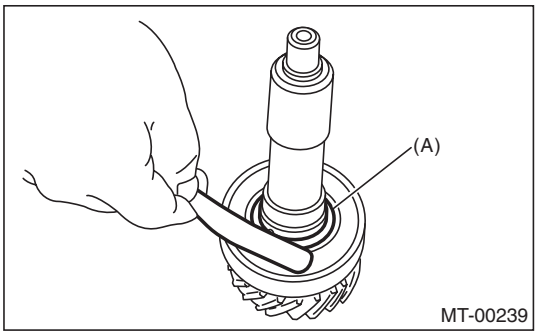
6) Oil seal

Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

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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.
9) Measure the clearance between snap ring and ball bearing using thickness gauge.

Clearance:
0 — 0.12 mm (0 — 0.0047 in)



(A) Snap ring

If the measurement is not within specification, select a suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
805028050	2.48 (0.0976)
805028060	2.56 (0.1008)
805028070	2.64 (0.1039)

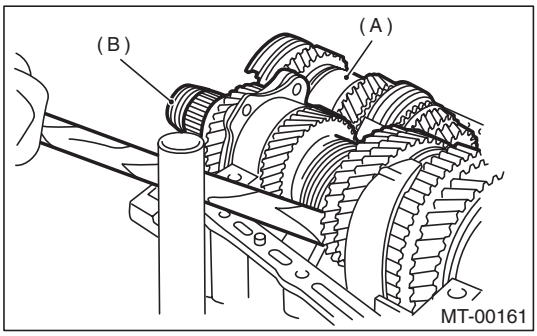
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19.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly.

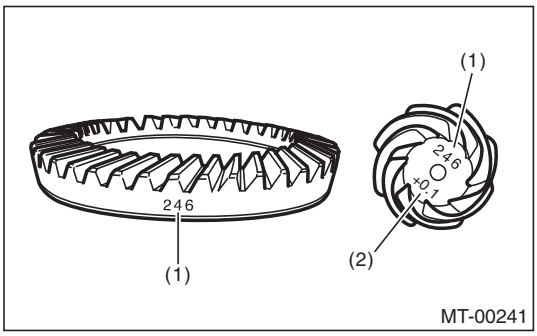
NOTE:
Use a hammer handle, etc. to remove if too tight.



(A) Main shaft assembly
(B) Drive pinion shaft assembly

B: INSTALLATION

1) Remove the differential assembly.
2) Alignment marks/numbers on hypoid gear set:
The upper number on drive 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.

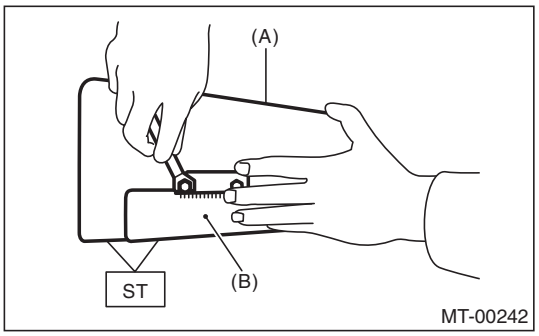


(A) Drive pinion
(B) Hypoid driven gear

3) Place the drive pinion shaft assembly on right hand transmission main case without shim and tighten the 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



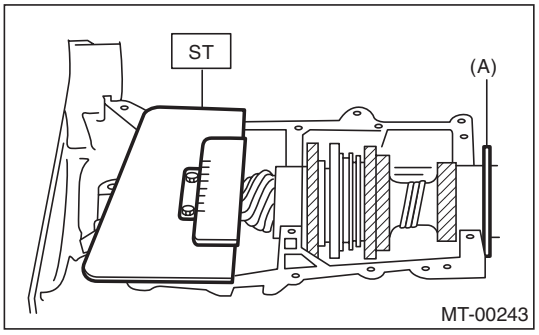
(A) Plate
(B) Scale

5) Position the ST by inserting the knock pin of ST into the knock hole in transmission case.

ST 499917500 DRIVE PINION GAUGE ASSY

6) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.

ST 499917500 DRIVE PINION GAUGE ASSY



(A) Adjust clearance to zero without shim.

7) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on 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 indicated value.

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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)

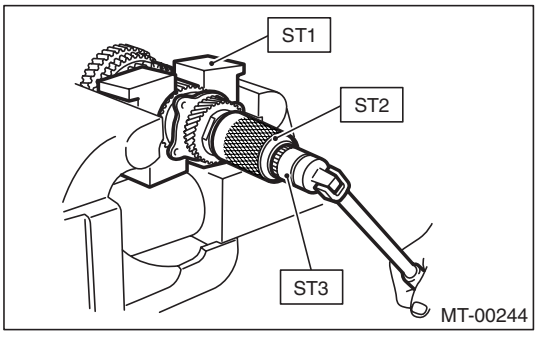
9) Install the differential assembly. <Ref. to 5MT-104, INSTALLATION, Front Differential Assembly.>
10) Set the transmission main shaft assembly and drive pinion assembly in position. (So there is no clearance between the two when moved all the way to the front). Inspect the suitable 1st-2nd, 3rd-4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms. <Ref. to 5MT-101, INSPECTION, Drive Pinion Shaft Assembly.>
11) Install the transmission case. <Ref. to 5MT-69, INSTALLATION, Transmission Case.>
12) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
13) Install the manual transmission assembly to vehicle.<Ref. to 5MT-38, Manual Transmission Assembly.>

C: DISASSEMBLY

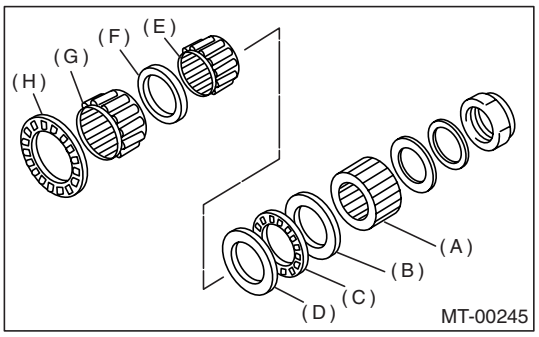
1. AWD MODEL

NOTE:
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) to prevent damage during disassembly or reassembly.

1) Straighten the lock nut at staked portion. Remove the lock nut using ST1, ST2 and ST3.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)



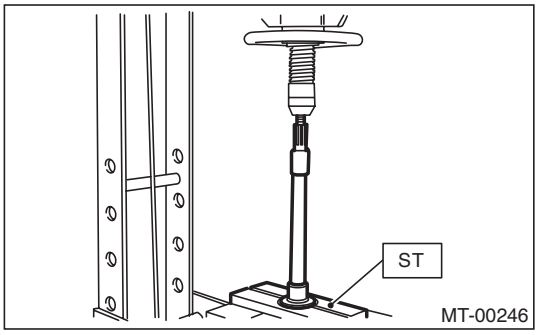
2) Withdraw the drive pinion from driven shaft. Remove the differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing, drive pinion collar, needle bearing and thrust bearing.



(A) Differential bevel gear sleeve
(B) Washer No. 1 (25 × 37.5 × t)
(C) Thrust bearing (25 × 37.5 × 3)
(D) Washer No. 2 (25 × 37.5 × 4)
(E) Needle bearing (25 × 30 × 20)
(F) Drive pinion collar
(G) Needle bearing (30 × 37 × 23)
(H) Thrust bearing (33 × 50 × 3)

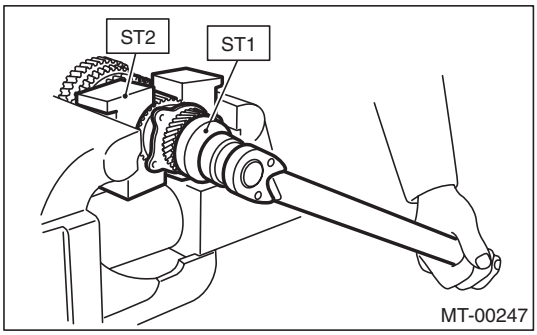
3) Remove the roller bearing and washer using ST and press.

NOTE:
Do not reuse the roller bearing.
ST 498077000 REMOVER

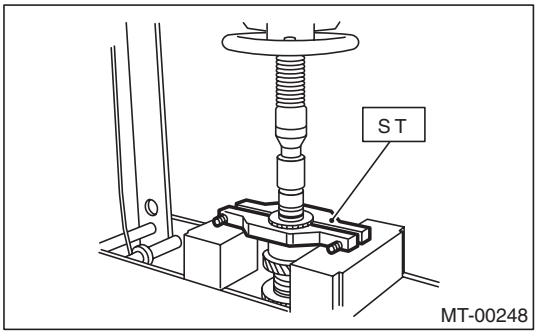


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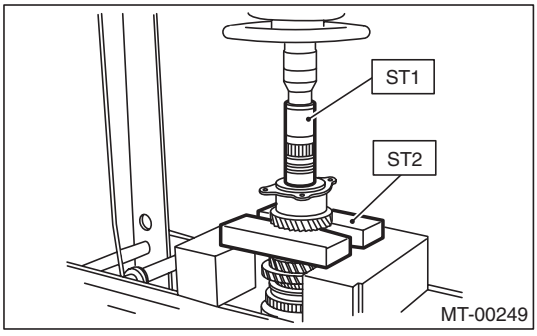
4) Straighten the lock nut at staked portion. Remove the lock nut using ST1 and ST2.
ST1 499987300SOCKET WRENCH (50)
ST2 899884100 HOLDER



5) Remove the 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER

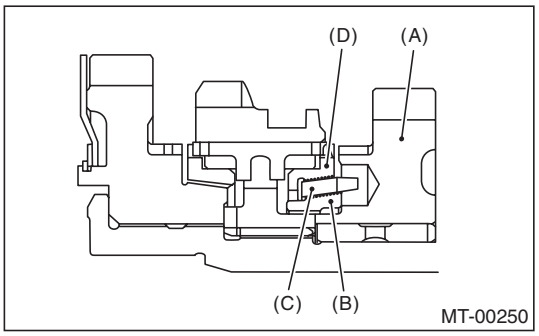


6) Remove the woodruff key.
7) Remove the roller bearing, 3rd-4th driven gear using ST1 and ST2.
ST1 499757002 INSTALLER
ST2 899714110 REMOVER



8) Remove the key.

9) Remove the 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring. (Except 1.6 L model)

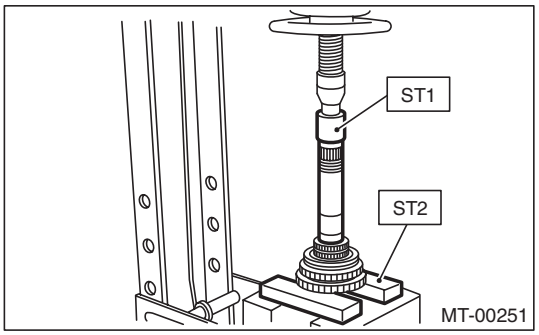


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

10) Remove the 2nd driven gear assembly. (1.6 L model)
11) Remove the 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.

NOTE:
Replace the gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they should be disassembled, mark engagement point beforehand.

ST1 499757002 INSTALLER
ST2 899714110 REMOVER



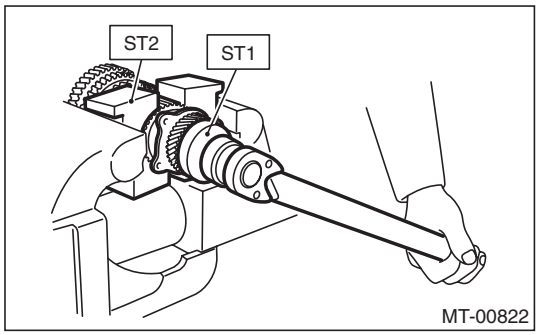
12) Remove the sub gear for 1st driven gear.

2. FWD MODEL

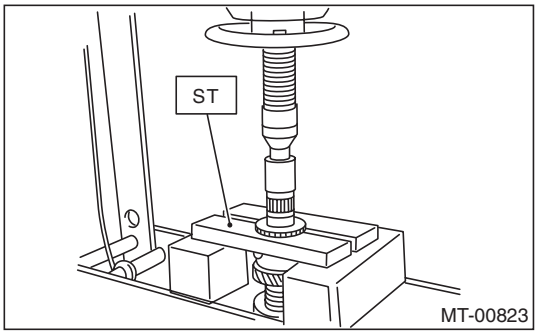
1) Loosen lock nut using ST1 and ST2.
ST1 49987100 or 499987003 or 899984103 SOCKETWRENCH (35)
ST2 899884100 HOLDER

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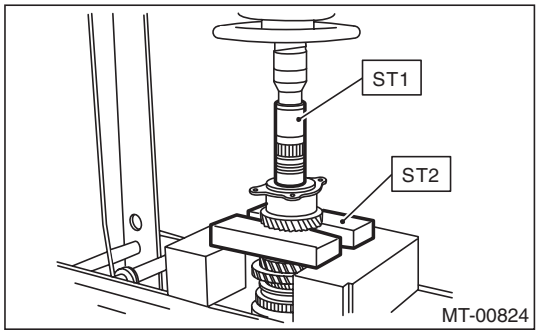
NOTE:
Remove caulking before taking off lock nut.



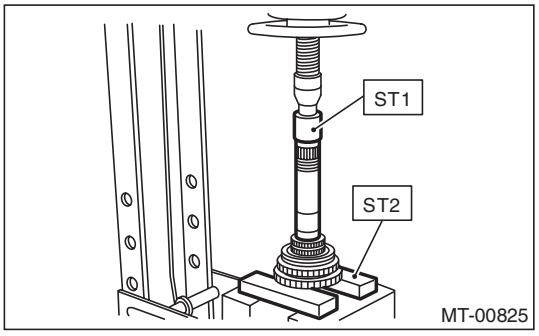
2) Remove 5th driven gear using ST and press.
ST 498077000 5TH DRIVEN GEAR REMOVER



3) Remove woodruff key.
4) Remove roller bearing and 3rd-4th driven gear using ST1 and ST2.
ST1 499757002 SNAP RING GUIDE
ST2 899714110 REMOVER

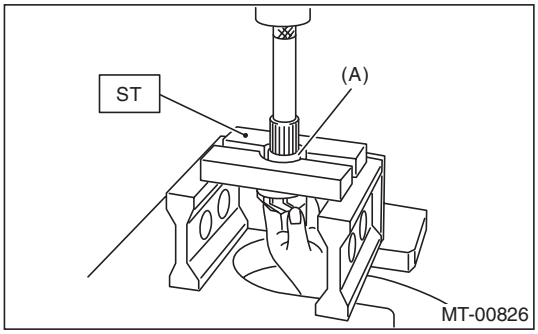


5) Remove 2nd driven gear assembly.
6) Remove 3rd-4th driven gear key.
7) Remove 1st driven gear, 2nd gear bushing and gear & hub assembly using ST1 and ST2.
Replace gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they have to be disassembled, mark the engaging point beforehand.
ST1 499757002 SNAP RING GUIDE
ST2 899714110 REMOVER



8) Remove 1st gear bushing, 1st driven gear thrust plate and roller bearing using ST and press.
ST 498517000 REPLACER

CAUTION:
Replace roller bearing (41 × 71 × 23) with a new one if this disassembly is performed.



(A) 1st gear bushing

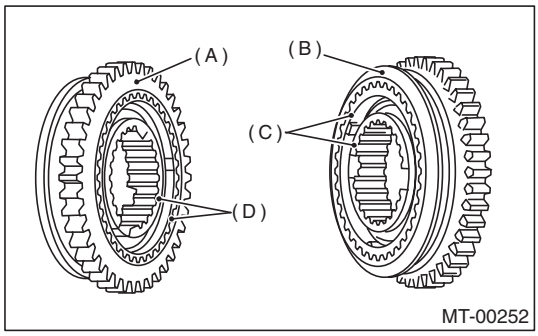
D: ASSEMBLY

1. AWD MODEL

1) Install the sleeve and hub assembly by matching alignment marks.

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NOTE:
Use a 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

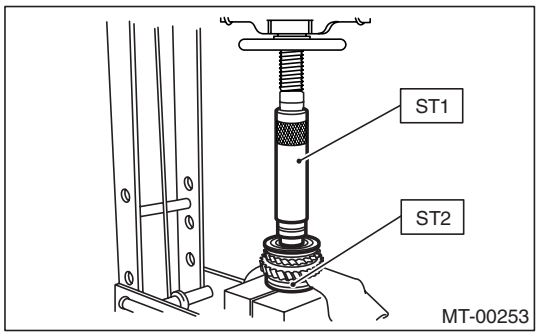
2) Install the washer, snap ring and sub gear to 1st driven gear.
3) Install the 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.

NOTE:
• Take care to install the gear and hub assembly in proper direction.
• Align the baulk ring and gear & hub assembly with key groove.

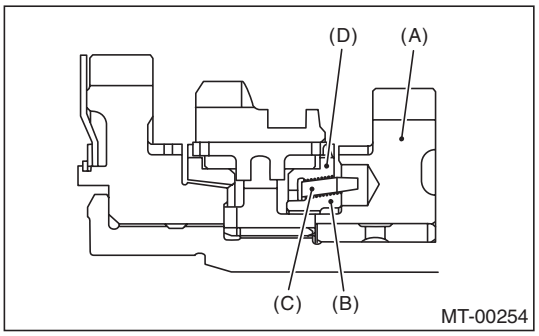
4) Install the 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

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 the oil holes of shaft and bush.

ST1 499277200 INSTALLER
ST2 499587000 INSTALLER



5) Install the 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft. (Except 1.6 L model)

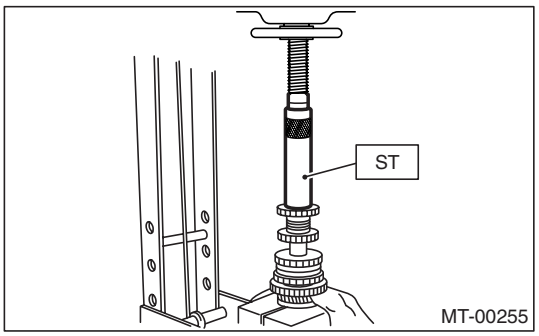


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

6) Install the 2nd driven gear, 1st-2nd bulk ring and insert onto driven shaft. (1.6 L model)
7) After installing the key on driven shaft, install the 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 the groove in baulk ring with insert.

ST 499277200 INSTALLER

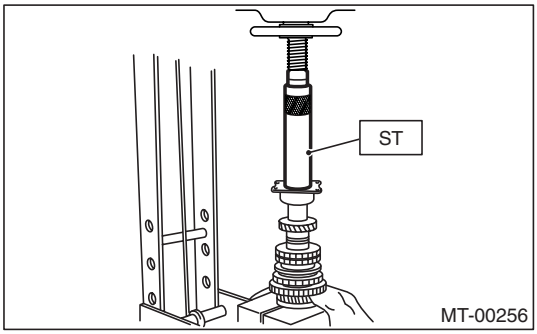


8) Install a set of roller bearings onto the driven shaft using ST and press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

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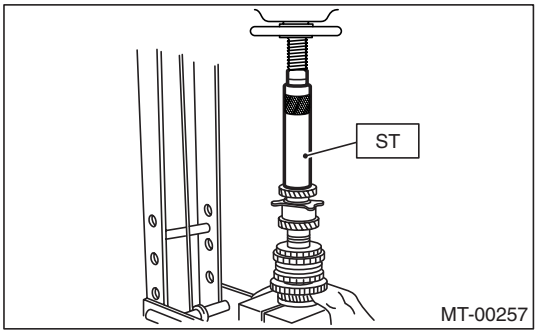
ST 499277200 INSTALLER



9) Position the woodruff key in groove on the rear of driven shaft. Install the 5th driven gear onto 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).

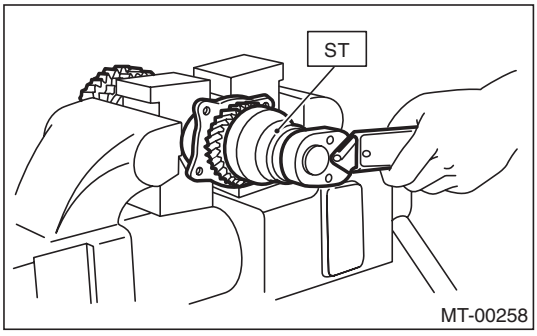
ST 499277200 INSTALLER



10) Install the lock washer. Install the lock nut and tighten to the specified torque using ST.

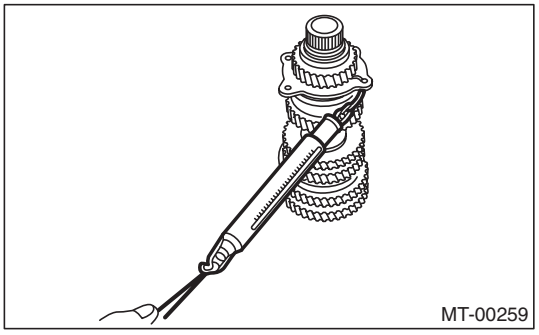
ST 499987300 SOCKET WRENCH (50)

Tightening torque:
260 N·m (26.5 kgf-m, 191.7 ft-lb)



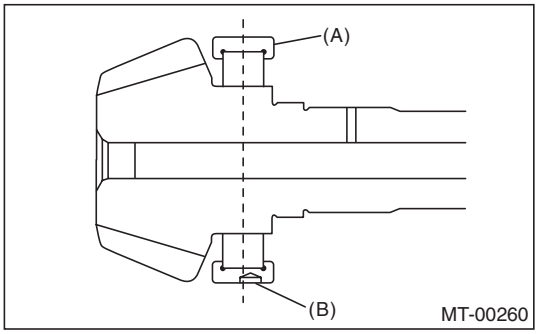
NOTE:
- Stake the lock nut at two points.

- Using the 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 0.33 ft).



11) Install the roller bearing onto drive pinion.

NOTE:
When installing the roller bearing, note its directions (front and rear) because the knock pin hole in outer race is offset.

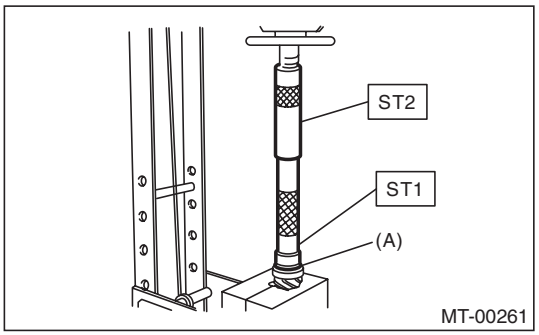


(A) Roller bearing
(B) Knock pin hole

12) Install the washer using ST1, ST2 and press.

NOTE:
- Discard the old lock nuts, replace with new ones.
- Secure the lock nut in four places.

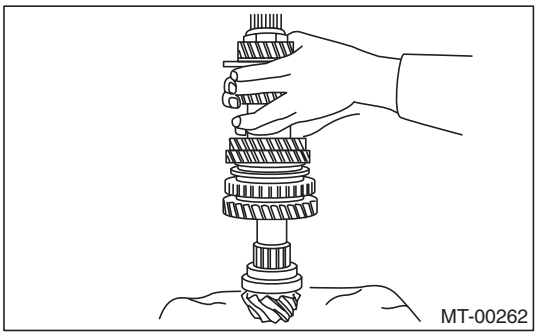
ST1 499277100 BUSH 1-2 INSTALLER
ST2 499277200 INSTALLER



(A) Washer

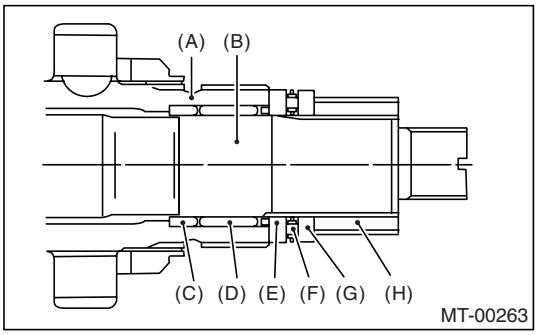
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13) Install the thrust bearing and needle bearing. Install the driven shaft assembly.



14) Install the 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 the spacer must be installed in proper direction.

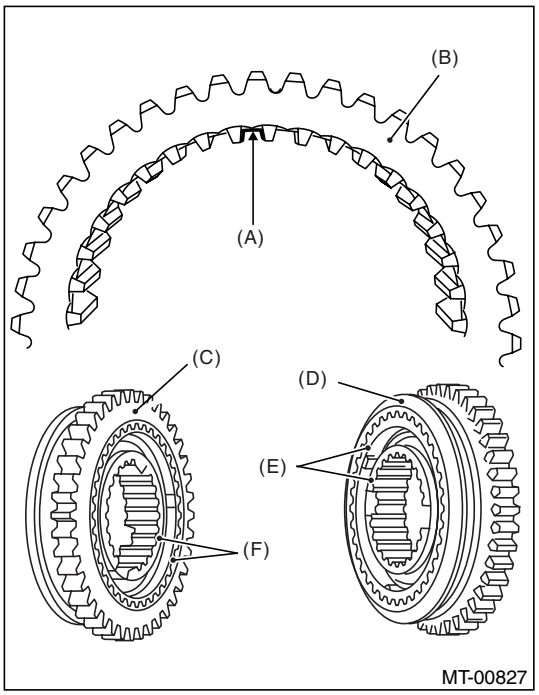


(A) Driven shaft
(B) Drive shaft
(C) Drive pinion collar
(D) Needle bearing (25 × 30 × 20)
(E) Washer No. 2 (25 × 36 × 4)
(F) Thrust bearing (25 × 37.5 × 3)
(G) Washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

2. FWD MODEL

1) Assemble gear and hub assembly.

NOTE:
• Use new gear and hub assembly, if gear or hub have been replaced.
• Be sure the insert keys are correctly located in the insert key grooves inside the reverse driven gear.

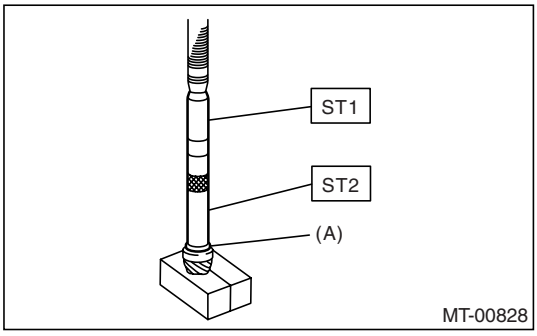


(A) Key grooves
(B) Reverse driven gear
(C) 1st driven gear side
(D) 2nd driven gear side
(E) Flush surface
(F) Stepped surface

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2) Drive roller bearing onto drive pinion shaft and 1st driven gear thrust washer using ST1 and ST2.
ST1 499277000RACE 4-5 INSTALLER
ST2 499277100BUSH 1-2 INSTALLER

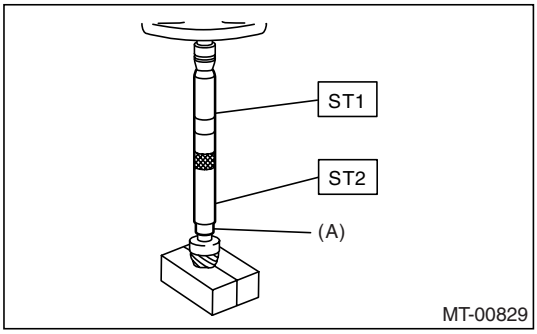
CAUTION:
Use new roller bearing, 1st gear thrust washer.



(A) Thrust washer

3) Install 1st-2nd driven gear bushing onto drive pinion shaft.

NOTE:
Bushing may be installed with either side up.
ST1 499877000 RACE 4-5 INSTALLER
ST2 499277100 BUSH 1-2 INSTALLER



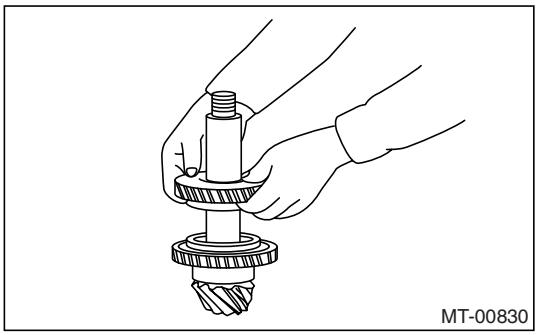
(A) 1st-2nd driven gear bush

4) Measure outside diameter of 1st driven gear bushing to determine suitable 1st driven gear.

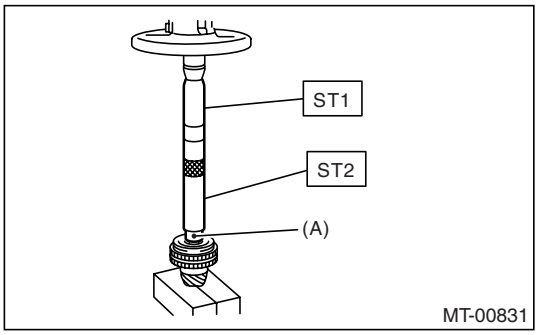
1st driven gear	
Part number	Outer diameter of bushing mm (in)
32231AA840	42.019 — 42.033 (1.6543 — 1.6548)
32231AA850	42.005 — 42.018 (1.6537 — 1.6543)
32231AA860	41.990 — 42.004 (1.6531 — 1.6537)

5) Install 1st driven gear, 1st-2nd balk ring and gear and hub assembly (already assembled in previous step) to drive pinion shaft by hand.

NOTE:
Align ring groove with insert.



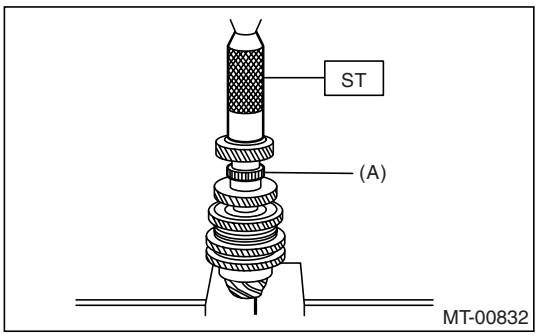
6) Install 1st-2nd driven gear bushing to drive pinion shaft using ST1 and ST2.
ST1 499877000 RACE 4-5 INSTALLER
ST2 499277100 BUSH 1-2 INSTALLER



(A) 1st-2nd driven gear bushing

7) Install 2nd driven gear and 1st-2nd balk ring to drive pinion shaft by hand.
8) Install key into the groove on drive pinion shaft and install 3rd-4th driven gear.

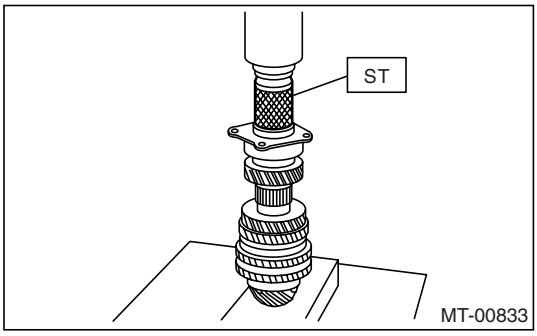
NOTE:
Ball bearing may be installed without using the tool. There should be no problem.
ST 499877000 RACE 4-5 INSTALLER



(A) 3rd-4th driven gear

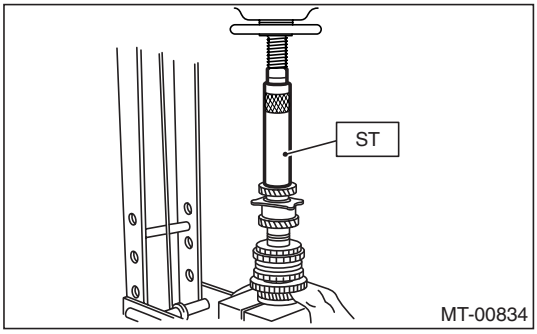
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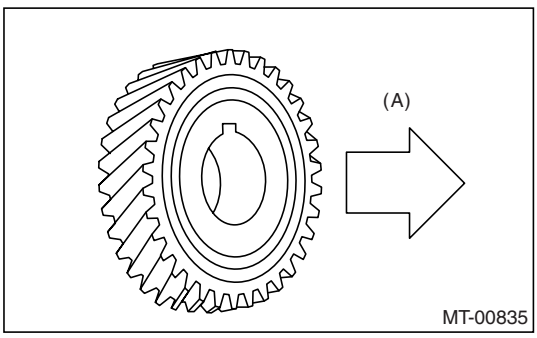
9) Install ball bearing (29 × 74 × 38) on drive pinion shaft with ST.
ST 499277100 BUSH 1-2 INSTALLER



10) Position woodruff key in groove on the rear of drive pinion shaft. Install 5th driven gear onto drive shaft using ST and press.
ST 499277100 INSTALLER

CAUTION:
- **Face 5th driven gear in the correct direction.**
- **Be careful not to dislocate woodruff key while installing 5th driven gear.**



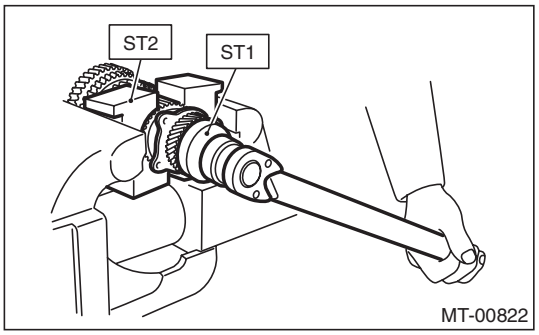


(A) Rear

11) Install lock washer and tighten lock nut to the specified torque using ST1 and ST2.
ST1 49987100 or 499987003 or 899984103 SOCKETWRENCH (35)
ST2 899884100HOLDER

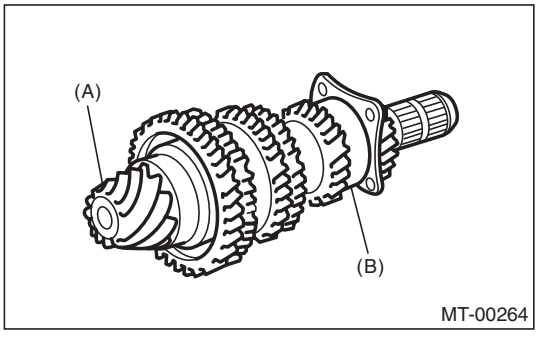
CAUTION:
- **Discard old lock nuts, replace with new ones.**
- **Secure lock nut in four places.**

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)



E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace the 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.



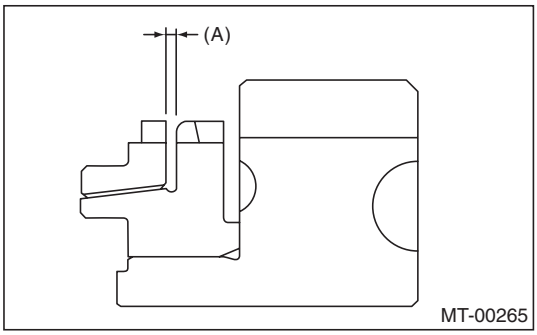
(A) Drive pinion shaft
(B) Ball bearing

- Bearings having other defects

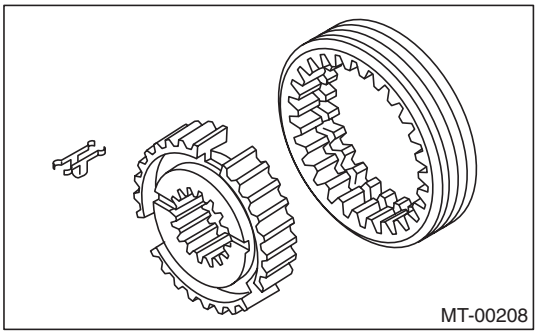
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2) Bushing (each gear)
Replace the bushing in the following cases:
• When the sliding surface is damaged or abnormally worn.
• When the inner wall is abnormally worn.
3) Gears
• Replace the gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
• Correct or replace if the cone that contacts the baulk ring is rough or damaged.
• Correct or replace if the inner surface or end face is damaged.
4) Baulk ring
Replace the ring in the following cases:
• When the inner surface and end face are damaged.
• When the ring inner surface is abnormally or partially worn down.
• If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

Clearance (A):
0.5 — 1.0 mm (0.020 — 0.040 in)



• When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
5) Shifting insert key
Replace the insert if deformed, excessively worn, or defective in any way.



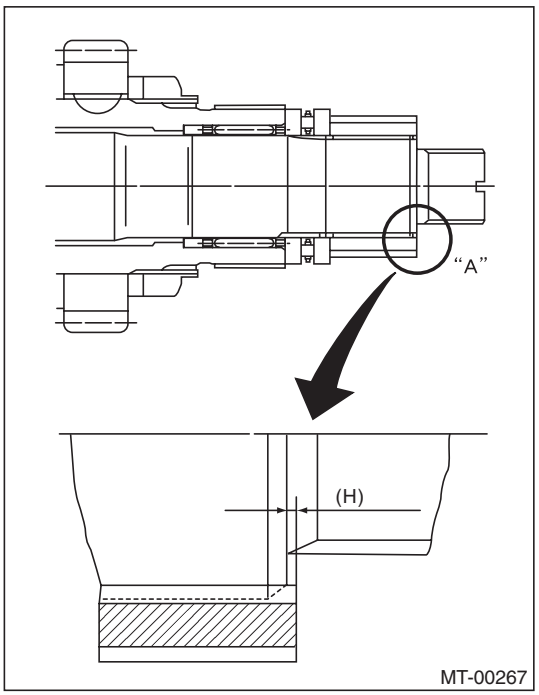
6) Oil seal
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

F: ADJUSTMENT

1. THRUST BEARING PRELOAD

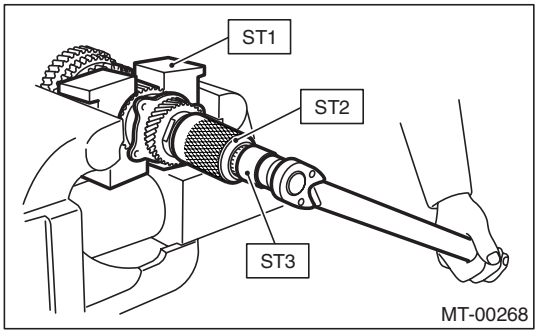
1) After completing the preceding steps 1) through 3), select the adjusting washer No. 1 so that dimension (H) is zero through visual check. Position the washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install the lock nut (18 × 13.5).



2) Using the ST1, ST2 and ST3, tighten the lock nut to specified torque.

ST1	899884100	HOLDER
ST2	498427100	STOPPER
ST3	899988608	SOCKET WRENCH (27)

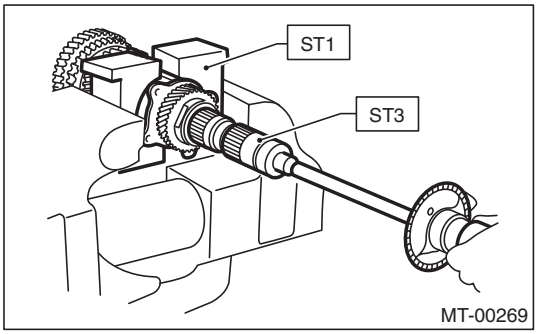
Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)



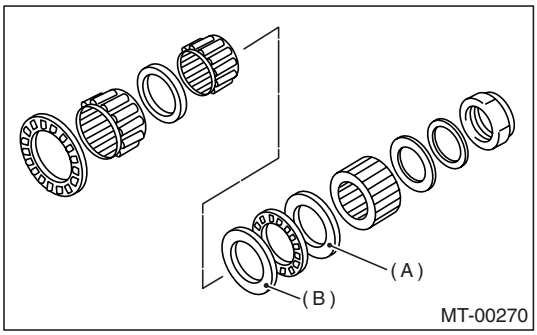
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3) After removing the ST2, measure the starting torque using torque driver.
ST1 899884100HOLDER
ST3 899988608 SOCKET WRENCH (27)

Starting torque:
0.3 — 0.8 N·m
(0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)



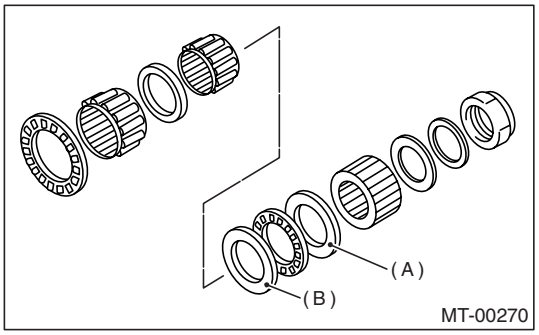
4) If the starting torque is not within specified limit, select a new adjusting washer No. 1 and recheck starting torque.



(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 the 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 the starting torque is within specified range, then clinch the lock nut at four positions.

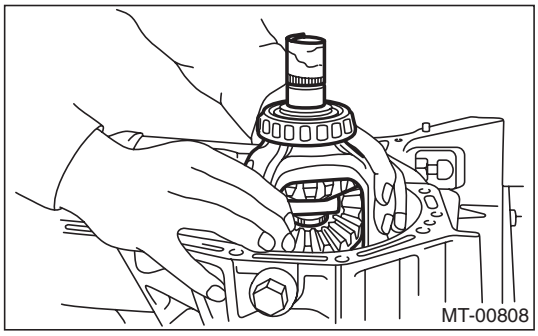
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20.Front Differential Assembly

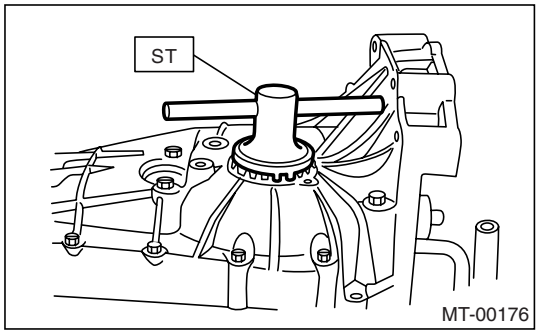
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. <Ref. to 5MT-93, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly.
Single-range model
<Ref. to 5MT-73, REMOVAL, Main Shaft Assembly for Single-Range.>
Dual-range model
<Ref. to 5MT-83, REMOVAL, Main Shaft Assembly for Dual-Range.>
6) Remove the differential assembly.

NOTE:
• Be careful not to confuse the right and left roller bearing outer races.
• Be careful not to damage the retainer oil seal.



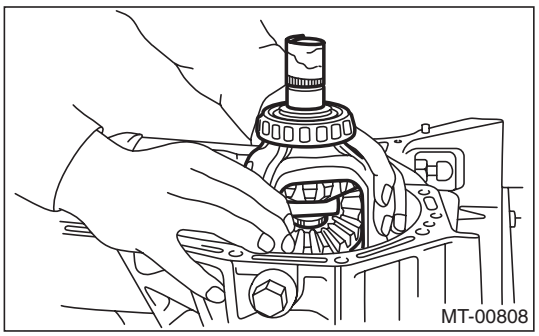
7) Remove the differential side retainers using ST.
ST 499787000 WRENCH ASSY



B: INSTALLATION

1) Install the differential side retainers using ST.
ST 499787000 WRENCH ASSY
2) Install the bearing outer race to transmission case.
3) Install the differential assembly.

NOTE:
• Be careful not to fold the sealing lip of oil seal.
• Wrap the right and left spline sections of axle shaft with vinyl tape to prevent scratches.



4) Install the main shaft assembly.
Single-range model
<Ref. to 5MT-73, INSTALLATION, Main Shaft Assembly for Single-Range.>
Dual-range model
<Ref. to 5MT-83, INSTALLATION, Main Shaft Assembly for Dual-Range.>
5) Install the drive pinion assembly. <Ref. to 5MT-93, INSTALLATION, Drive Pinion Shaft Assembly.>
6) Install the transmission case. <Ref. to 5MT-69, INSTALLATION, Transmission Case.>
7) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
8) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

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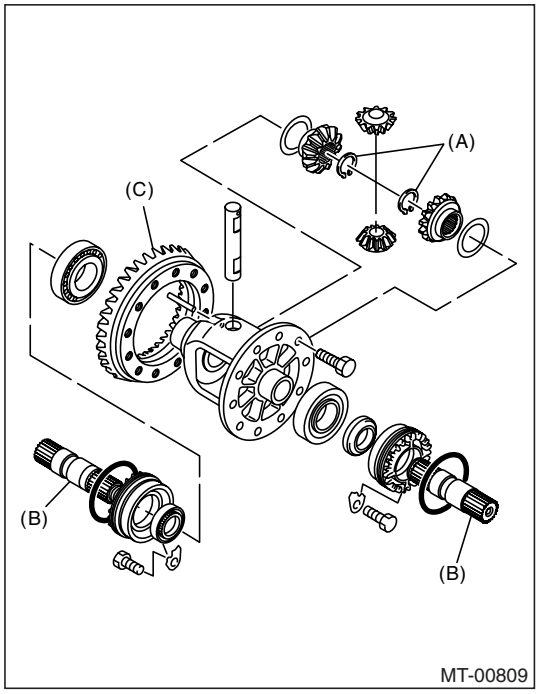
C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Remove the right and left snap rings from differential, and then remove the two axle drive shafts.

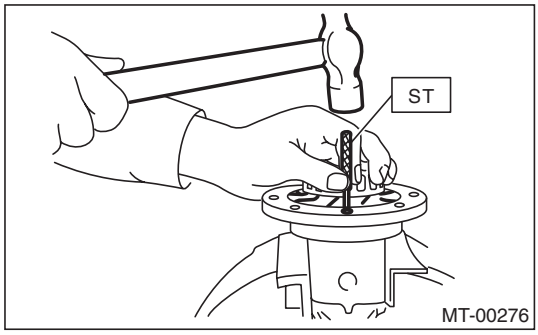
NOTE:
During reassembly, reinstall each axle drive shaft in the same place from which it was removed.

2) Loosen the twelve bolts and remove the hypoid driven gear.

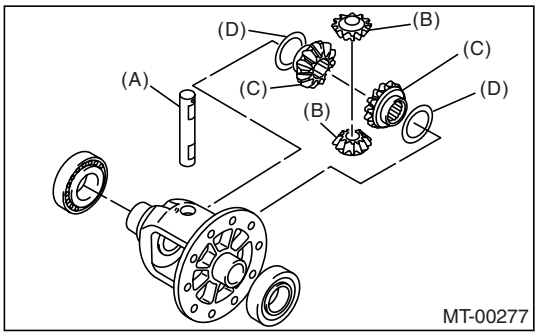


(A) Snap ring
(B) Axle drive shaft
(C) Hypoid driven gear

3) Drive out the straight pin from differential assembly toward hypoid driven gear.
ST 899904100 REMOVER

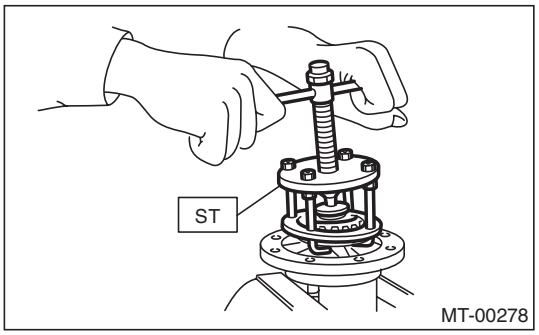


4) Pull out the pinion shaft, and remove the differential bevel pinion and gear and washer.



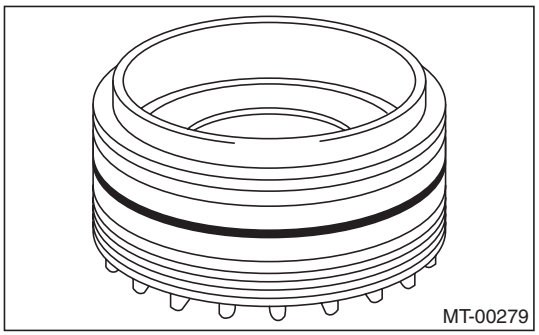
(A) Pinion shaft
(B) Bevel pinion
(C) Bevel gear
(D) Washer

5) Remove the roller bearing using ST.
ST 399527700 PULLER SET



2. SIDE RETAINER

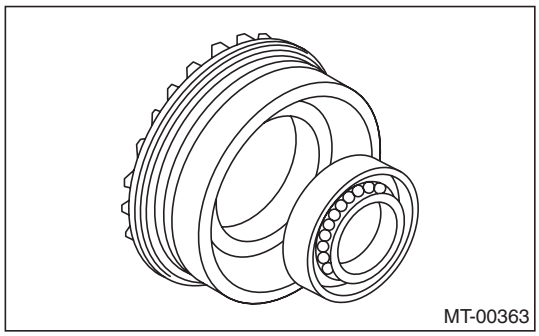
1) Remove the O-ring.



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2) Remove the oil seal.

NOTE:
Do not reuse the oil seal. Prepare a new oil seal.

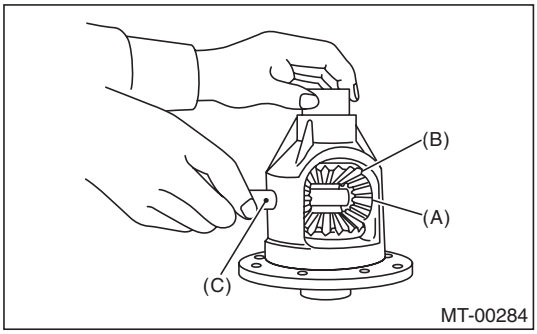


D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install the bevel gear and bevel pinion together with washers, and insert pinion shaft.

NOTE:
Face the chamfered side of washer toward gear.



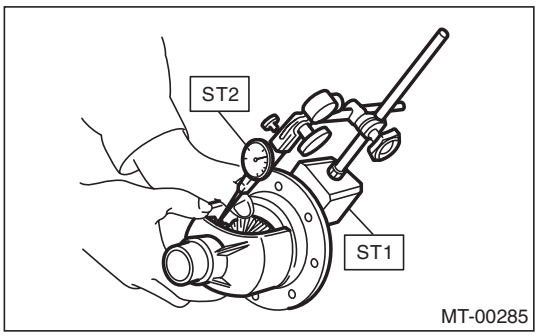
(A) Bevel pinion
(B) Bevel gear
(C) Pinion shaft

2) Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. <Ref. to 5MT-108, ADJUSTMENT, Front Differential Assembly.>

NOTE:
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

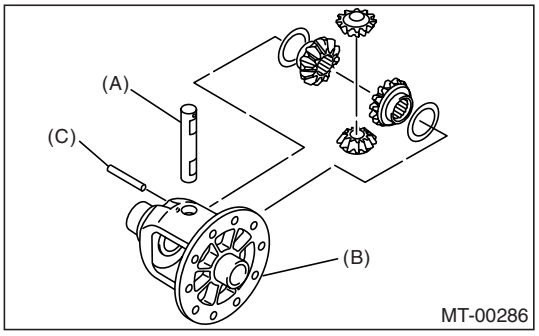
Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



3) Align the pinion shaft and differential case at their holes, and drive the straight pin into holes from the hypoid driven gear side, using ST.

NOTE:
Lock the straight pin after installing.

ST 899904100 REMOVER

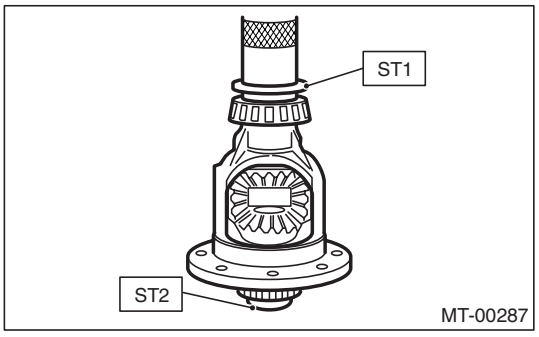


(A) Pinion shaft
(B) Differential case
(C) Straight pin

4) Install the 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 the roller bearing outer races are used as a set.

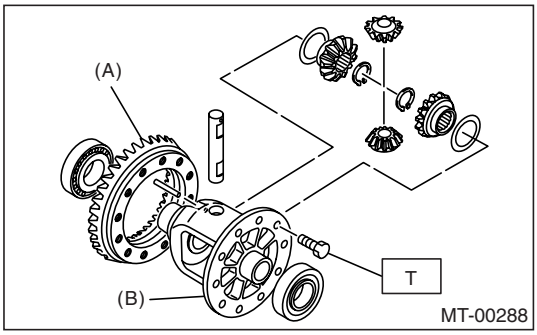
ST1 499277100 BUSH 1-2 INSTALLER
ST2 398497701 ADAPTER



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5) Install the hypoid driven gear to differential case using twelve bolts.

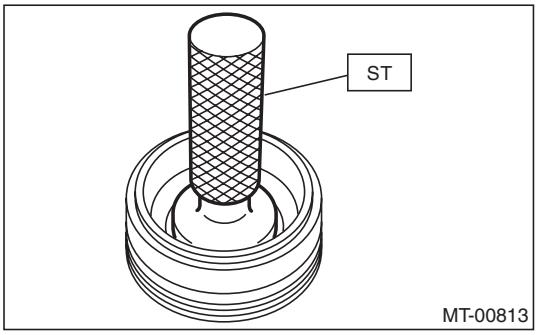
Tightening torque:
T: 62 N·m (6.3 kgf-m, 45.6 ft-lb)



(A) Hypoid driven gear
(B) Differential case

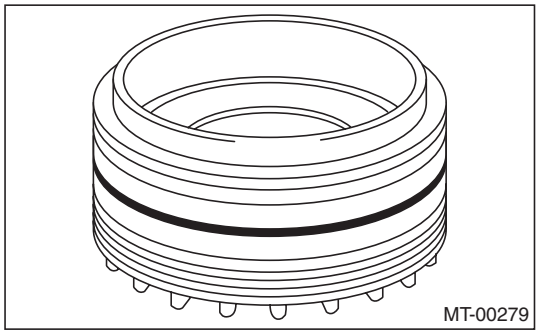
2. SIDE RETAINER

1) Install a new oil seal.
ST 49979700 INSTALLER



2) Install a new O-ring.

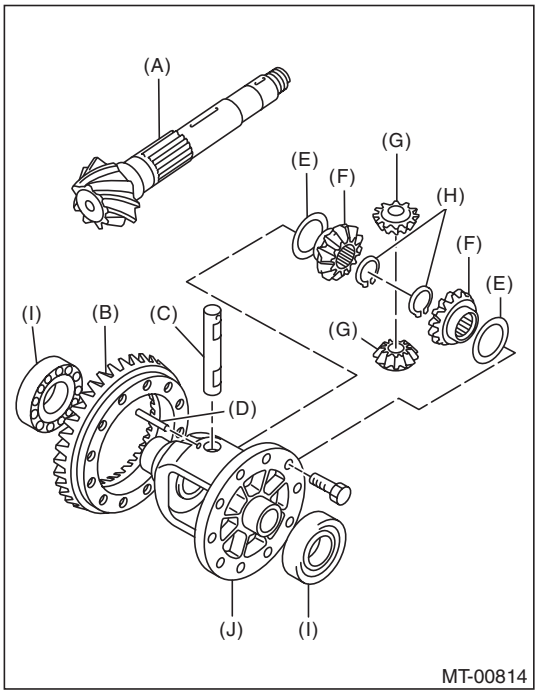
NOTE:
Do not stretch or damage the O-ring.



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

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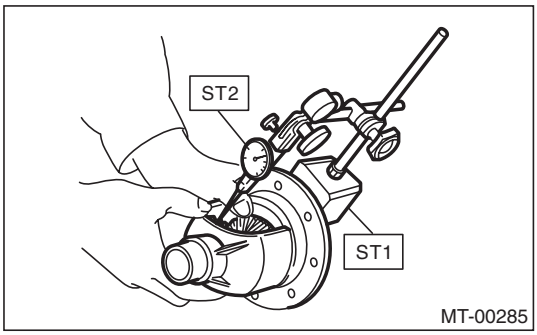
1. BEVEL PINION GEAR BACKLASH

Measure the 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)

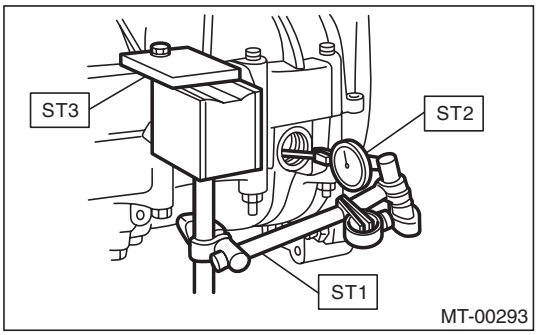


2. HYPOID GEAR BACKLASH

Set the 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)

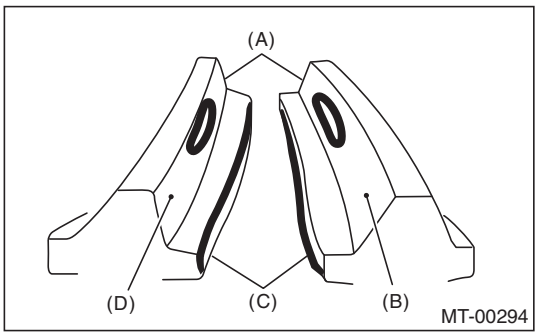


NOTE:
If the backlash is outside specified range, adjust it by turning the holder in right side case.

3. TOOTH CONTACT OF HYPOID GEAR

Check the 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 5MT-108, ADJUSTMENT, Front Differential Assembly.>

- 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 5MT-104, REMOVAL, Front Differential Assembly.>
2) Select a differential 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)

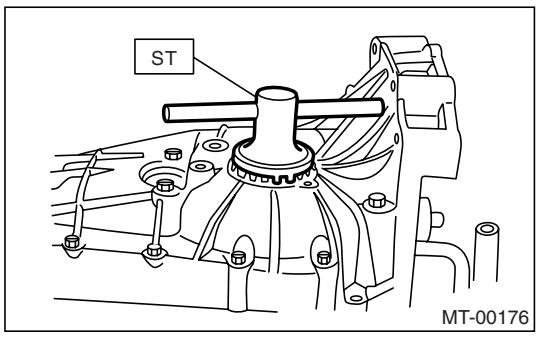
3) Adjust until the specified value is obtained.

Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

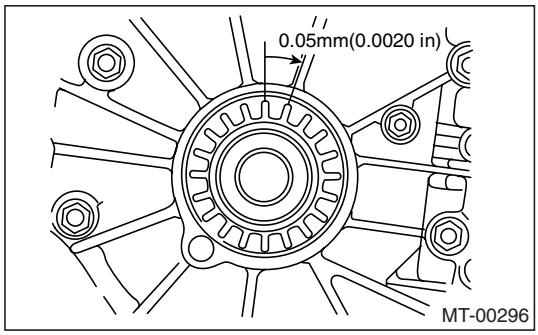
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2. HYPOID GEAR BACKLASH

Adjust backlash by turning the holder in right side case.
ST 499787000 WRENCH ASSY

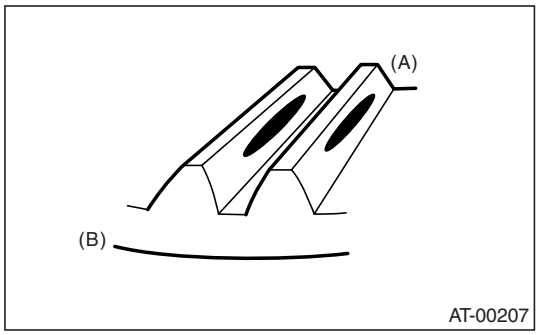


NOTE:
Each time holder rotates one tooth, backlash changes by 0.05 mm (0.020 in).



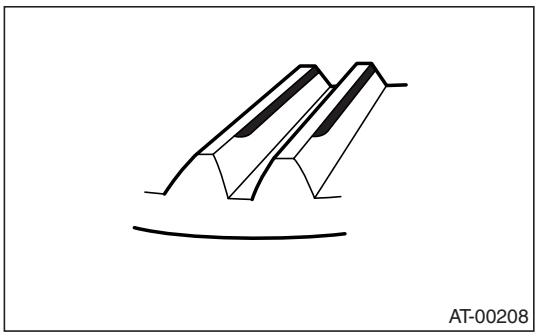
3. TOOTH CONTACT OF HYPOID GEAR

1) Adjust until the tooth contact is correct.
2) Check and adjust the tooth contact with 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.]

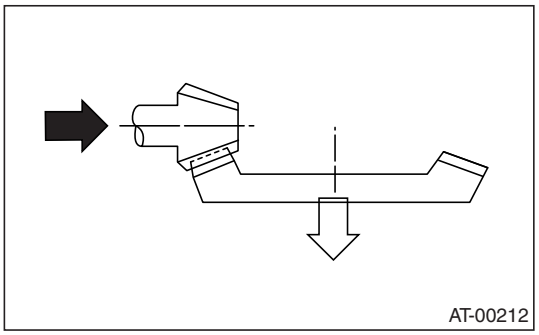


(A) Toe side
(B) Heel side

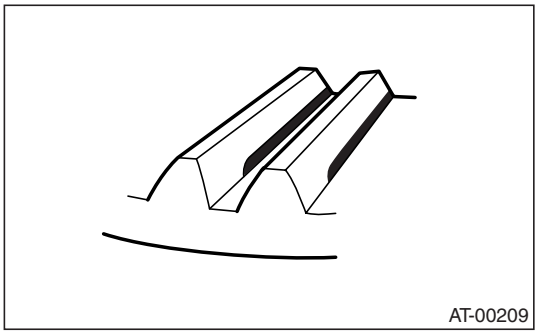
• Face contact
Checking item: Backlash is too large.
Contact pattern



Corrective action: Reduce thickness of drive pinion shim in order to bring drive pinion close to driven gear.

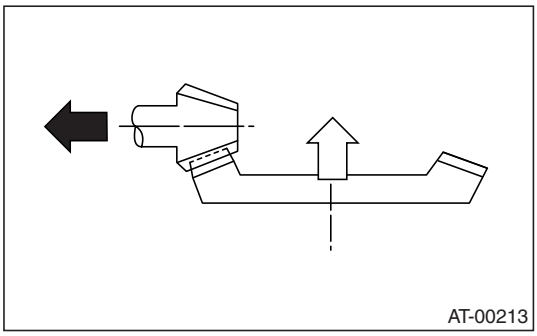


• Flank contact
Checking item: Backlash is too small.
Contact pattern



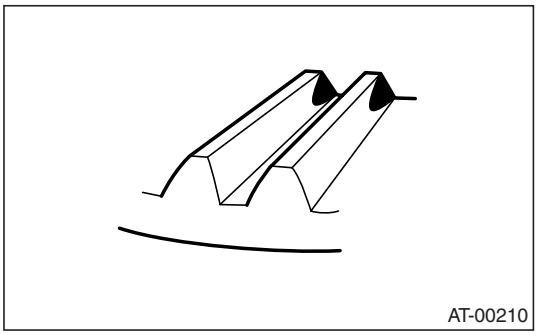
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Corrective action: Increase thickness of drive pinion shim in order to move drive pinion away from driven gear.

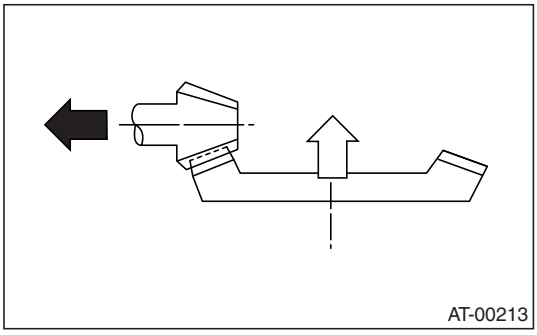


- Toe contact (Inside end contact)

Checking item: Contact areas is small.
Contact pattern

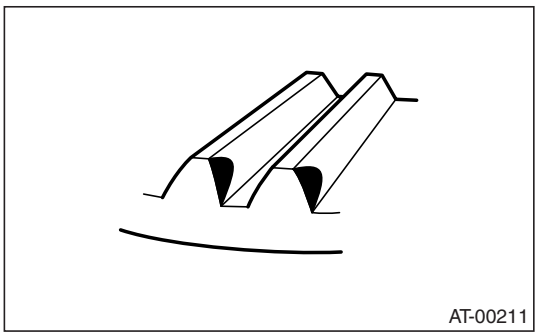


Corrective action: Increase thickness of drive pinion shim in order to bring drive pinion close to driven gear.

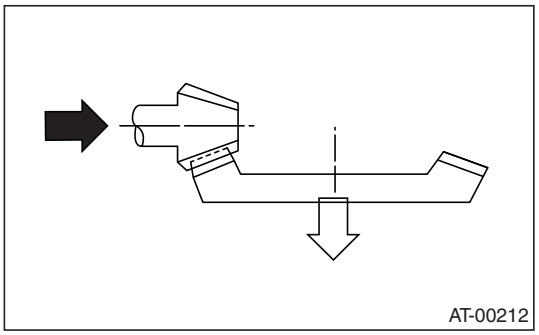


- Heel contact (Outside end contact)

Checking item: Contact areas is small.
Contact pattern



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

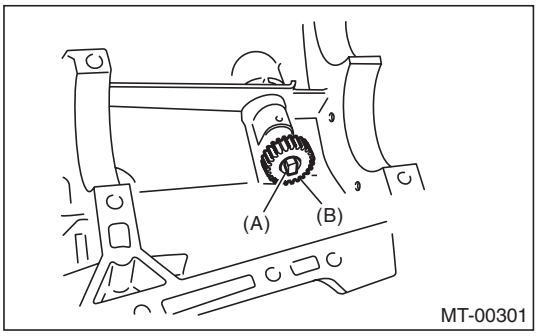


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21.Speedometer Gear

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
5) Remove the vehicle speed sensor. <Ref. to 5MT-51, REMOVAL, Vehicle Speed Sensor.>
6) Remove the outer snap ring and pull out speedometer driven gear. Next, remove the oil seal, speedometer shaft and washer.



(A) Outer snap ring
(B) Speedometer driven gear

B: INSTALLATION

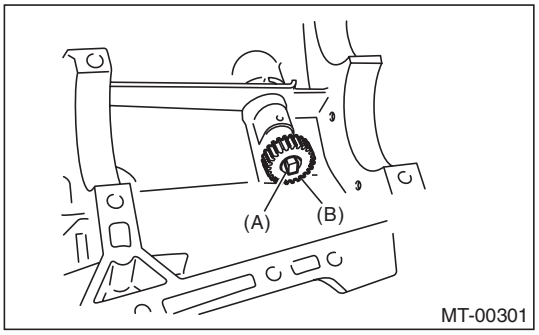
1) Install the washer and speedometer shaft, and press fit the oil seal with ST.

NOTE:
Use a new oil seal, if it has been removed.

ST 899824100 or 499827000PRESS

2) Install the vehicle speed sensor. <Ref. to 5MT-51, INSTALLATION, Vehicle Speed Sensor.>
3) Install the speedometer driven gear and snap ring.

NOTE:
Use a new snap ring, if it has been removed.



(A) Outer snap ring
(B) Speedometer driven gear

4) Install the transmission case. <Ref. to 5MT-69, INSTALLATION, Transmission Case.>
5) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install the back-up light switch and neutral position switch. <Ref. to 5MT-49, INSTALLATION, Switches and Harness.>
7) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

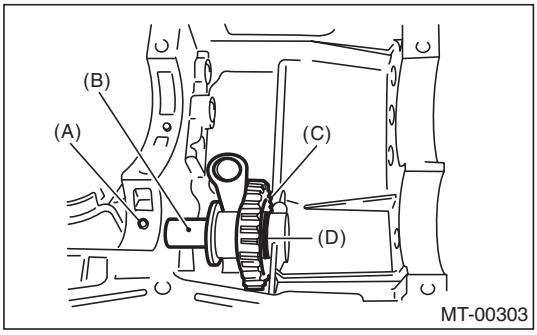
Check the speedometer gear, oil seal and speedometer shaft for damage. Replace if damaged.

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22.Reverse Idler Gear

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transmission case. <Ref. to 5MT-93, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the drive pinion shaft assembly. <Ref. to 5MT-93, REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove the main shaft assembly.
Single-range model
<Ref. to 5MT-73, REMOVAL, Main Shaft Assembly for Single-Range.>
Dual-range model
<Ref. to 5MT-83, REMOVAL, Main Shaft Assembly for Dual-Range.>
7) Remove the differential assembly. <Ref. to 5MT-104, REMOVAL, Front Differential Assembly.>
8) Remove the shifter forks and rods. <Ref. to 5MT-114, REMOVAL, Shifter Fork and Rod.>
9) Pull out the straight pin, and remove the idler gear shaft, reverse idler gear and washer.



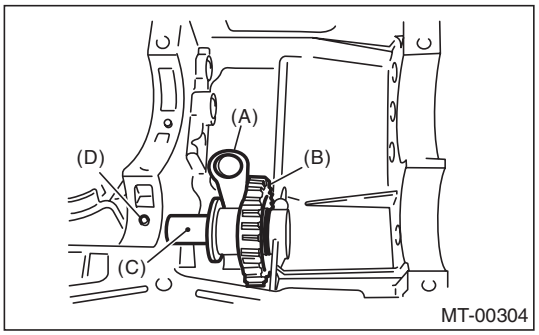
(A) Straight pin
(B) Idler gear shaft
(C) Idler gear
(D) Washer

10) Remove the reverse shifter lever.

B: INSTALLATION

1) Install the reverse shifter lever, reverse idler gear and reverse idler gear shaft, and secure with straight pin.

NOTE:
Be sure to install the reverse idler shaft from rear side.



(A) Reverse shifter lever
(B) Reverse idler gear
(C) Reverse idler gear shaft
(D) Straight pin

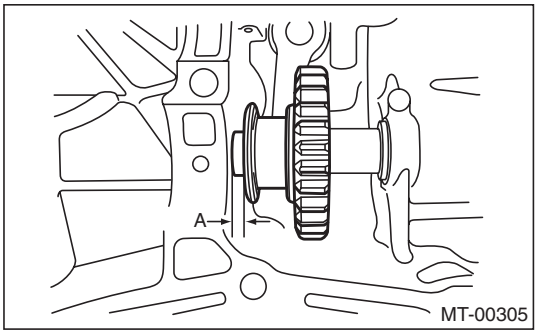
2) Inspect and adjust the clearance between reverse idler gear and transmission case wall. <Ref. to 5MT-112, INSTALLATION, Reverse Idler Gear.> and <Ref. to 5MT-113, ADJUSTMENT, Reverse Idler Gear.>
3) Install the shifter forks and rods. <Ref. to 5MT-115, INSTALLATION, Shifter Fork and Rod.>
4) Install the differential assembly. <Ref. to 5MT-104, INSTALLATION, Front Differential Assembly.>
5) Install the main shaft assembly.
Single-range model
<Ref. to 5MT-73, INSTALLATION, Main Shaft Assembly for Single-Range.>
Dual-range model
<Ref. to 5MT-83, INSTALLATION, Main Shaft Assembly for Dual-Range.>
6) Install the drive pinion shaft assembly. <Ref. to 5MT-93, INSTALLATION, Drive Pinion Shaft Assembly.>
7) Install the transmission case. <Ref. to 5MT-69, INSTALLATION, Transmission Case.>
8) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
9) Install the back-up light switch and neutral position switch. <Ref. to 5MT-49, INSTALLATION, Switches and Harness.>
10) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

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C: INSPECTION

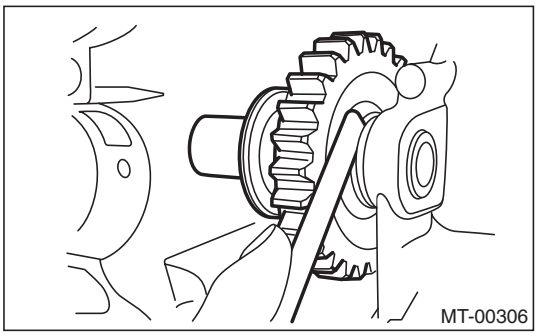
1) Move the reverse shifter rod toward the reverse side. Inspect the clearance between reverse idler gear and transmission case wall.
If out of specification, select the appropriate reverse shifter lever and adjust.

Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



2) After installing a suitable reverse shifter lever, shift into neutral. Inspect the 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)

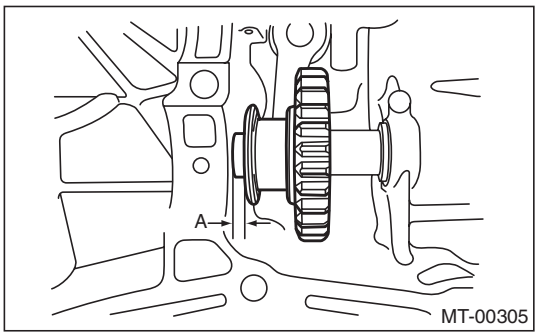


3) Check the reverse idler gear and shaft for damage. Replace if damaged.

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.

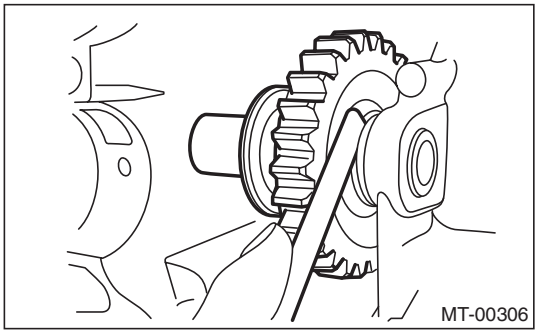
Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



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)



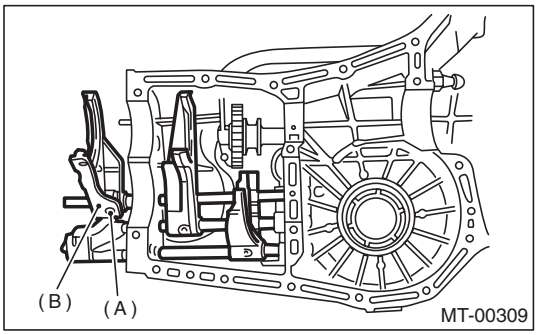
Washer	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

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23.Shifter Fork and Rod

A: REMOVAL

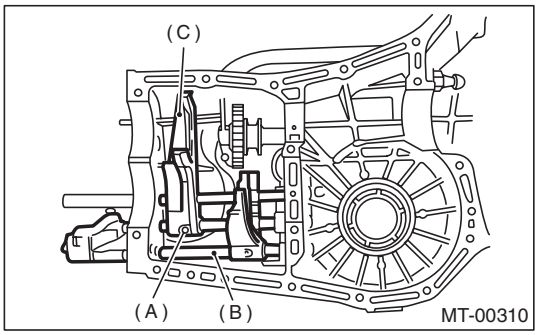
1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-48, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
5) Remove the drive pinion shaft assembly. <Ref. to 5MT-93, REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove the main shaft assembly.
Single-range model
<Ref. to 5MT-73, REMOVAL, Main Shaft Assembly for Single-Range.>
Dual-range model
<Ref. to 5MT-83, REMOVAL, Main Shaft Assembly for Dual-Range.>
7) Remove the differential assembly. <Ref. to 5MT-104, REMOVAL, Front Differential Assembly.>
8) Drive out the straight pin with ST, and 5th shifter fork.
ST 398791700 STRAIGHT PIN REMOVER



(A) Straight pin
(B) 5th shifter fork

9) Remove the plugs, springs and checking balls.
10) Drive out the straight pin, and pull out 3-4 fork rod and shifter fork.

NOTE:
When removing the rod, keep other rods in neutral. Also, when pulling out the straight pin, remove it toward the inside of case so that it does not hit against the case.



(A) Straight pin
(B) 3-4 fork rod
(C) Shifter fork

11) Drive out the straight pin, and pull out 1-2 fork rod and shifter fork.
12) Remove the outer snap ring, and pull out the reverse shifter rod arm from reverse fork rod. Then take out the ball, spring and interlock plunger from rod.
And then remove the rod.

NOTE:
When pulling out the reverse shifter rod arm, be careful not to let the ball pop out of arm.

13) Remove the reverse shifter lever.

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B: INSTALLATION

1) Install the reverse arm fork spring, ball and interlock plunger to reverse fork rod arm. Insert the 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 the ball, spring and new gasket in reverse shifter rod hole, on left side transmission case, and tighten the checking ball plug.

3) Install the 1-2 fork rod into 1-2 shifter fork via the hole on the rear of 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 the interlock plunger is on the 3-4 fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

5) Install the interlock plunger onto 3-4 fork rod.

NOTE:
Apply a coat of grease to plunger to prevent it from falling.

6) Install the 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.

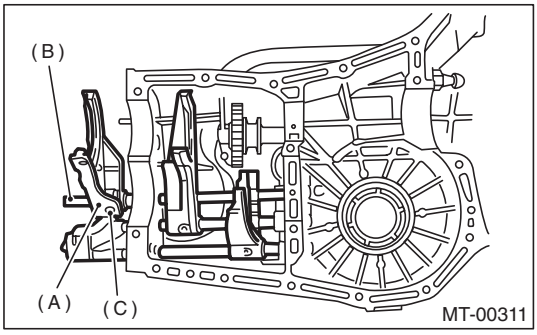
7) Align the holes in rod and fork, and new drive straight pin into these holes.

NOTE:
- Set the reverse fork rod to neutral.
- Make sure the interlock plunger (installing before) is on the reverse fork rod side.

ST 398791700 STRAIGHT PIN REMOVER

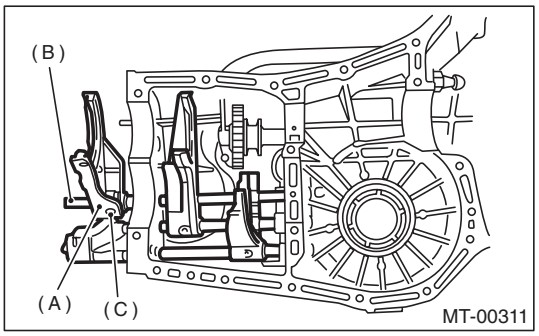
8) Install the 5th shifter fork onto the rear of reverse fork rod. Align holes in the two parts and new drive straight pin into place.

ST 398791700 STRAIGHT PIN REMOVER



(A) 5th shifter fork
(B) Reverse fork rod
(C) Straight pin

9) Position the balls, checking ball springs and new gaskets into 3-4 and 1-2 rod holes, and install plugs.



(A) 5th shifter fork
(B) Reverse fork rod
(C) Straight pin

10) Install the differential assembly. <Ref. to 5MT-104, INSTALLATION, Front Differential Assembly.>

11) Install the main shaft assembly.
Single-range model
<Ref. to 5MT-73, INSTALLATION, Main Shaft Assembly for Single-Range.>
Dual-range model
<Ref. to 5MT-83, INSTALLATION, Main Shaft Assembly for Dual-Range.>

12) Install the drive pinion shaft assembly. <Ref. to 5MT-93, INSTALLATION, Drive Pinion Shaft Assembly.>

13) Install the transmission case. <Ref. to 5MT-69, INSTALLATION, Transmission Case.>

14) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>

15) Install the back-up light switch and neutral position switch. <Ref. to 5MT-49, INSTALLATION, Switches and Harness.>

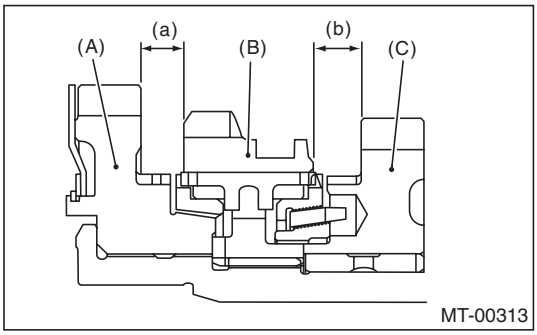
16) Install the manual transmission assembly to vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

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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 the clearance between 1st, 2nd driven gear and reverse driven gear. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a) and (b):
9.5 mm (0.374 in)

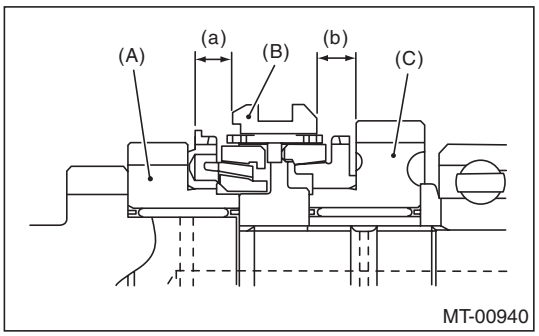


(A) 1st driven gear
(B) Reverse driven gear
(C) 2nd driven gear

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 the clearance between 3rd, 4th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a) and (b):
7.3 mm (0.287 in)

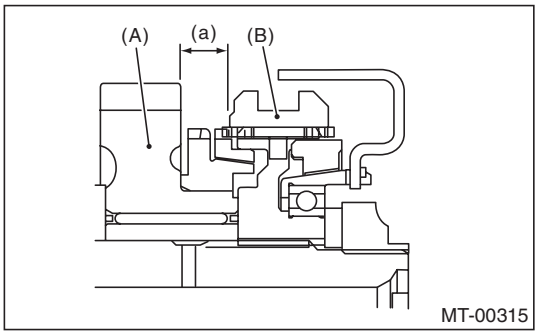


(A) 3rd drive gear
(B) Coupling sleeve
(C) 4th drive gear

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 the clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a):
9.3 mm (0.366 in)



(A) 5th drive gear
(B) Coupling sleeve

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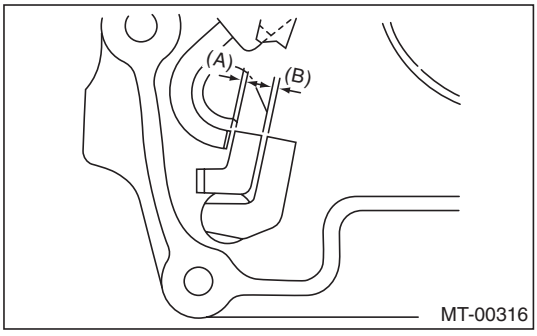
5th shifter fork (Non-turbo)		
Part No.	Mark	Remarks
32812AA201	4	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	5	Standard
32812AA221	6	Become distant from 5th gear by 0.2 mm (0.008 in).

5th shifter fork (Turbo)		
Part No.	Mark	Remarks
32812AA231	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA241	—	Standard
32812AA251	9	Become distant from 5th gear by 0.2 mm (0.008 in).

6) Inspect the rod end clearances (A) and (B). If any clearance is not within specifications, replace the rod or fork as required.

Clearance (A):
1st-2nd to 3rd-4th:
0.4 — 1.4 mm (0.016 — 0.055 in)

Clearance (B):
3rd-4th to 5th:
0.5 — 1.3 mm (0.020 — 0.051 in)

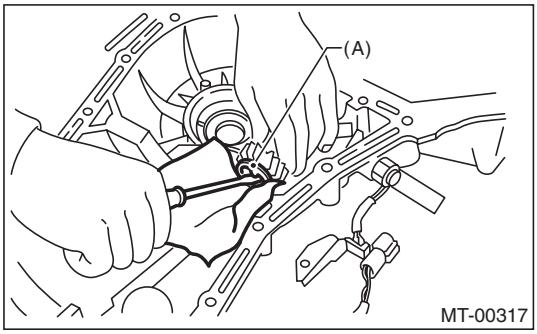


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24.Counter Gear

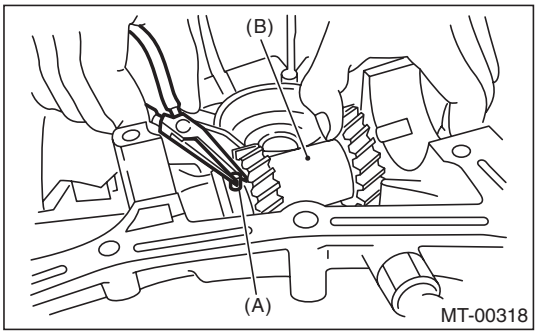
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-53, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-66, REMOVAL, Transmission Case.>
4) Move the counter gear shaft until it touches transmission case, and remove the snap ring with a suitable tool.



(A) Snap ring

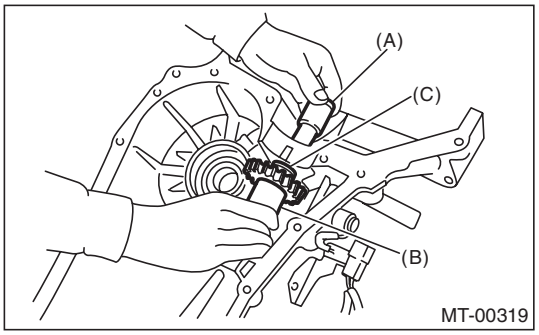
5) Slide the washer at rear of high-low counter shaft, and remove the straight pin from counter shaft.



(A) Straight pin
(B) Counter gear

6) Remove the counter shaft from transmission case, taking care not to drop the counter gear and two washers.

NOTE:
• Be careful not to damage the O-ring.
• Be careful not to drop the straight pin on front side.
• Be careful not to drop the two needle bearings and collar contained in counter gear.



(A) Counter shaft
(B) Counter gear
(C) Washers

B: INSTALLATION

1) Install the O-ring and straight pin onto counter gear shaft.
2) Install the following parts in main case (Right-side), and push the shaft perfectly into case.
• Counter gear shaft
• Two counter gear washers
• Two needle bearings
• Counter gear collar
• Counter gear
• Straight pin
• Snap ring
3) Install the transmission case. <Ref. to 5MT-69, INSTALLATION, Transmission Case.>
4) Install the transfer case with extension case assembly. <Ref. to 5MT-53, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the manual transmission assembly on vehicle. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

NOTE:
• Make sure that the cut-out end surface of counter gear shaft does not protrude above the end surface of the case.
• Position the cut-out portion of counter gear shaft.

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C: INSPECTION

1) After installing the snap ring, measure the clearance between snap ring and counter washer.

Clearance:
0.05 — 0.35 mm (0.0020 — 0.0138 in)

2) If the clearance is out of measured value, select a snap ring and install to put clearance within measured value. <Ref. to 5MT-119, ADJUSTMENT, Counter Gear.>

D: ADJUSTMENT

Selection of snap ring:
If the measurement is not within specification, select suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
031319000	1.50 (0.0591)
805019010	1.72 (0.0677)

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25.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 adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear and driven shaft	Replace.
	(h) Worn 2nd driven gear and bushing	Replace.
	(i) Worn 3rd drive gear and needle bearing	Replace.
	(j) Worn 4th drive gear and needle bearing	Replace.
	(k) Worn reverse idler gear and bushing	Replace.
3. Unusual noise comes from transmission. NOTE: If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

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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 the 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 the 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 the vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises. • Gear noise when driving: If noise increases as vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc. • Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment • Bearing noise when driving or when coasting: Cracked, broken or damaged bearings • Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc.	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust the bearing preload.
	(d) Loose roller bearing	Readjust the 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.

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MANUAL TRANSMISSION AND DIFFERENTIAL

6MT

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1. General Description

A: SPECIFICATION

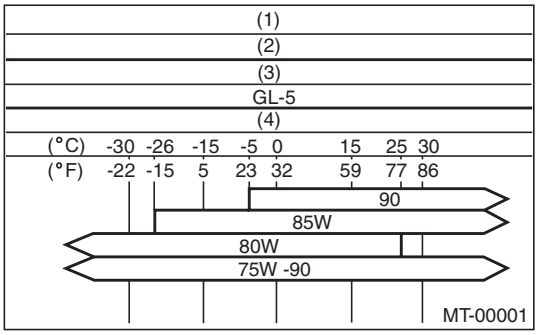
1. MANUAL TRANSMISSION AND FRONT DIFFERENTIAL

Item			STD	OP
Type			6-forward speeds and 1-reverse	
Transmission gear ratio		1st	3.636	
		2nd	2.375	
		3rd	1.761	
		4th	1.346	
		5th	0.971 [1.062]	
		6th	0.756 [0.842]	
		Reverse	3.545	
Front reduction gear	Final	Type of gear	Hypoid	
		Gear ratio	3.900	
Rear reduction gear	Transfer	Type of gear	Helical	
		Gear ratio	1.100 [1.000]	
	Final	Type of gear	Hypoid	
		Gear ratio	3.545 [3.900]	
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)	SURETRAC®
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)	
Transmission gear oil			GL-5	
Transmission gear oil capacity			4.1 ℓ (4.3 US qt, 3.6 Imp qt)	

[ ]: Australia model

2. TRANSMISSION GEAR OIL

Recommended oil

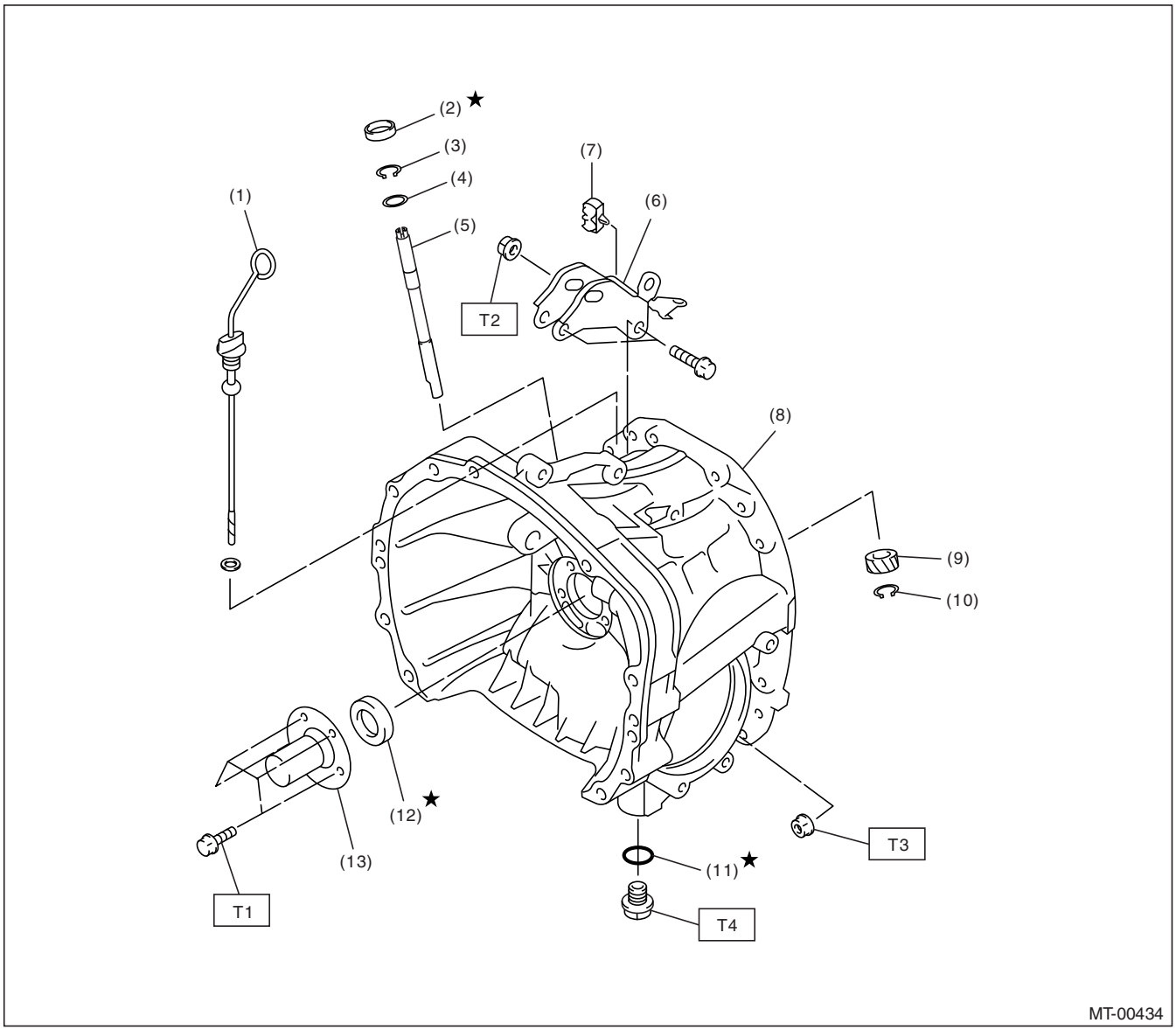


(1) Item
(2) Transmission gear oil
(3) API classification
(4) SAE viscosity No. and applicable temperature

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B: COMPONENT

1. CLUTCH HOUSING

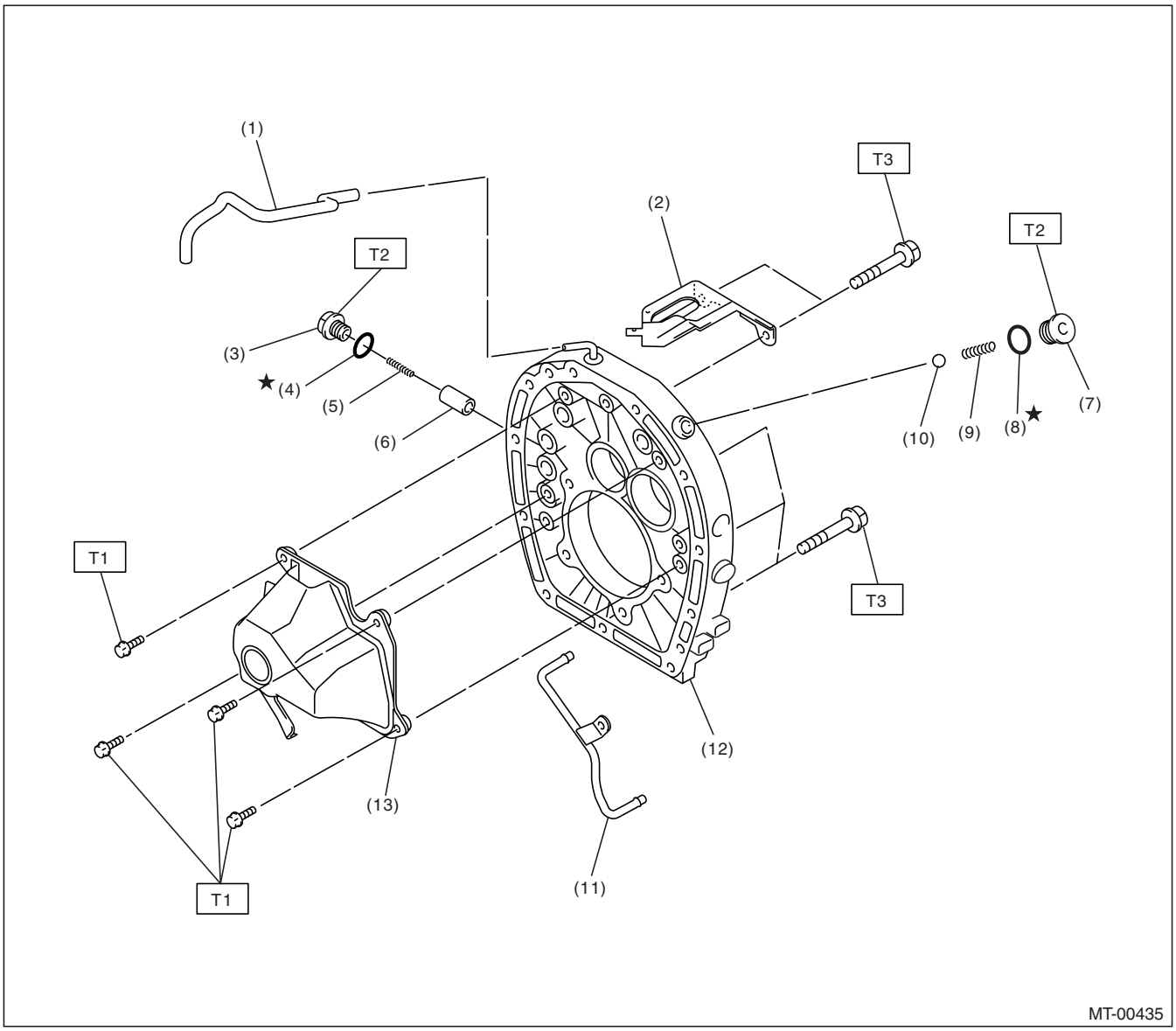


(1)	Oil level gauge	(8)	Clutch housing
(2)	Oil seal	(9)	Speedometer driven gear
(3)	Snap ring	(10)	Snap ring
(4)	Washer	(11)	Gasket
(5)	Speedometer gear shaft	(12)	Oil seal
(6)	Pitching stopper bracket	(13)	Clutch release bearing guide
(7)	Clip		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 41 (4.2, 30.2)
T3: 50 (5.1, 36.9)
T4: 70 (7.1, 51.6)

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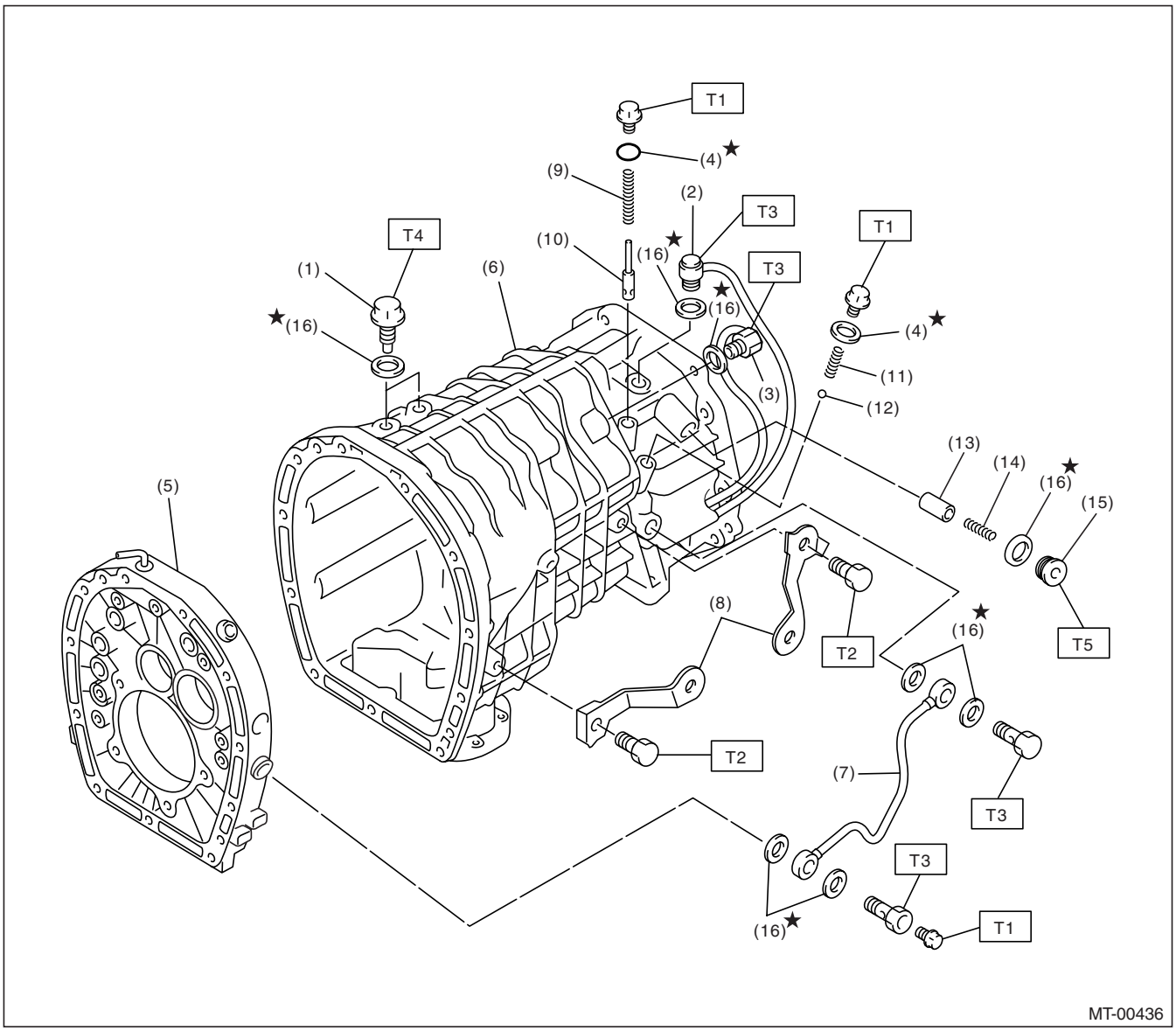
2. ADAPTER PLATE



(1)	Breather hose	(7)	Plug	(13)	Oil chamber
(2)	Transmission harness stay	(8)	Gasket		
(3)	Plug	(9)	Spring	***Tightening torque: N·m (kgf-m, ft-lb)***	
(4)	Gasket	(10)	Ball	***T1:***	***6.4 (0.65, 4.7)***
(5)	Spring	(11)	Lubrication pipe	***T2:***	***37 (3.8, 27.3)***
(6)	Plunger	(12)	Adapter plate	***T3:***	***50 (5.1, 36.9)***

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3. TRANSMISSION CASE

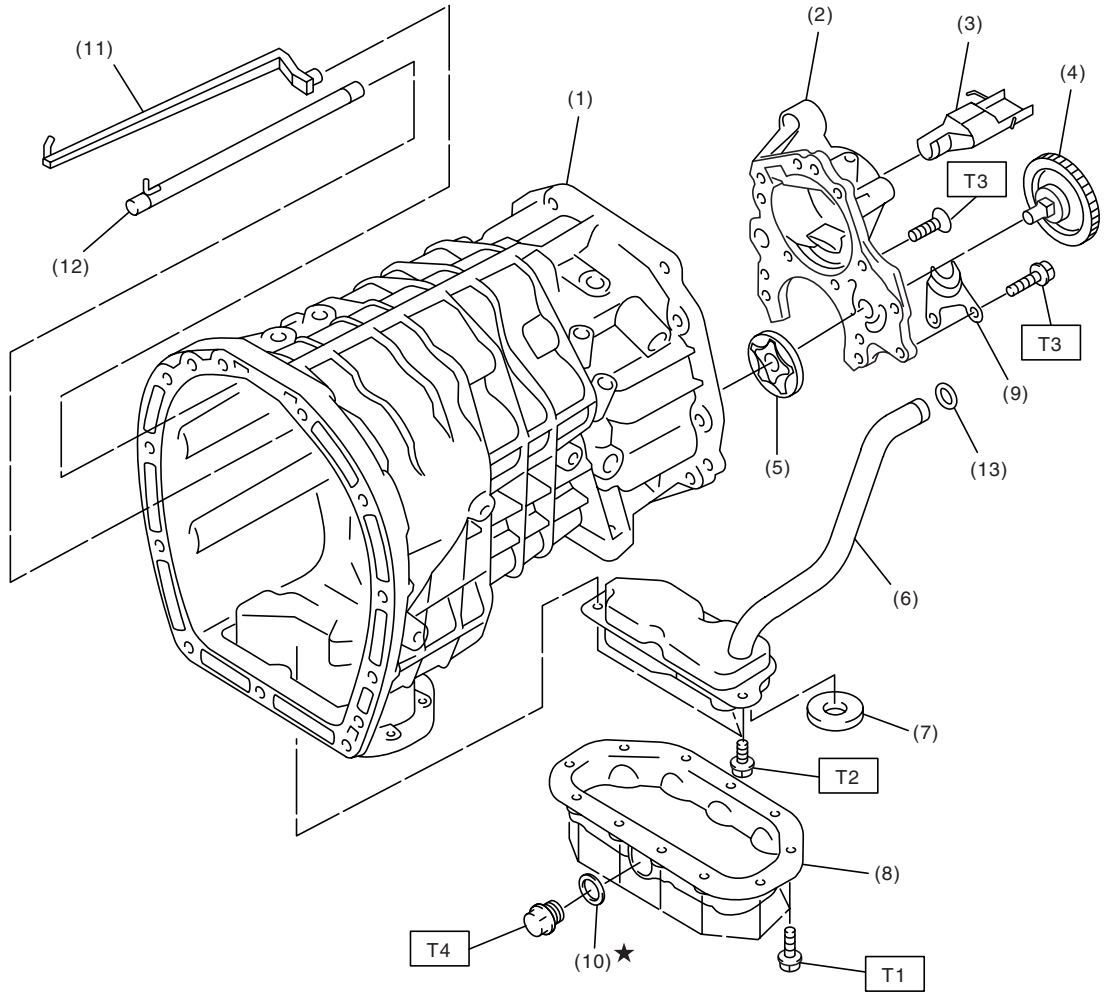


(1)	Pilot bolt	(9)	Return spring
(2)	Neutral switch	(10)	Pressure relief valve
(3)	Back-up light switch	(11)	Return spring
(4)	O-ring	(12)	Ball
(5)	Adapter plate	(13)	Plunger
(6)	Transmission case	(14)	Spring
(7)	Oil pipe	(15)	Plug
(8)	Harness bracket	(16)	Gasket

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*13 (1.3, 9.6)*
T2:	*16 (1.6, 11.8)*
T3:	*32 (3.3, 23.6)*
T4:	*34 (3.5, 25.1)*
T5:	*41 (4.2, 30.2)*

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4. OIL PAN AND OIL PUMP

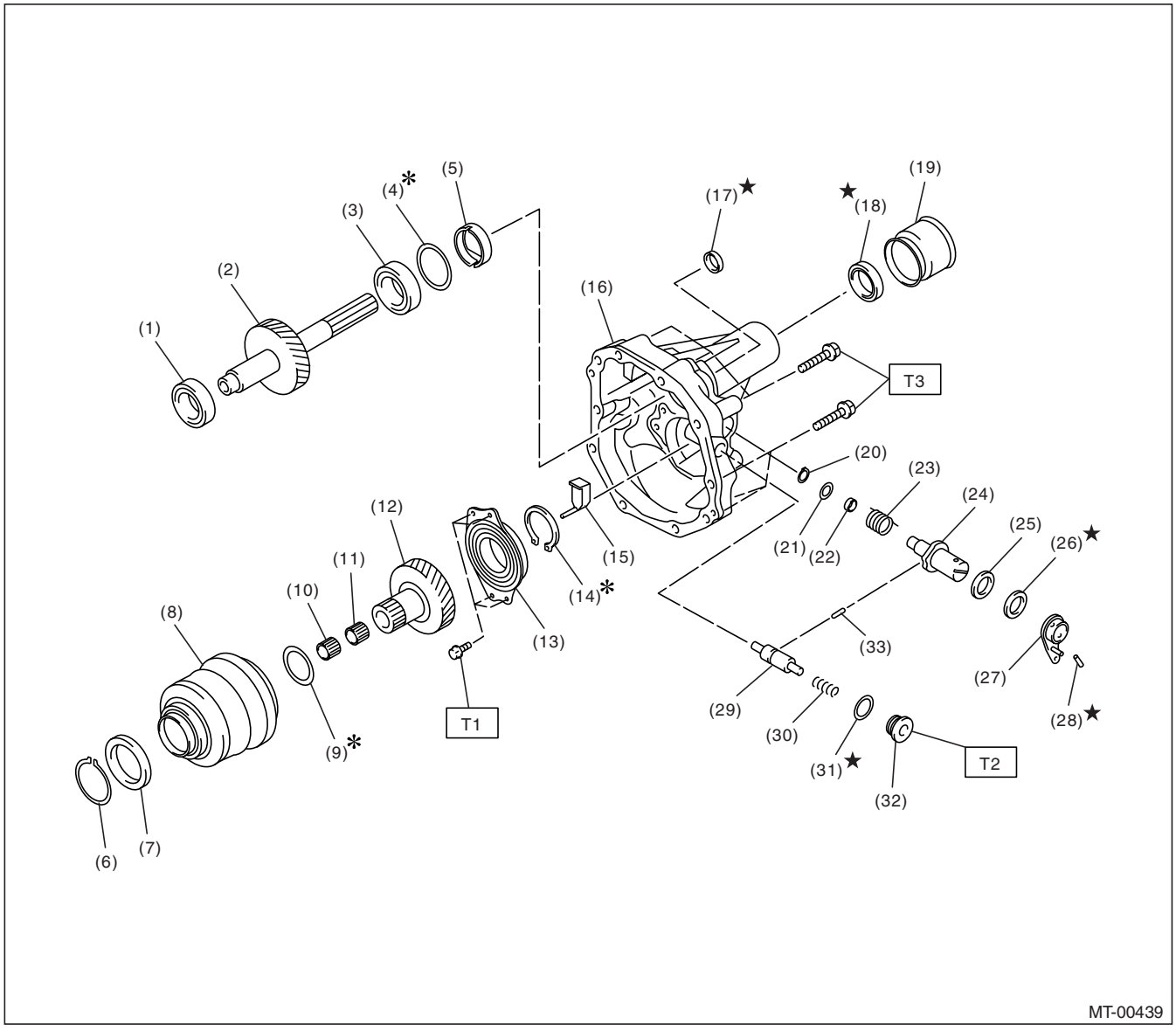


(1) Main case
(2) Oil pump cover
(3) Oil guide
(4) Oil pump driven gear ASSY
(5) Oil pump rotor ASSY
(6) Strainer ASSY
(7) Magnet
(8) Oil pan
(9) Plate
(10) Gasket
(11) Oil guide
(12) Oil pipe
(13) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 10 (1.0, 7.4)
T3: 25 (2.5, 18.1)
T4: 44 (4.5, 32.5)

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5. EXTENSION CASE AND CENTER DIFFERENTIAL

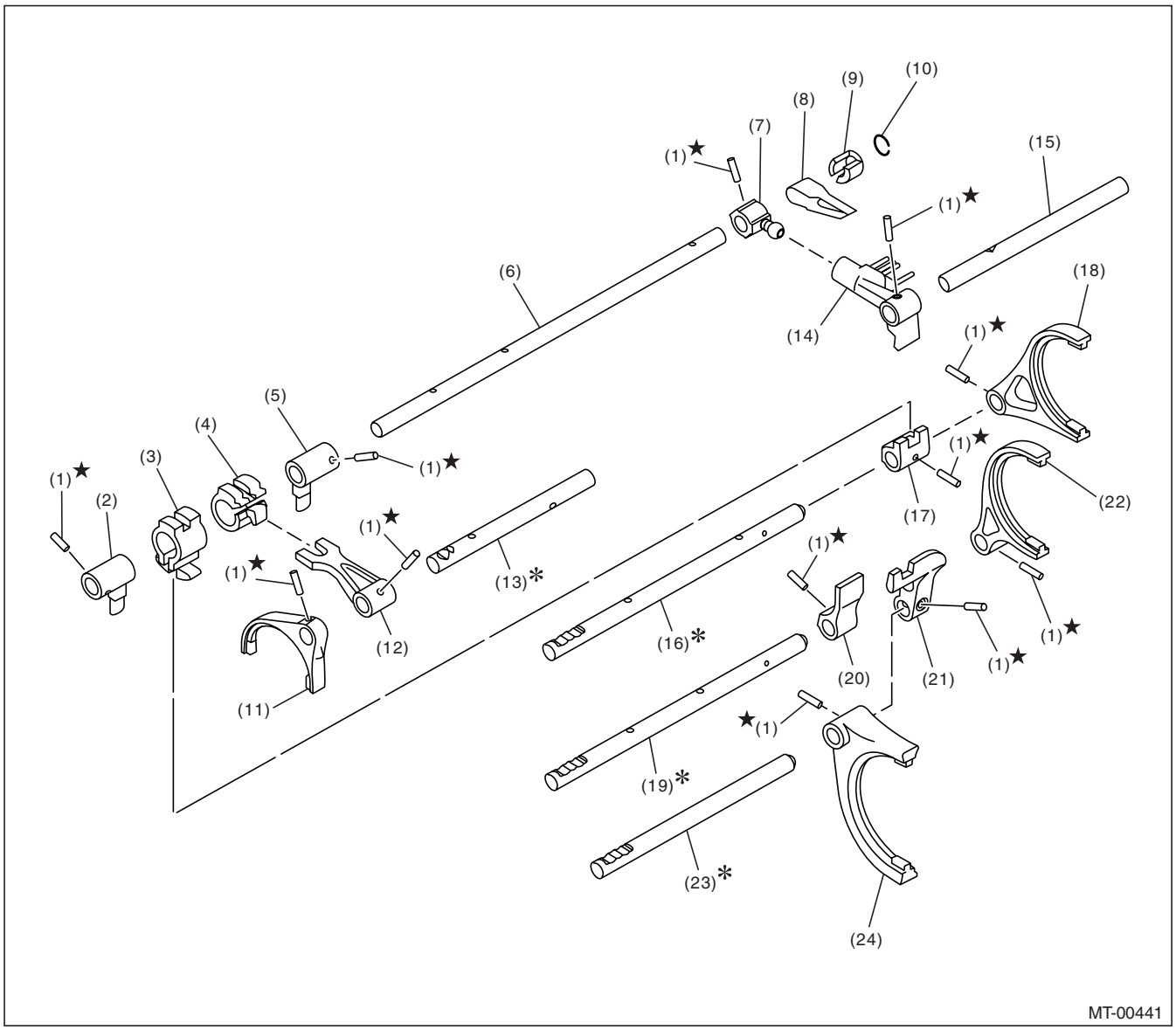


(1) Taper roller bearing
(2) Transfer driven gear
(3) Taper roller bearing
(4) Shim
(5) Oil plate
(6) Snap ring
(7) Oil pump drive gear
(8) Center differential
(9) Shim
(10) Needle bearing
(11) Needle bearing
(12) Transfer drive gear
(13) Ball bearing (with flange)
(14) Snap ring
(15) Extension guide
(16) Extension case
(17) Oil seal
(18) Oil seal
(19) Dust cover
(20) Snap ring
(21) Washer
(22) Bush
(23) Spring
(24) Reverse check shaft
(25) Ball bearing
(26) Oil seal
(27) Reverse check lever COMPL
(28) Straight pin
(29) Reverse check plug
(30) Spring
(31) Gasket
(32) Plug
(33) Plunger

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 41 (4.2, 30.2)
T3: 48 (4.9, 35.4)

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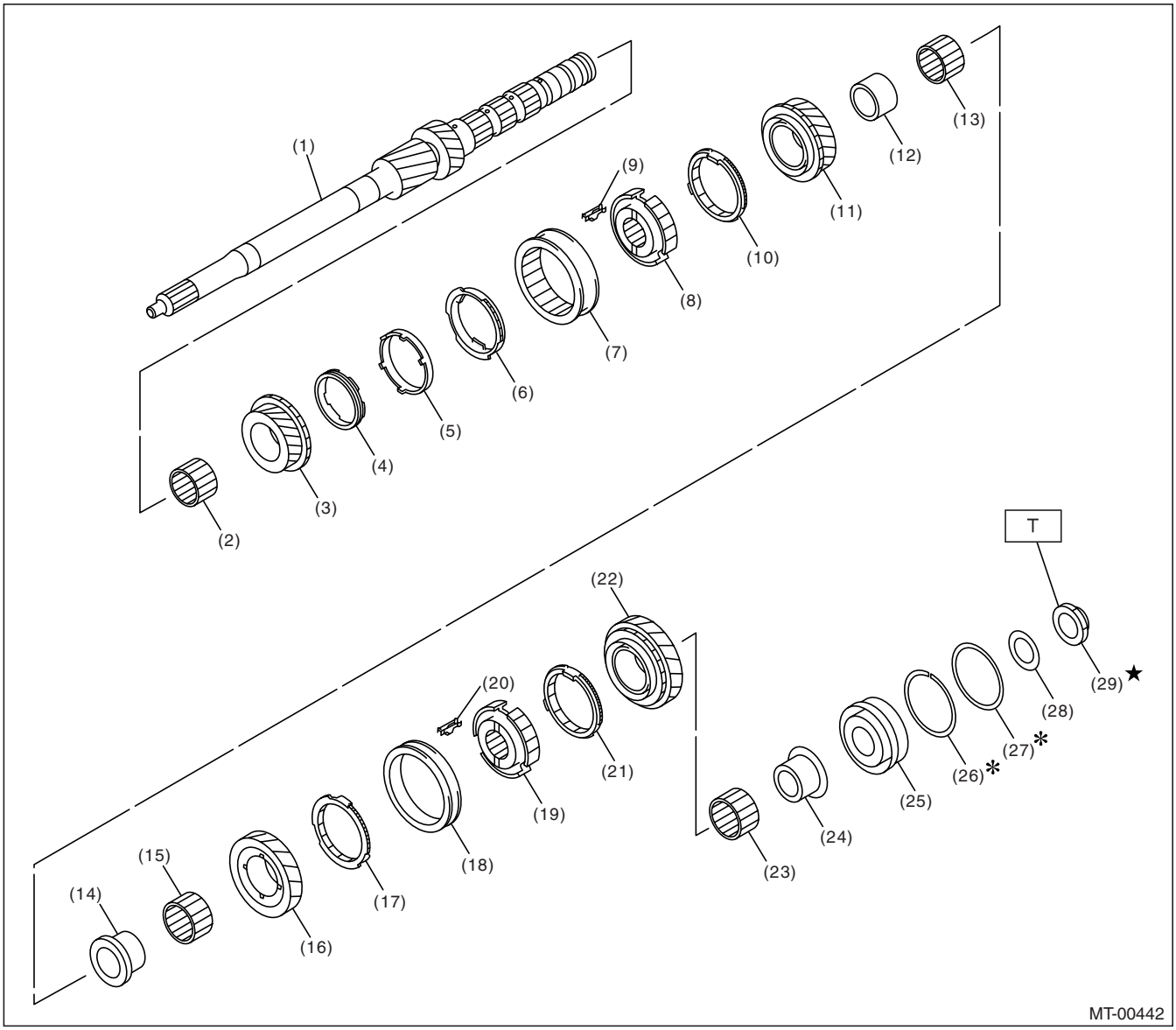
6. SHIFTER FORK AND FORK ROD



(1)	Spring pin	(9)	Support	(17)	5th-6th shifter arm
(2)	Interlock arm	(10)	Snap ring	(18)	5th-6th fork COMPL
(3)	Interlock block	(11)	Reverse fork COMPL	(19)	3rd-4th fork rod
(4)	Reverse interlock block	(12)	Reverse shifter arm	(20)	3rd-4th shifter arm
(5)	Interlock arm	(13)	Reverse fork rod	(21)	1st-2nd shifter arm
(6)	Striking rod	(14)	Selector arm COMPL	(22)	3rd-4th fork COMPL
(7)	Selector arm No.2	(15)	Shifter arm shaft	(23)	1st-2nd fork rod
(8)	Neutral set spring	(16)	5th-6th fork rod	(24)	1st-2nd fork COMPL

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7. MAIN SHAFT ASSY

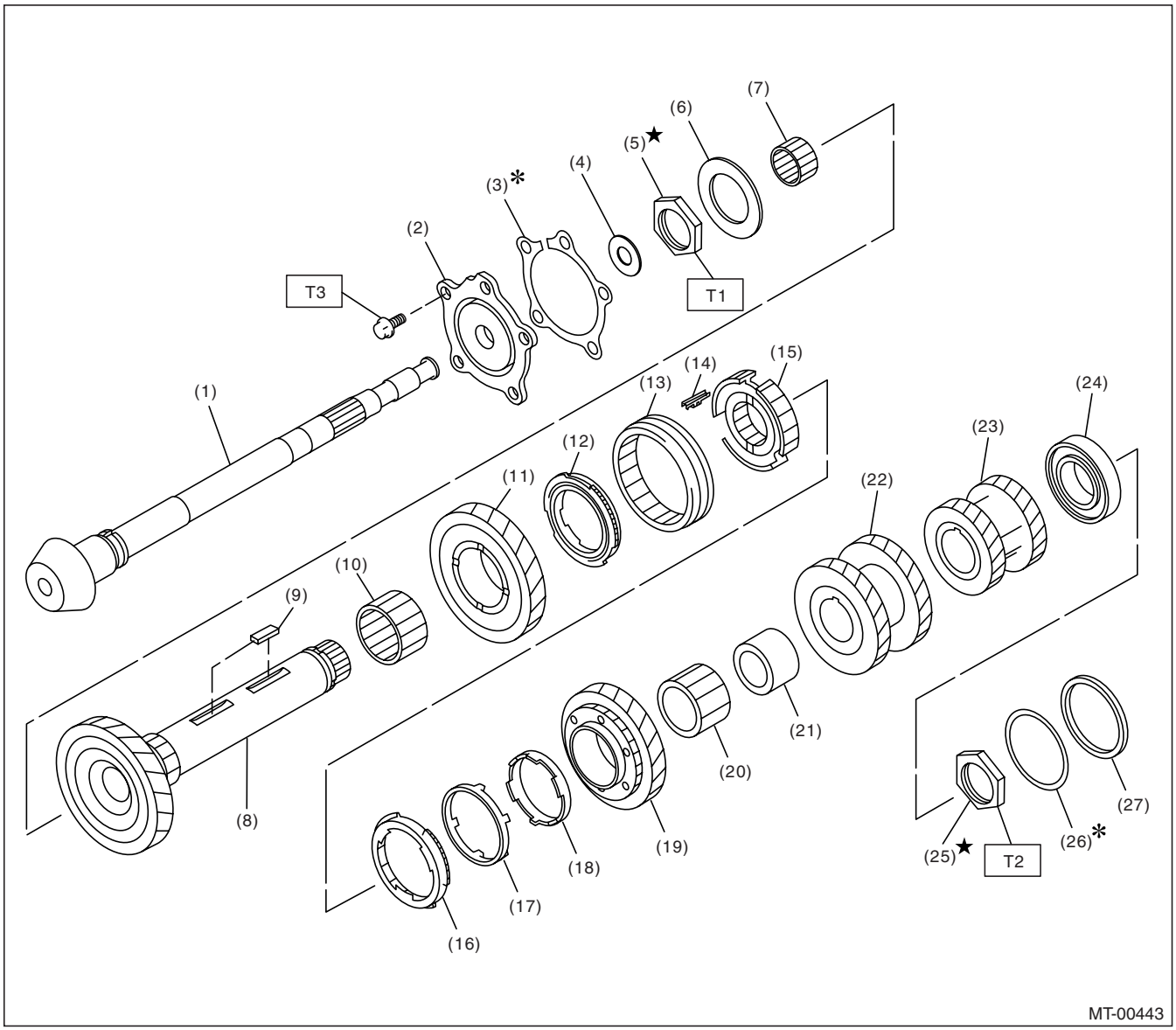


(1) Main shaft
(2) Needle bearing
(3) 3rd drive gear
(4) Inner baulk ring
(5) Synchro cone
(6) Outer baulk ring
(7) 3rd-4th sleeve
(8) 3rd-4th hub
(9) Shifting insert
(10) 4th baulk ring
(11) 4th gear
(12) 4th bush
(13) Needle bearing
(14) 5th bush
(15) Needle bearing
(16) 5th drive gear
(17) 5th baulk ring
(18) 5th-6th sleeve
(19) 5th-6th hub
(20) Shifting sleeve
(21) 6th baulk ring
(22) 6th drive gear
(23) Needle bearing
(24) 6th bush
(25) Taper roller bearing
(26) Snap ring
(27) Washer
(28) Washer
(29) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T: 392 (40.0, 289)

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8. DRIVE PINION AND DRIVEN SHAFT ASSY



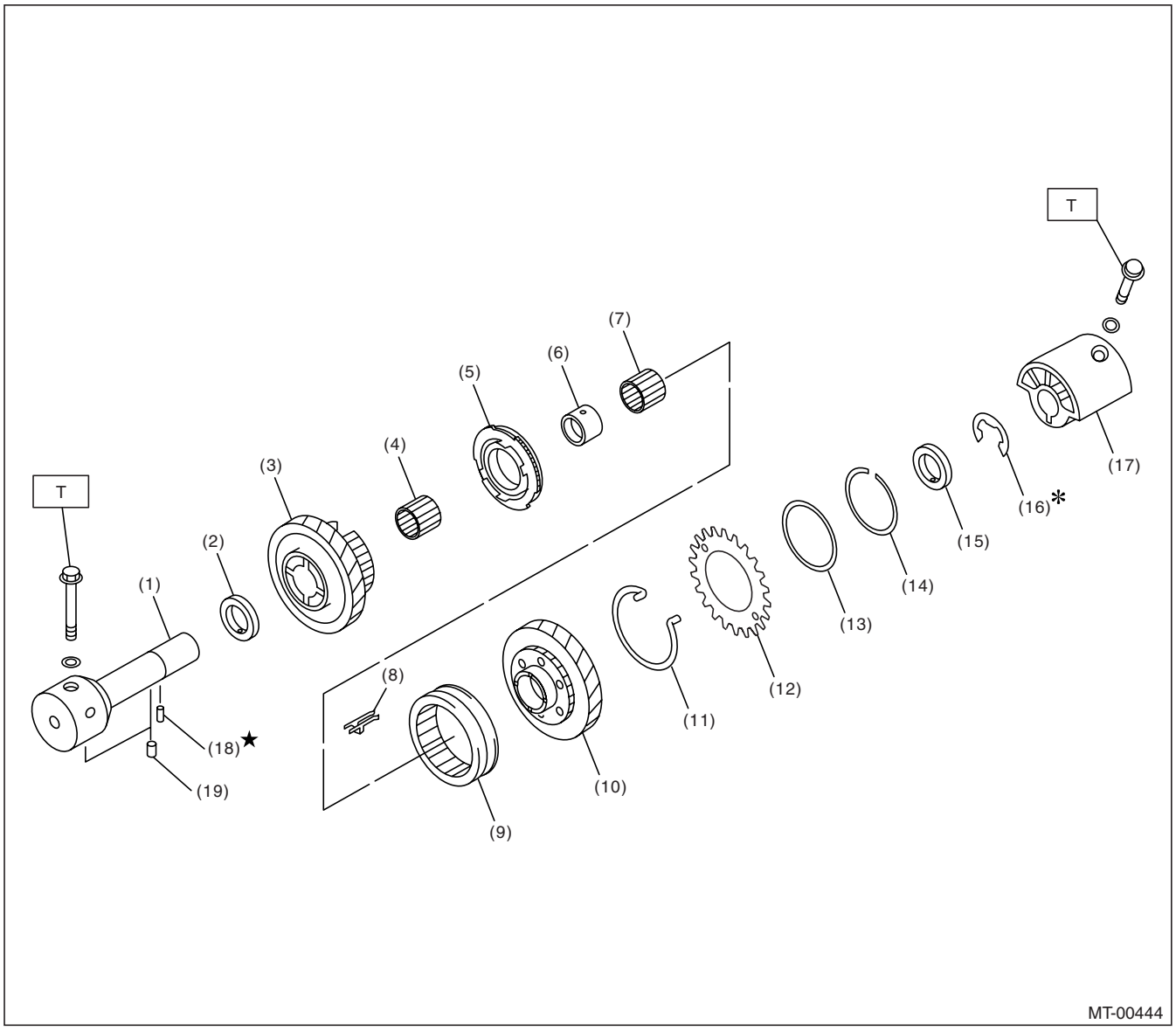
(1) Drive pinion shaft
(2) Taper roller bearing
(3) Shim
(4) Washer
(5) Lock nut
(6) Thrust bearing
(7) Needle bearing
(8) Driven shaft
(9) Key
(10) Needle bearing
(11) 1st driven gear
(12) 1st synchro ring ASSY
(13) 1st-2nd sleeve
(14) Shifting insert
(15) 1st-2nd hub
(16) Outer baulk ring
(17) Synchro cone
(18) Inner baulk ring
(19) 2nd driven gear
(20) Needle bearing
(21) 2nd bush
(22) 3rd-4th driven gear
(23) 5th-6th driven gear
(24) Ball bearing
(25) Lock nut
(26) Shim
(27) Collar

Tightening torque: N·m (kgf-m, ft-lb)
T1: 285 (29.1, 210)
**** 265 (27.0, 195)***
T2: 570 (58.1, 420)
**** 530 (54.0, 391)***
T3: 50 (5.0, 36.9)

* Tightening torque when ST used.

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9. REVERSE IDLER GEAR ASSY

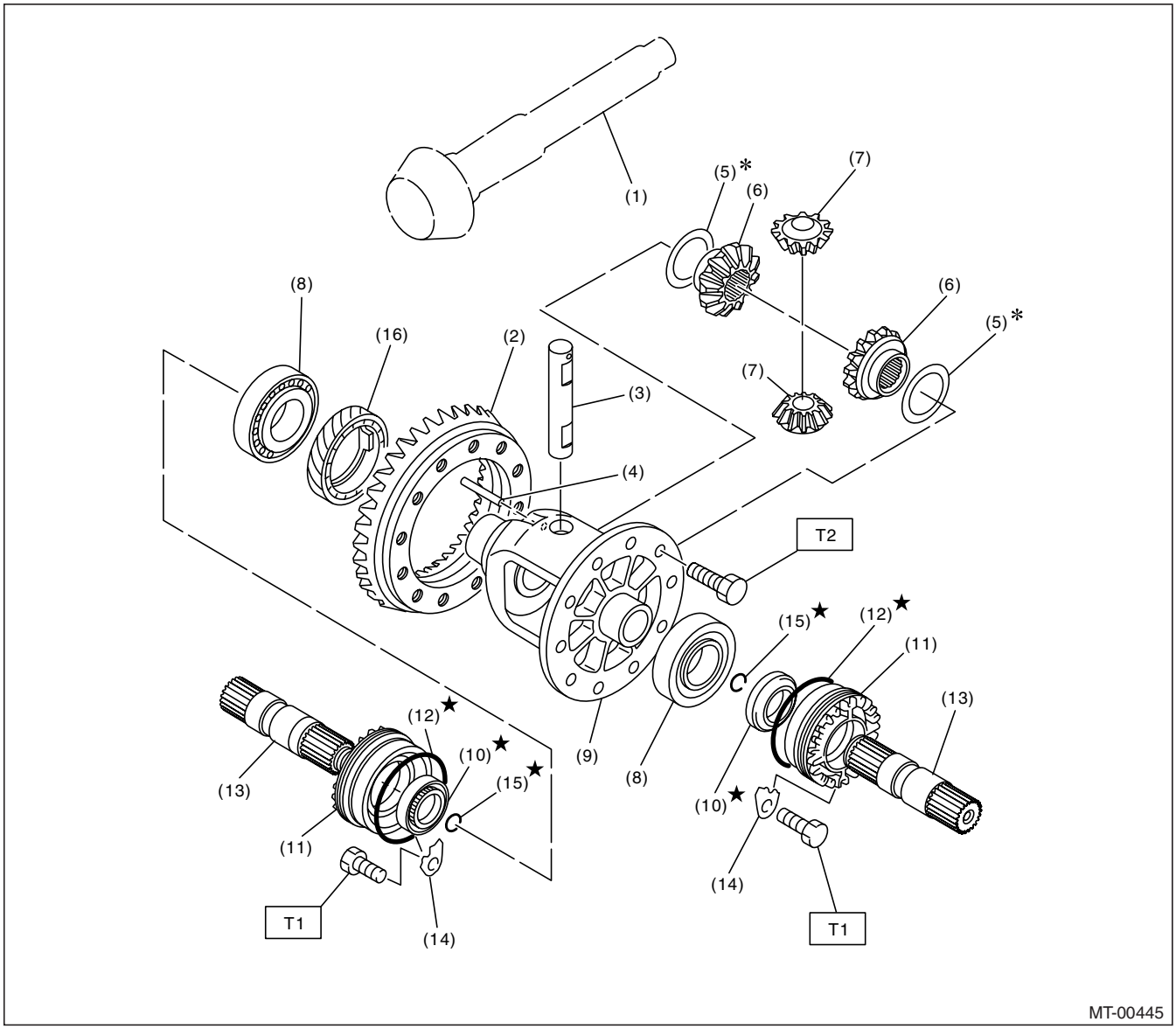


(1) Base COMPL
(2) Washer
(3) Reverse idler gear No.2
(4) Needle bearing
(5) Reverse idler synchro set
(6) Reverse idler gear bush
(7) Needle bearing
(8) Shifting insert
(9) Reverse coupling sleeve
(10) Reverse idler gear
(11) Spring
(12) Sub gear
(13) Friction plate
(14) Snap ring
(15) Washer
(16) Snap ring
(17) Reverse idler holder
(18) Spring pin
(19) Knock pin

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

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10.FRONT DIFFERENTIAL WITHOUT LSD

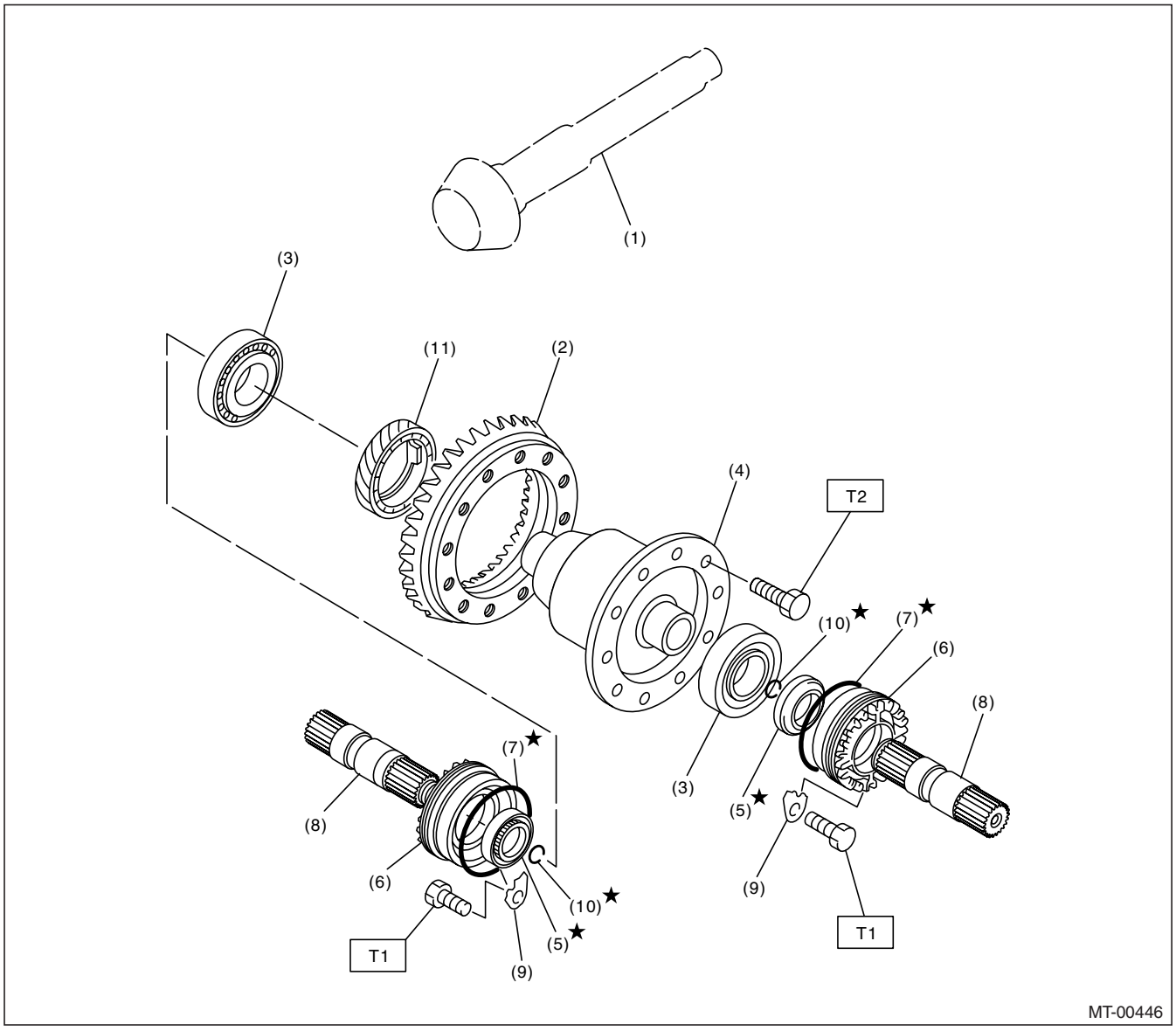


(1) Drive pinion shaft
(2) Hypoid driven gear
(3) Pinion shaft
(4) Straight pin
(5) Washer
(6) Differential bevel gear
(7) Differential bevel pinion
(8) Roller bearing
(9) Differential case
(10) Oil seal
(11) Differential side retainer
(12) O-ring
(13) Axle drive shaft
(14) Retainer lock plate
(15) Circlip
(16) Speedometer drive gear

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 69 (7.0, 50.9)

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11.FRONT DIFFERENTIAL WITH LSD

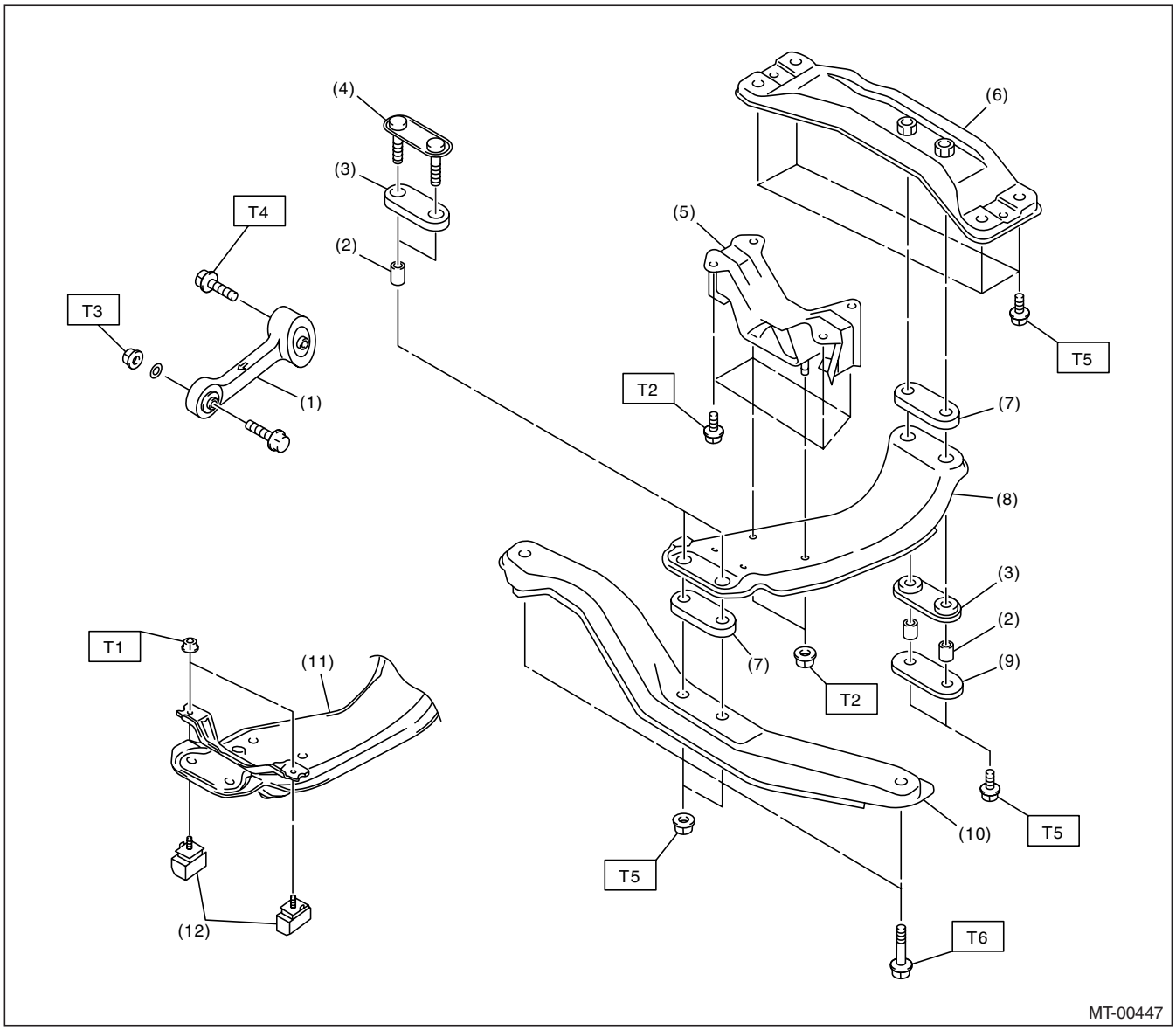


(1) Drive pinion shaft
(2) Hypoid driven gear
(3) Roller bearing
(4) Differential case ASSY
(5) Oil seal
(6) Differential side retainer
(7) O-ring
(8) Axle drive shaft
(9) Retainer lock plate
(10) Circlip
(11) Speedometer drive gear

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 69 (7.0, 50.9)

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12.TRANSMISSION MOUNTING



(1)	Pitching stopper	(8)	Center crossmember (Except EUROPE model)
(2)	Spacer	(9)	Rear plate
(3)	Cushion C	(10)	Front crossmember
(4)	Front plate	(11)	Center crossmember (EUROPE model)
(5)	Rear cushion rubber	(12)	Dynamic damper (EUROPE model)
(6)	Rear crossmember		
(7)	Cushion D		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 35 (3.6, 25.8)
T3: 50 (5.1, 36.9)
T4: 58 (5.9, 42.8)
T5: 70 (7.1, 51.6)
T6: 140 (14.3, 103)

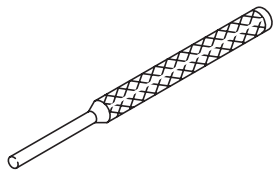
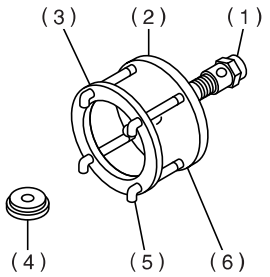
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C: CAUTION

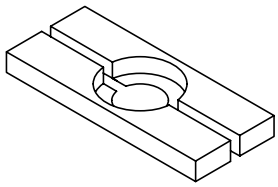
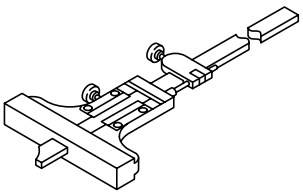
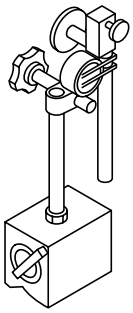
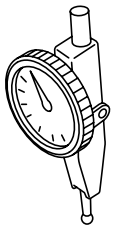
• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation, and disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation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

D: PREPARATION TOOL

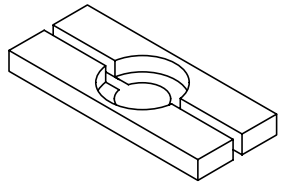
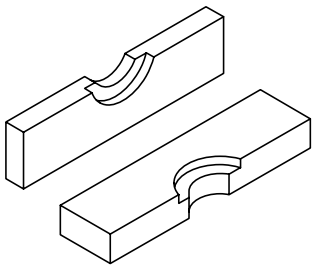
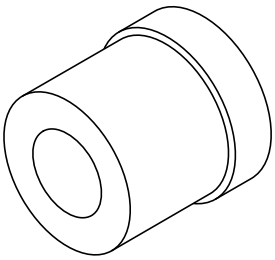
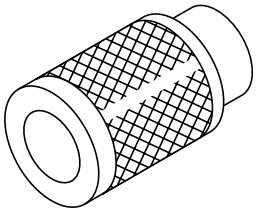
1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398791700	398791700	REMOVER	Used for removing and installing spring pin (6 mm).
 ST-399527700	399527700	PULLER SET	Used for removing and installing roller bearing (Differential). (1) BOLT (899521412) (2) PULLER (399527702) (3) HOLDER (399527703) (4) ADAPTER (398497701) (5) BOLT (899520107) (6) NUT (021008000)

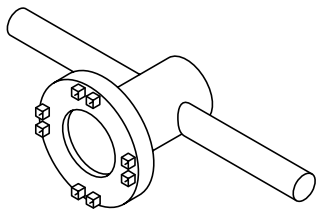
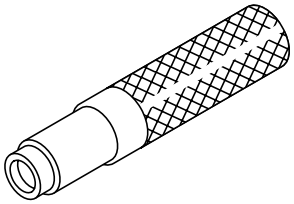
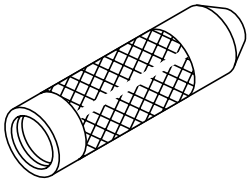
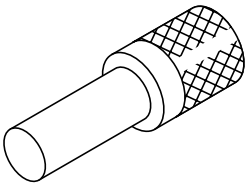
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498515700	498515700	REMOVER	Used for removing roller bearing of drive pinion shaft.
 ST-49814700	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with MAGNET BASE (498247001).

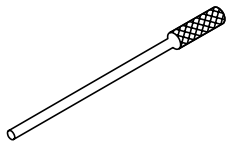
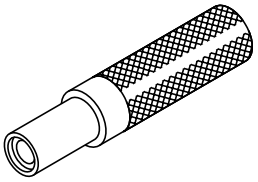
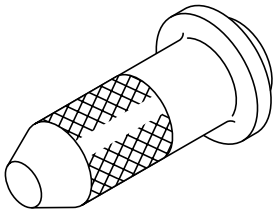
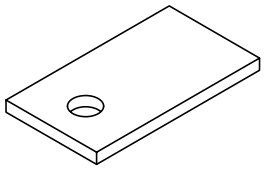
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077000	498077000	REMOVER	Used for removing differential taper roller bearing.
 ST-899858600	899858600	REMOVER	Used for removing roller bearing.
 ST-399513600	399513600	INSTALLER	Used for installing oil seal.
 ST-499757002	499757002	INSTALLER	Used for installing bearing cone of transfer driven gear (extension core side).

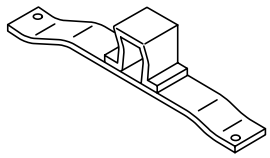
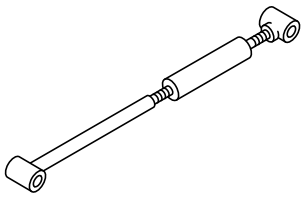
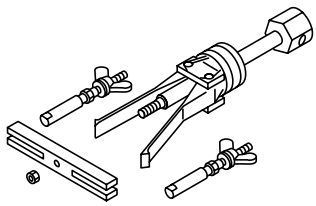
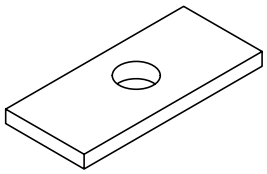
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499787000	499787000	WRENCH ASSY	Used for removing and installing differential side retainer (right side).
 ST-499827000	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.
 ST-499877000	499877000	RACE 4-5 INSTALLER	Used for disassembling driven shaft and transfer driven gear.
 ST-899864100	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.

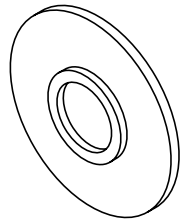
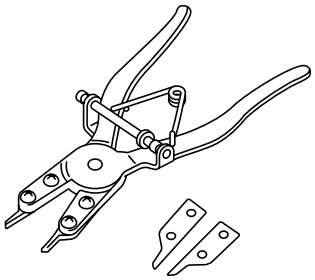
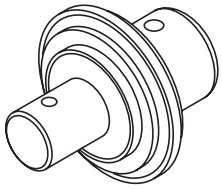
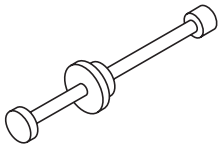
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899904100	899904100	REMOVER	Used for removing and installing straight pin.
 ST-899824100	899824100	PRESS	Used for installing speedometer shaft oil seal.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST-498255400	498255400	PLATE	Used for measuring backlash.

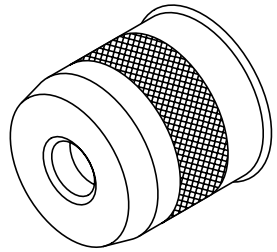
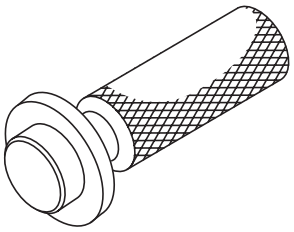
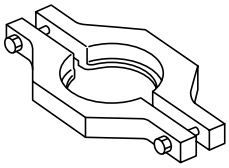
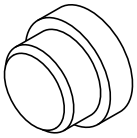
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41099AA010	41099AA010	ENGINE SUPPORT BRACKET	Used for supporting engine.
 ST41099AA020	41099AA020	ENGINE SUPPORT	Used for supporting engine.
 ST-398527700	398527700	PULLER ASSY	Used for removing extension case oil seal and clutch housing oil seal.
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.

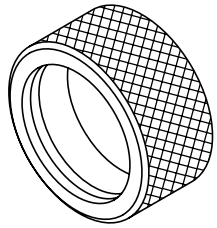
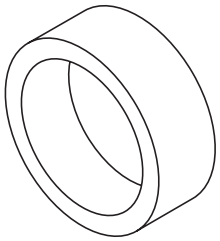
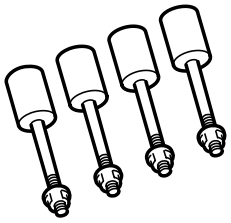
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398177700	398177700	INSTALLER	Used for assembling main shaft.
 ST-398663600	398663600	PLIERS	• Used for removing and installing neutral set spring. • Used with CLAW (18756AA000).
 ST-499247300	499247300	INSTALLER	• Used for removing axle shaft. • Used with REMOVER ASSY (499095500).
 ST-499095500	499095500	REMOVER ASSY	• Used for removing axle shaft. • Used with INSTALLER (499247300).

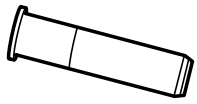
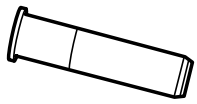
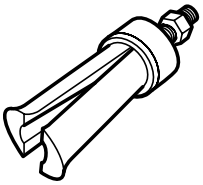
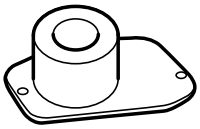
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499247400	499247400	INSTALLER	Used for installing transfer drive gear ball bearing.
 ST-499797000	499797000	OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.
 ST-498077610	498077610	REMOVER	Used for removing speedometer drive gear.
 ST-398497701	398497701	SEAT	Used for installing transfer drive gear ball bearing.

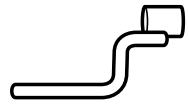
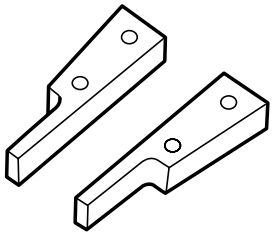
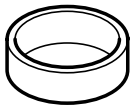
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398437700	398437700	INSTALLER	Used for installing front differential side bearing.
 ST-498745600	498745600	INSTALLER	Used for installing oil pump drive gear.
 ST18632AA000	18632AA000	STAND ASSY	Used for disassembling and assembling transmission.
 ST18671AA000	18671AA000	OIL SEAL GUIDE	• Used for installing oil seal to reverse check. • Used with INSTALLER (18657AA010).

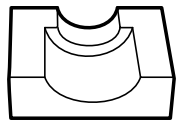
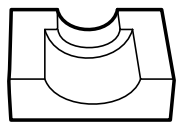
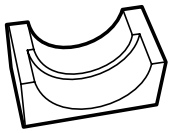
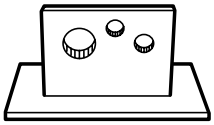
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18657AA010	18657AA010	INSTALLER	• Used for installing oil seal to reverse check. • Used with OIL SEAL GUIDE (18671AA000).
 ST18657AA000	18657AA000	INSTALLER	Used for installing oil seal to shift rod.
 ST18758AA000	18758AA000	PULLER	Used for removing extension taper roller bearing outer race.
 ST18831AA000	18831AA000	GAUGE	Used for measuring extension taper roller bearing.

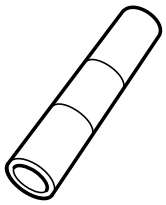
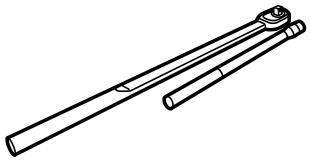
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18631AA000	18631AA000	HANDLE	Used for measuring front differential backlash.
 ST18756AA000	18756AA000	CLAW	• Used for installing and removing neutral set spring. • Used with INSTALLER (399893600).
 ST18754AA000	18754AA000	REMOVER	Used for removing each parts of driven gear.
 ST18757AA000	18757AA000	STRAIGHT PIN REMOVER	Used for installing reverse idler gear.

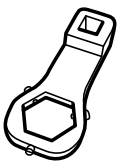
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18665AA000	18665AA000	HOLDER	• Used for installing and removing main shaft lock nut. • Used with BASE (18664AA000).
 ST18666AA000	18666AA000	HOLDER	• Used for installing and removing driven shaft lock nut. • Used with BASE (18664AA000).
 ST18667AA000	18667AA000	HOLDER	• Used for installing and removing drive pinion shaft lock nut. • Used with BASE (18664AA000).
 ST18664AA000	18664AA000	BASE	• Used for installing and removing main shaft lock nut. • Used for installing and removing drive pinion shaft lock nut. • Used for installing and removing driven shaft lock nut.

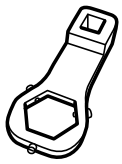
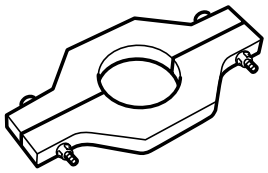
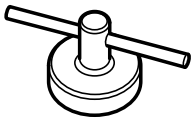
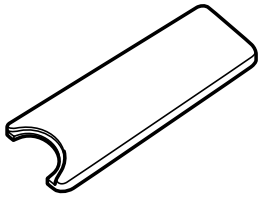
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18722AA000	18722AA000	REMOVER	Used for disassembling main shaft. (TY856WX···model)
 ST18722AA010	18722AA010	REMOVER	Used for disassembling main shaft. (TY856WN···model)
 ST18651AA000	18651AA000	INSTALLER	Used for assembling main shaft.
 ST18852AA000	18852AA000	TORQUE WRENCH	• Used for tightening main shaft lock nut. • Used for tightening drive pinion shaft lock nut. • Used for tightening driven shaft lock nut.

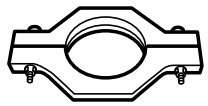
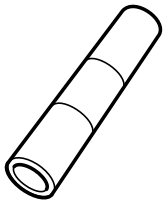
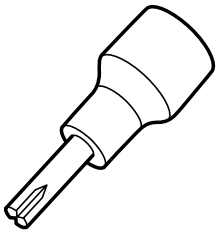
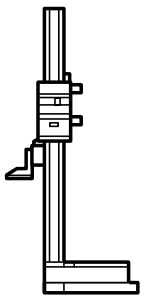
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18668AA000	18668AA000	PUNCH	Used for caulking main shaft lock nut.
 ST18669AA000	18669AA000	PUNCH	Used for caulking driven shaft lock nut.
 ST18670AA000	18670AA000	PUNCH	Used for caulking drive pinion shaft lock nut.
 ST18620AA000	18620AA000	ADAPTER WRENCH	Used for installing and removing driven gear shaft lock nut.

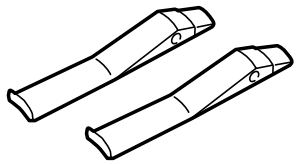
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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18621AA000	18621AA000	ADAPTER WRENCH	Used for installing and removing drive pinion shaft lock nut.
 ST18723AA000	18723AA000	REMOVER	Used for disassembling the driven shaft.
 ST18630AA000	18630AA000	WRENCH ASSY	Used for removing and installing differential side retainer (left side).
 ST18672AA000	18672AA000	GUIDE CLIP	Used for installing reverse idler gear snap ring.

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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18720AA000	18720AA000	REMOVER	Used for disassembling main shaft.
 ST18654AA000	18654AA000	INSTALLER	Used for assembling driven shaft.
 ST18663AA000	18663AA000	SOCKET	Used for installing and removing oil pump cover.
 ST18853AA000	18853AA000	HEIGHT GAUGE	Used for selecting shift rod.

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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18760AA000	18760AA000	CLAW	• Used for removing front side retainer bearing outer race. • Used with PULLER ASSEMBLY (398527705).

2. GENERAL PURPOSE TOOLS

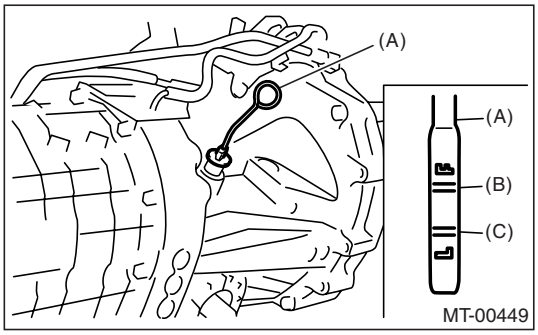
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

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2. Transmission Gear Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Turn the ignition switch to OFF, and wait until the engine cools.
3) Remove the oil level gauge and wipe it clean.
4) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper direction.
5) Pull out the oil level gauge again and check the oil level on it. If it is below the lower level, add oil through the oil level gauge hole to bring the level up to the upper level.



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

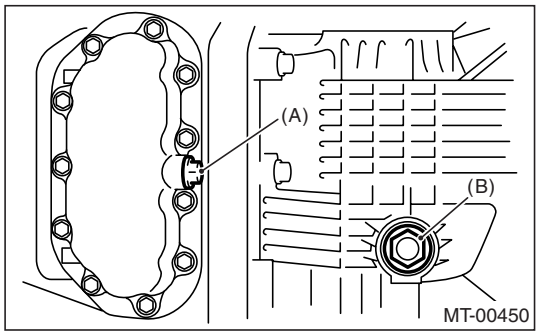
B: REPLACEMENT

1) Pull out the oil level gauge.
2) Lift-up the vehicle.
3) Remove the transmission under cover.
4) Drain the transmission gear oil completely.

CAUTION:
Directly after the engine has been running, the transmission gear oil is hot. Be careful not to burn yourself.

NOTE:
• Tighten the transmission gear oil drain plug after draining transmission gear oil.
• Always use a new gasket.

Tightening torque:
Oil pan side
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Clutch housing side
70 N·m (7.1 kgf-m, 51.6 ft-lb)



(A) Drain plug (Oil pan side)
(B) Drain plug (Clutch housing side)

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

Recommended gear oil:
Use GL-5 or equivalent.

Gear oil capacity:
4.1 ℓ (4.3 US qt, 3.6 Imp qt)

7) Check the level of the transmission gear oil.

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.
• The gear oil level should be within the specified range marked on the level gauge.

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3. Oil Seal

A: INSPECTION

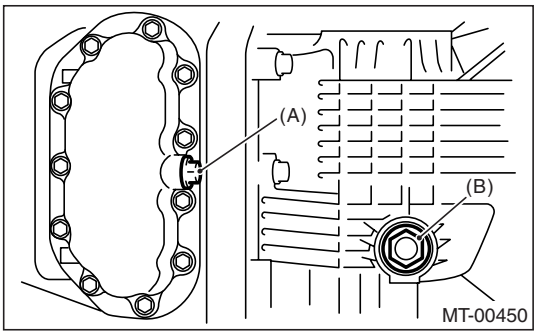
Inspect for oil leakage from the oil seal. Replace the oil seal if the lips is deformed, hardened, damaged, worn or defective if any.

B: REPLACEMENT

1) Clean the transmission exterior.
2) Drain the gear oil completely.

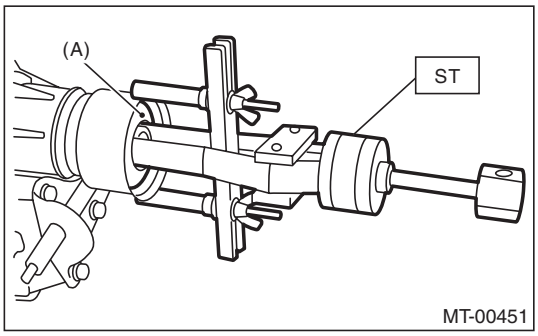
NOTE:
- Tighten the drain plug after draining gear oil.
- Always use a new gasket.

Tightening torque:
Oil pan side
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Clutch housing side
70 N·m (7.1 kgf-m, 51.6 ft-lb)



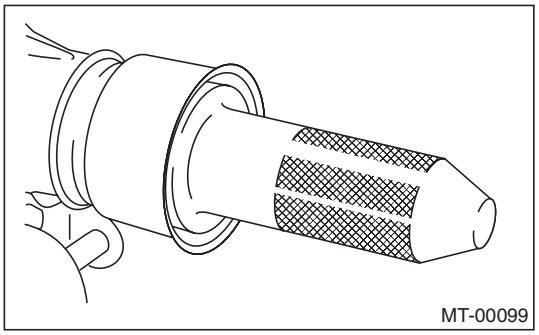
(A) Drain plug (Oil pan side)
(B) Drain plug (Clutch housing side)

3) Remove the rear exhaust pipe and muffler.
4) Remove the propeller shaft. <Ref. to DS-15, REMOVAL, Propeller Shaft.>
5) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY



(A) Oil seal

6) Using the ST, install the oil seal.
ST 498057300 INSTALLER



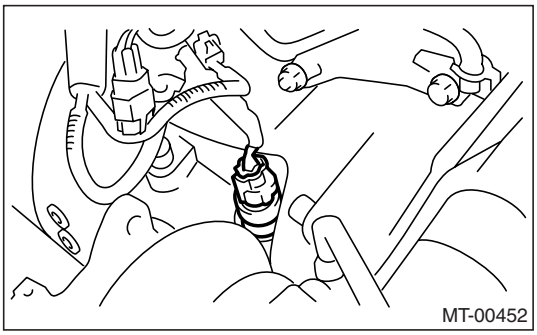
7) Install the propeller shaft. <Ref. to DS-16, INSTALLATION, Propeller Shaft.>
8) Install the rear exhaust pipe and muffler.
9) Pour gear oil and check the oil level. <Ref. to 6MT-32, REPLACEMENT, Transmission Gear Oil.>

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4. Vehicle Speed Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
3) Disconnect the vehicle speed sensor connector.



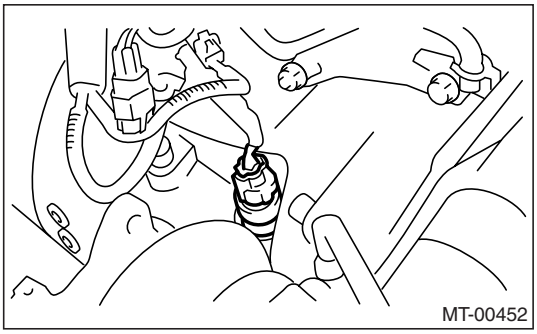
4) Remove the vehicle speed sensor.

B: INSTALLATION

1) Align the tip end of vehicle speed sensor key with key groove on the end of speedometer shaft, and then install it.

Tightening torque:
5.9 N·m (0.6 kgf-m, 4.4 ft-lb)

NOTE:
• Ensure the sensor mounting hole is clean and free of foreign matter.
• Discard the vehicle speed sensor and after removal, replace with a new one.



2) Connect the connector to vehicle speed sensor.
3) Install the intercooler. <Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

C: INSPECTION

Inspect that the speedometer is normally operated, because vehicle speed sensor cannot be inspected as single part. If it is not normally operated, inspect the combination meter system. <Ref. to IDI-3, INSPECTION, Combination Meter System.>

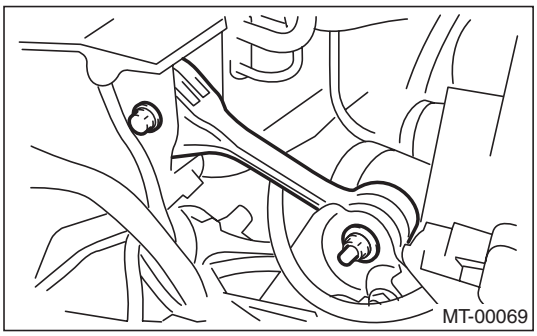
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5. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
3) Remove the pitching stopper.

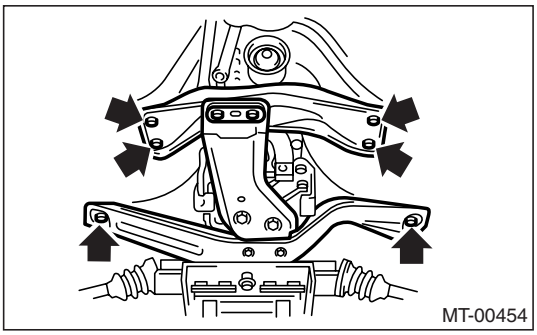


2. CROSSMEMBER AND CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Jack-up the vehicle and support it with sturdy racks.
3) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-9, REMOVAL, Center Exhaust Pipe.>
4) Remove the rear exhaust pipe and muffler.
5) Remove the heat shield cover.
6) Set the transmission jack under the transmission body.

CAUTION:
Always support the transmission case with a transmission jack.

7) Remove the rear crossmember.



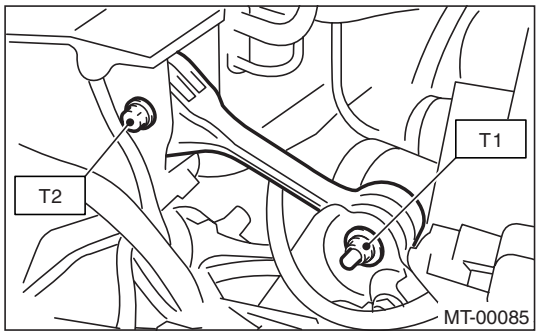
8) Remove the rear cushion rubber.

B: INSTALLATION

1. PITCHING STOPPER

1) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



2) Install the intercooler.
<Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>
3) Connect the battery ground cable to battery.

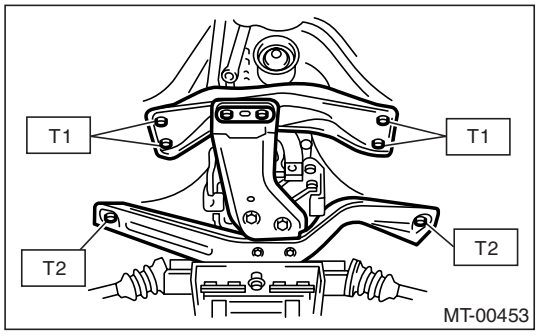
2. CROSSMEMBER AND CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

2) Install the crossmember.

Tightening torque:
T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



3) Remove the transmission jack.
4) Install the center exhaust pipe. <Ref. to EX(H4DOTC)-10, INSTALLATION, Center Exhaust Pipe.>
5) Install the rear exhaust pipe and muffler.

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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.

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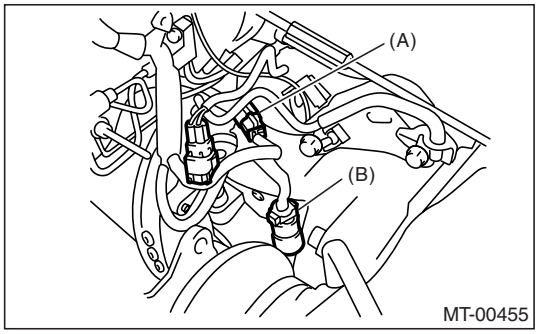
6. Manual Transmission Assembly

A: REMOVAL

1) Set the vehicle on a lift, and then open the front hood and support with hood stay.

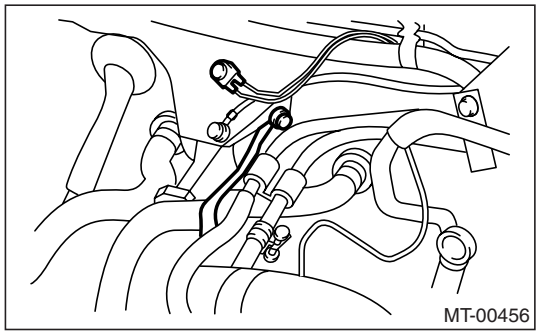
NOTE:
Set the hood stay to its specified hole.

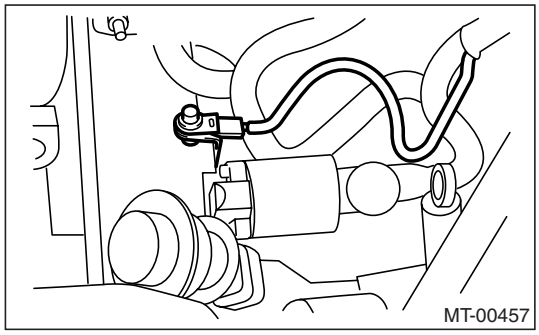
2) Remove the front wheel.
3) Disconnect the ground cable from battery.
4) Remove the intercooler assembly. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
5) Lift-up the vehicle, and then remove the under cover.
6) Remove the steering universal joint. <Ref. to PS-24, REMOVAL, Universal Joint.>
7) Lower the vehicle and disconnect the connector located on upper side of transmission.



(A) Transmission connector
(B) Vehicle speed sensor connector

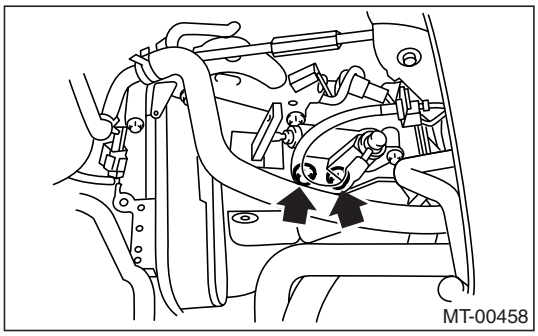
8) Disconnect the ground cable at upper side of transmission case and body.





9) Remove the starter assembly. <Ref. to SC(H4SO)-7, REMOVAL, Starter.>
10) Remove the clutch operating cylinder.

NOTE:
Hang the removed operating cylinder with wire.

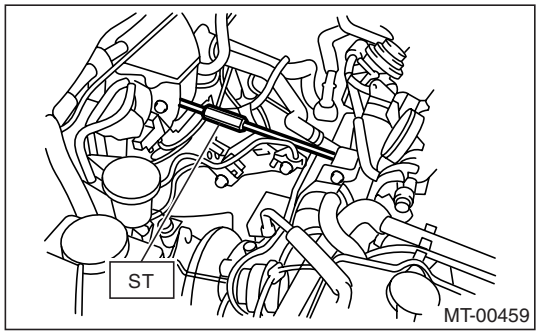


11) Remove the clutch release shaft.
   (1) Remove the plug with hexagon wrench.
   (2) Install a 6 mm (0.24 in) bolt to the release shaft, then pull out the release shaft.
   (3) Lift up the release fork, and then remove it from the release bearing claw. Pull it to the engine side and set it free.
12) Remove the pitching stopper, and then remove the pitching stopper bracket.

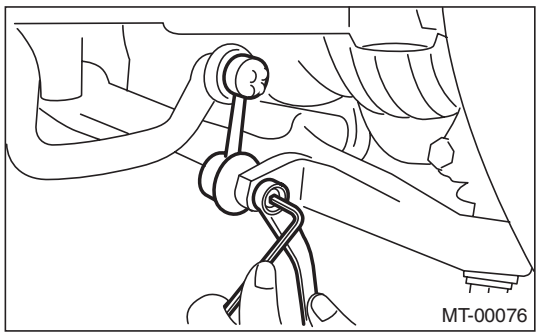
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13) Set the ST.

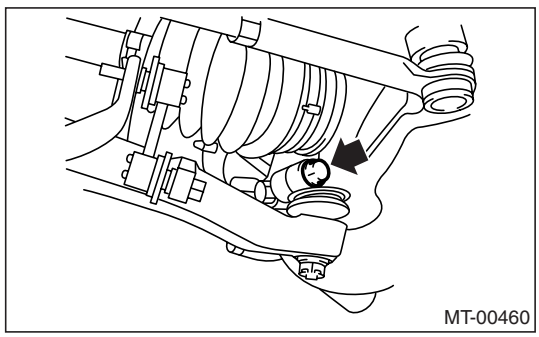
NOTE:
Also Part No. 41099AA010 can be used.
ST 41099AA020 ENGINE SUPPORT



14) Remove the center and rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-9, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-13, REMOVAL, Joint Pipe.>
15) Remove the propeller shaft. <Ref. to DS-15, REMOVAL, Propeller Shaft.>
16) Remove the front stabilizer bolt.

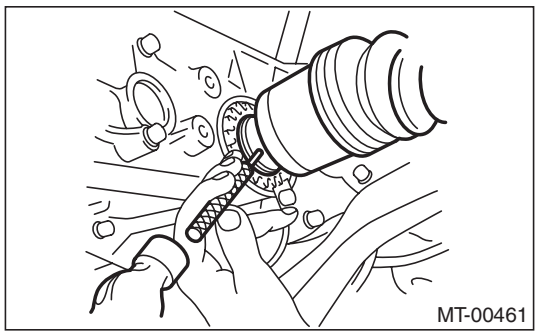


17) Remove the ball joint of transverse link from housing.

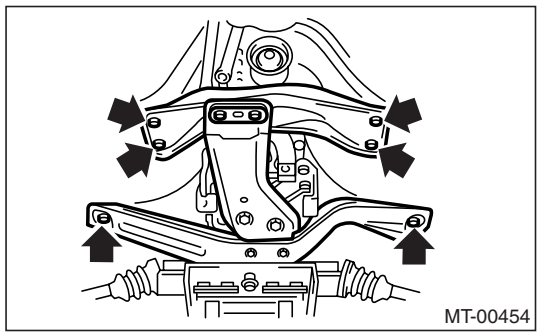


18) Using the ST, remove the spring pin of front drive shaft.
ST 398791700REMOVER

NOTE:
Do not reuse the spring pin.

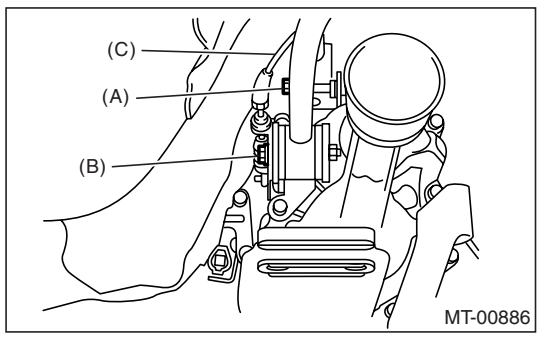


19) Remove the front drive shaft.
20) Set the transmission jack under the transmission, then remove the front crossmember and rear crossmember.



21) Move the transmission to right side, then remove the joint COMPL, stay bolt and reverse check cable.

NOTE:
If the transmission is not moved, the joint COMPL and stay bolt will contact body and damage may occur.

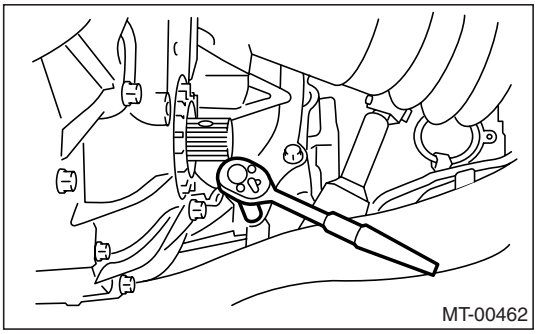


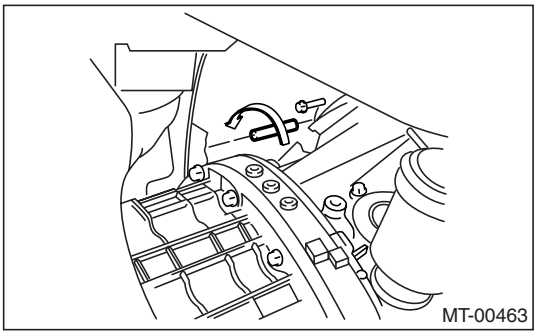
(A) Joint COMPL bolt
(B) Stay bolt
(C) Reverse check cable

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22) Remove the fixing bolt of engine and transmission, then remove the transmission from vehicle.

NOTE:
• Rotate the ST (ENGINE SUPPORT ASSY) counterclockwise (to shorter the ST) and lower the rear side of engine to facilitate removal.
• Take care not to contact the transmission with body when pulling backward to remove.
• Remove carefully. The clutch pipe and breather pipe may interfere each other.


MT-00462

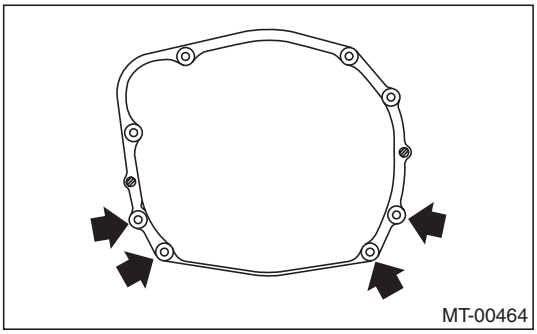

MT-00463

B: INSTALLATION

1) Set the release fork, release bearing and release shaft to transmission. <Ref. to CL-26, INSTALLATION, Release Bearing and Lever.>
2) Install the transmission.

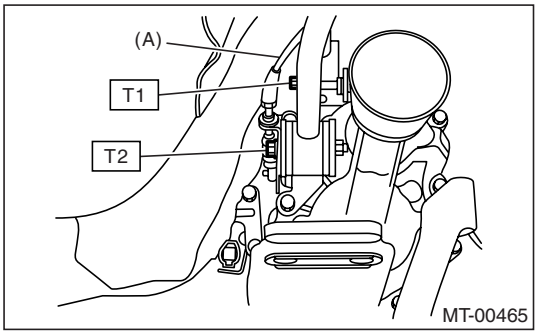
NOTE:
• Make sure the main shaft spline part is inserted completely.
• Make sure the rear side of engine is lowered.

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


MT-00464

3) Move the transmission to the right side, then install the joint COMPL bolt, stay bolt and reverse check cable.

Tightening torque:
T1: 11.8 N·m (1.2 kgf-m, 8.7 ft-lb)
T2: 32 N·m (3.3 kgf-m, 23.6 ft-lb)



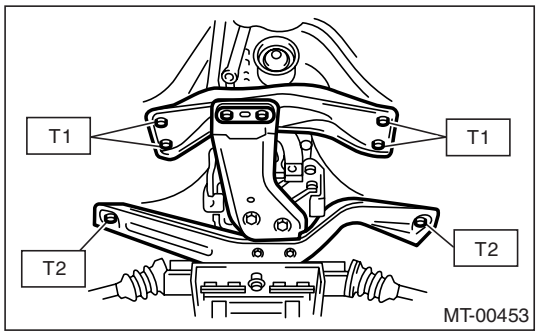
MT-00465

(A) Reverse check cable

4) Install the front crossmember and rear crossmember.

NOTE:
Rotate the ST (ENGINE SUPPORT ASSY) turn buckle clockwise (make longer the ST) and lift up the rear side of engine to facilitate installation.

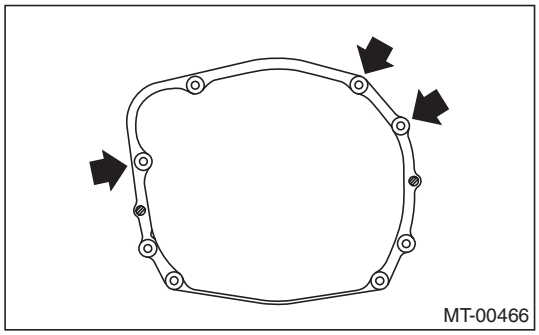
Tightening torque:
T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



MT-00453

5) Lower the vehicle and install the fixing bolt.

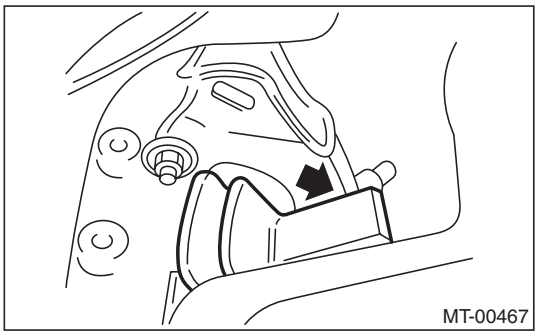
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)


MT-00466

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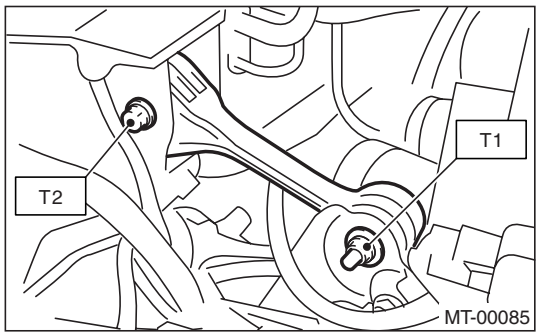
6) Make sure the release bearing is installed completely.

NOTE:
• Push the release fork to operating cylinder side until you hear a “click” sound. Pull the release fork to engine side. Setting is completed if the release fork does not contact case.
• Make sure the boot cover is firmly set.



7) Install the pitching stopper bracket, and then install the pitching stopper.

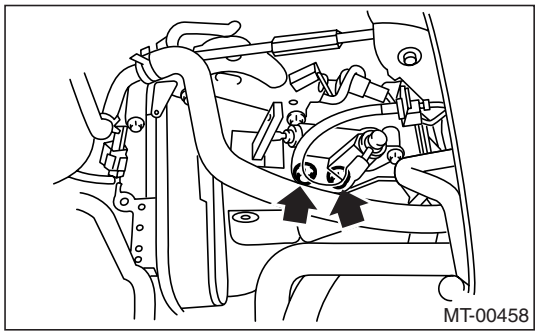
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



8) Install the clutch operating cylinder.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

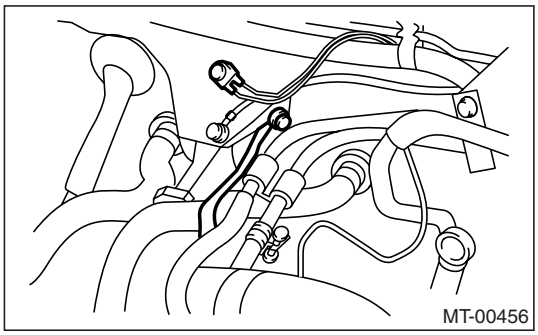
NOTE:
Check that the clutch hose is routed properly.

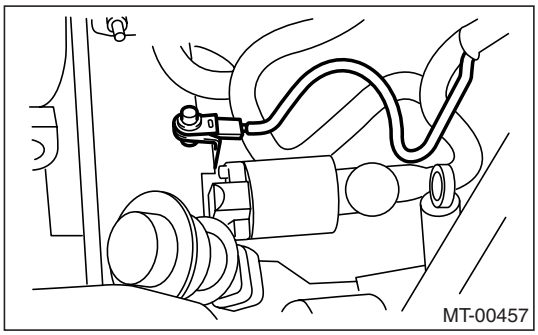


9) Install the starter assembly.

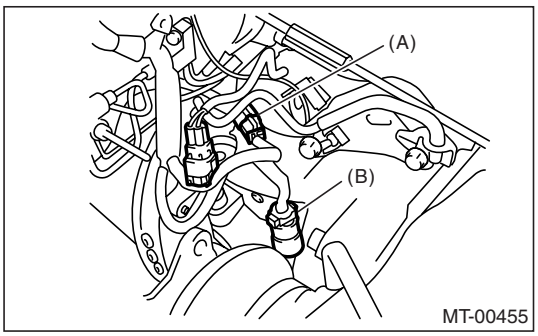
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

10) Install the transmission and body ground cable.





11) Connect the connector located on the upper side of transmission.



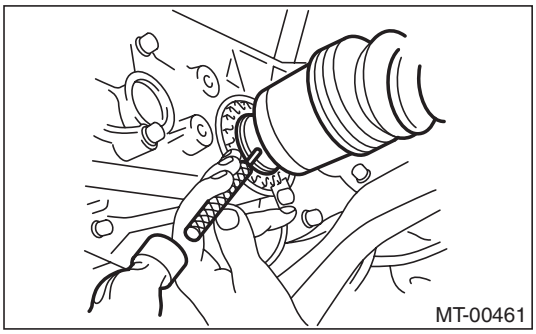
(A) Vehicle speed sensor connector
(B) Transmission connector

12) Lift-up the vehicle, and then install the drive shaft.

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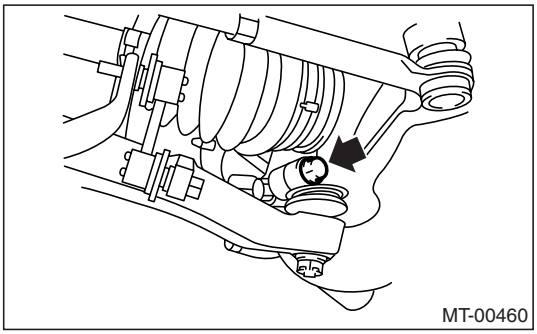
13) Using the ST, install the spring pin of front drive shaft.
ST 398791700REMOVER

NOTE:
Align each chamfered part of front drive shaft and axle drive shaft spring pin hole, and assemble them. Then insert the spring pin.


MT-00461

14) Install the ball joint of transverse link to housing.

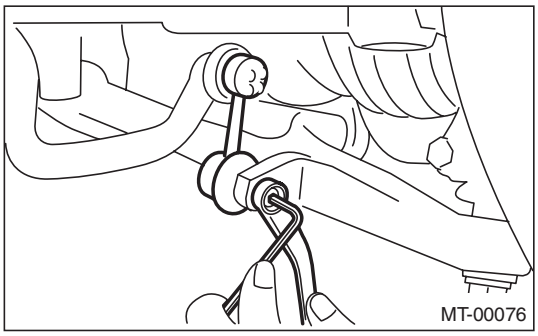
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)


MT-00460

15) Install the stabilizer nut.

Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)

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


MT-00076

16) Install the propeller shaft. <Ref. to DS-16, INSTALLATION, Propeller Shaft.>

17) Install the center exhaust pipe. <Ref. to EX(H4DOTC)-10, INSTALLATION, Center Exhaust Pipe.>
18) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-14, INSTALLATION, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-13, INSTALLATION, Joint Pipe.>
19) Install the universal joint. <Ref. to PS-24, INSTALLATION, Universal Joint.>
20) Install the under cover.
21) Install the intercooler assembly. <Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>
22) Connect the battery ground cable to battery.

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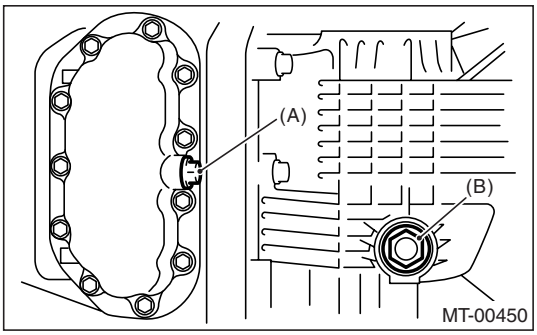
7. Preparation for Overhaul

A: PROCEDURE

1) Clean oil, grease, dirt and dust from transmission.
2) Remove the drain plug to drain oil. After draining, retighten it as before.

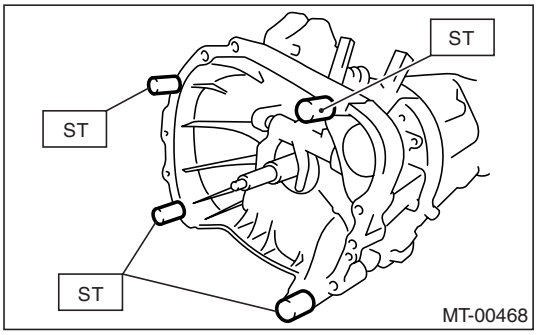
NOTE:
Replace the gasket with a new one.

Tightening torque:
Oil pan side
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Clutch housing
70 N·m (7.1 kgf-m, 51.6 ft-lb)



(A) Drain plug (Oil pan side)
(B) Drain plug (Clutch housing side)

3) Attach the transmission to ST.
ST 18632AA000 STAND ASSY



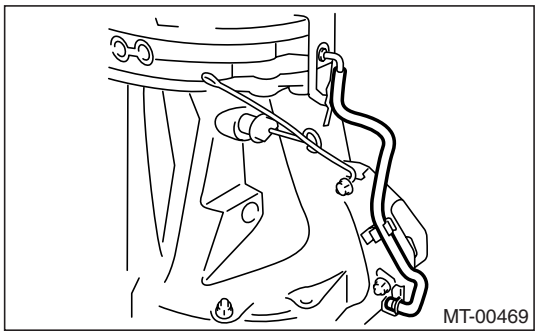
4) Rotating parts should be coated with oil prior to assembly.
5) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
6) Gaskets, lock washers and lock nut must be replaced with new ones.
7) Liquid gasket should be used where specified to prevent leakage.

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8. Air Breather Hose

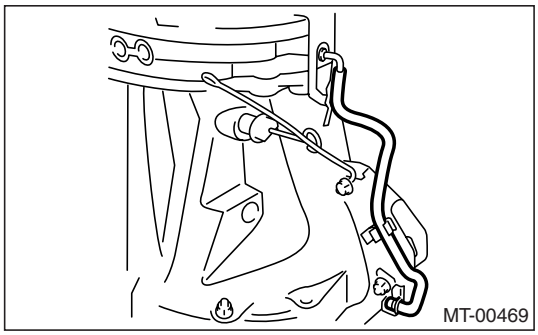
A: REMOVAL

Disconnect the air breather hose.



B: INSTALLATION

Install the air breather hose.



C: INSPECTION

Make sure the hose is not cracked or clogged.

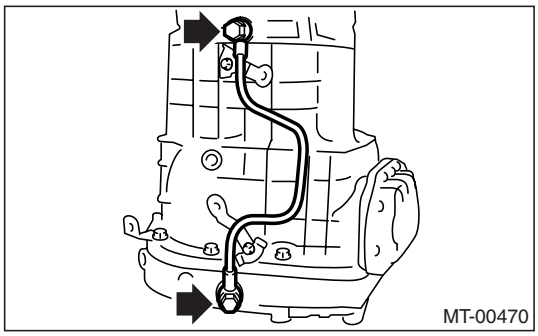
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9. Oil Pipe

A: REMOVAL

Remove the oil pipe.

NOTE:
Do not reuse the gasket.

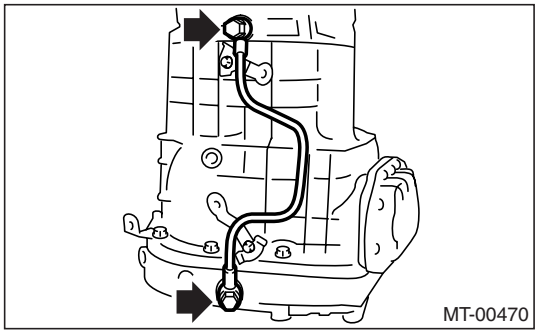


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Always use a new gasket.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)



C: INSPECTION

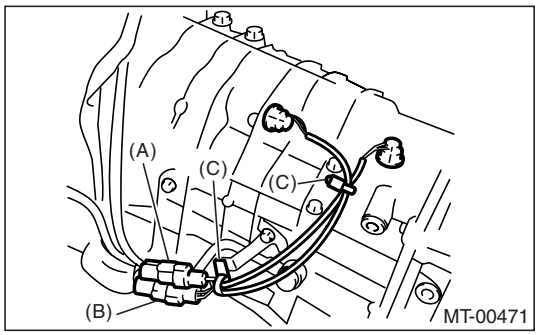
1) Make sure there is no damage on pipe. If there is damage, replace the pipe.
2) Check the joint parts of pipe for oil leakage. If there is oil leakage, replace the gasket.

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10.Back-up Light Switch

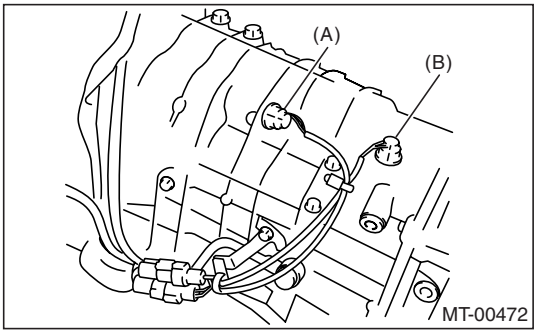
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Disconnect the back-up light switch connector.



(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Remove the back-up light switch.

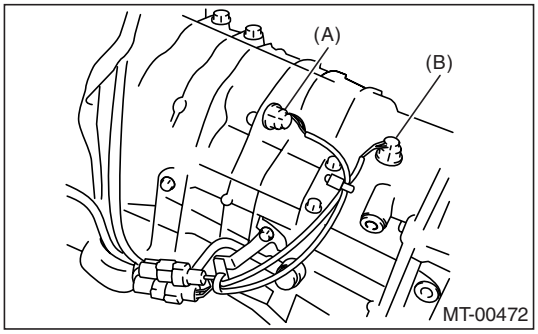


(A) Back-up light switch
(B) Neutral position switch

B: INSTALLATION

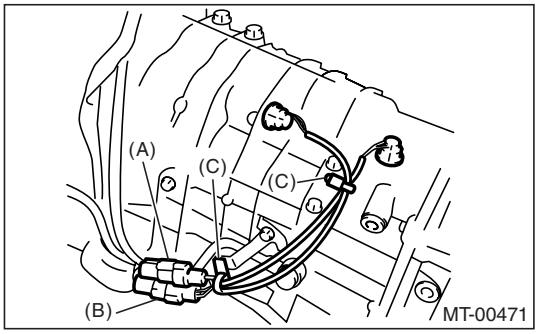
1) Install the back-up light switch.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Back-up light switch
(B) Neutral position switch

2) Connect the back-up light switch connector.



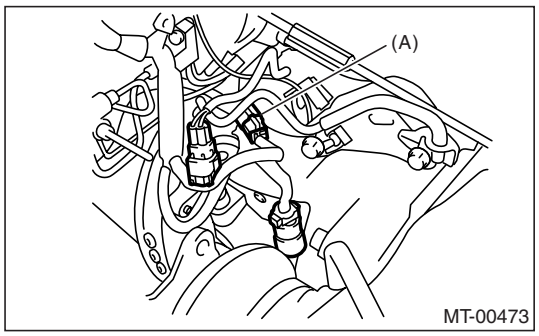
(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

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C: INSPECTION

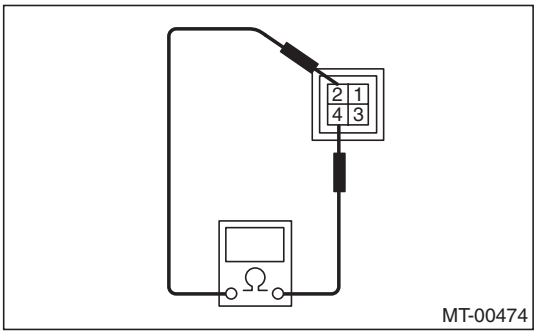
1) Disconnect the ground cable from battery.
2) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
3) Disconnect the transmission harness and chassis harness.



(A) Transmission connector

4) Measure the resistance between back-up light switch terminals. If it is not within specifications, replace the back-up light switch.

Gear shift position	Terminal No.	Specified resistance
Back-up position	2 and 4	Less than 1 Ω
Other positions		More than 1 MΩ

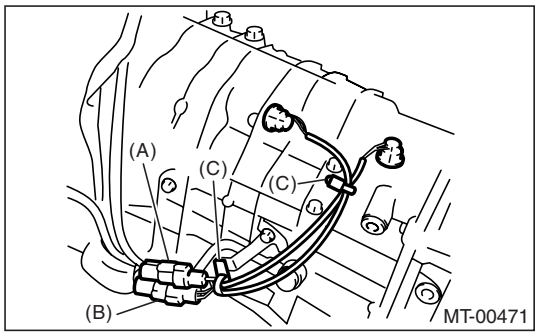


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11.Neutral Position Switch

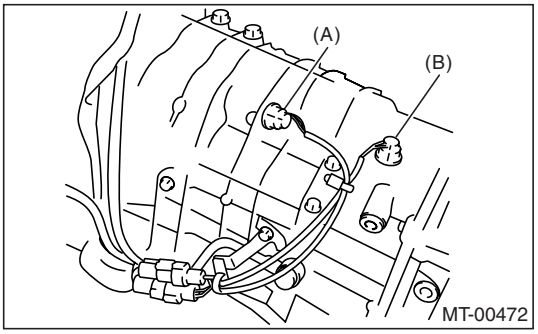
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Disconnect the neutral position switch connector and clip.



(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Remove the neutral position switch.

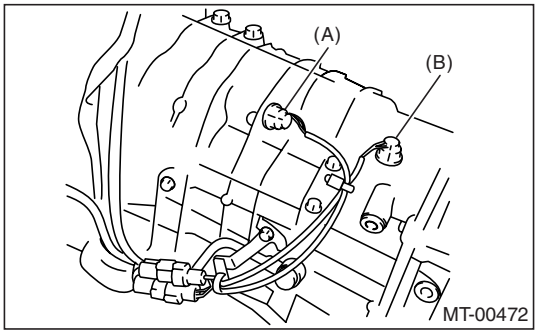


(A) Back-up light switch
(B) Neutral position switch

B: INSTALLATION

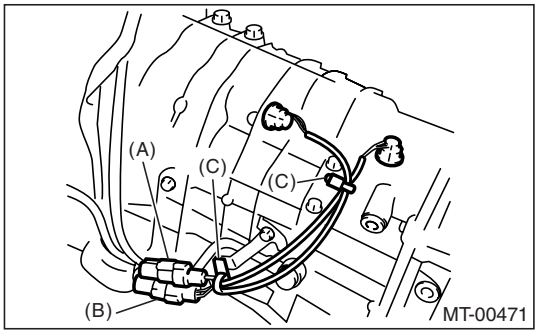
1) Install the neutral position switch.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Back-up light switch
(B) Neutral position switch

2) Connect the neutral position switch connector and clip.



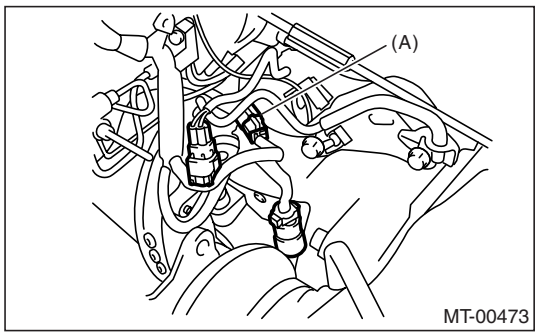
(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

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C: INSPECTION

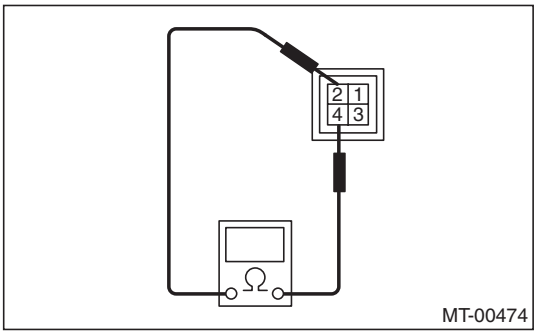
1) Disconnect the ground cable from battery.
2) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
3) Disconnect the transmission harness and chassis harness.



(A) Transmission connector

4) Measure the resistance between neutral position switch terminals. If it is not within specifications, replace the neutral position switch.

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 3	Less than 1 Ω
Other positions		More than 1 MΩ

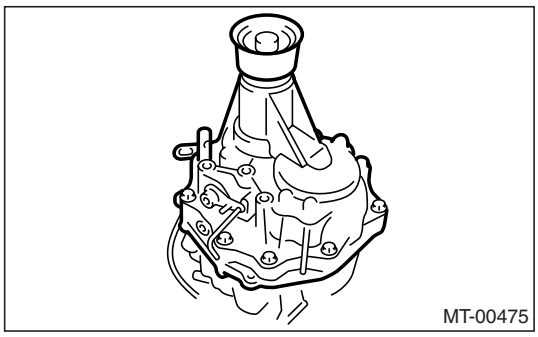


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12.Extension Case

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case.

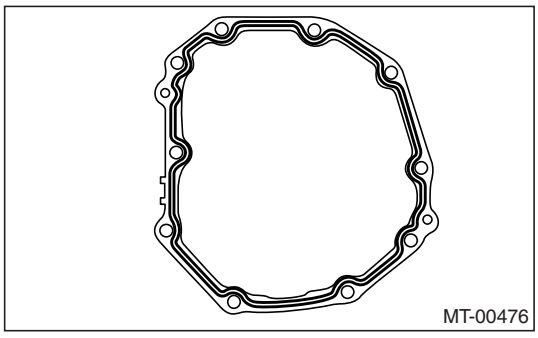

MT-00475

4) Completely remove the remaining liquid gasket from the extension case and transmission case.

B: INSTALLATION

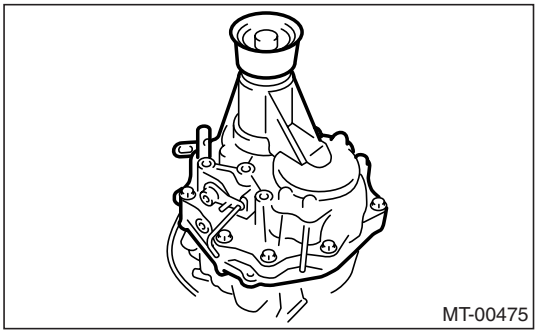
1) Select the transfer driven gear thrust washer, and then install it to extension case. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
2) Apply oil lightly to the outer periphery of bearing cone, and then install it to extension case.
3) Select the thrust washer of transfer drive gear, and then install it to center differential.
4) Apply liquid gasket to the transmission case.

Liquid gasket:
THREE BOND 1215


MT-00476

5) Install the extension case.

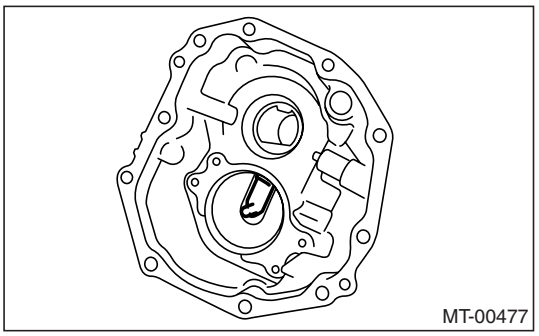
Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)


MT-00475

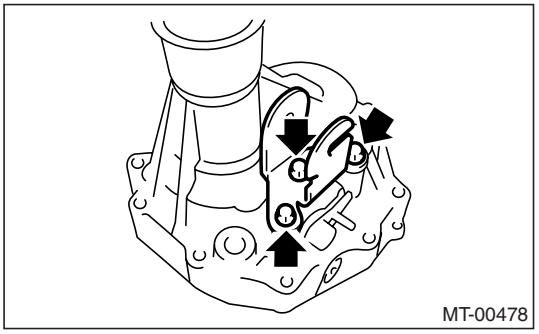
6) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Remove the transfer drive gear. <Ref. to 6MT-58, REMOVAL, Transfer Drive Gear.>
2) Remove the extension guide.

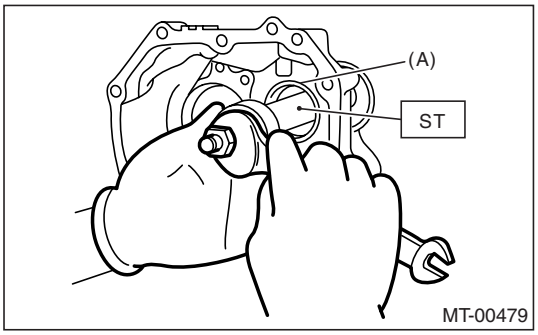

MT-00477

3) Remove the shift bracket.


MT-00478

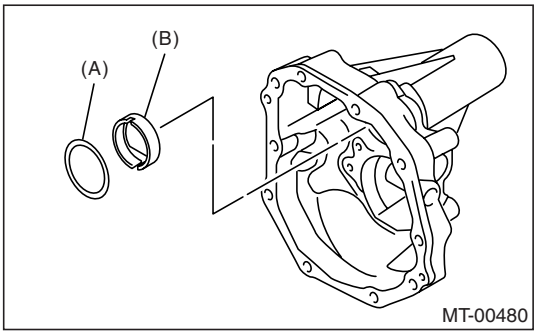
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4) Using the ST, remove the bearing cone.
ST 18758AA000 PULLER



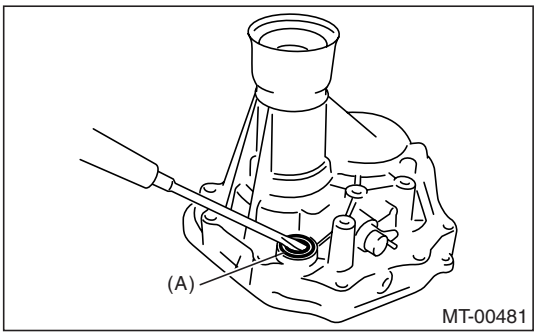
(A) Bearing cone

5) Remove the thrust washer and oil plate.



(A) Thrust washer
(B) Oil plate

6) Remove the shifter arm oil seal.

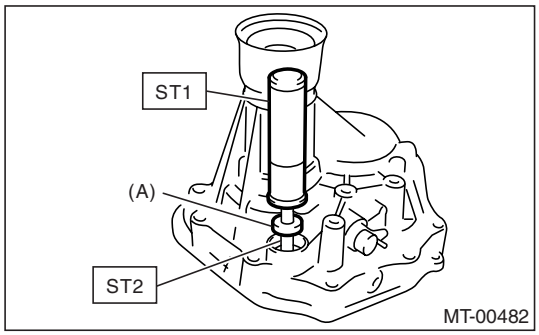


(A) Oil seal

7) Remove the reverse checking system. <Ref. to 6MT-55, REMOVAL, Reverse Checking System.>
8) Remove the extension oil seal. <Ref. to 6MT-33, REPLACEMENT, Oil Seal.>

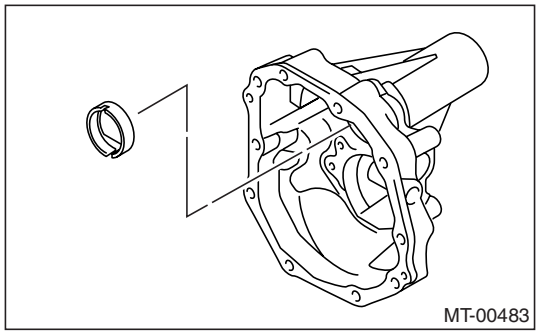
D: ASSEMBLY

1) Install the reverse checking system. <Ref. to 6MT-56, INSTALLATION, Reverse Checking System.>
2) Install the extension case oil seal. <Ref. to 6MT-33, REPLACEMENT, Oil Seal.>
3) Using the ST, install the shifter arm oil seal.
ST1 18657AA000 INSTALLER
ST2 18671AA000 OIL SEAL GUIDE



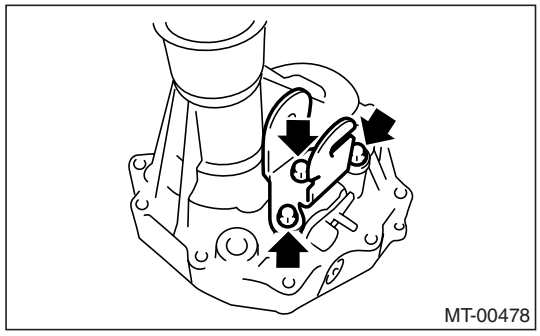
(A) Oil seal

4) Install the oil plate.



5) Select the bearing thrust washer, and then install it to extension case. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
6) Apply oil lightly to the outer periphery of bearing cone, and then install it to extension case.
7) Install the shift bracket.

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



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8) Install the extension guide, and then install the transfer driven gear. <Ref. to 6MT-58, INSTALLATION, Transfer Drive Gear.>

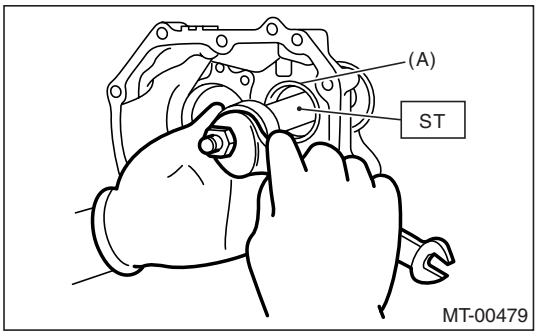
E: INSPECTION

1) Make sure there is no damage or crack on extension case. If there is damage or crack, replace the extension case.
2) Check each oil seal and joint part of extension case and transmission case for oil leakage. If there is oil leakage, replace the oil seal and liquid gasket.

F: ADJUSTMENT

1. TRANSFER DRIVEN GEAR BEARING THRUST WASHER ADJUSTMENT

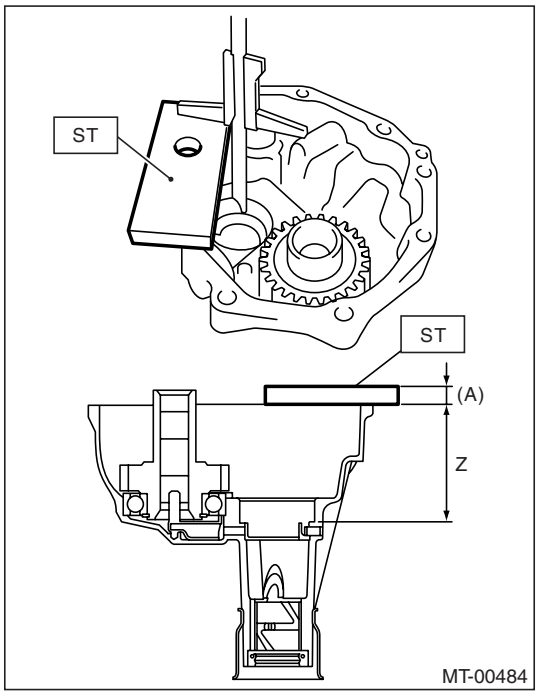
1) Using the ST, remove the bearing cone from extension case.
ST 18758AA000 PULLER



(A) Bearing cone

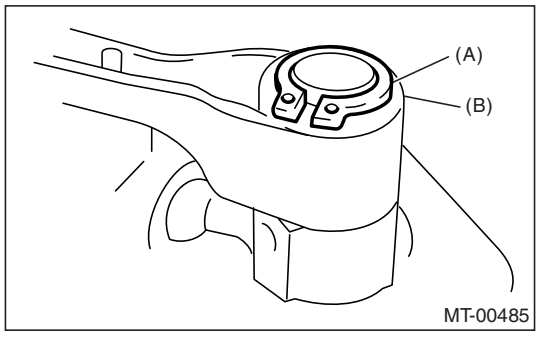
2) Remove the thrust washer.
3) Measure the depth “Z” between end of extension case and contact point of bearing cone.
ST 398643600 GAUGE

NOTE:
To measure the depth “Z”, subtract the thickness of ST [15 mm (0.59 in)] from the measured value.



(A) 15 mm (0.59 in)

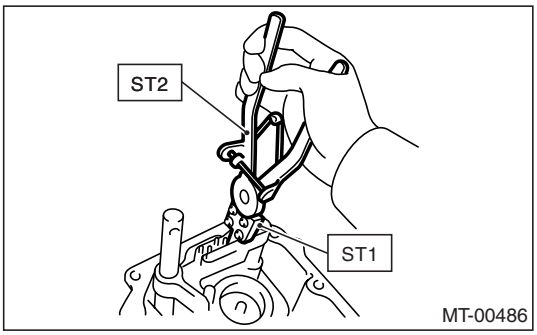
4) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
5) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
6) Remove the snap ring and support from selector arm part.



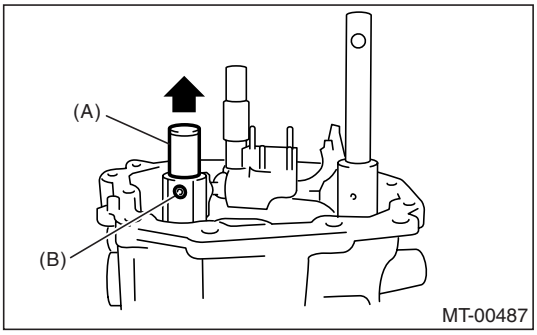
(A) Snap ring
(B) Support

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7) Using the ST, remove the neutral set spring and support.
ST1 18756AA000CLAW
ST2 398663600 PLIERS

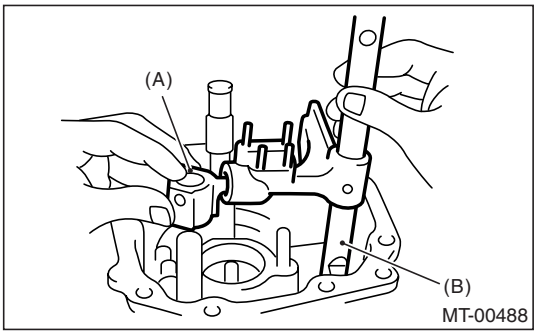


8) Lift-up the striking rod and remove spring pin.



(A) Striking rod
(B) Spring pin

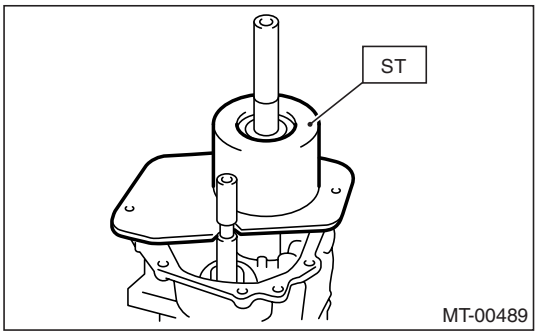
9) Remove the selector arm No.2 and shifter arm.



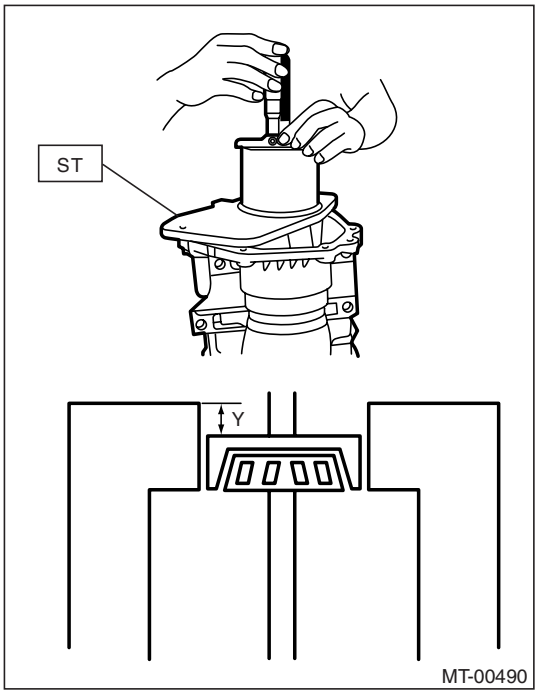
(A) Selector arm No.2
(B) Shifter arm

10) Install the bearing cone to transfer driven gear.

11) Set the ST.
ST 18831AA000 GAUGE



12) Rotate the transfer driven gear approx. ten times to get the bearing accustomed.
13) Measure the depth “Y” between end of ST and bearing cone.
ST 18831AA000 GAUGE



14) Calculate the value “t” of transfer driven gear bearing thrust washer using the following equation.
t = Z – (100 – Y) – { –0.04 to 0.11 mm (–0.0016 to 0.0043 in)}

t mm (in)	Thickness of transfer driven gear bearing thrust washer.
Y mm (in)	Depth from end of ST to bearing cone.
Z mm (in)	Depth from end of extension case to contact point of bearing cone.
–0.04 — 0.11 mm (–0.0016 — 0.0043 in)	Standard clearance between thrust washer and taper roller bearing.
100 mm (3.94 in)	Height of ST.

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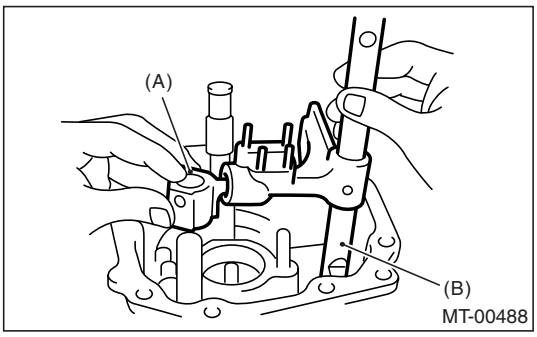
15) Select the nearest thrust washer from the following table, according to the calculated value “t”.

Standard clearance between thrust washer and taper roller bearing:
−0.04 — 0.11 mm T (−0.0016 — 0.0043 in T)

NOTE:
T: Tight

Thrust washer (50 × 61 × t)	
Part No.	Thickness t mm (in)
803050060	0.50 (0.0197)
803050062	0.60 (0.0236)
803050064	0.70 (0.0276)
803050066	0.80 (0.0315)
803050068	0.90 (0.0354)
803050070	1.00 (0.0394)
803050072	1.10 (0.0433)
803050074	1.20 (0.0472)
803050076	1.30 (0.0512)
803050078	1.40 (0.0551)

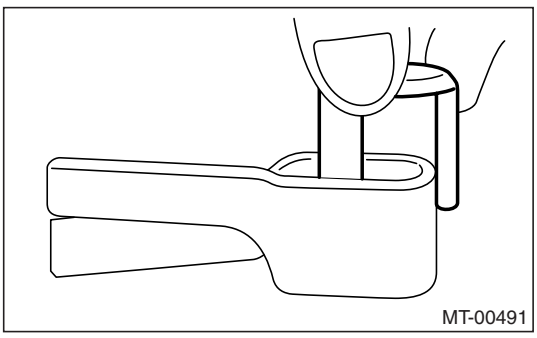
16) Install the selector arm No.2 and shifter arm.



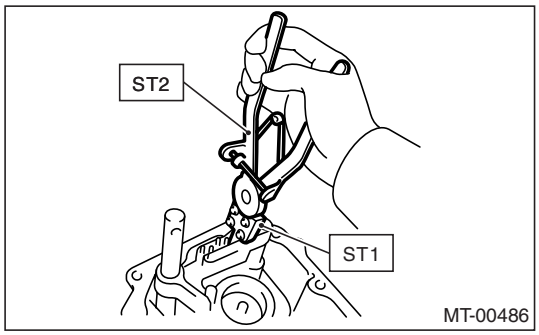
(A) Selector arm No. 2
(B) Shifter arm

17) Install a new spring pin.
18) Install the support to neutral set spring.

NOTE:
Make sure to install the support in proper direction.



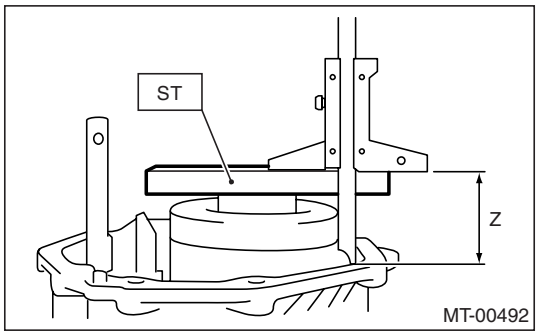
19) Using the ST, install the neutral set spring and support.
ST1 18756AA000CLAW
ST2 398663600 PLIERS



20) Install the snap ring.
21) Install the center differential.

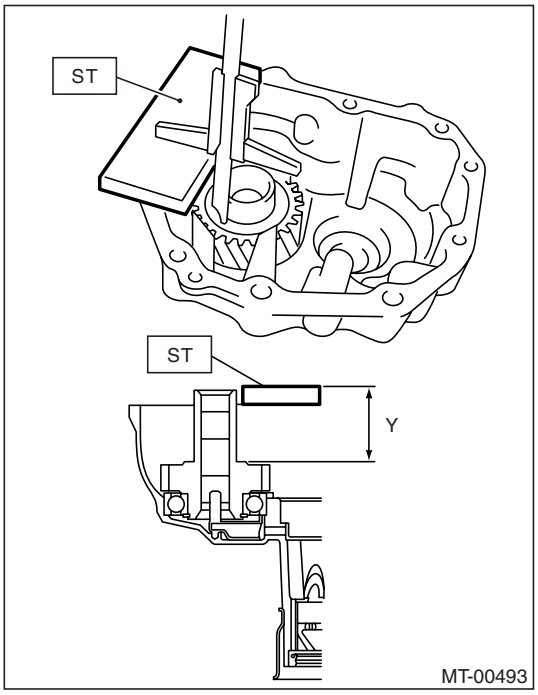
2. SELECTING THE TRANSFER DRIVE GEAR THRUST WASHER

1) Measure the height “Z” between end of transmission case and end of ST.
ST 398643600 GAUGE



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2) Measure the depth “Y” between end of ST and transfer drive gear.
ST 398643600 GAUGE



3) Calculate the value “t” of transfer drive gear thrust washer using the following equation.
t = {Y – 15 mm (1.18 in)} – {Z – 15 mm (1.18 in)} – 0.45 to 0.65 mm (0.018 to 0.026 in)

t mm (in)	Thickness of transfer drive gear thrust washer
Y mm (in)	Depth from end of ST to transfer drive gear
Z mm (in)	Height from end of transmission case to the end of ST
0.45 — 0.65 mm (0.018 — 0.026 in)	Standard clearance between thrust washer and transfer drive gear.
15 mm (1.18 in)	Thickness of ST

4) Select the nearest thrust washer from the following table, according to the calculated value “t”.

Standard clearance between thrust washer and transfer drive gear:
0.45 — 0.65 mm (0.018 — 0.026 in)

Thrust washer (36.3 × 52 × t)	
Part No.	Thickness mm (in)
803036070	0.80 (0.0315)
803036071	0.95 (0.0374)
803036072	1.10 (0.0433)
803036073	1.25 (0.0492)
803036074	1.40 (0.0551)
803036075	0.65 (0.0256)

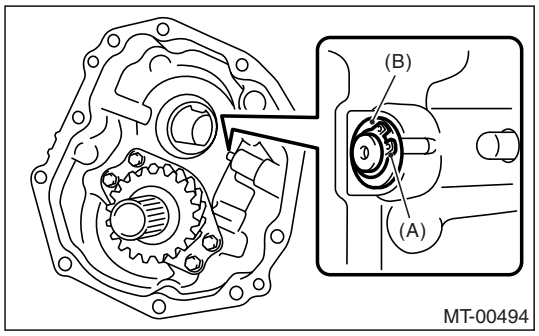
5) Install the selected thrust washer.

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13.Reverse Checking System

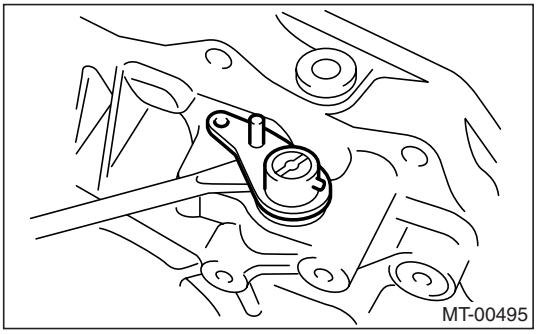
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
4) Remove the snap ring and washer from reverse check shaft.



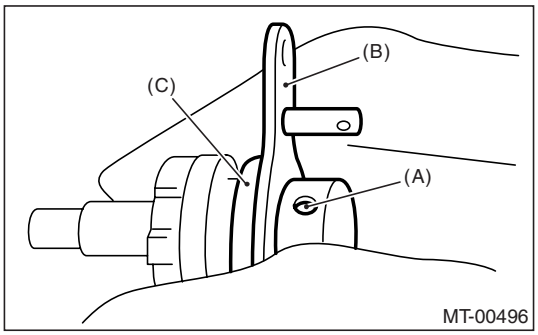
(A) Snap ring
(B) Washer

5) Remove the reverse check shaft and spring from extension case.



6) Remove the spring pin, and then remove the reverse check lever and oil seal from reverse check shaft.

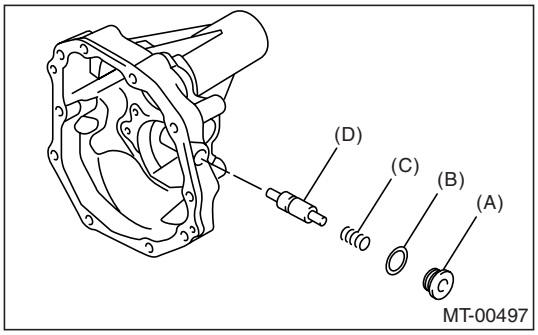
NOTE:
Do not reuse the oil seal.



(A) Spring pin
(B) Reverse check lever
(C) Oil seal

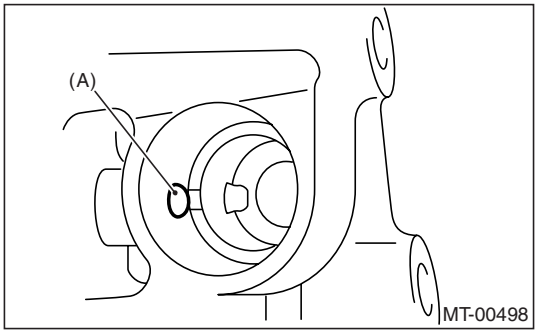
7) Remove the plug from extension case, then remove the gasket, spring and plunger.

NOTE:
Do not reuse the gasket.



(A) Plug
(B) Gasket
(C) Spring
(D) Plunger

8) Remove the reverse lock plunger.



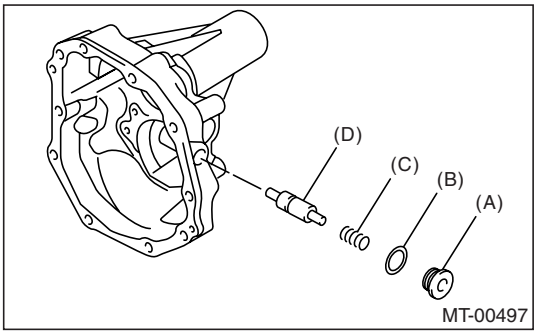
(A) Reverse lock plunger

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B: INSTALLATION

1) Insert the reverse lock plunger.
2) Install in the order of reverse check plug, spring, gasket and plug.

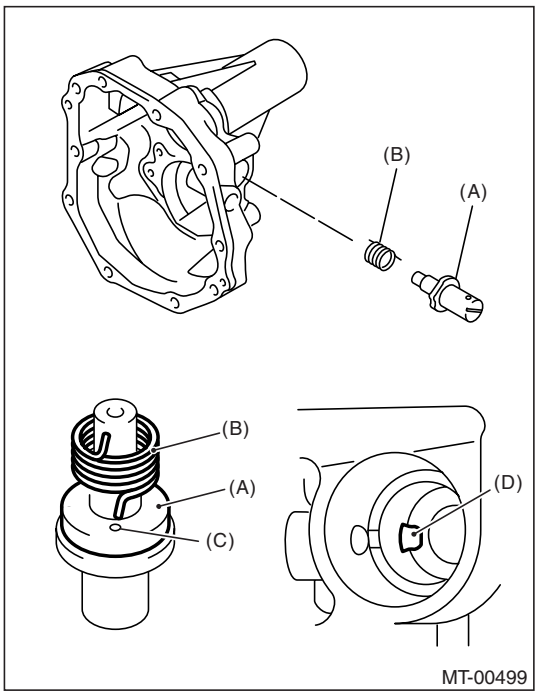
Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)



(A) Plug
(B) Gasket
(C) Spring
(D) Reverse check plug

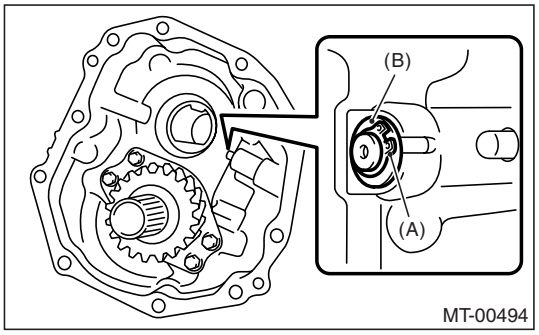
3) Install the spring and reverse check shaft to extension case.

NOTE:
Be sure the spring end aligns with the hole of reverse check shaft and cutout portion of extension case.



(A) Reverse check shaft
(B) Spring
(C) Hole
(D) Cutout portion

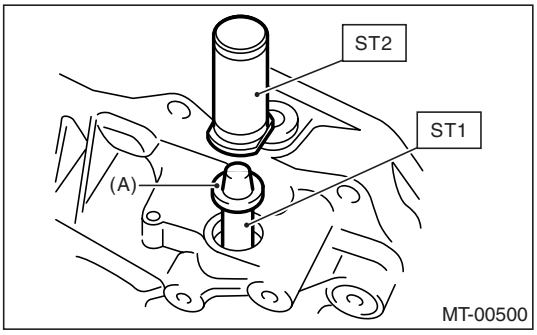
4) Install the washer and snap ring.



(A) Snap ring
(B) Washer

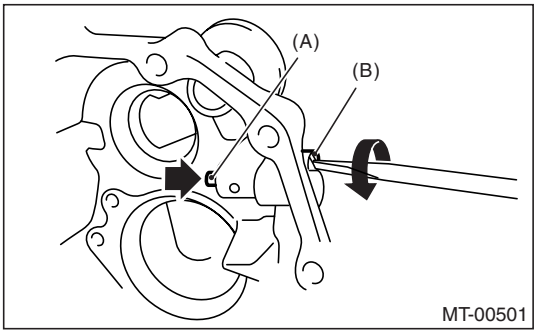
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5) Set the ST1 to reverse check shaft. Install a new oil seal, then press with ST2.
ST1 18671AA000OIL SEAL GUIDE
ST2 18657AA010 INSTALLER



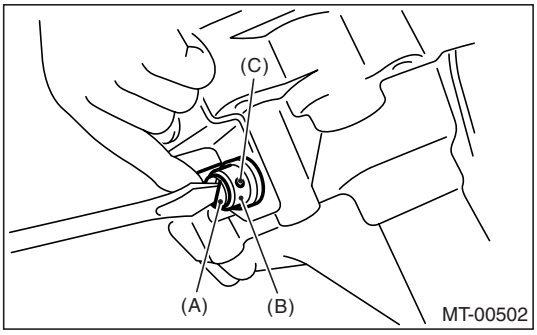
(A) Oil seal

6) Insert the reverse check lever, then rotate the reverse check shaft until the plunger can be pushed in first.



(A) Plunger
(B) Reverse check shaft

7) Align the hole of reverse check lever and reverse check shaft, then install the spring pin.



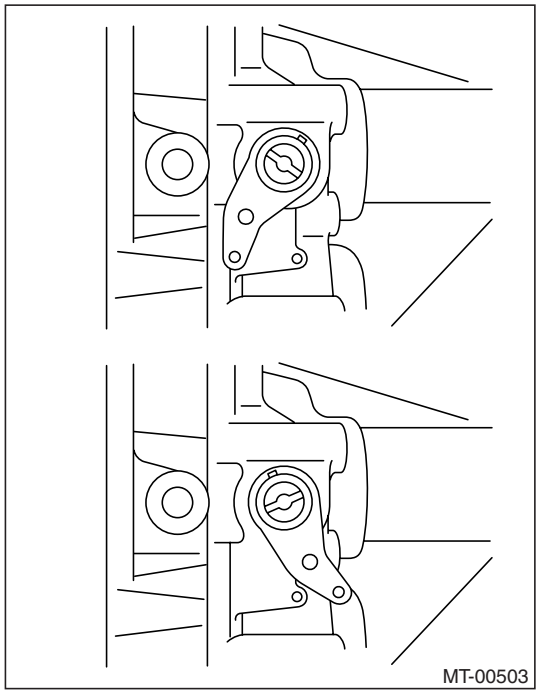
(A) Reverse check shaft
(B) Reverse check lever
(C) Hole

8) Make sure the reverse check operates correctly. <Ref. to 6MT-57, INSPECTION, Reverse Checking System.>

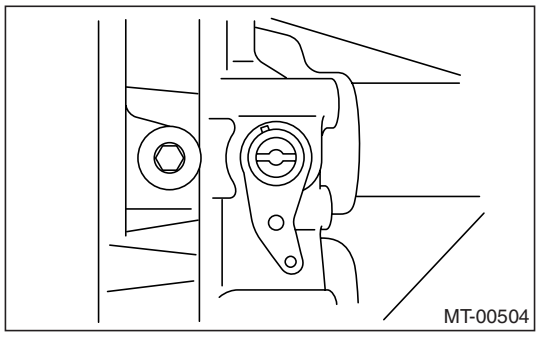
9) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
10) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1) Make sure there is no damage on each parts.
2) Make sure the reverse check lever operates smoothly.
3) Make sure there is no oil leakage on oil seal part of reverse check shaft. If there is oil leakage, replace the oil seal.
4) Inspect the reverse check operation.
(1) The plunger can be pushed or the gear can be shifted to reverse, when reverse check lever is in the following position.



(2) The plunger cannot be pushed or the gear cannot be shifted to reverse, when reverse check lever is in the following position.



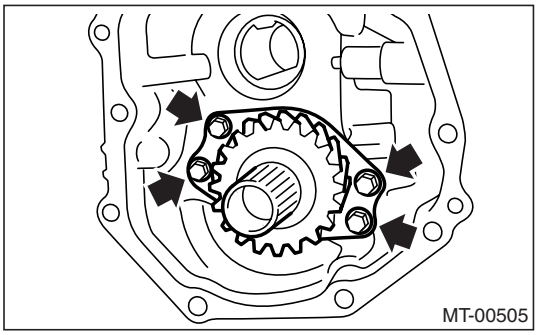
5) If not as specified, reassemble the reverse check system.

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14.Transfer Drive Gear

A: REMOVAL

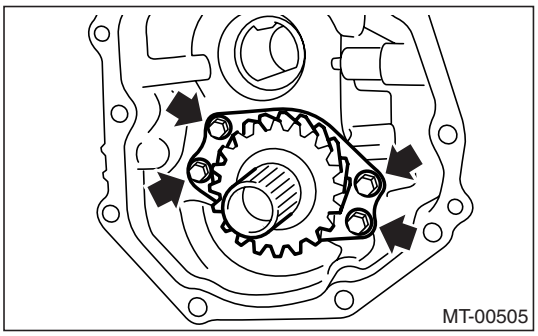
1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
4) Remove the transfer drive gear.



B: INSTALLATION

1) Install the transfer drive gear.

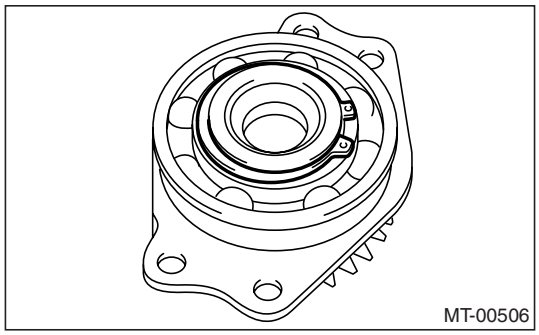
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



2) If the ball bearing, transfer drive gear or snap ring is replaced, select the transfer drive gear thrust washer. <Ref. to 6MT-50, ASSEMBLY, Extension Case.>
3) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
4) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

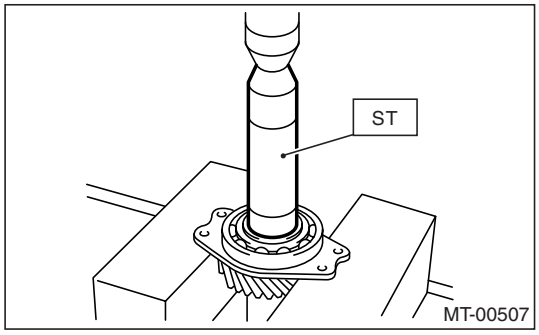
C: DISASSEMBLY

1) Remove the snap ring.



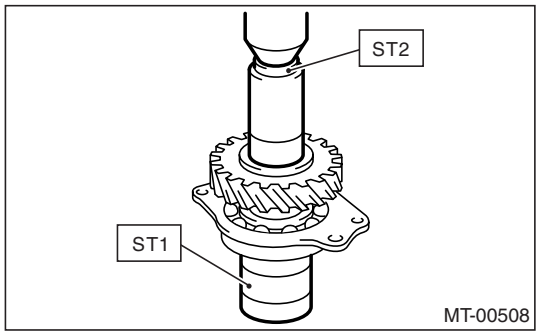
2) Using the ST, remove the ball bearing.
ST 499877000 RACE 4-5 INSTALLER

NOTE:
Do not reuse the ball bearing.



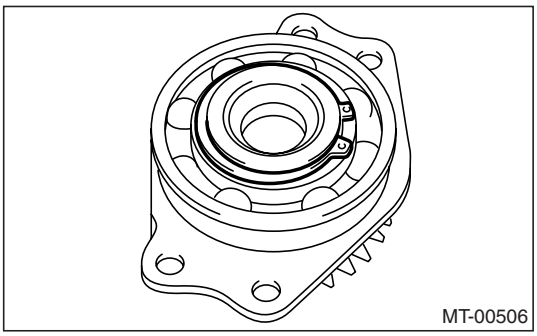
D: ASSEMBLY

1) Using the ST, install the ball bearing.
ST1 499247400 INSTALLER
ST2 398497701 SEAT



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2) Install the snap ring.



3) Inspect the clearance between snap ring and ball bearing. <Ref. to 6MT-59, INSPECTION, Transfer Drive Gear.>

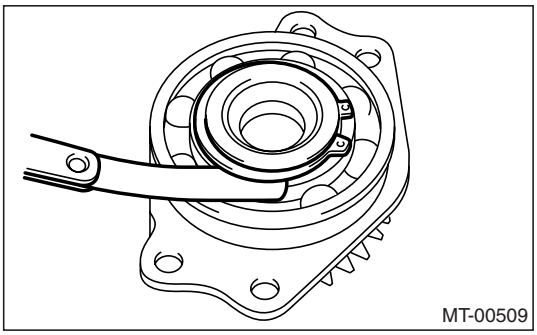
E: INSPECTION

1) Bearings
Replace the bearings in the following cases.
- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise.

2) Drive gear
Replace the drive gear in the following cases.
- If their tooth surface and shaft are excessively broken or damaged.

3) Measure the clearance between snap ring and inner race of ball bearing with a thickness gauge.

Standard clearance between snap ring and inner race:
0 — 0.15 mm (0 — 0.0059 in)



4) If the measurement is not within specifications, select suitable snap ring.

Thrust washer	
Part No.	Thickness mm (in)
805045050	1.76 (0.069)
805045060	1.88 (0.074)
805045070	2.00 (0.079)

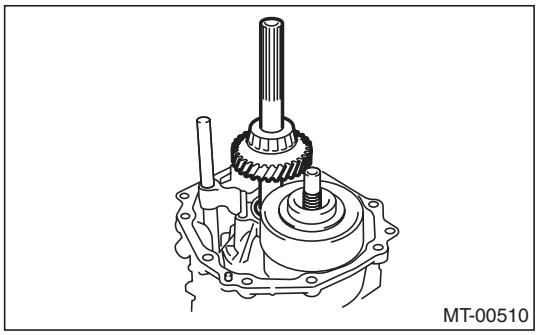
After replacement of the snap ring, inspect the clearance again.

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15.Transfer Driven Gear

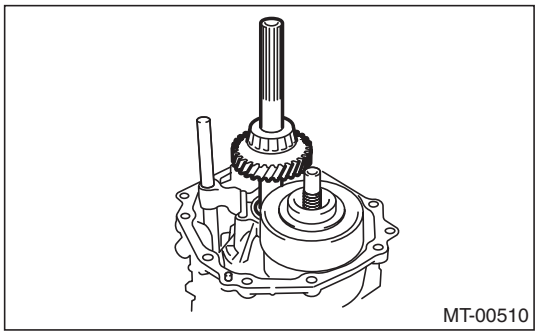
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
4) Remove the transfer driven gear.



B: INSTALLATION

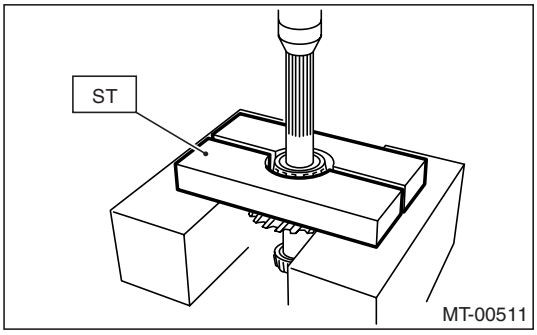
1) Install the transfer driven gear.



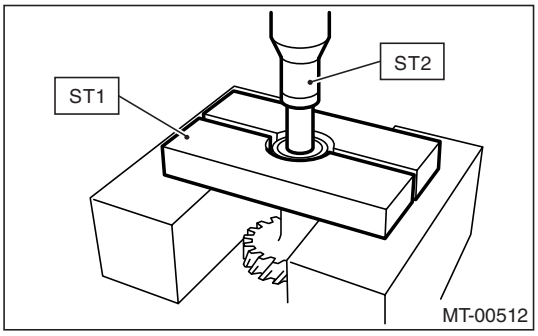
2) If the bearing or transfer driven gear is replaced, select the transfer driven thrust washer. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
3) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
4) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Using the ST, remove the roller bearing of extension case side.
ST 498515700 REMOVER



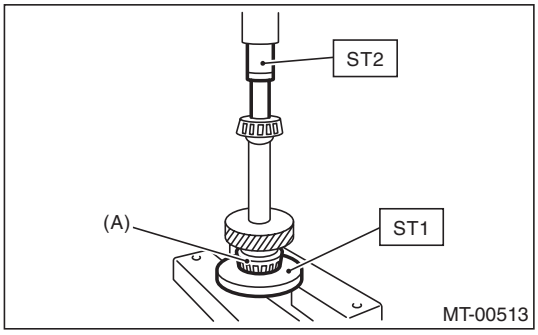
2) Using the ST, remove the roller bearing of transmission case side.
ST1 899858600 REMOVER
ST2 899864100 REMOVER



D: ASSEMBLY

1) Using the ST, install the roller bearing of extension case side.
ST1 398177700 INSTALLER
ST2 899864100 REMOVER

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

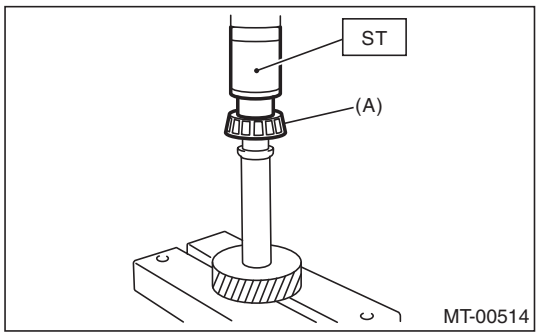


(A) Roller bearing

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2) Using the ST, install the roller bearing of transmission case side.
ST 499757002INSTALLER

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

E: INSPECTION

1) Bearings
Replace the bearing in 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.

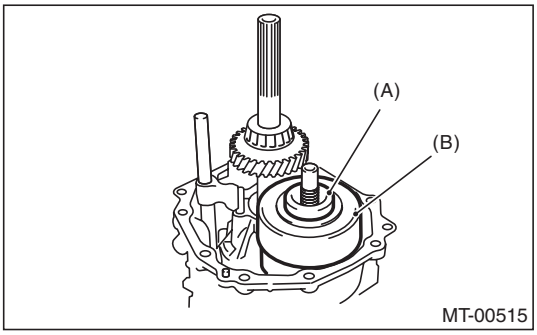
2) Driven gear
Replace the driven gear in following case.
- If their tooth surfaces and shaft are excessively broken or damaged.

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16.Center Differential

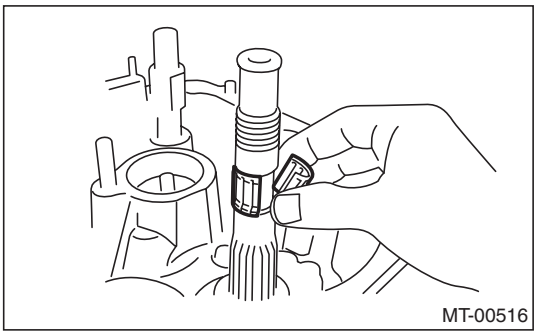
A: REMOVAL

1) Remove the manual transmission case assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
4) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
5) Remove the thrust washer and center differential.



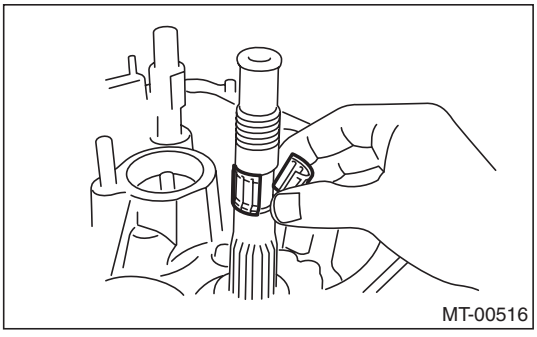
(A) Thrust washer
(B) Center differential

6) Remove the needle bearing.

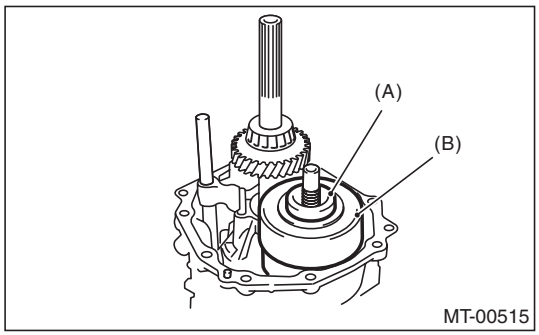


B: INSTALLATION

1) Install the needle bearing.



2) Install the thrust washer and center differential.



(A) Thrust washer
(B) Center differential

3) If replacing the center differential, select the transfer drive gear and thrust washer and install. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
4) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
5) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
6) Install the manual transmission case assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

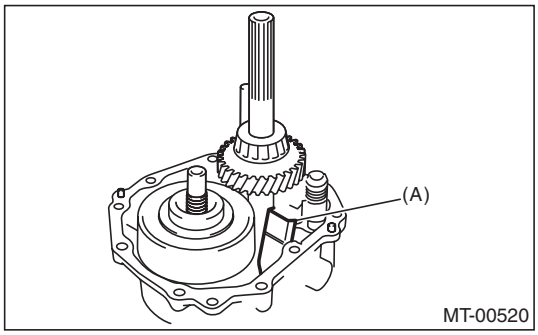
Make sure there is no damage on the center differential. Replace if damaged.

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17.Oil Pump

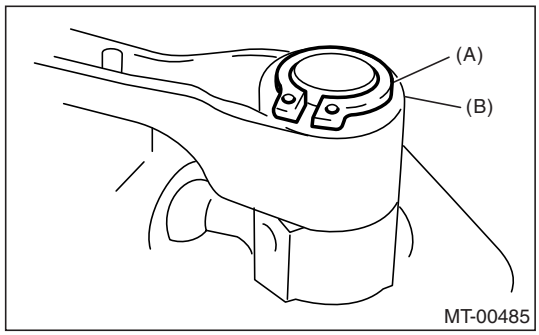
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
4) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
5) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
6) Remove the oil guide.



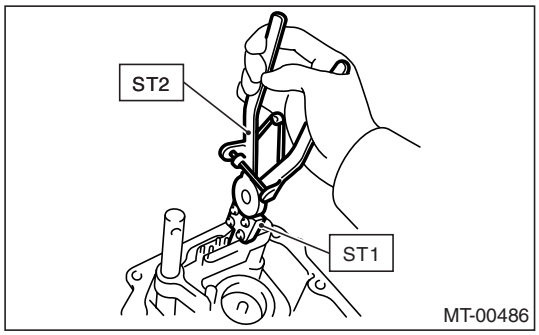
(A) Oil guide

7) Remove the snap ring.

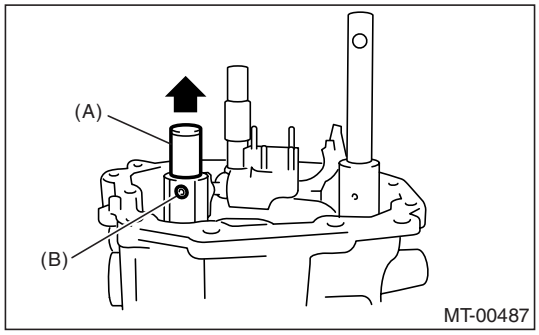


(A) Snap ring
(B) Support

8) Using the ST, remove the neutral set spring and support.
ST1 18756AA000 CLAW
ST2 398663600 PLIERS

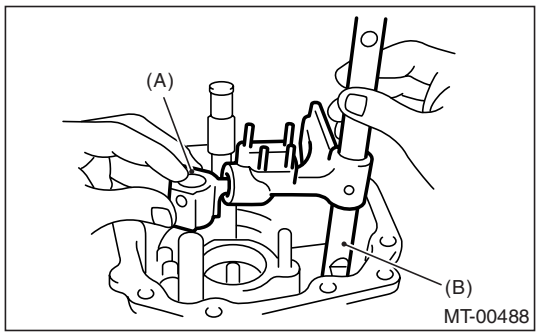


9) Raise the striking rod up, and then remove the spring pin.



(A) Striking rod
(B) Spring pin

10) Remove the selector arm No.2 and shifter arm.

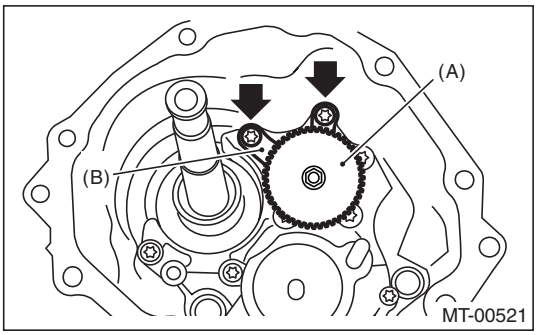


(A) Selector arm No. 2
(B) Shifter arm

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11) Remove the oil pump shaft assembly and plate.

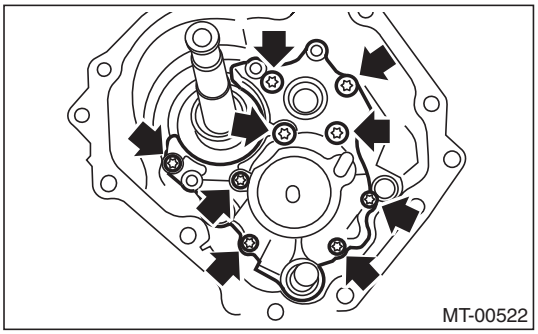
NOTE:
Remove the bolts using ST, because tool may break if general tool is used.
ST 18663AA000 SOCKET



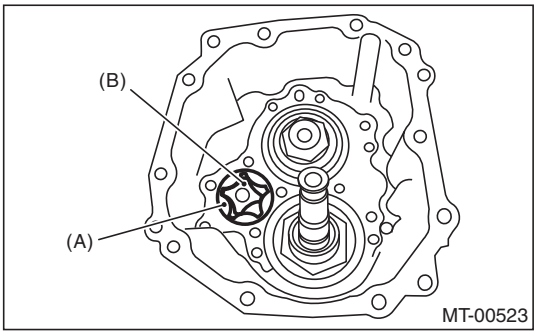
(A) Oil pump shaft assembly
(B) Plate

12) Remove the oil pump cover assembly.

NOTE:
Remove the bolts using ST, because tool may break if general tool is used.
ST 18663AA000 SOCKET



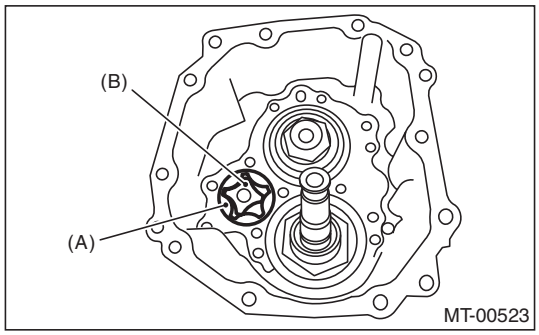
13) Remove the thrust washer on main shaft part.
14) Remove the oil pump rotor.



(A) Outer rotor
(B) Inner rotor

B: INSTALLATION

1) Apply oil to the outer periphery of outer rotor, then install to transmission case.

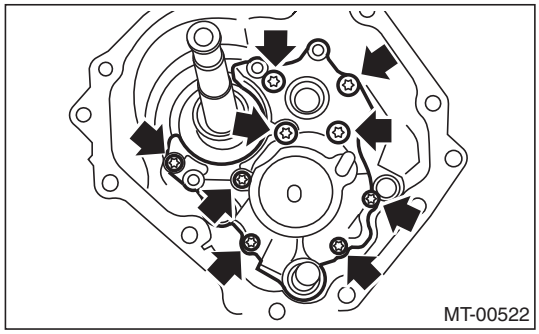


(A) Outer rotor
(B) Inner rotor

2) Install the thrust washer to main shaft part.
3) Install the oil pump cover assembly.

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

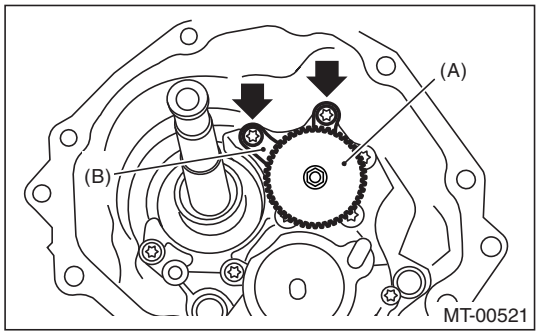
ST 18663AA000 SOCKET



4) Install the oil pump shaft assembly and plate.

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

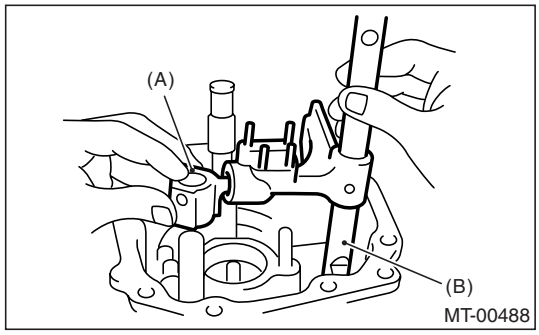
ST 18663AA000 SOCKET



(A) Oil pump shaft assembly
(B) Plate

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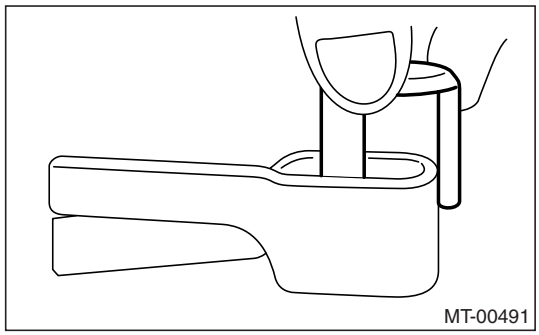
5) If replacing the oil pump cover assembly, select the transfer driven gear and thrust washer, then install them to the extension case. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
6) Install the selector arm No.2 and shifter arm.



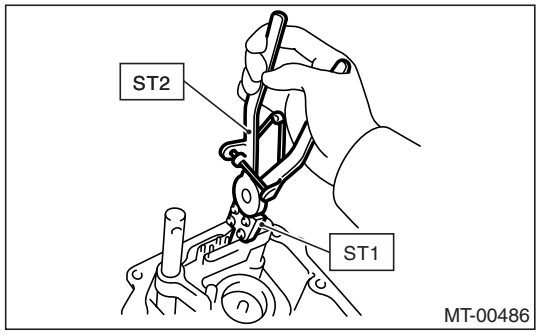
(A) Selector arm No. 2
(B) Shift arm

7) Install a new spring pin.
8) Install the support to neutral set spring.

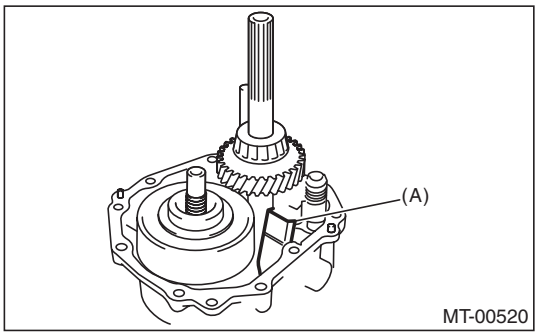
NOTE:
Make sure to install the support in proper direction.



9) Using the ST, install the neutral set spring and support.
ST1 18756AA000 CLAW
ST2 398663600 PLIERS



10) Install the snap ring.
11) Install the oil guide.



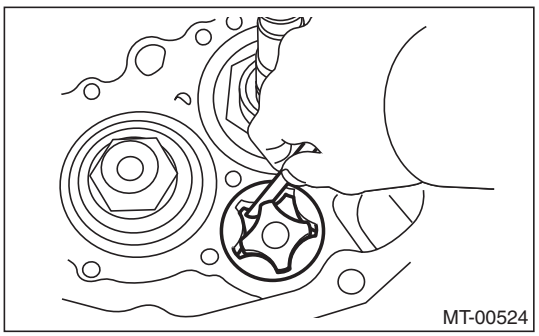
(A) Oil guide

12) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
13) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
14) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
15) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1) Make sure there is no damage on the inner rotor and outer rotor. Replace the inner rotor and outer rotor as assembly if damaged.
2) Clearance at tip
Install the inner rotor and outer rotor to transmission case. Align tip of the inner rotor and outer rotor, then measure the clearance. Replace the inner rotor and outer rotor as a set if clearance exceeds specification.

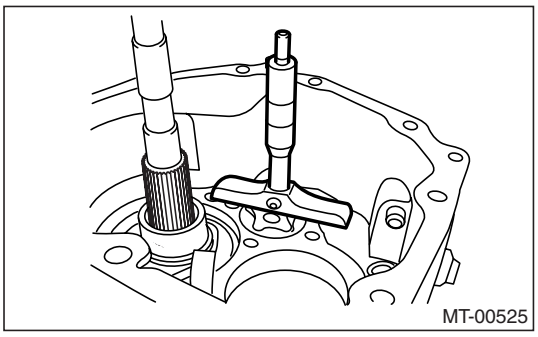
Specification of clearance at tip:
Less than 0.15 mm (0.0059 in)



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3) Side clearance
Measure to the transmission case and rotor. Replace the inner rotor and outer rotor as a set if clearance exceeds specification.

Specification of side clearance:
0.03 — 0.10 mm (0.0012 — 0.0039 in)

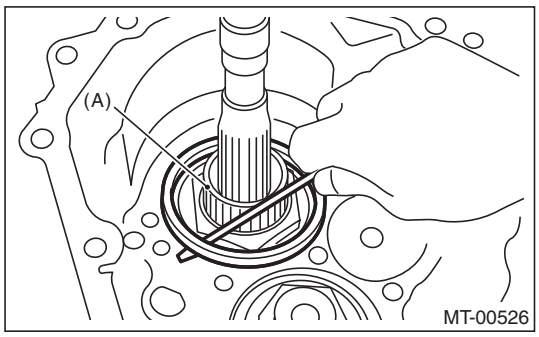


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18.Transmission Case

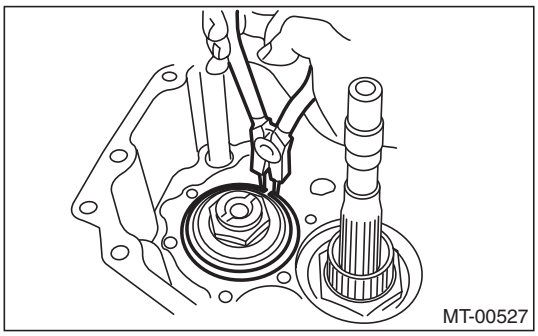
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the shim and spacer of driven gear assembly.

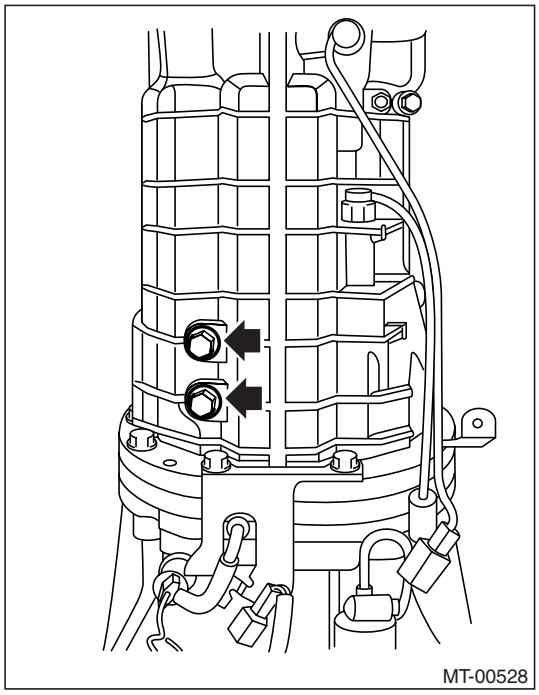


(A) Driven gear assembly

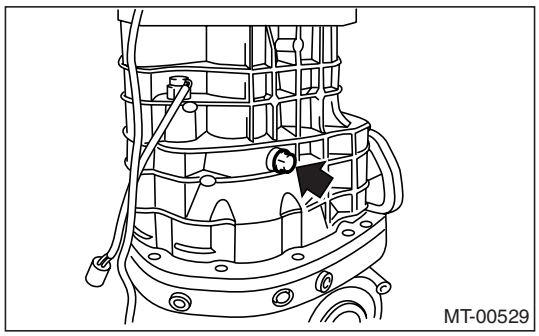
9) Remove the snap ring.



10) Remove the pilot bolt.

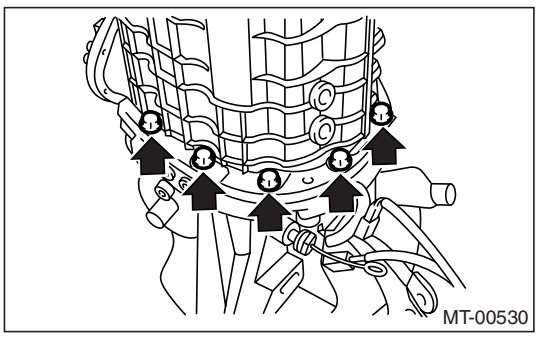


11) Remove the holder reverse bolt.



12) Remove the transmission case.

NOTE:
If the oil guide catches on shift fork, the transmission case may be difficult to be removed. Move the oil guide right and left to remove. Do not pull the transmission case by force.

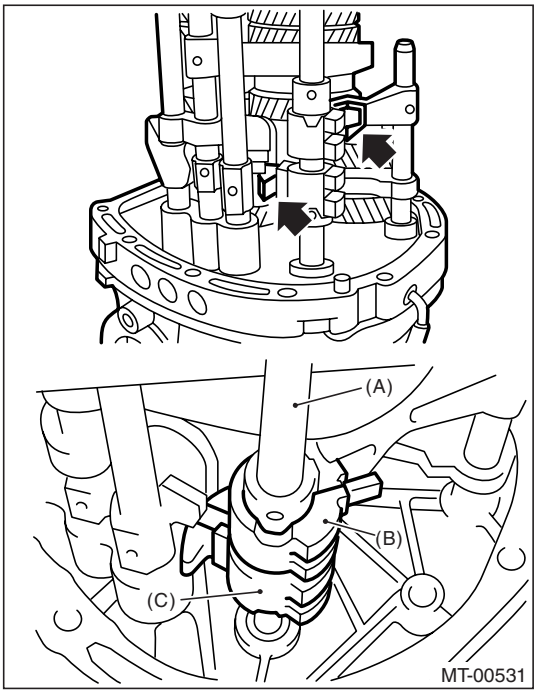


13) Completely remove the remaining liquid gasket on transmission case and adapter plate.

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B: INSTALLATION

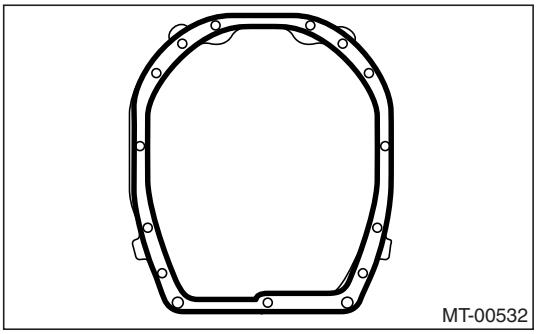
1) Make sure that each shifter fork and interlock block is shifted to neutral position. If not, shift to neutral position.



(A) Striking rod
(B) Reverse interlock block
(C) Interlock block

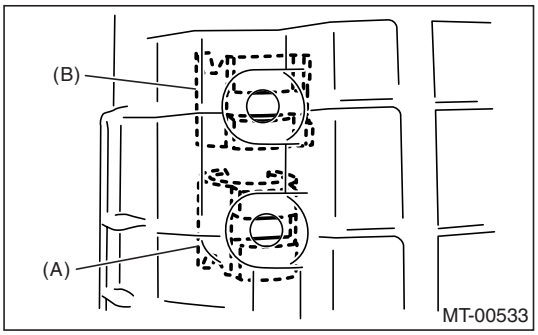
2) Apply liquid gasket to the adapter plate.

Liquid gasket:
THREE BOND 1215



3) Install the transmission case.

4) Make sure the interlock block and reverse interlock block are aligned in neutral position by inspecting through the pilot bolt installation hole. If not aligned, remove the transmission case, then shift each shifter fork and interlock block to neutral position.



(A) Interlock block
(B) Reverse interlock block

5) Using a new gasket, install the pilot bolts temporarily.
6) Tighten the transmission case with bolts and nuts.

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

7) Tighten the pilot bolts.

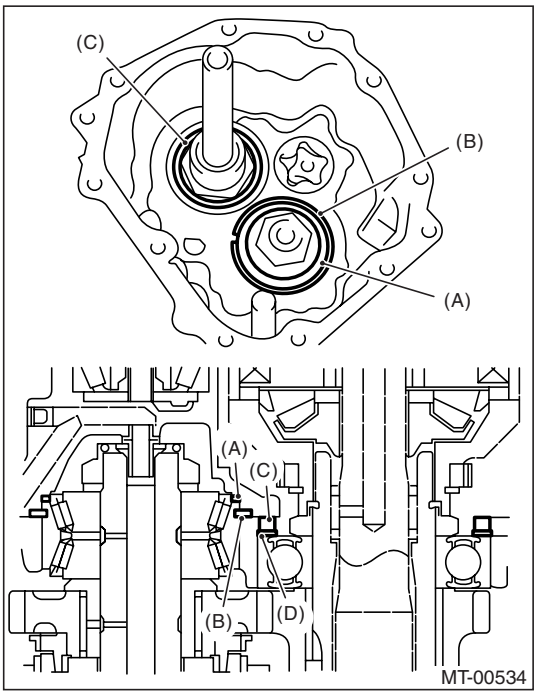
Tightening torque:
34 N·m (3.5 kgf-m, 25.1 ft-lb)

8) Tighten the holder reverse bolt.

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

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9) Install the snap ring, washer and collar of driven gear assembly.

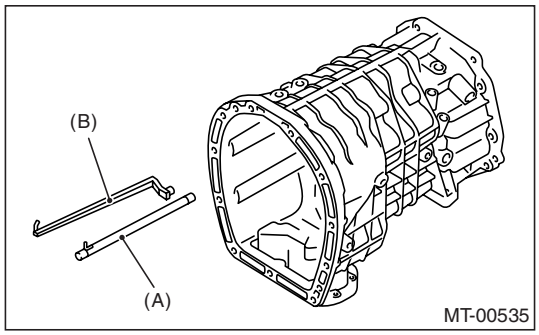


(A) Washer
(B) Snap ring
(C) Collar
(D) Washer

10) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
11) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
12) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
13) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
14) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
15) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

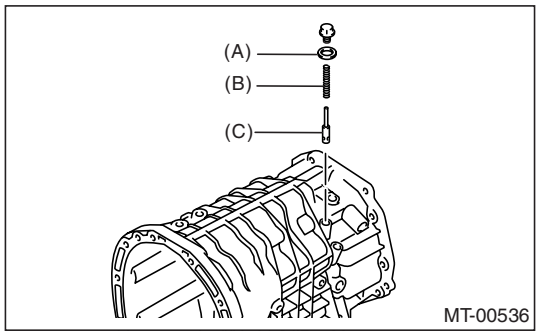
C: DISASSEMBLY

1) Remove the oil pipe and oil guide.



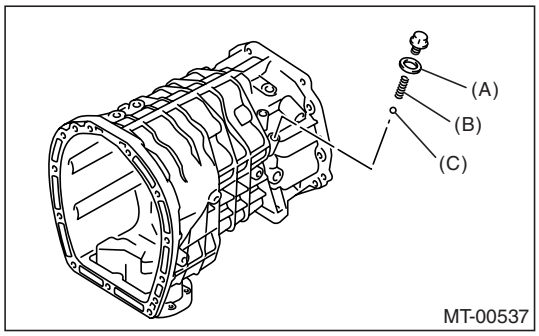
(A) Oil pipe
(B) Oil guide

2) Remove the bolt, and then remove the O-ring, relief spring and relief valve.



(A) O-ring
(B) Relief valve spring
(C) Relief valve

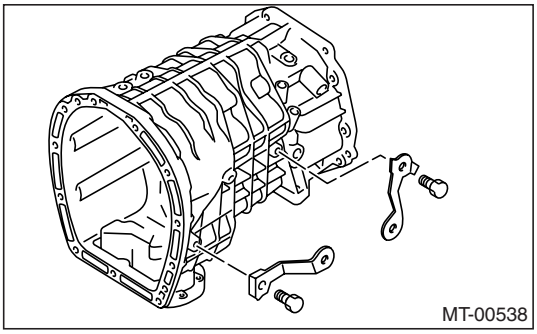
3) Remove the bolt, and then remove the O-ring, valve spring and ball.



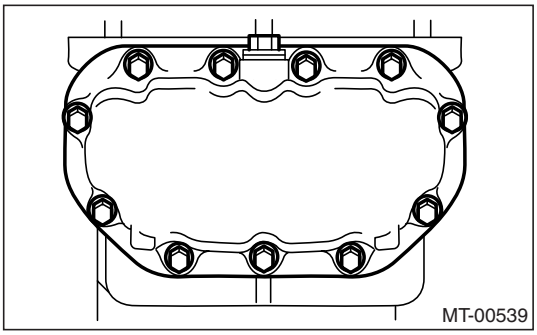
(A) O-ring
(B) Valve spring
(C) Ball

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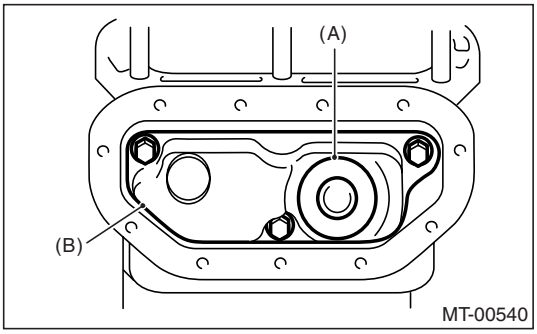
4) Remove the harness bracket.



5) Remove the oil pan.



6) Completely remove the remaining liquid gasket on transmission case and oil pan.
7) Remove the oil pan magnet, and then remove the oil strainer.

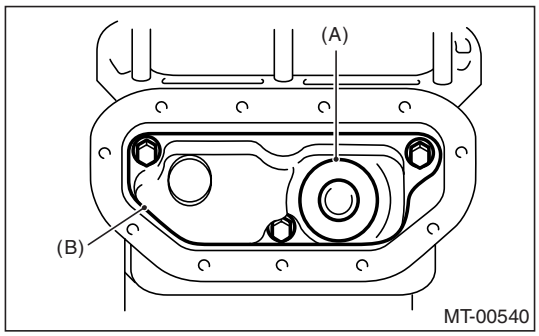


(A) Oil pan magnet
(B) Oil strainer

D: ASSEMBLY

1) Install the oil strainer and magnet.

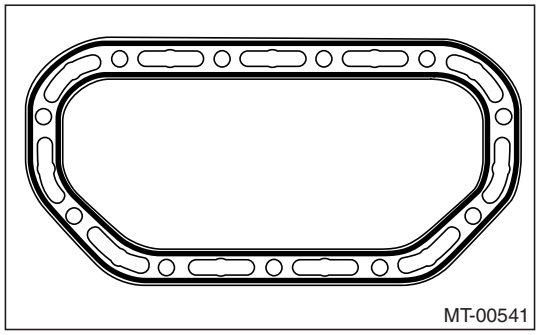
Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



(A) Oil pan magnet
(B) Oil strainer

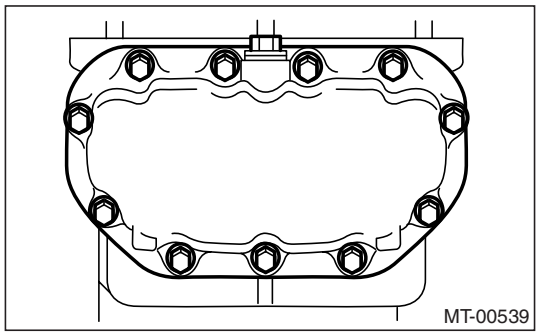
2) Apply liquid gasket to the oil pan.

Liquid gasket:
THREE BOND 1215



3) Install the oil pan.

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

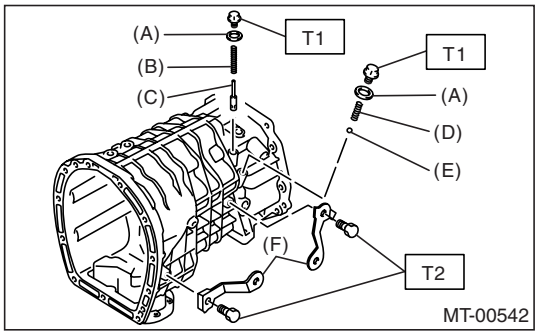


4) Install the relief valve, relief valve spring and new O-ring.

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5) Install the ball, valve spring and new O-ring.

Tightening torque:
T1: 13 N·m (1.3 kgf-m, 9.6 ft-lb)
T2: 16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) O-ring
(B) Relief valve spring
(C) Relief valve
(D) Valve spring
(E) Ball
(F) Harness bracket

E: INSPECTION

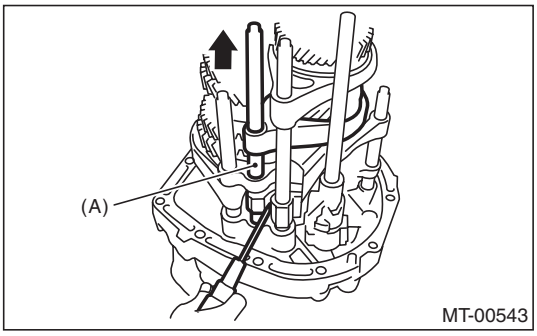
1) Completely remove with shop cloth if sludge is adhered to the oil pan magnet.
2) Make sure there is no clog on the oil strainer. If clogged, remove clog or replace the oil strainer.
3) Make sure there is no damage on each parts. Replace damaged parts with new parts.

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19.Main Shaft Assembly

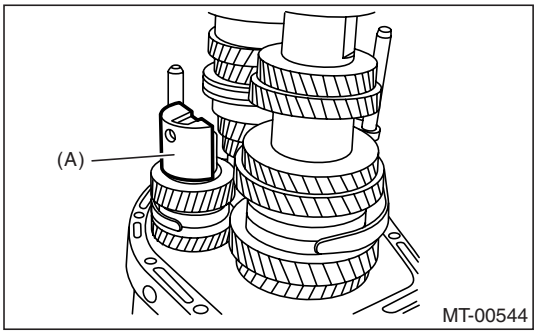
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove the striking rod.
10) Using a screwdriver, shift to 4th gear position.



(A) 3rd-4th shift rod

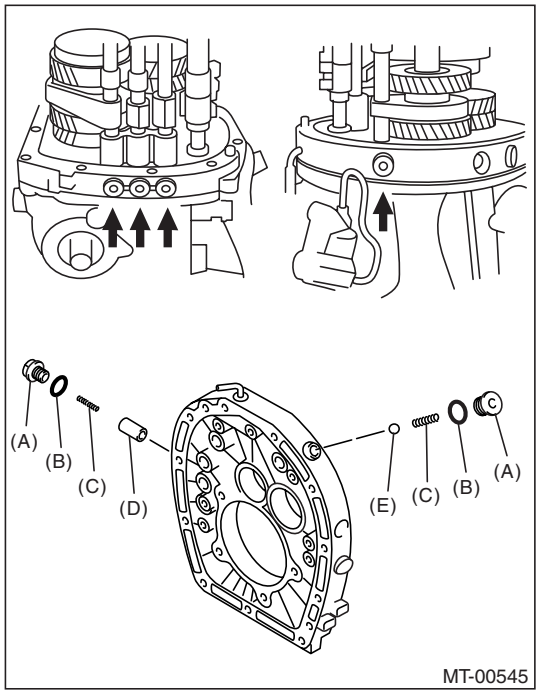
11) Remove the reverse idler holder.



(A) Reverse idler holder

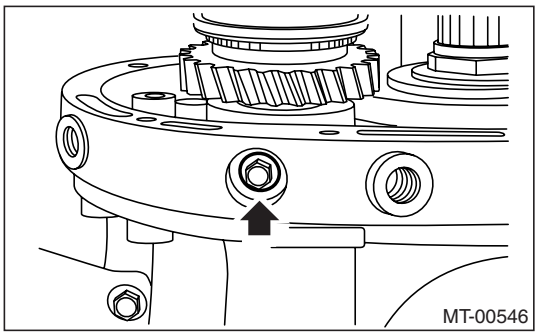
12) Remove all checking plug, gasket, checking spring, plunger and checking ball from adapter plate.

NOTE:
Do not reuse the gasket.



(A) Checking plug
(B) Gasket
(C) Checking spring
(D) Plunger
(E) Checking ball

13) Remove the bolt and gasket installing reverse idler shaft.



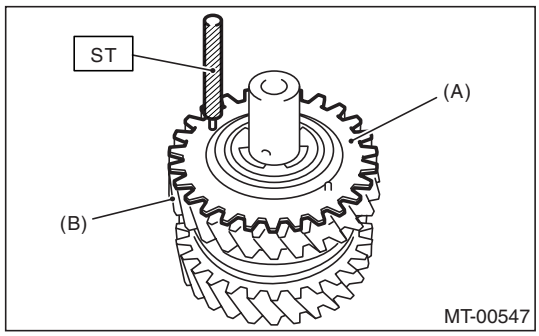
14) Press the main shaft assembly, driven gear assembly, reverse idler gear and each shifter fork, then remove from the adapter plate at once.

NOTE:
Two people should do the work.

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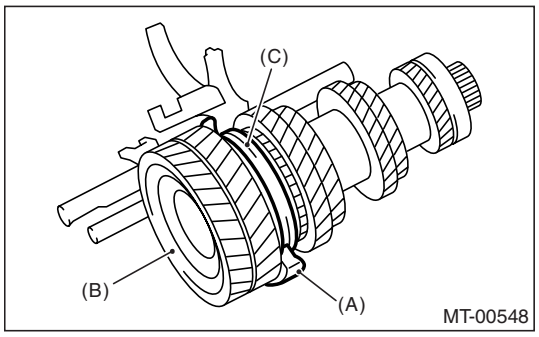
B: INSTALLATION

1) Adjust the 3rd-4th, and 5th-6th shifter fork rod. <Ref. to 6MT-119, ADJUSTMENT, Shifter Fork and Rod.>
2) Turn the sub gear counterclockwise for approx. three teeth. Align the sub gear and reverse idler gear hole, then insert the ST.
ST 18757AA000 STRAIGHT PIN



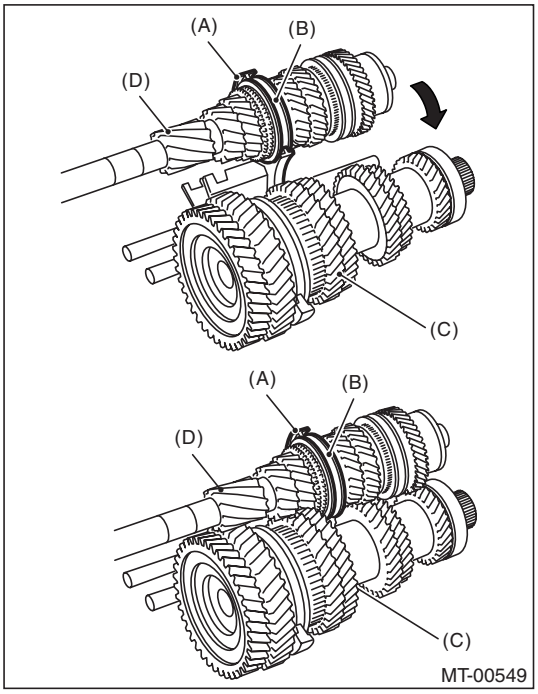
(A) Sub gear
(B) Reverse idler gear

3) Install the driven gear assembly to 1st-2nd shifter fork assembly.



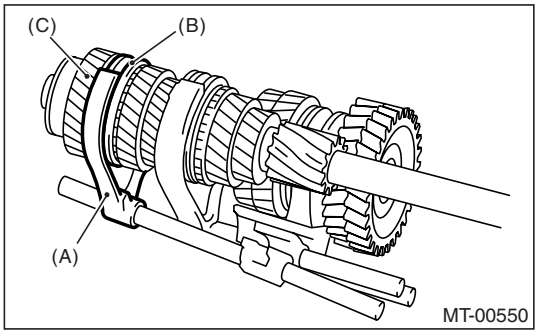
(A) 1st-2nd shifter fork
(B) Driven gear assembly
(C) 1st-2nd sleeve

4) Install the main shaft assembly to 3rd-4th shifter fork, and then assemble to driven gear assembly.



(A) 3rd-4th shifter fork
(B) 3rd-4th sleeve
(C) Driven gear assembly
(D) Main shaft assembly

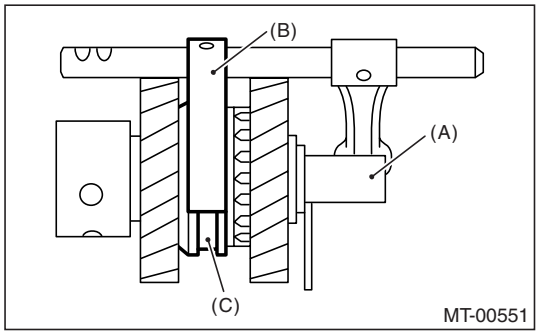
5) Install the 5th-6th shifter fork assembly to main shaft assembly.



(A) 5th-6th shifter fork
(B) 5th-6th sleeve
(C) Main shaft assembly

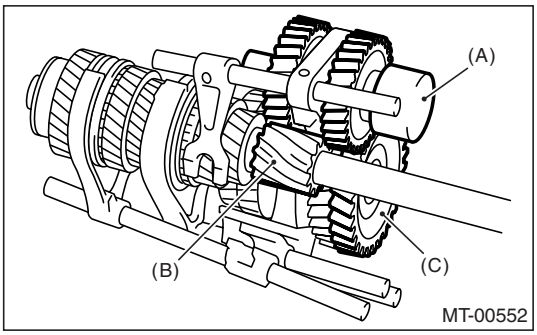
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6) Install the reverse shifter fork assembly to reverse idler gear assembly.



(A) Reverse idler gear assembly
(B) Reverse shifter fork
(C) Reverse sleeve

7) Install the reverse idler gear assembly.



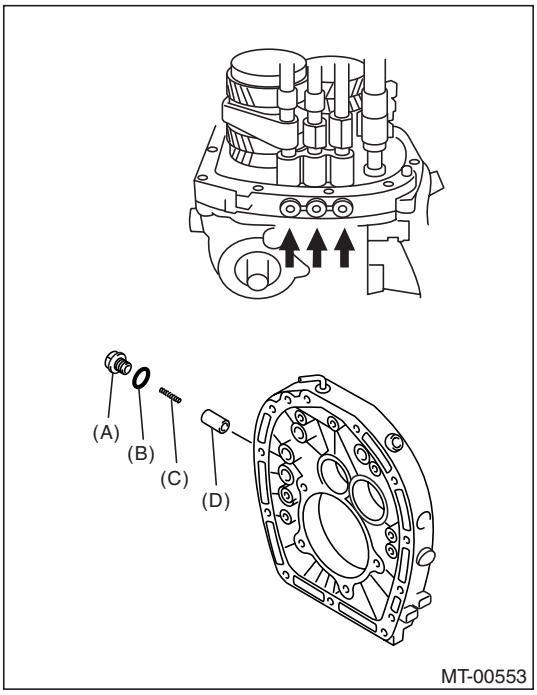
(A) Reverse idler gear assembly
(B) 1st drive gear
(C) Reverse gear

8) Install the thrust bearing of driven gear assembly.
9) Press each shifter fork, main shaft assembly, driven gear assembly and reverse idler gear assembly, then install to the adapter plate at once.

NOTE:
Two people should do the work.

10) Install the plunger, checking spring, new gasket and checking plug.

Tightening torque:
37 N·m (3.8 kgf-m, 27.3 ft-lb)

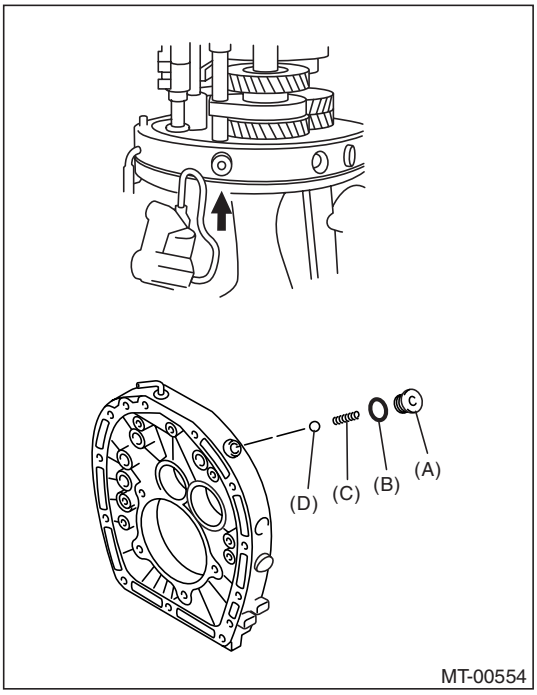


(A) Checking plug
(B) Gasket
(C) Checking spring
(D) Plunger

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11) Install the checking ball, checking spring, new gasket and checking plug.

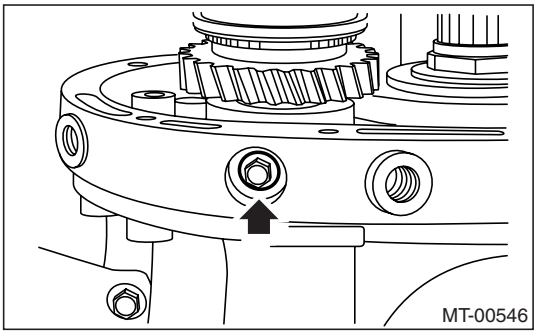
Tightening torque:
37 N·m (3.8 kgf-m, 27.3 ft-lb)



(A) Checking plug
(B) Gasket
(C) Checking spring
(D) Checking ball

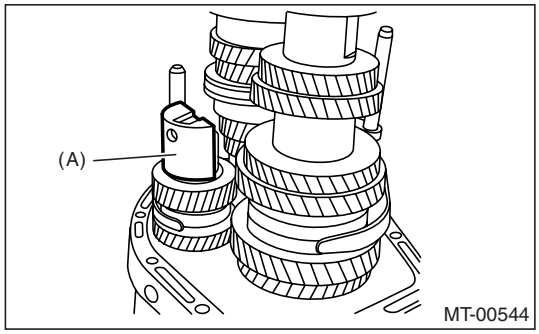
12) Install the bolt and new gasket.

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



13) Using a screwdriver, shift to 4th gear position.

14) Install the reverse idler holder



(A) Reverse idler holder

15) Install the striking rod.
16) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
17) Install the selected main shaft snap ring and washer.
18) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
19) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
20) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
21) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
22) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
23) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

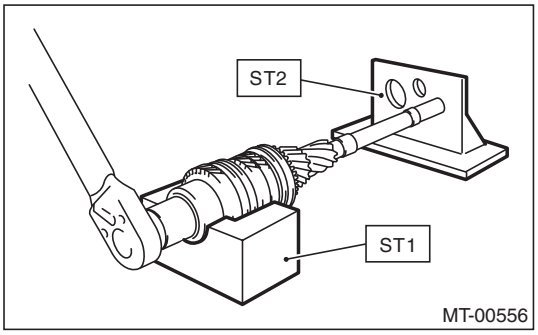
C: DISASSEMBLY

NOTE:
Each sleeve and hub engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

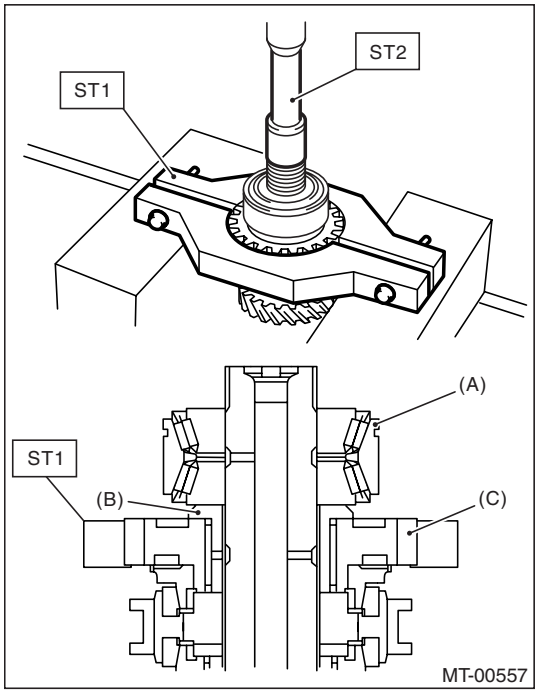
1) Secure the ST on workbench.
ST 18664AA000 BASE
2) Lift the caulking of lock nut.
3) Set the main shaft assembly on ST, then remove the lock nut and washer.
ST1 18665AA000 HOLDER
ST2 18664AA000 BASE

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NOTE:
Use a 38 mm (1.50 in) socket wrench.

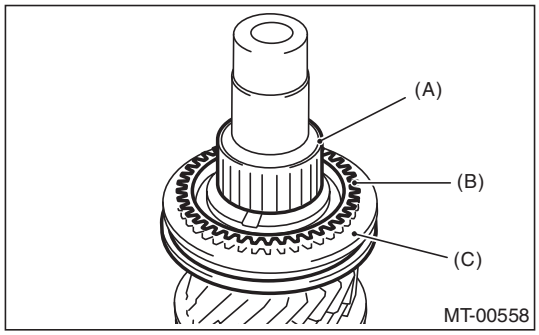


4) Remove the main shaft assembly from ST.
5) Set the ST1 on 6th drive gear, then remove the taper roller bearing, bush and 6th drive gear using press.
ST1 (TY856WX···model) 18722AA000 REMOVER
ST1 (TY856WN···model) 18722AA010 REMOVER
ST2 899864100 REMOVER



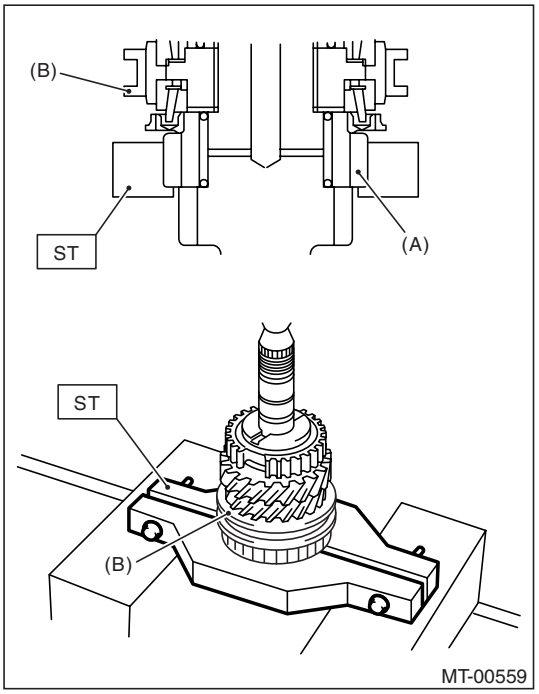
(A) Taper roller bearing
(B) Bush
(C) 6th drive gear

6) Remove the 5th-6th sleeve, 6th needle bearing and 6th baulk ring.



(A) Needle bearing
(B) 6th baulk ring
(C) 5th-6th sleeve

7) Set the ST on 3rd drive gear, then remove each part using press.
ST 18720AA000 REMOVER



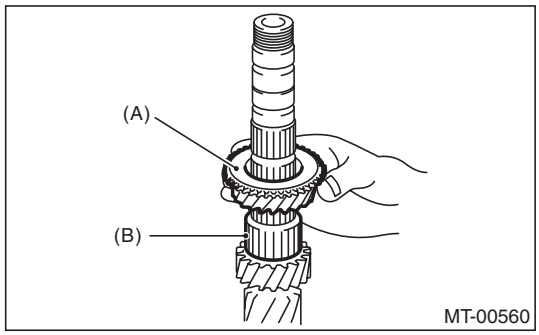
(A) 3rd drive gear
(B) 3rd-4th sleeve

D: ASSEMBLY

NOTE:
Replace the following parts as a set.
• Sleeve and hub
• Outer baulk ring, 3rd synchro cone and inner baulk ring
• Taper roller bearing

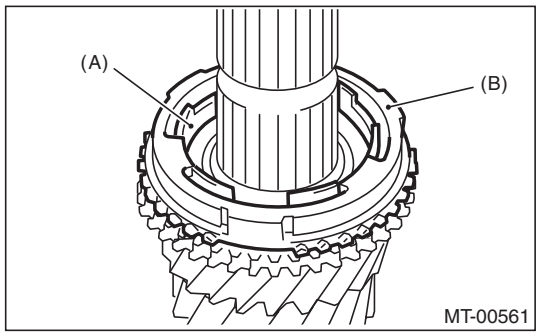
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1) Sufficiently apply gear oil to the main shaft, 3rd needle bearing and inner periphery of 3rd drive gear.
2) Install the 3rd needle bearing and 3rd drive gear to main shaft.



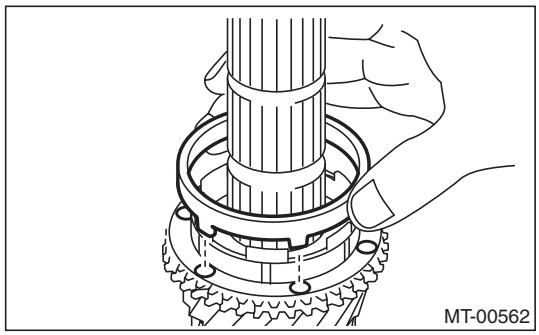
(A) 3rd needle bearing
(B) 3rd drive gear

3) Install the inner baulk ring, 3rd synchro cone and outer baulk ring.



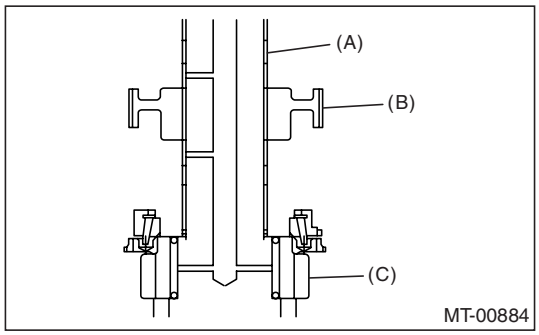
(A) Inner baulk ring
(B) Outer baulk ring

NOTE:
Install the 3rd synchro cone, by aligning protrusion portions of the 3rd synchro cone with 3rd drive gear hole portion.



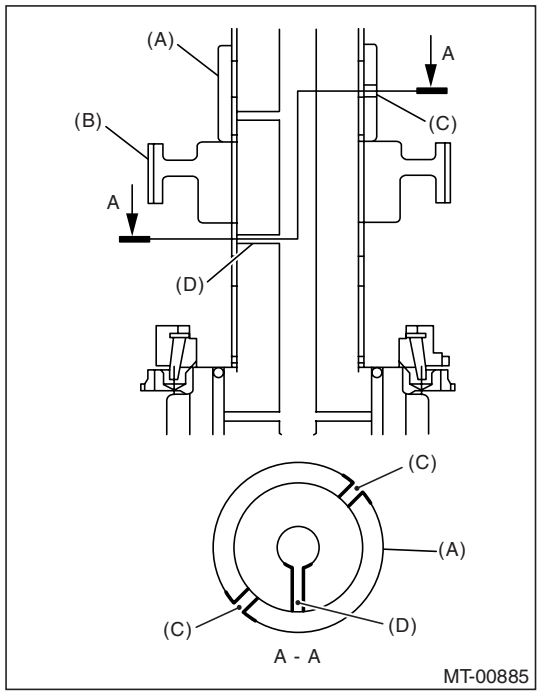
4) Install the 3rd-4th hub and 4th bush.

(1) Set to the main shaft, taking care of 3rd-4th hub installing direction.



(A) Main shaft
(B) 3rd-4th hub
(C) 3rd drive gear

(2) Set to the main shaft, taking care not to overlap the main shaft oil hole and 4th bush oil hole.



(A) 4th bush
(B) 3rd-4th hub
(C) 4th bush oil hole
(D) Main shaft oil hole

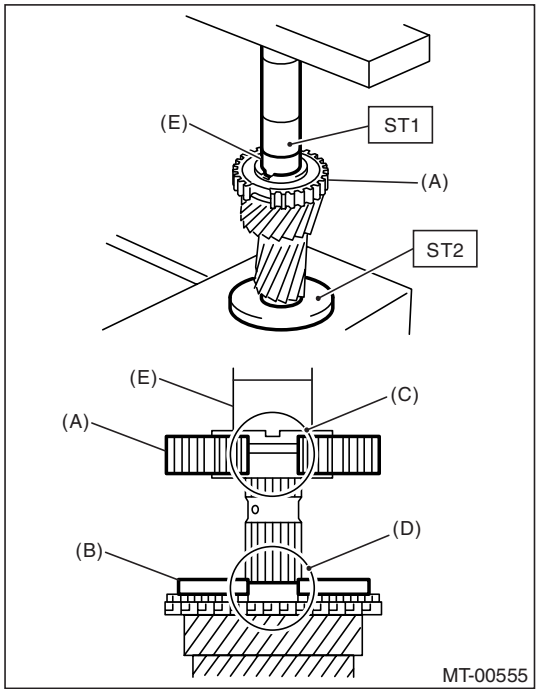
(3) Using the ST, press in the 3rd-4th hub and 4th bush at once.

ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

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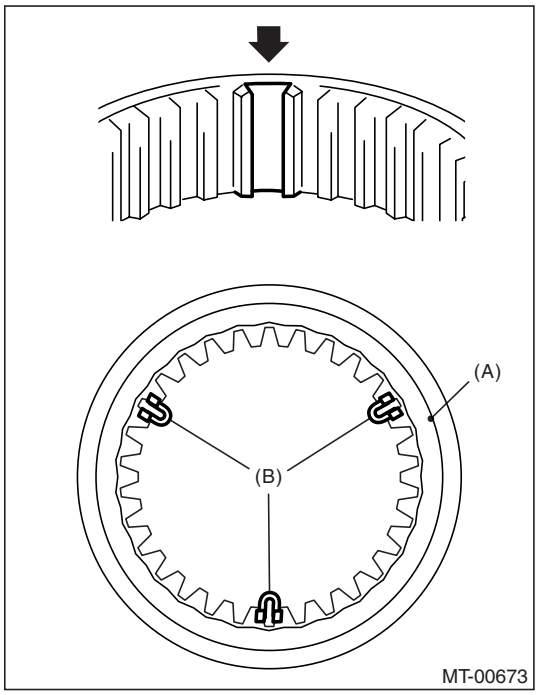
NOTE:
When pressing in 3rd-4th hub and 4th bush, align the protrusion portion of outer baulk ring and cutout portion of 3rd-4th bush by moving the outer baulk ring.



(A) 3rd-4th hub
(B) Outer baulk ring
(C) Cutout portion of 3rd-4th hub
(D) Protrusion portion of outer baulk ring
(E) 4th bush

5) Make sure the 3rd drive gear is smoothly turned by hand. If not, reassemble.
6) Install the 3rd-4th shifting insert key in proper place of 3rd-4th sleeve.

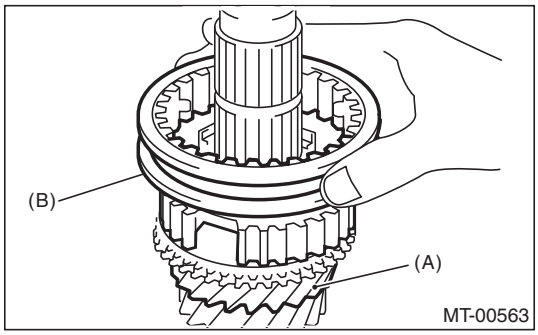
NOTE:
Angle of each shifting insert key is 120° apart.



(A) 3rd-4th sleeve
(B) 3rd-4th shifting insert key

7) Install the 3rd-4th sleeve to 3rd-4th hub.

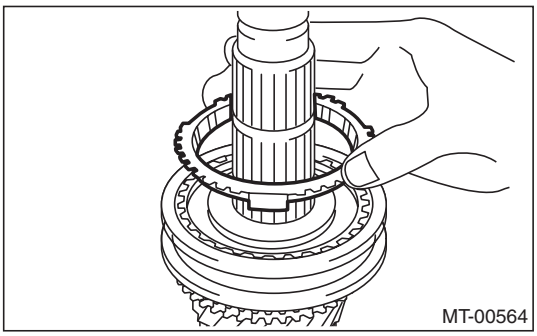
NOTE:
• 3rd-4th sleeve has a groove for identification.
• Install the 3rd-4th sleeve with groove facing to 3rd drive gear side.



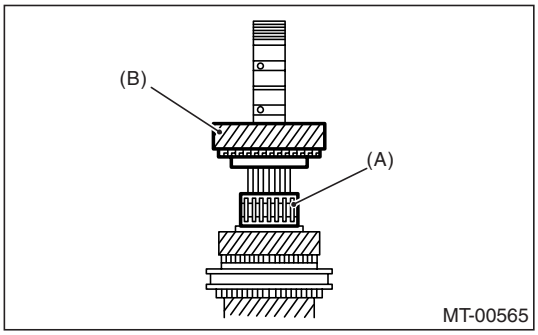
(A) 3rd drive gear
(B) Groove (1) for identification of 3rd-4th sleeve

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8) Install the 4th baulk ring.



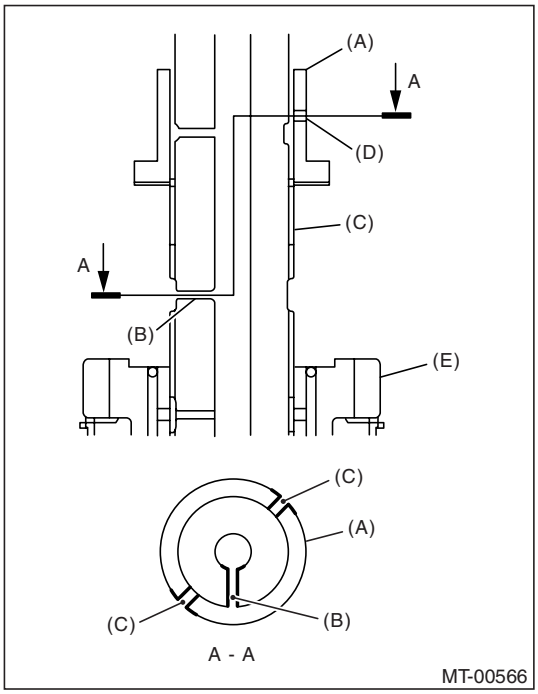
9) Sufficiently apply gear oil to the main shaft, 4th needle bearing and inner periphery of 4th drive gear.
10) Install the 4th needle bearing and 4th drive gear.



(A) 4th needle bearing
(B) 4th drive gear

11) Install the 5th bush.

(1) Set to the main shaft, taking care not to overlap the main shaft oil hole and 5th bush oil hole.

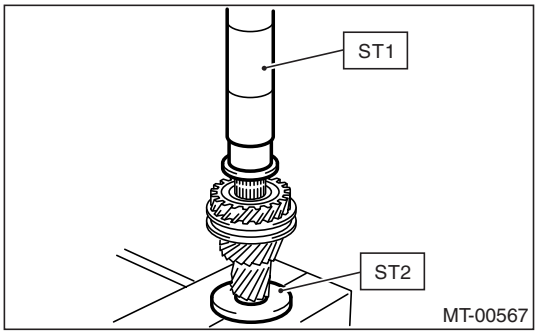


(A) 5th bush
(B) Main shaft oil hole
(C) Main shaft
(D) 5th bush oil hole
(E) 4th drive gear

(2) Using the ST, press in the 5th bush.

ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

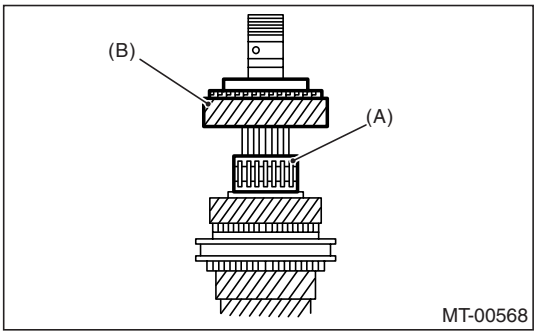
CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



12) Make sure the 4th drive gear is smoothly turned by hand. If not, reassemble.
13) Sufficiently apply gear oil to the main shaft, 5th needle bearing and inner periphery of 5th drive gear.

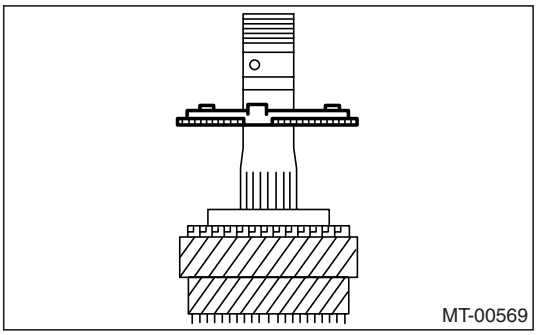
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14) Install the 5th needle bearing and 5th drive gear.

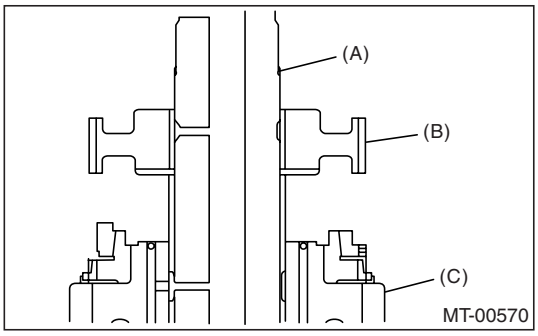


(A) 5th needle bearing
(B) 5th drive gear

15) Install the 5th baulk ring.



16) Install the 5th-6th hub.
(1) Set to the main shaft, taking care of 5th-6th hub installing direction.

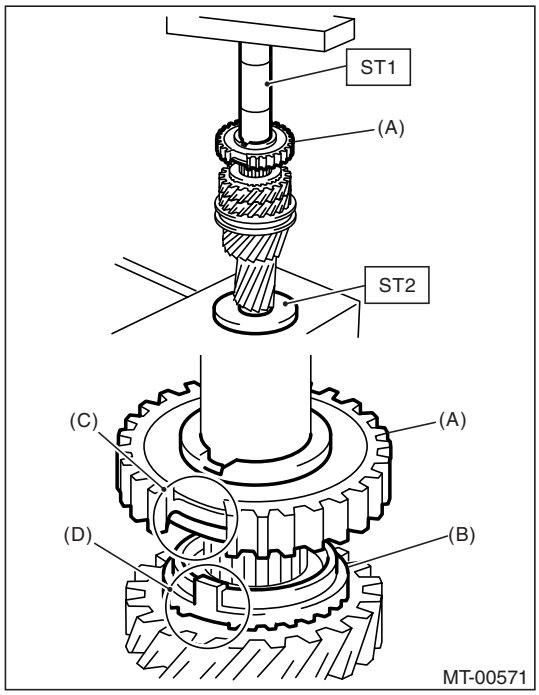


(A) Main shaft
(B) 5th-6th hub
(C) 5th drive gear

(2) Using the ST, press in the 5th-6th hub.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:
When pressing in 5th-6th hub, align the protrusion portion of outer baulk ring and cutout portion of 5th-6th bush by moving the outer baulk ring.



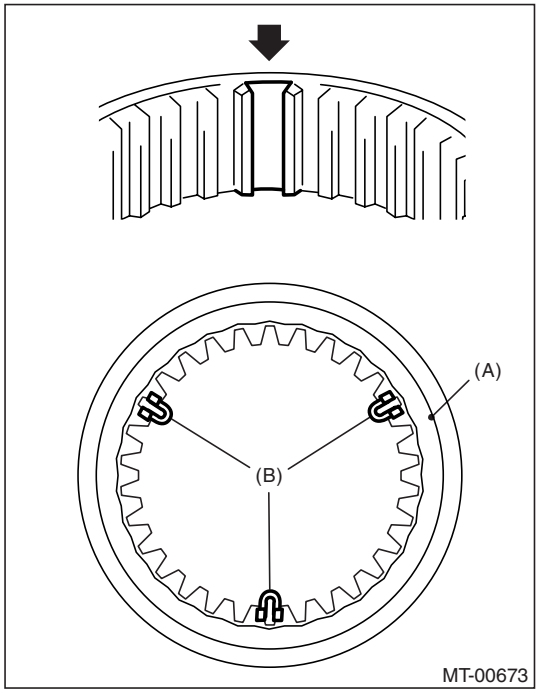
(A) 5th-6th hub
(B) Outer baulk ring
(C) Cutout portion of 5th-6th hub
(D) Protrusion portion of outer baulk ring

17) Make sure the 5th drive gear is smoothly turned by hand. If not, reassemble.

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18) Install the 5th-6th shifting insert key in proper place of 5th-6th sleeve.

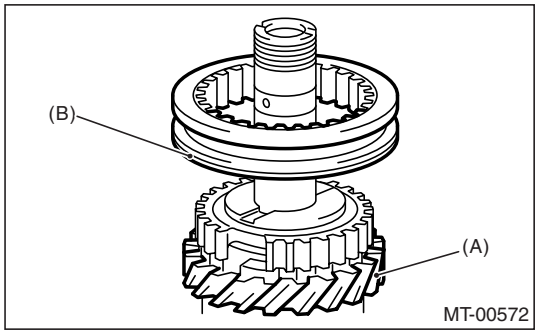
NOTE:
Angle of each shifting insert key is 120° apart.



(A) 5th-6th sleeve
(B) Shifting insert key

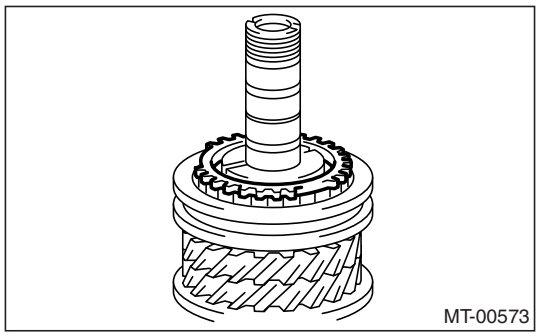
19) Install the 5th-6th sleeve to 5th-6th hub.

NOTE:
• 5th-6th sleeve has two grooves for identification.
• Install the 5th-6th sleeve with the groove facing to 5th drive gear side.

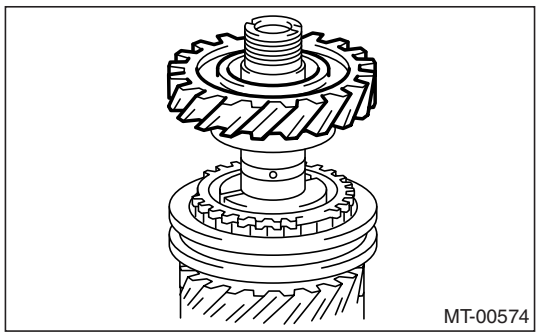


(A) 5th drive gear
(B) Groove (2) for identification of 5th-6th sleeve

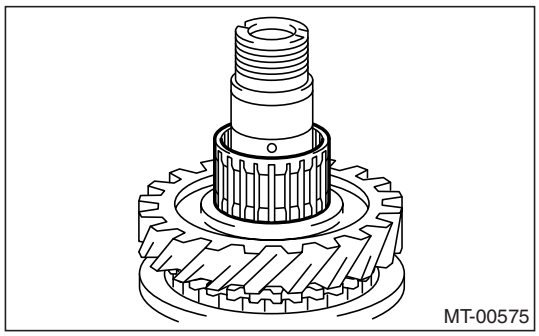
20) Install the 6th baulk ring.



21) Sufficiently apply gear oil to the main shaft, 6th needle bearing and inner periphery of 6th drive gear.
22) Install the 6th drive gear.

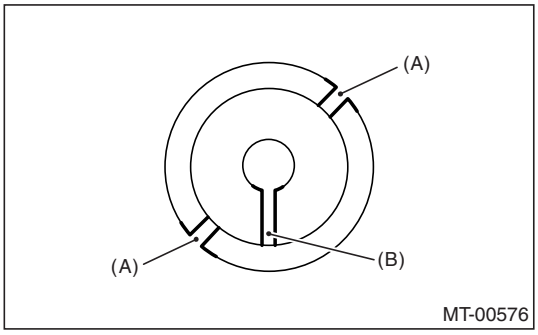


23) Install the 6th needle bearing.



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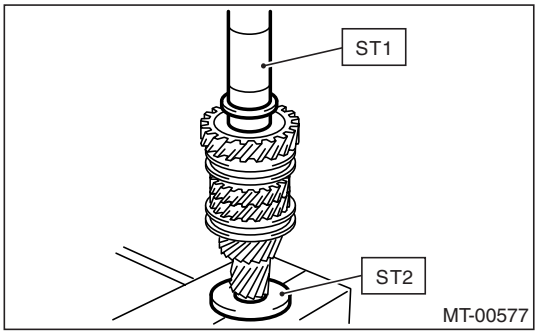
24) Set the 6th bush to main shaft, taking care not to overlap the 6th bush oil hole and main shaft oil hole.



(A) 6th bush oil hole
(B) Main shaft oil hole

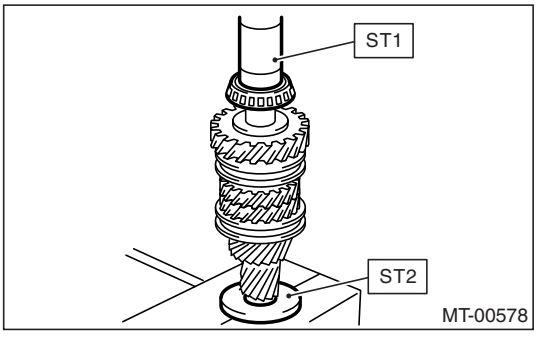
25) Using the ST, install the 6th bush.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 lmp ton).



26) Make sure the 6th drive gear is smoothly turned by hand. If not, reassemble.
27) Using the ST, install the inner bearing inner race.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

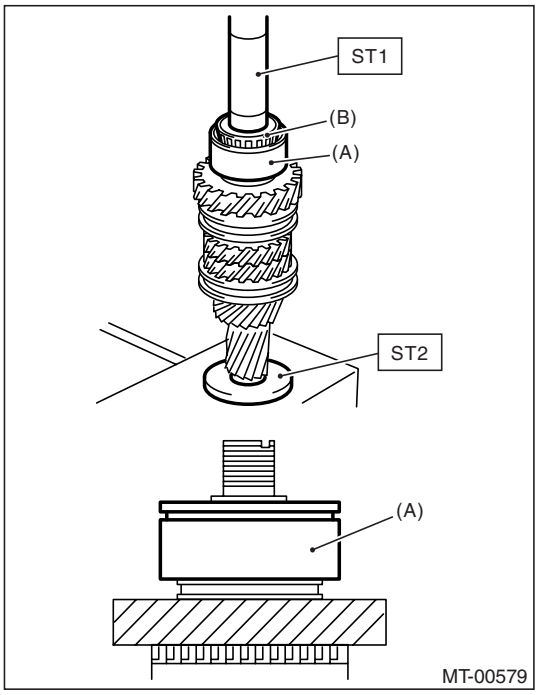
CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 lmp ton).



28) Using the ST, install the retainer and outer bearing inner race.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 lmp ton).

NOTE:
• Make sure to install the retainer in proper direction.
• Press in until there is no backlash in retainer and where bearing is smoothly turned by hand.



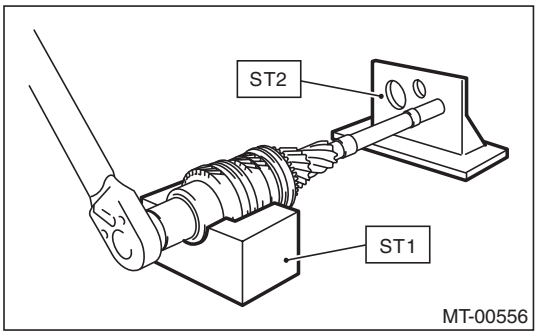
(A) Retainer
(B) Outer bearing inner race

29) Make sure the taper roller bearing is smoothly turned by hand. If not, replace the taper roller bearing as a set and reassemble.
30) Install the lock washer and new lock nut.

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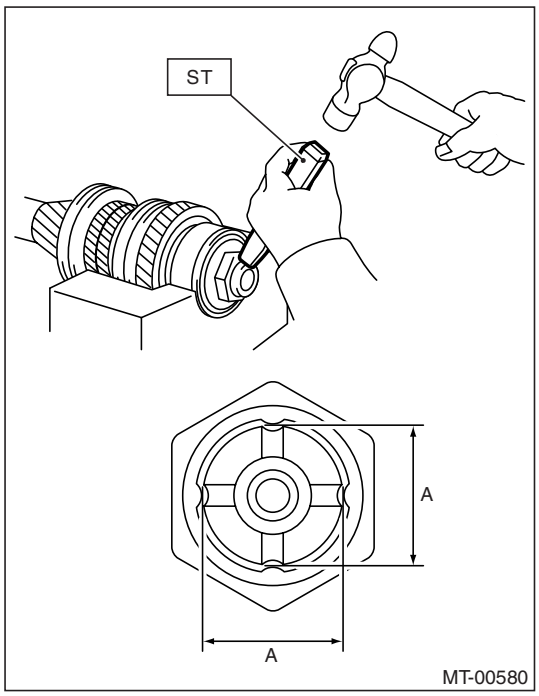
31) Set the main shaft assembly to ST, then tighten the lock nut.
ST1 18665AA000 HOLDER
ST2 18664AA000 BASE

Tightening torque:
392 N·m (40.0 kgf-m, 289 ft-lb)



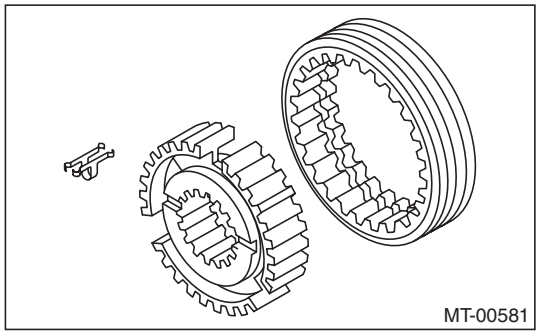
32) Using the ST, caulk four portions on the lock nut to obtain dimension A 27±0.3 mm (1.06±0.01 in).
ST 18668AA000 PUNCH

NOTE:
Do not crack the caulking part of lock nut.



E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearing
Replace the bearings in the following cases.
• Worn, rusted and damaged bearing
• Bearings that fail to turn smoothly or make abnormal noise when turned
• Bearings having other defects
2) Bushing (each gear)
Replace the bushings in the following case.
• When the sliding surface is damaged or abnormally worn.
3) Gears
Replace the gears in the following cases.
• Gear teeth surfaces are broken or excessively worn.
• Parts that contact the baulk ring is damaged.
• The inner surface of gear is damaged.
4) Baulk ring, synchro cone
Replace the baulk ring and synchro cone in the following case.
• Worn, rusted and damaged baulk ring
5) Shifting insert key
Replace the shifting insert key if deformed, excessively worn or defective in any way.



F: ADJUSTMENT

1. SELECTION OF MAIN SHAFT SNAP RING AND WASHER

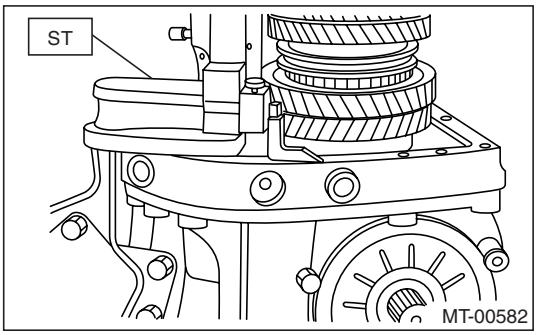
NOTE:
Perform the following procedures when.
• Replacing the 1st to 6th driven gear.
• Replacing the 1st and 2nd synchro ring assembly.
• Replacing the ball bearing.
• Replacing the adapter plate.
• Replacing the driven shaft.

1) Insert the drive pinion assembly in adapter plate.

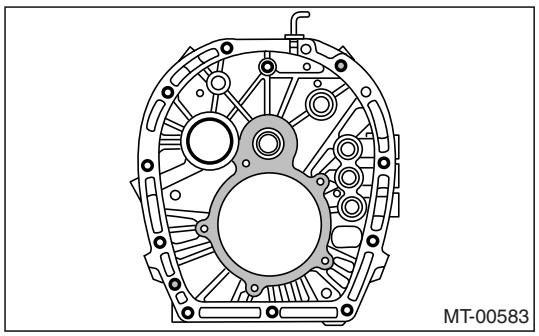
NOTE:
Make sure the thrust bearing outer race is not removed and drive pinion is not lift-up.

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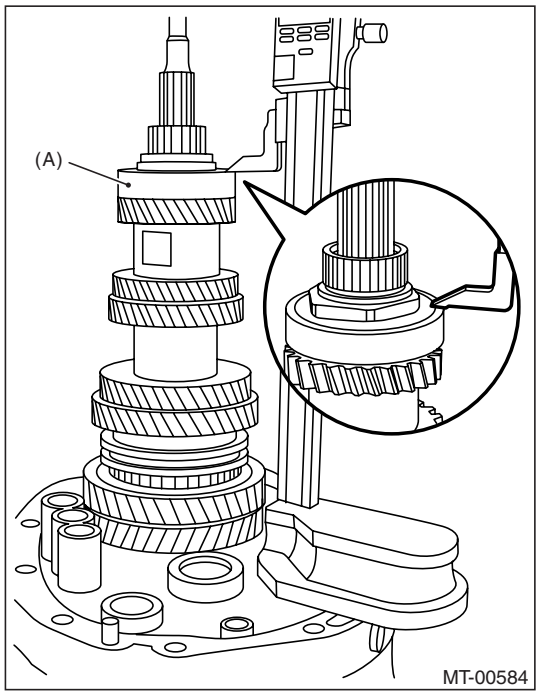
2) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.
ST 18853AA000 HEIGHT GAUGE



NOTE:
• Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.
• Do not place the height gauge on shaded area in the figure during measurement.

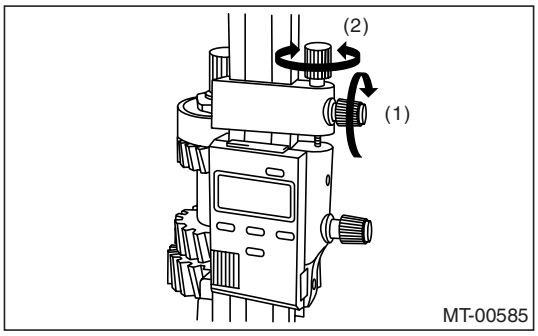


3) Measure the height to edge surface of ball bearing (height A1).



(A) Ball bearing

NOTE:
Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of bearing.



Measure five points of the ball bearing turning every approx. 120°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

4) According to measurement value, select the snap ring and washer from the following table.

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Snap ring

A1: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	805072010	1.65 (0.065)
271.41 — 271.98 (10.69 — 10.71)	805072011	1.95 (0.077)
271.99 — 272.56 (10.71 — 10.73)	805072012	2.25 (0.089)

Washer

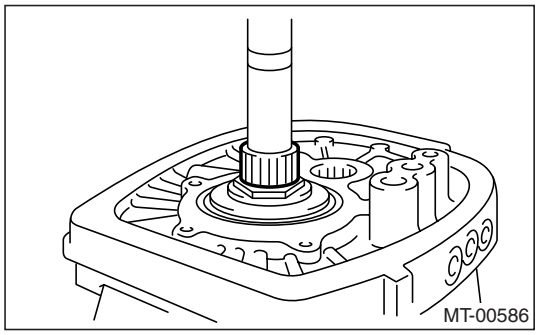
A1: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	803067012	1.6 (0.063)
271.41 — 271.98 (10.69 — 10.71)	803067011	1.3 (0.051)
271.99 — 272.56 (10.71 — 10.73)	803067010	1.0 (0.039)

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20.Driven Gear Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove the driven gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>
10) Remove the 1st needle bearing.

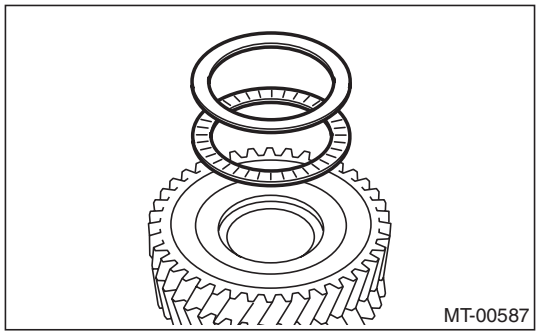


11) Remove the thrust needle bearing.

B: INSTALLATION

1) Adjust the main shaft snap ring. <Ref. to 6MT-83, ADJUSTMENT, Main Shaft Assembly.>
2) Adjust the 1st-2nd shifter rod. <Ref. to 6MT-119, ADJUSTMENT, Shifter Fork and Rod.>
3) Install the thrust needle bearing

NOTE:
Make sure to install the thrust needle bearing in proper direction.



4) Install the 1st needle bearing.
5) Install the driven gear assembly. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
6) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
7) Adjust backlash at axial direction of driven gear assembly. <Ref. to 6MT-93, ADJUSTMENT, Driven Gear Assembly.>
8) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
9) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
10) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
11) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
12) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
13) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

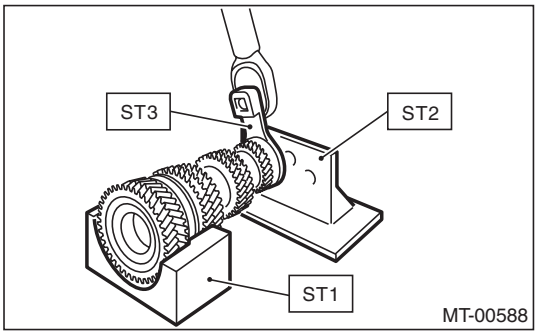
C: DISASSEMBLY

NOTE:
Each sleeve and hub engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

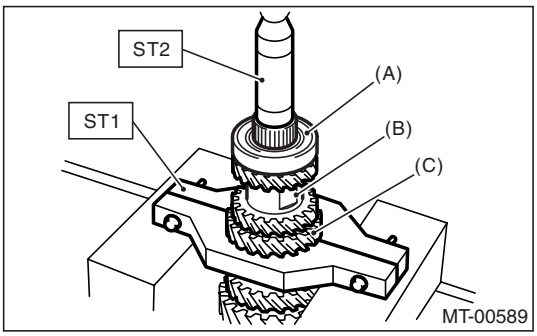
1) Secure the ST on workbench.
ST 18664AA000 BASE
2) Lift the caulking of lock nut.

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3) Install the ST3 to lock nut, set the driven gear assembly on ST, then remove the lock nut and washer.
ST1 18666AA000 HOLDER
ST2 18664AA000 BASE
ST3 18620AA000 ADAPTER WRENCH

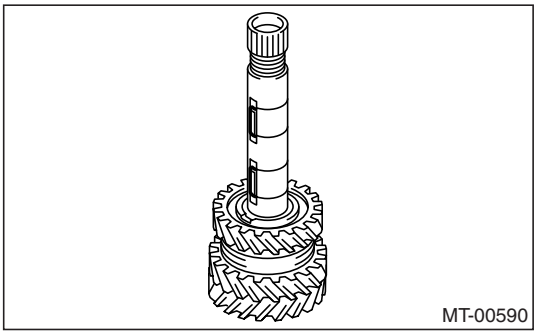


4) Install the ST1 to 4th gear, then remove the ball bearing, 5th-6th driven gear and 3rd-4th driven gear.
ST1 18723AA000 REMOVER
ST2 499877000 REMOVER

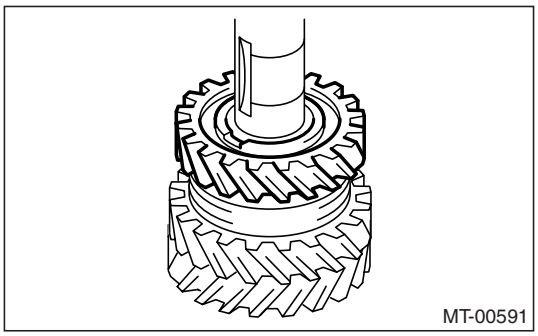


(A) Ball bearing
(B) 5th-6th driven gear
(C) 3rd-4th driven gear

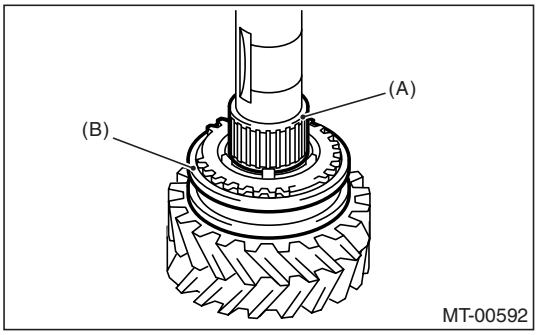
5) Remove the driven gear key.



6) Remove the 2nd gear.

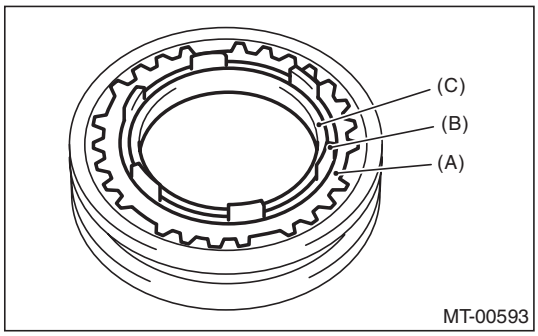


7) Remove the needle bearing and 1st-2nd sleeve.



(A) Needle bearing
(B) 1st-2nd sleeve

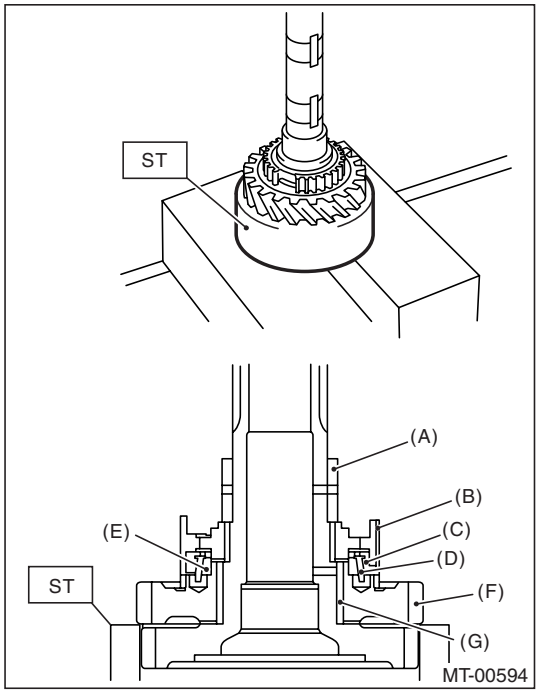
8) Remove the outer baulk ring, 2nd synchro cone and inner baulk ring.



(A) Outer baulk ring
(B) 2nd synchro cone
(C) Inner baulk ring

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9) Using the ST, remove each parts.
ST 18754AA000 REMOVER

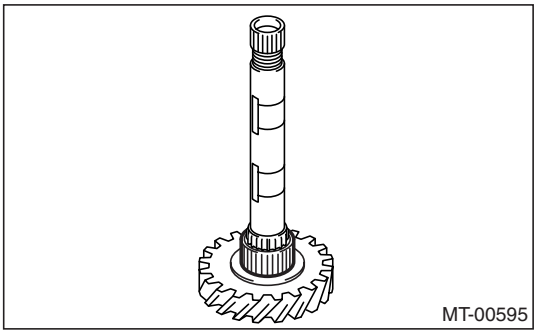


(A) 2nd bush
(B) 1st-2nd hub
(C) Outer baulk ring
(D) 1st synchro cone
(E) Inner baulk ring
(F) 1st driven gear
(G) 1st needle bearing

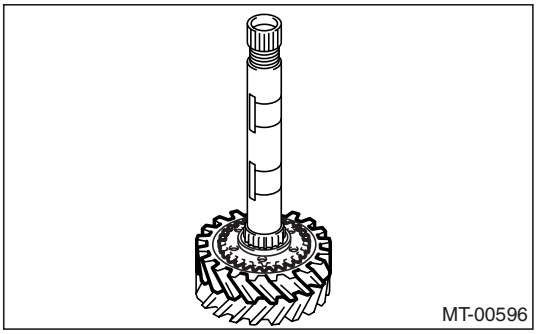
D: ASSEMBLY

NOTE:
Replace the following parts as a set.
- Sleeve and hub
- Outer baulk ring, 1st synchro cone, inner baulk ring
- Outer baulk ring, 2nd synchro cone, inner baulk ring

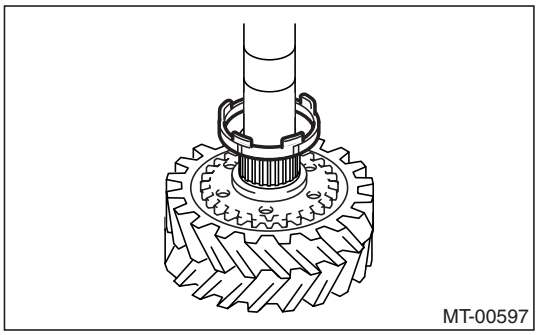
1) Sufficiently apply gear oil to the drive shaft, 1st needle bearing and inner periphery of 1st driven gear.
2) Install the 1st needle bearing.



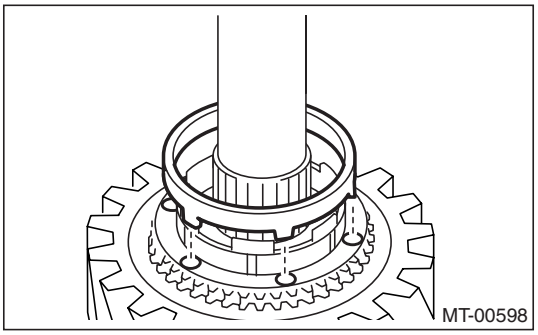
3) Install the 1st driven gear to driven shaft.



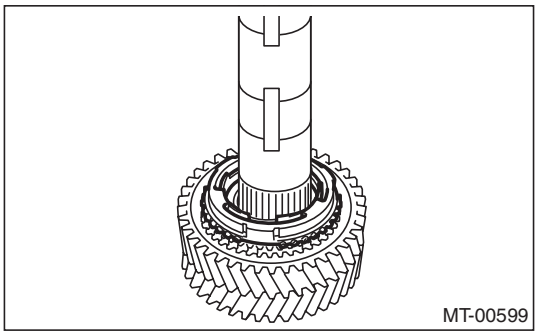
4) Install the inner baulk ring.



5) Align protrusion portions of the 1st synchro cone to the holes of 1st drive gear to install.



6) Install the outer baulk ring.

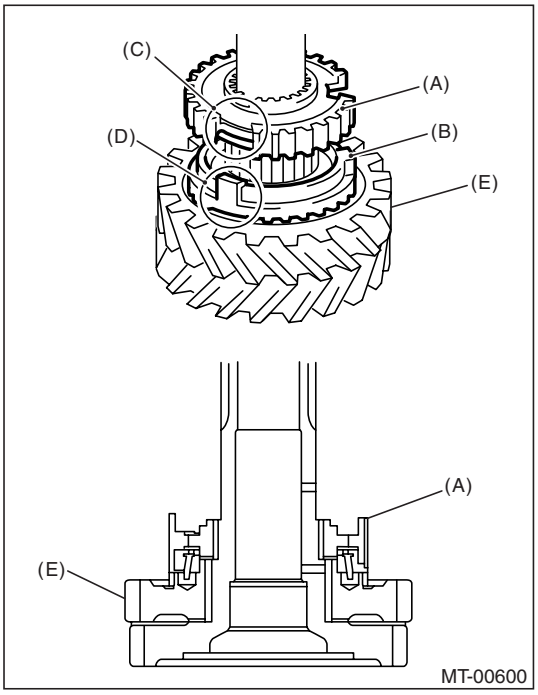


7) Install the 1st-2nd hub.

NOTE:
- Align the protrusion portion of outer baulk ring and cutout portion of 1st-2nd hub, then install.

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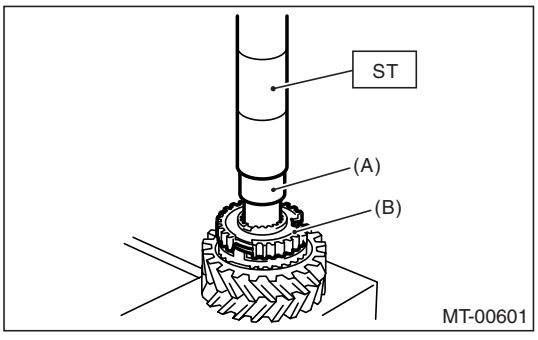
• Make sure to install the 1st-2nd hub in proper direction.



(A) 1st-2nd hub
(B) Outer baulk ring
(C) Cutout portion of 1st-2nd hub
(D) Protrusion portion of outer baulk ring
(E) 1st driven gear

8) Using the ST, install the 2nd hub.
ST 18654AA000 INSTALLER

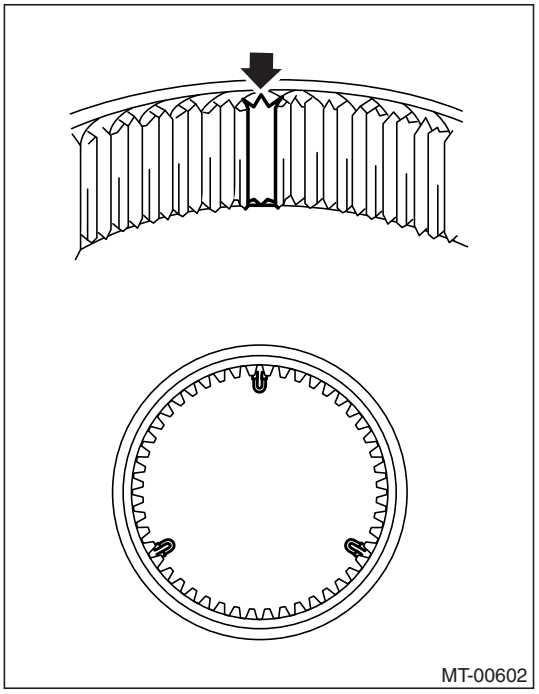
CAUTION:
• Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



(A) 2nd bush
(B) 1st-2nd hub

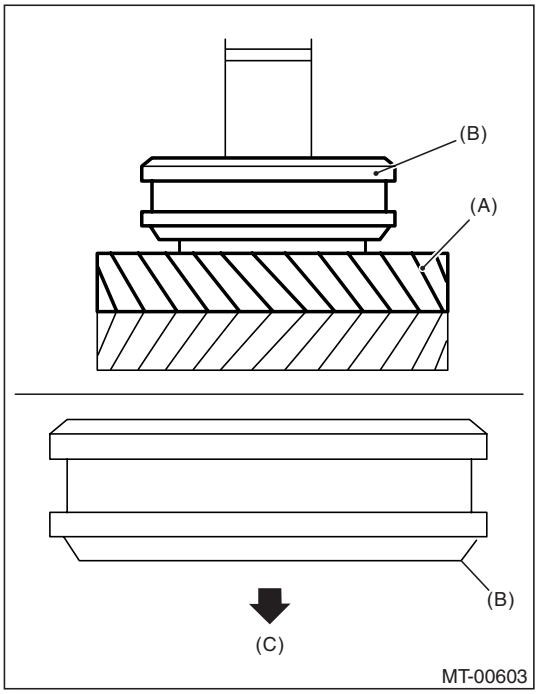
9) Make sure the 1st drive gear is smoothly turned by hand. If not, reassemble.
10) Install the shifting insert key in proper place of 1st-2nd sleeve.

NOTE:
Angle of each shifting insert key is 120° apart.



11) Install the 1st-2nd sleeve to 1st-2nd hub.

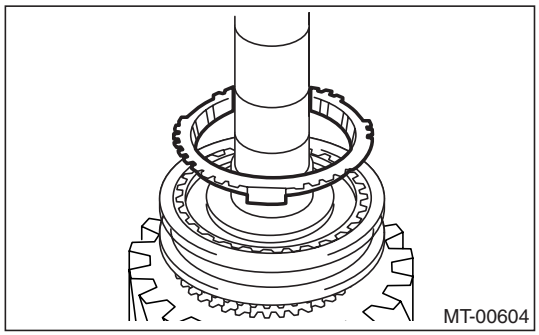
NOTE:
Make sure to install the 1st-2nd sleeve in proper direction.



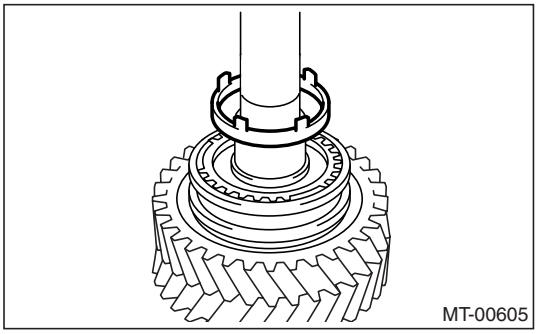
(A) 1st driven gear
(B) 1st-2nd sleeve
(C) 1st driven gear side

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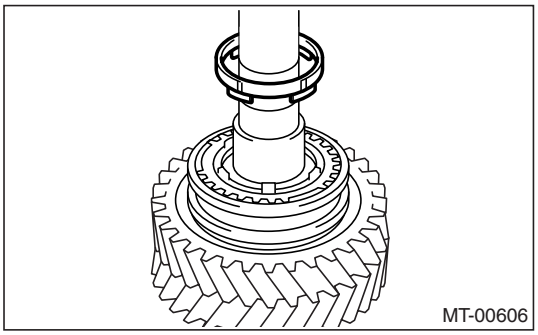
12) Install the outer baulk ring.



13) Install the 2nd synchro cone.

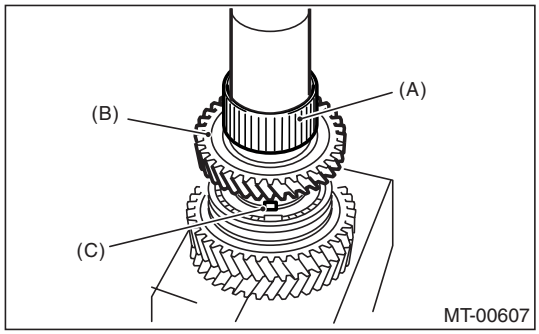


14) Install the inner baulk ring.



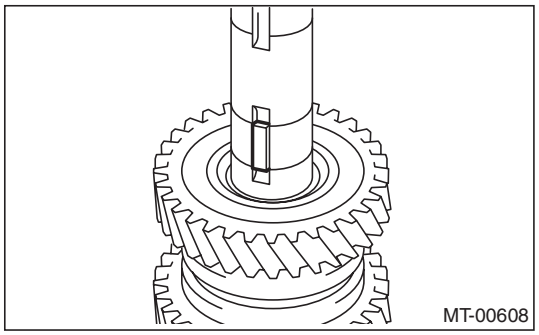
15) Sufficiently apply gear oil to the bush, 2nd needle bearing and inner periphery of 2nd drive gear.
16) Install the 2nd needle bearing and 2nd driven gear.

NOTE:
Align the protrusion portion of 2nd synchro cone with 2nd driven gear hole, then install.



(A) 2nd needle bearing
(B) 2nd driven gear
(C) Protrusion portion of 2nd synchro cone

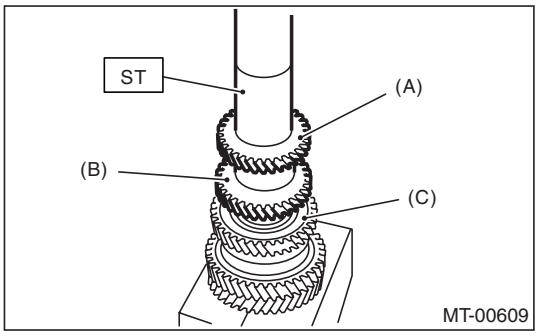
17) Install the key.



18) Using the ST, install the 3rd-4th driven gear.
ST 18654AA000 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 lmp ton).

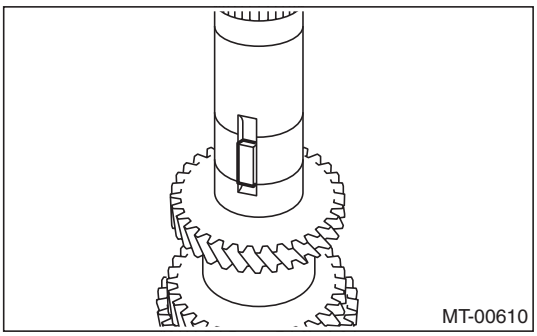
NOTE:
• Make sure to install the 3rd-4th driven gear in proper direction.
• Align the groove of 3rd-4th driven gear with key.



(A) 4th gear
(B) 3rd gear
(C) 2nd gear

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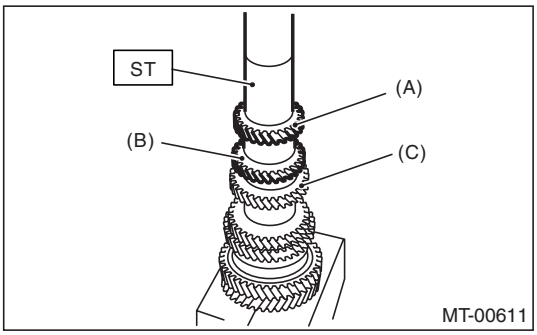
19) Make sure the 2nd driven gear is smoothly turned by hand. If not, reassemble.
20) Install the key.



21) Using the ST, install the 5th-6th driven gear.
ST 18654AA000 INSTALLER

CAUTION:
• Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:
• Make sure to install the 5th-6th driven gear in proper direction.
• Align the groove of 5th-6th driven gear with key.

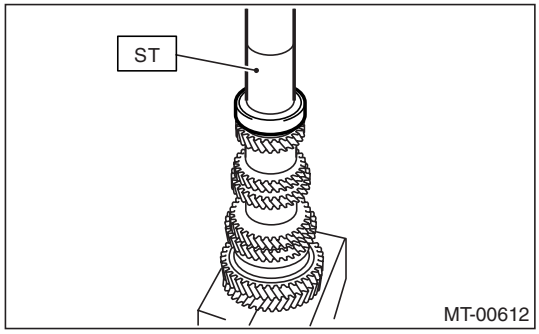


(A) 6th gear
(B) 5th gear
(C) 4th gear

22) Using the ST, install the ball bearing.
ST 18654AA000INSTALLER

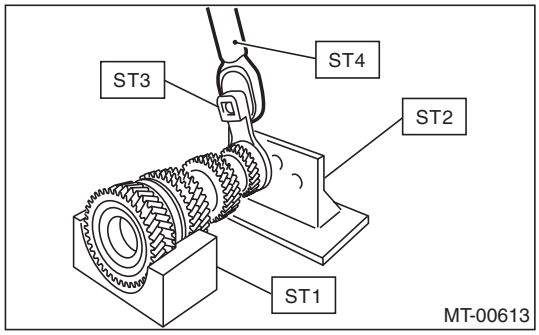
CAUTION:
• Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:
Make sure to install the ball bearing in proper direction.



23) Make sure the ball bearing is smoothly turned by hand. If not, reassemble.
24) Install a new lock nut.
25) Install the ST3 to lock nut, then install the ST to driven gear assembly and tighten lock nut.
ST1 18666AA000 HOLDER
ST2 18664AA000 BASE
ST3 18620AA000 ADAPTER WRENCH
ST4 18852AA000 TORQUE WRENCH

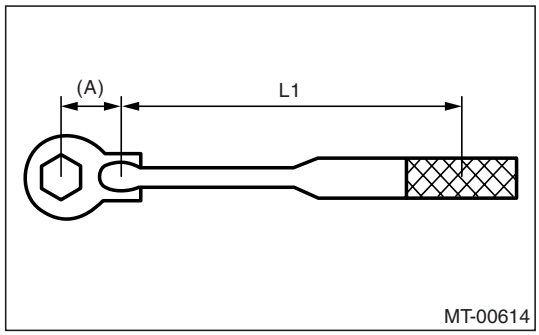
Tightening torque:
530 N·m (54.0 kgf-m, 391 ft-lb)



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NOTE:
If torque wrench except ST4 is used, calculate the following equation, then tighten the lock nut.
T=L1/(0.1 + L1)×570

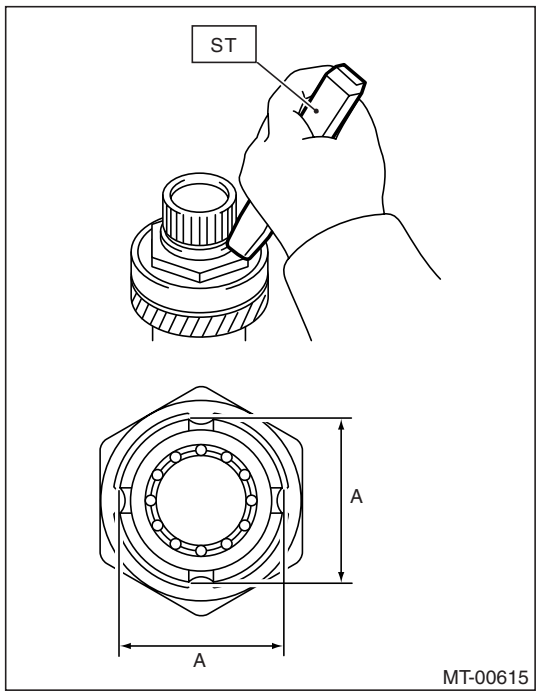
T N·m (kgf-m, ft-lb)	Setting value of torque wrench
L1 m (in)	Torque wrench length
0.1 m (3.94 in)	ST length
570 N·m (58.1 kgf-m, 420 ft-lb)	Tightening torque of lock nut



(A) 0.1 m (3.94 in)

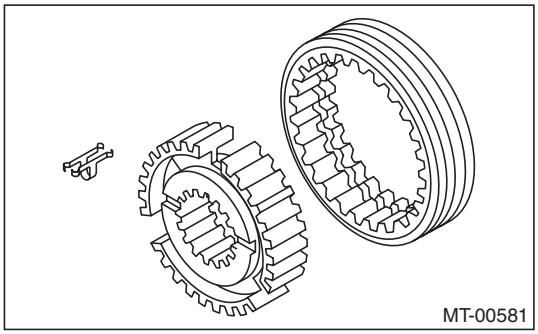
26) Using the ST, caulk four portions on the lock nut to obtain dimension A 44±0.5 mm (1.73±0.02 in).
ST1 18669AA000 PUNCH DRIVEN SHAFT

NOTE:
Do not crack the caulking part of lock nut.



E: INSPECTION

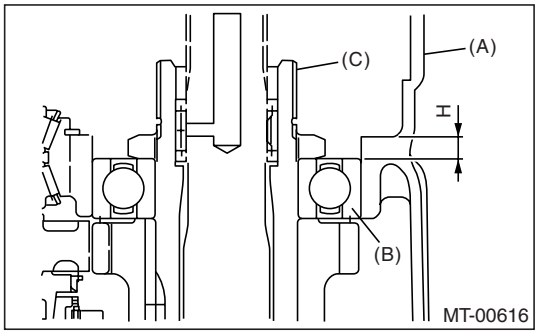
Disassembled parts should be washed clean first and then inspected carefully.
1) Bearing
Replace the bearings in the following cases.
• Worn, rusted and damaged bearing
• Bearings that fail to turn smoothly or make abnormal noise when turned
• Bearings having other defects
2) Bushing (each gear)
Replace the bushings in the following case.
• When the sliding surface is damaged or abnormally worn.
3) Gears
Replace the gears in the following cases.
• Gear teeth surfaces are broken or excessively worn.
• Parts that contact the baulk ring is damaged.
• The inner surface of gear is damaged.
4) Baulk ring, synchro cone
Replace the baulk ring and synchro cone in the following case:
• Worn, rusted and damaged baulk ring
5) Shifting insert key
Replace the shifting insert key if deformed, excessively worn or defective in any way.



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F: ADJUSTMENT

1) Measure length “H”, which is from transmission case and oil pump cover mating surface to ball bearing edge.



(A) Transmission case
(B) Ball bearing
(C) Driven gear assembly

2) Using the following equation, calculate the washer thickness of driven gear assembly.
T=H – {5.8±0.05 mm (0.23±0.002 in)} – {0.1 to 0.3 mm (0.0039 to 0.0118 in)}

t	Thickness of washer
H	Length from transmission case and oil pump cover mating surface to ball bearing edge
5.8±0.05 mm (0.23±0.002 in)	Thickness of collar
0.1 to 0.3 mm (0.0039 to 0.0118 in)	Backlash specification at axial direction of driven gear assembly

3) Select 0 to 3 washers from the following table to adjust backlash closest to specification.

Backlash specification at axial direction of driven gear assembly:
0.1 — 0.3 mm (0.0039 — 0.0118 in)

Washer	
Part No.	Thickness t mm (in)
803072030	0.15 (0.0059)
803072031	0.30 (0.0118)
803072032	0.45 (0.0177)
803072033	0.60 (0.0236)

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21.Reverse Idler Gear Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove the reverse idler gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>

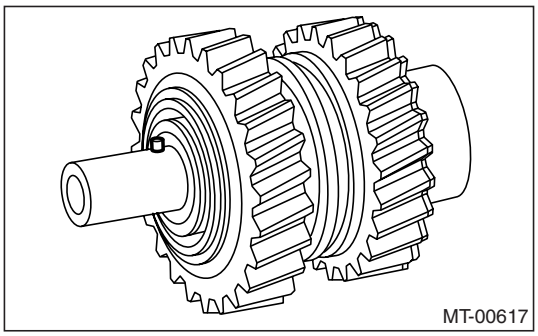
B: INSTALLATION

1) Select the reverse fork rod. <Ref. to 6MT-119, ADJUSTMENT, Shifter Fork and Rod.>
2) Install the reverse idler gear assembly. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
3) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
4) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
5) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
6) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
7) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
8) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
9) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

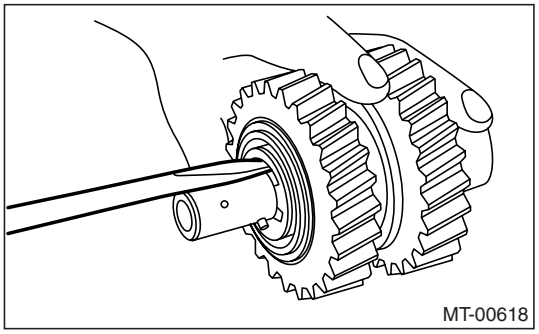
C: DISASSEMBLY

NOTE:
The sleeve and reverse gear engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

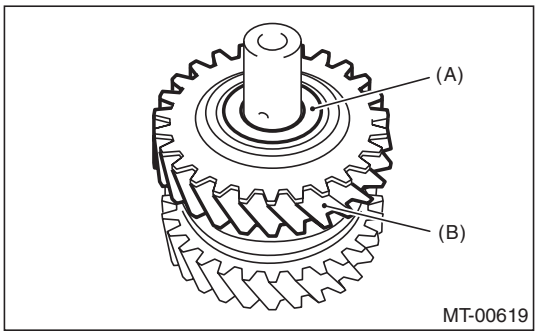
1) Remove the spring pin.



2) Remove the snap ring.

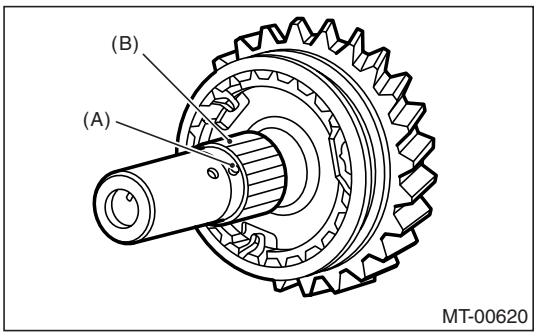


3) Remove the washer and reverse idler gear.



(A) Washer
(B) Reverse idler gear

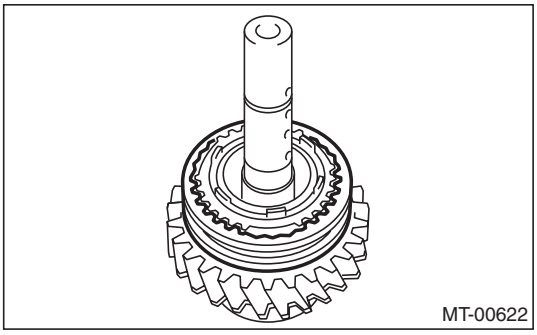
4) Remove the knock pin and reverse idler gear needle bearing.



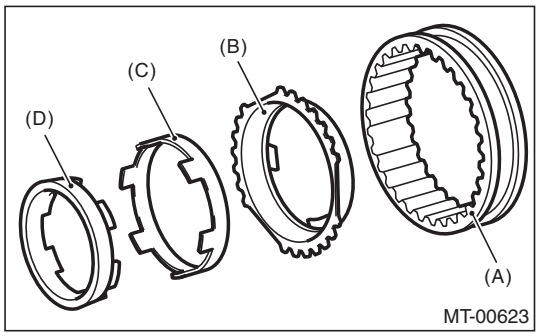
(A) Knock pin
(B) Reverse idler gear needle bearing

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5) Remove the collar.
6) Remove the reverse sleeve.

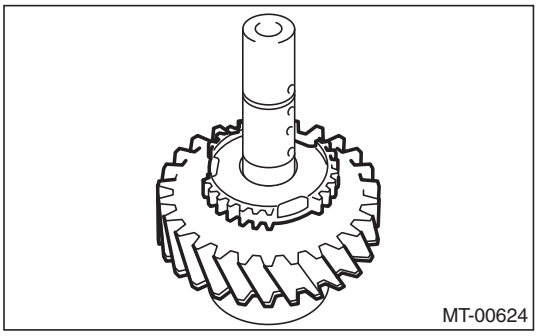


7) Remove the outer baulk ring, reverse synchro cone and inner baulk ring from reverse sleeve.

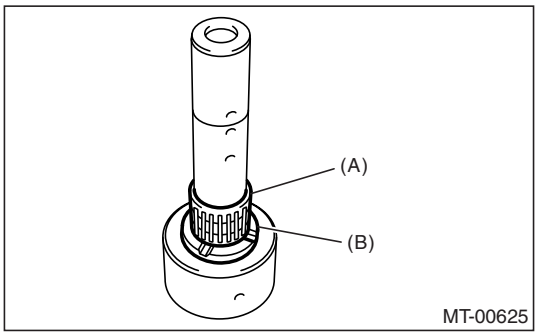


(A) Reverse sleeve
(B) Outer baulk ring
(C) Reverse synchro cone
(D) Inner baulk ring

8) Remove the reverse idler gear No.2.

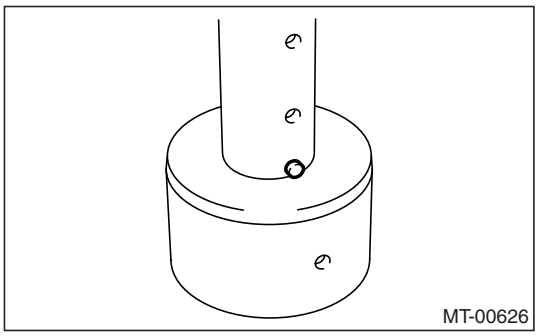


9) Remove the washer and needle bearing.

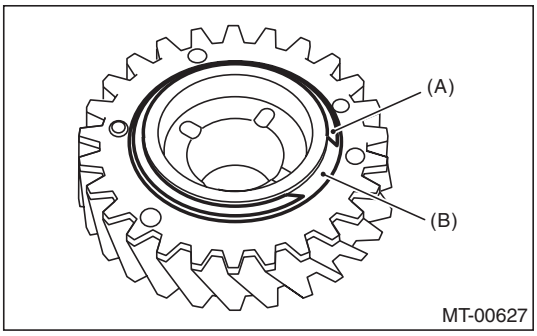


(A) Needle bearing
(B) Washer

10) Remove the knock pin.



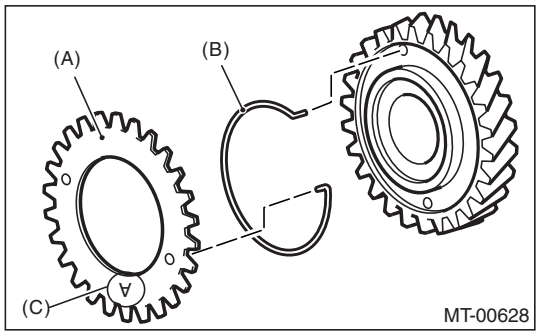
11) Remove the snap ring and friction plate from reverse gear.



(A) Snap ring
(B) Friction plate

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12) Remove the sub gear and spring.

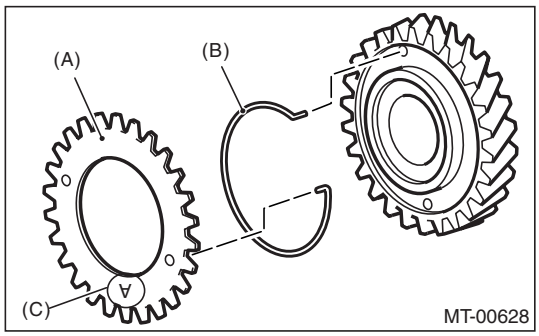


(A) Sub gear
(B) Spring
(C) Punch mark (mark A)

D: ASSEMBLY

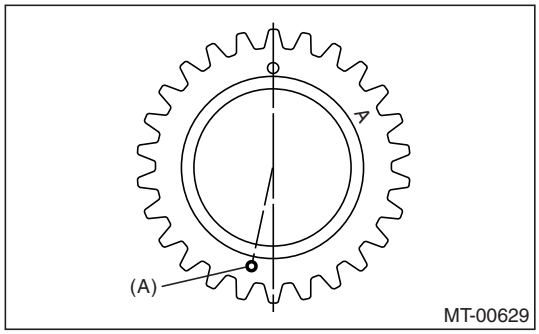
1) Install the sub gear and spring.

NOTE:
• Install the spring with white marking on hook part facing to sub gear side.
• Install the sub gear with punch mark (mark A) facing outside.



(A) Sub gear
(B) Spring
(C) Punch mark (mark A)

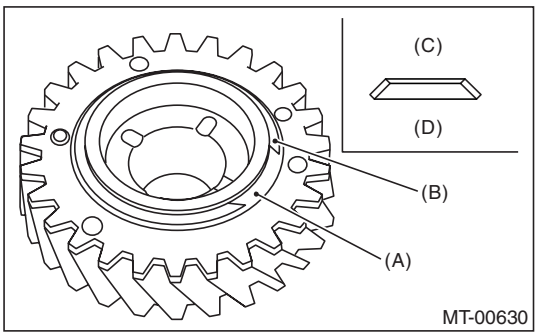
• Install the spring and sub gear, taking care to install the sub gear installation hole in proper direction.



(A) Installation hole

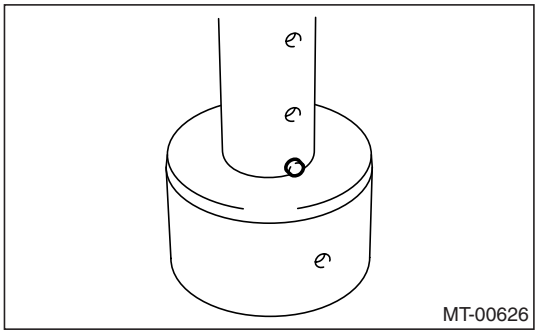
2) Install the friction plate and snap ring.

NOTE:
Make sure to install the friction plate in proper direction.



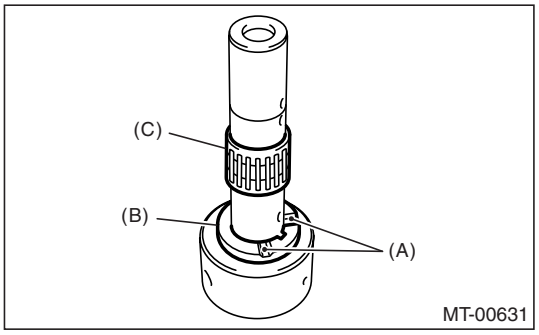
(A) Friction plate
(B) Snap ring
(C) Snap ring side
(D) Sub gear side

3) Sufficiently apply gear oil to the shaft, needle bearing and inner periphery of reverse drive gear.
4) Install the knock pin.



5) Install the washer and needle bearing.

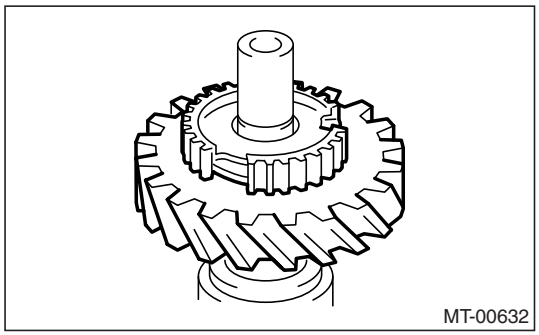
NOTE:
Install the washer with groove facing to reverse idler gear.



(A) Groove
(B) Washer
(C) Needle bearing

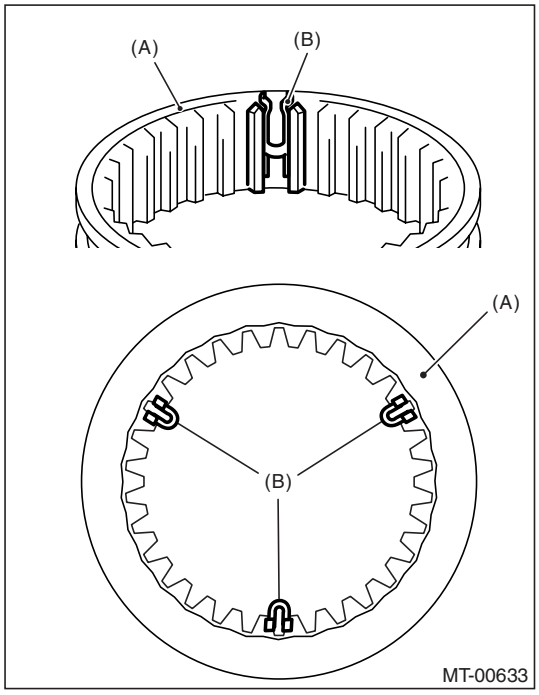
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6) Install the reverse idler gear No.2.



7) Install the shifting insert key in proper place of reverse sleeve.

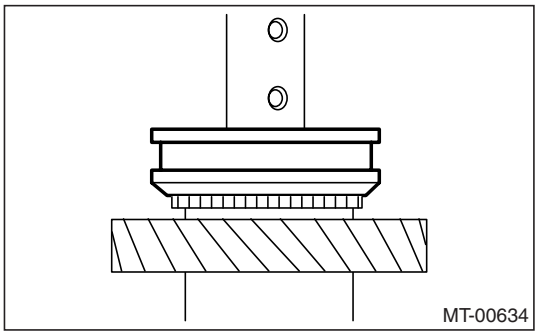
NOTE:
Angle of each shifting insert key is 120° apart.



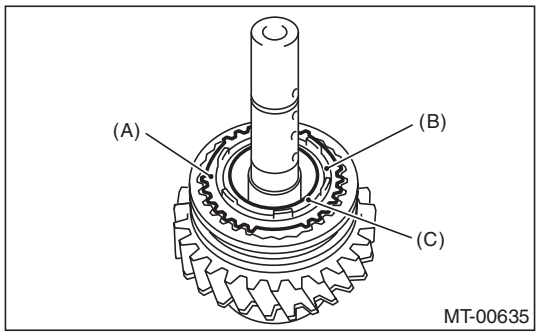
(A) Reverse sleeve
(B) Shifting insert key

8) Install the reverse sleeve to reverse idler gear No.2.

NOTE:
Make sure to install the reverse sleeve in proper direction.

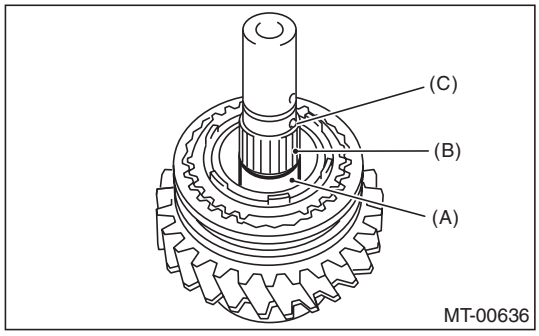


9) Sufficiently apply gear oil to the collar, needle bearing and inner periphery of reverse drive gear.
10) Install the outer baulk ring, reverse synchro cone and inner baulk ring.



(A) Outer baulk ring
(B) Reverse synchro cone
(C) Inner baulk ring

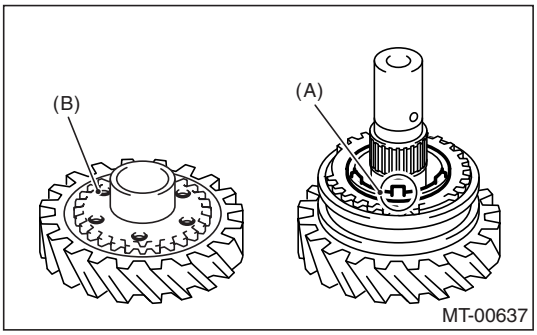
11) Install the collar and needle bearing, then install the knock pin.



(A) Collar
(B) Needle bearing
(C) Knock pin

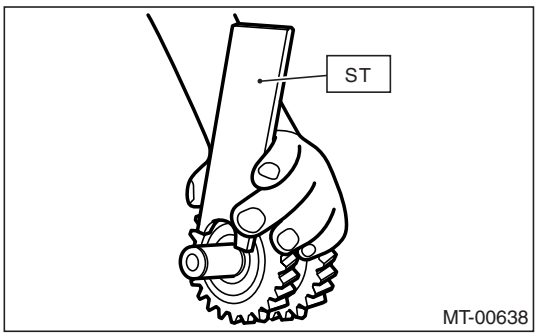
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12) Align the protrusion portion of reverse synchro cone with reverse idler gear hole, then install the reverse idler gear.



(A) Protrusion portion of reverse synchro cone
(B) Reverse idler gear hole

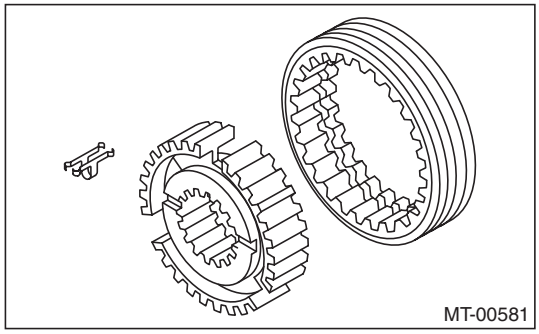
13) Install the washer with groove facing to reverse idler gear.
14) Using the ST, install the snap ring.
ST 18672AA000 GUIDE CLIP



15) Inspect and adjust the clearance between snap ring and washer. <Ref. to 6MT-98, INSPECTION, Reverse Idler Gear Assembly.>
16) Install a new spring pin.

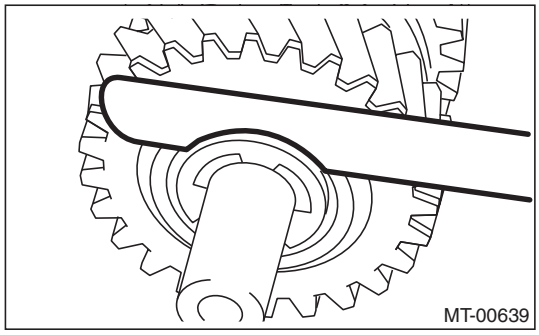
E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace the bearings in the following cases.
• Worn, rusted and damaged bearing
• Bearings that fail to turn smoothly or make abnormal noise when turned
• Bearings having other defects
2) Bushing (each gear)
Replace the bushings in the following case:
• When the sliding surface is damaged or abnormally worn.
3) Gears
Replace the gears in the following cases:
• The gear teeth surfaces are broken or excessively worn.
• The parts that contact the baulk ring is damaged.
• The inner surface of gear is damaged.
4) Baulk ring, synchro cone
Replace the baulk ring and synchro cone in the following case:
• Worn, rusted and damaged baulk ring
5) Shifting insert key
Replace the shifting insert key if deformed, excessively worn or defective in any way.



6) Inspect the clearance between snap ring and washer.

Specification of clearance:
0.1 — 0.3 mm (0.0039 — 0.0118 in)



Select and replace the snap ring from the following table if clearance is out of specification.

Snap ring	
Parts No.	Thickness mm (in)
031319000	1.50 (0.059)
805019030	1.60 (0.062)
805019010	1.72 (0.068)

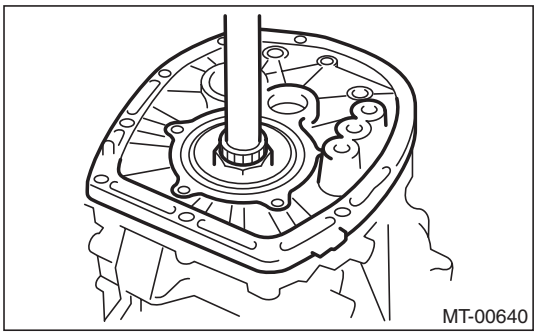
Inspect the clearance again after replacing snap ring.

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22.Drive Pinion Shaft Assembly

A: REMOVAL

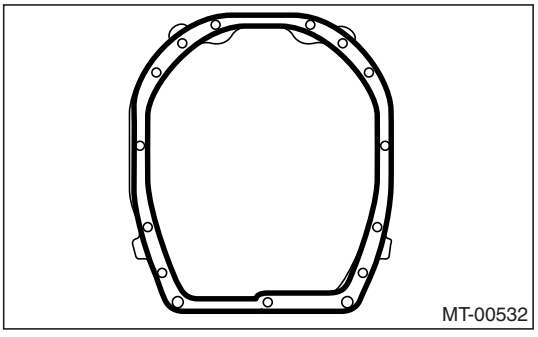
1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove each gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly.


MT-00640

B: INSTALLATION

1) Completely remove the remaining gasket on drive plate and clutch housing.
2) Apply liquid gasket to the clutch housing.

Liquid gasket:
THREE BOND 1215

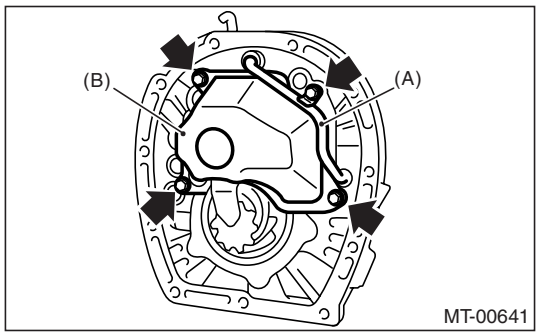

MT-00532

3) Install each gear assembly. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
4) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
5) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
6) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
7) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
8) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
9) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
10) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:
Replace the drive pinion shaft as a set with hypoid driven gear.

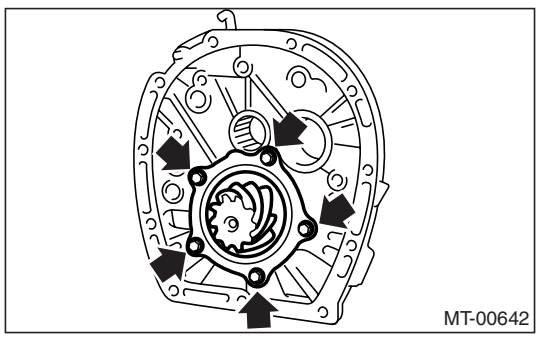
1) Remove the pipe and oil chamber.



MT-00641

(A) Pipe
(B) Oil chamber

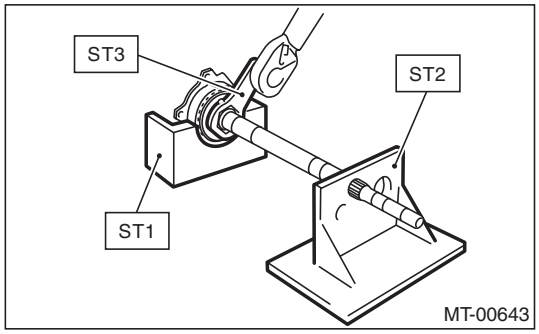
2) Remove the drive pinion shaft and shim from adapter plate.


MT-00642

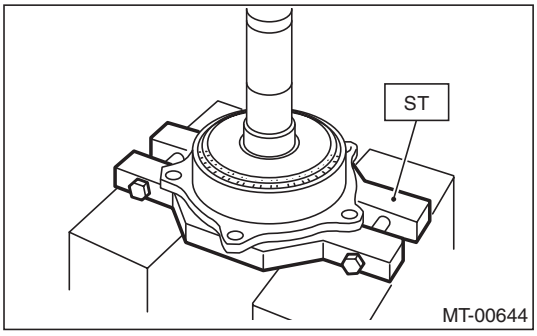
3) Secure the ST on workbench.
ST 18664AA000 BASE

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4) Lift the caulking of lock nut.
5) Install the ST3 to lock nut, then set drive pinion shaft to ST. Remove the lock nut and washer.
ST1 18667AA000 HOLDER
ST2 18664AA000 BASE
ST3 18621AA000 ADAPTER WRENCH



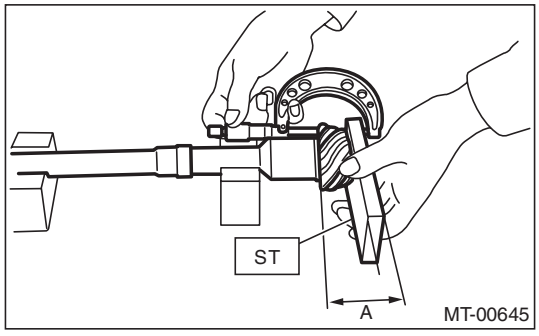
6) Using the ST, remove the taper roller bearing assembly.
ST 18723AA000 REMOVER



D: ASSEMBLY

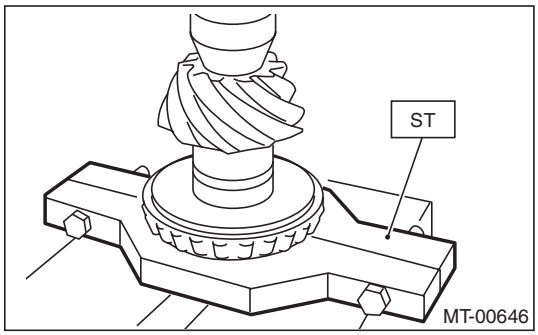
1) Using the ST, measure dimension A of drive pinion.

NOTE:
Note dimension A for selection of drive pinion shim.
ST 398643600 GAUGE



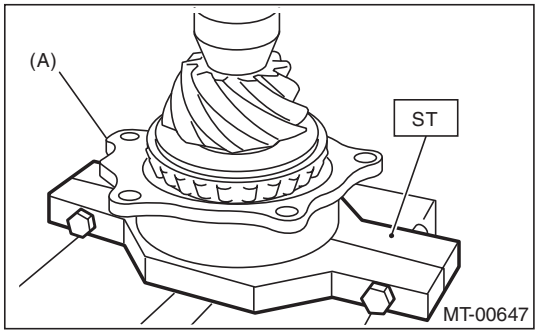
2) Install the inner bearing inner race to drive pinion shaft using ST and press.
ST 18723AA000 REMOVER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



3) Install the retainer and outer bearing inner race to drive pinion shaft using ST and press.
ST 18723AA000 REMOVER

NOTE:
Press to the point where bearing is turned smoothly without slack.



(A) Retainer

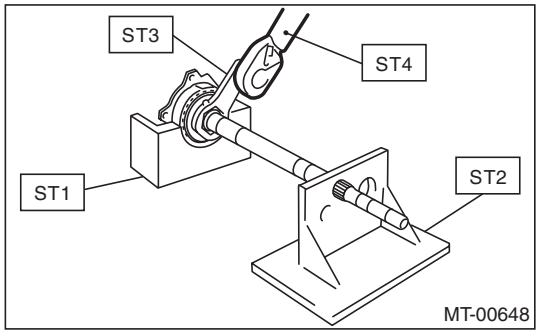
4) Install the washer and new lock nut.

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5) Set the ST to drive pinion, then tighten the lock nut.
ST1 18667AA000HOLDER
ST2 18664AA000BASE
ST3 18621AA000ADAPTER WRENCH
ST4 18852AA000TORQUE WRENCH

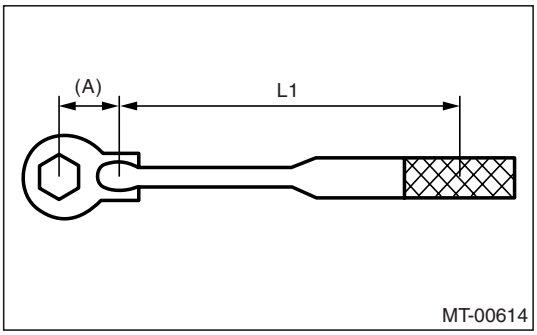
NOTE:
Tighten with the ST and torque wrench straight-lined.

Tightening torque:
265 N·m (27.0 kgf-m, 195 ft-lb)



NOTE:
• If torque wrench except ST4 is used, calculate the following equation, then tighten the lock nut.
Tighten with the ST and torque wrench straight-lined.
T=L1/(0.1 + L1)×285

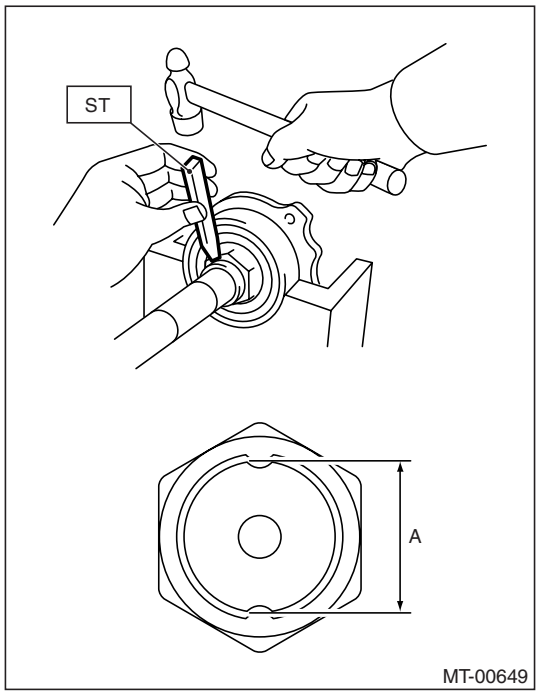
T N·m (kgf-m, ft-lb)	Setting value of torque wrench
L1 m (in)	Torque wrench length
0.1 m (3.94 in)	ST length
285 N·m (29.0 kgf-m, 210 ft-lb)	Tightening torque of lock nut



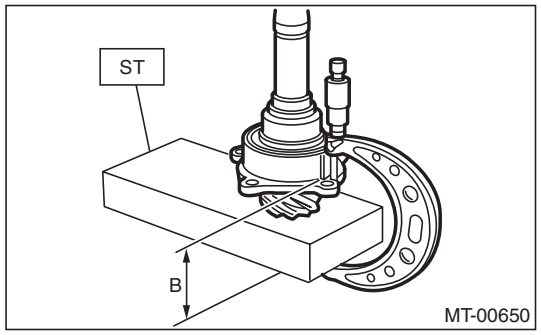
(A) 0.1 m (3.94 in)

6) Measure the starting torque. <Ref. to 6MT-102, INSPECTION, Drive Pinion Shaft Assembly.>
7) Using the ST, caulk two portions on the lock nut to obtain dimension A 37±0.5 mm (1.46±0.02 in).
ST 18670AA000 PUNCH

NOTE:
Do not crack the caulking part of lock nut.



8) Using the ST, measure dimension B of the drive pinion.
ST 398643600 GAUGE



9) Calculate the following equation, then select one or two pieces of drive pinion shim from the table below.
6.5±0.0625 mm — (B—A) [0.26±0.0025 in — (B—A)]

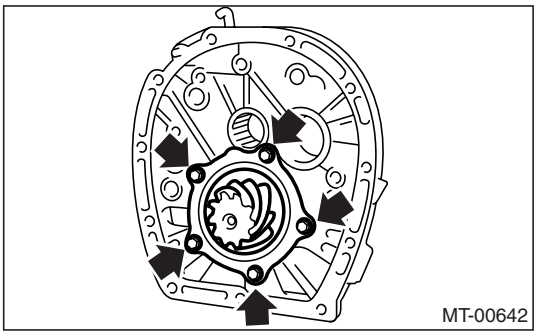
NOTE:
A: Measured value from step 1).
B: Measured value from step 8).

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Drive pinion shim	
Part No.	Thickness mm (in)
32295AA270	0.15 (0.0059)
32295AA280	0.175 (0.0069)
32295AA290	0.20 (0.0079)
32295AA300	0.225 (0.0089)
32295AA310	0.25 (0.0098)
32295AA320	0.275 (0.0108)

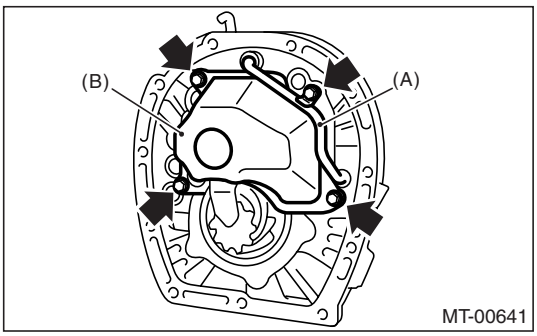
10) Apply gear oil to the side face of taper roller bearing, then install the drive pinion shaft and selected shim to adapter plate.

Tightening torque:
54 N·m (5.5 kgf-m, 40 ft-lb)



11) Install the oil chamber and pipe.

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

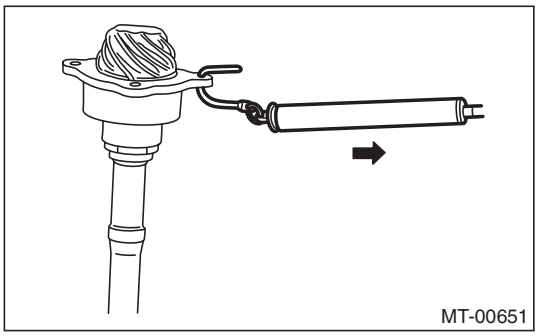


(A) Pipe
(B) Oil chamber

E: INSPECTION

1) Using the spring balancer, measure the starting torque. If the starting torque is out of specification, replace the taper roller bearing.

Starting torque:
0 — 0.95 N (0 — 0.097 kgf, 0 — 0.21 lb)

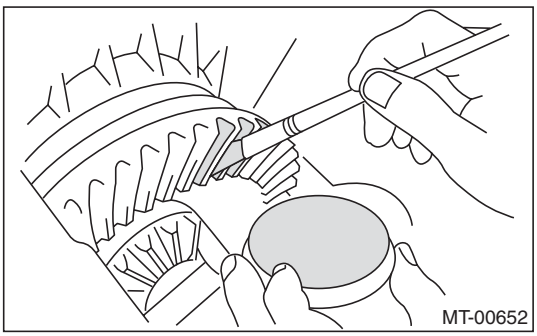


2) Gears
Replace the gears in the following case.
• Gear teeth surfaces are broken or excessively worn.
3) Bearings
Replace the bearings in the following cases.
• Worn, rusted and damaged bearing
• Bearings that fail to turn smoothly or make abnormal noise when turned
4) Adapter plate
Replace the adapter plate in the following cases.
• Worn, rusted and damaged bearing
• Damaged adapter plate
5) Make sure the pipe and pipe chamber is not damaged or clogged. Repair or replace if damaged or clogged.

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F: ADJUSTMENT

1) Inspect and adjust the backlash between hypoid driven gear and drive pinion. <Ref. to 6MT-111, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>
2) Apply a uniform thin coat of red lead on both teeth surfaces of three or four teeth of the hypoid driven gear.

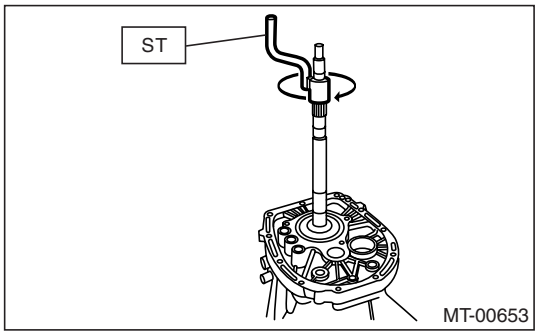


3) Install the drive pinion shaft assembly to clutch housing, then tighten at least four bolts.

NOTE:
Install with the liquid gasket remaining to prevent the mating surface of clutch housing and adapter plate from damaging.

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

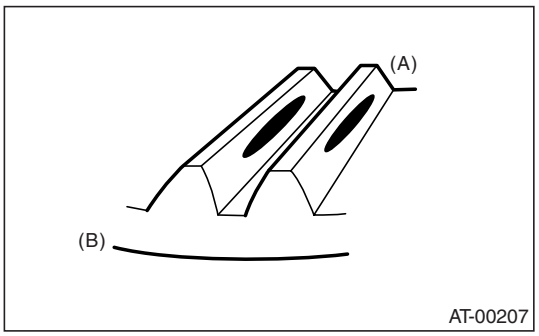
4) Using the ST, rotate several times.
ST 18631AA000 HANDLE



5) Remove the drive pinion shaft assembly, and then check tooth contact. If it is inaccurate, adjust the backlash or thickness of shim.

- Tooth contact

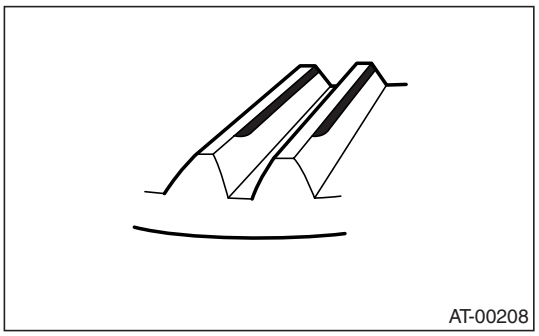
Checking item:Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]



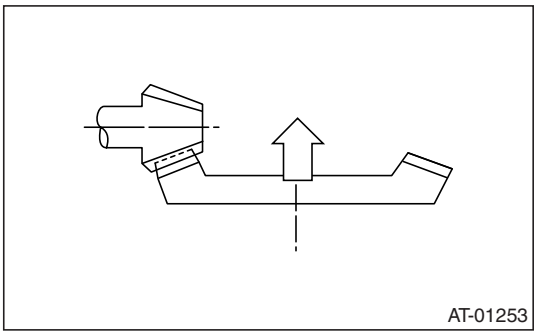
(A) Toe side
(B) Heel side

- Face contact

Checking item: Backlash is too large.
Contact pattern



Corrective action: Verify the backlash again, and then adjust it.

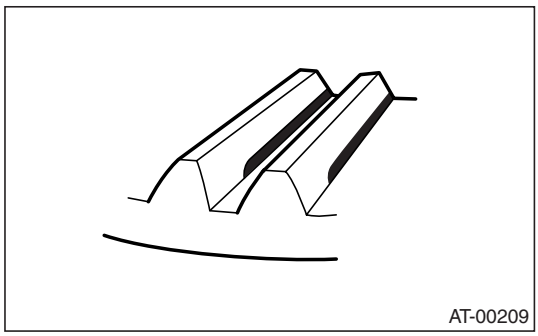


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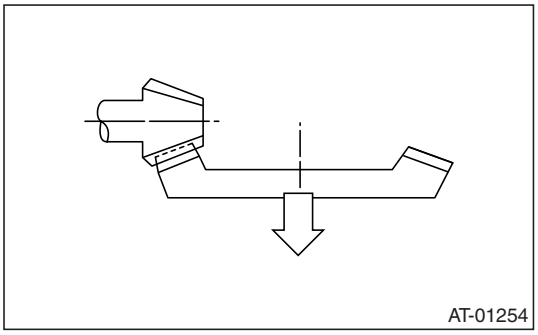
• Flank contact

Checking item: Backlash is too small.

Contact pattern



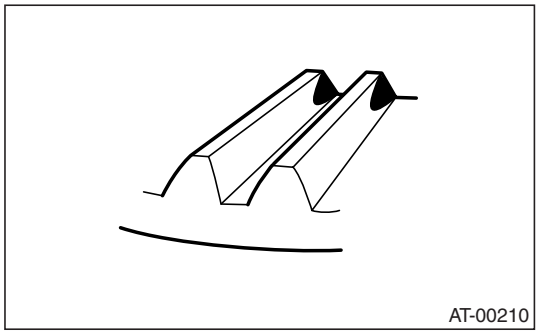
Corrective action: Verify the backlash again, and then adjust it.



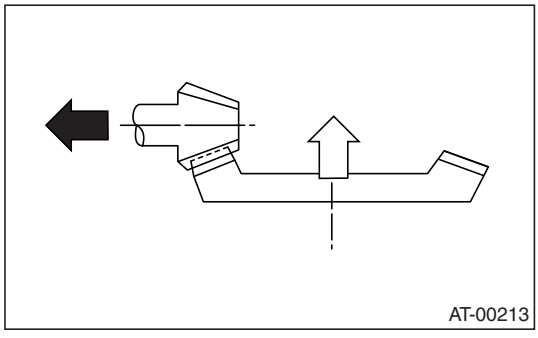
• Toe contact (Inside end contact)

Checking item: Contact areas is small.

Contact pattern



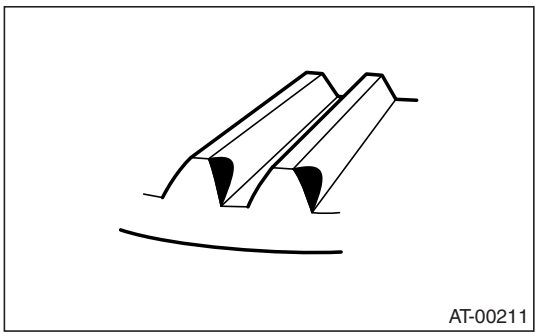
Corrective action: Reduce thickness of drive pinion shim in order to move drive pinion away from crown gear.



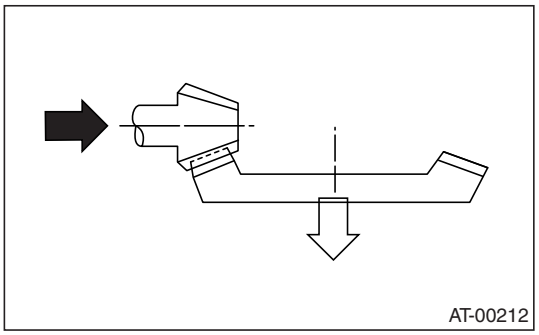
• Heel contact (Outside end contact)

Checking item: Contact areas is small.

Contact pattern



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

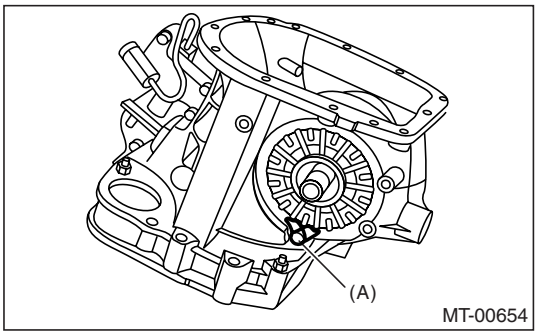


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23.Front Differential Assembly

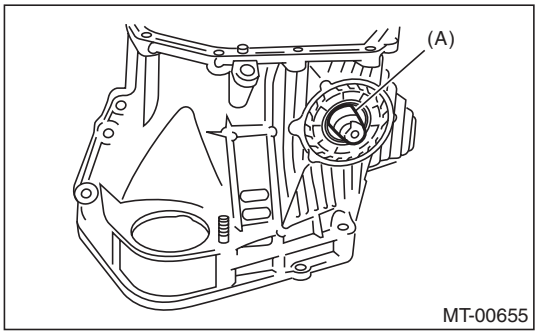
A: REMOVAL

1) Remove the manual transmission assembly. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove each gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly. <Ref. to 6MT-99, REMOVAL, Drive Pinion Shaft Assembly.>
11) Remove the lock plates on both side.



(A) Lock plate

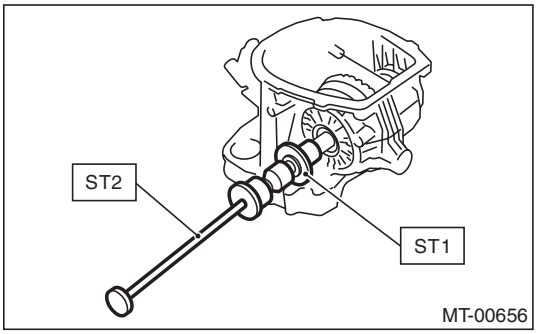
12) Wrap vinyl tape around the spline part of axle shaft.



(A) Vinyl tape

13) Using the ST, remove the axle shaft.
ST1 499247300 INSTALLER
ST2 499095500 REMOVER ASSY

NOTE:
- Do not reuse the circlip.
- Mark to identify the right and left axle shaft.

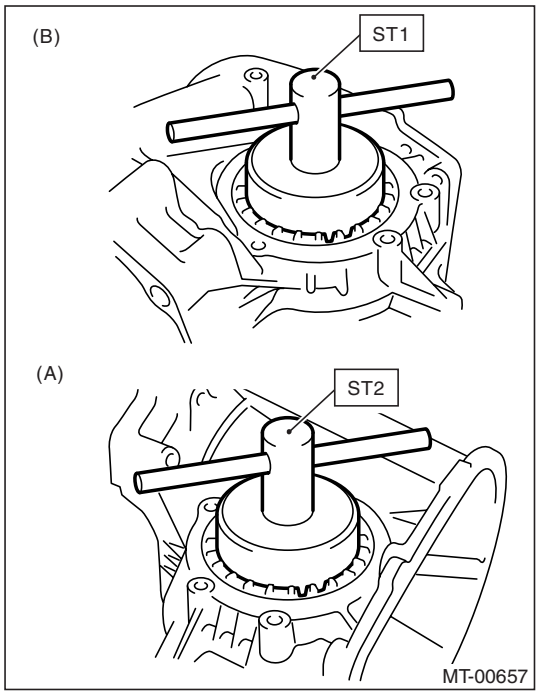


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14) Using the ST, remove the differential side retainer on both side.

ST1 499787000 WRENCH ASSY (RIGHT SIDE)
ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

NOTE:
Be careful not to damage the part of clutch case where the retainer is to be installed.



(A) Left side
(B) Right side

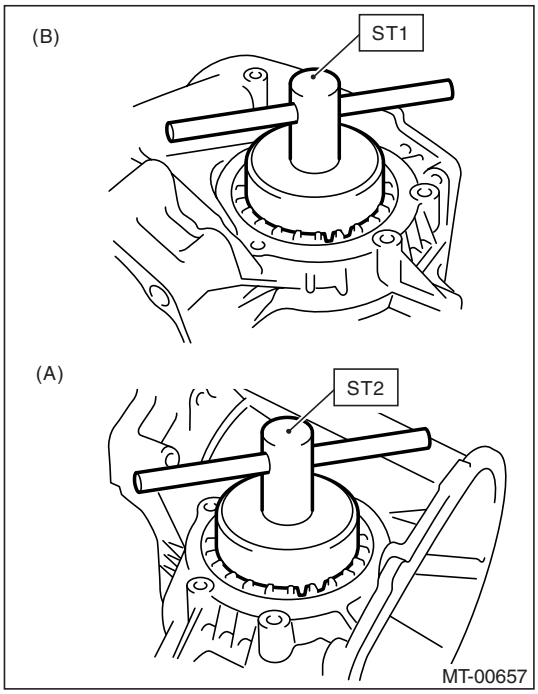
15) Remove the front differential.

B: INSTALLATION

1) Install the differential assembly into clutch housing.
2) Apply oil to the threaded portion part of side retainer.
3) Remove the O-ring from side retainer of both side.
4) Using the ST, install the differential side retainer to both side.

ST1 499787000 WRENCH ASSY (RIGHT SIDE)
ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

NOTE:
Be careful not to damage the oil seal.

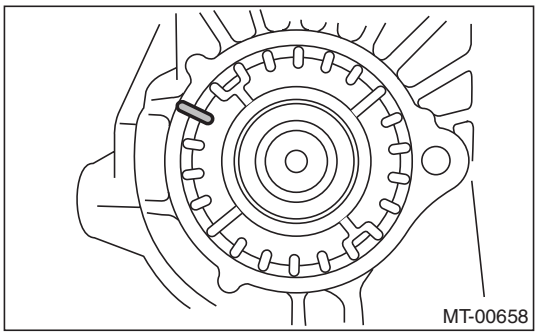


(A) Left side
(B) Right side

5) Install the axle shaft.

NOTE:
- Replace the circlip with a new one.
- Be careful not to confuse right and left axle shaft.
- Wrap vinyl tape around the spline part of axle shaft.

6) Check and adjust the hypoid gear backlash. <Ref. to 6MT-110, HYPOID GEAR BACKLASH, INSPECTION, Front Differential Assembly.>
7) Check and adjust the tooth contact. <Ref. to 6MT-103, ADJUSTMENT, Drive Pinion Shaft Assembly.>
8) Mark an engagement point on the right and left side retainer and clutch housing.



9) Remove the differential side retainer from both side.

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NOTE:
Note the rotating number of time till removal, when removing the side retainer.

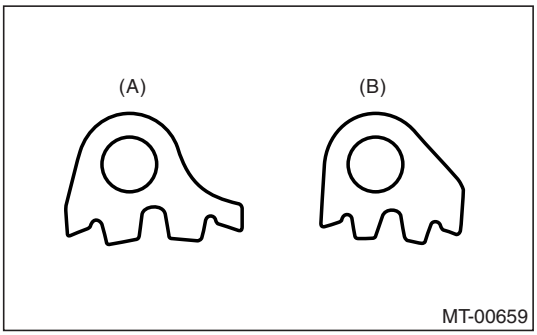
10) Install a new O-ring to side retainer of both side.
11) Install the differential side retainer to both side.

NOTE:
Install the side retainer by screwing in the same rotating number of time till removal, and then align the mark.

12) Install the lock plate.

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

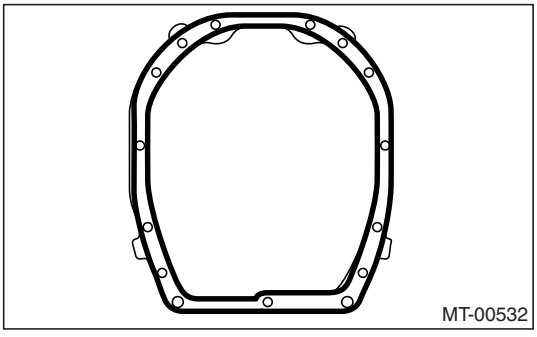
NOTE:
Be careful not to confuse right and left lock plate.



(A) Left
(B) Right

13) Completely remove the remaining gasket from the clutch housing and adapter plate.
14) Apply liquid gasket to the clutch housing.

Liquid gasket:
THREE BOND 1215

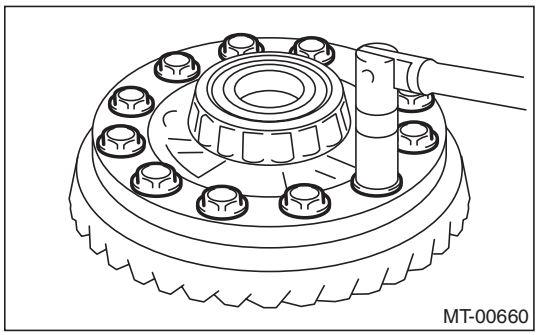


15) Install the drive pinion shaft assembly. <Ref. to 6MT-99, INSTALLATION, Drive Pinion Shaft Assembly.>
16) Install each gear assembly at once. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
17) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
18) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
19) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
20) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
21) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
22) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
23) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

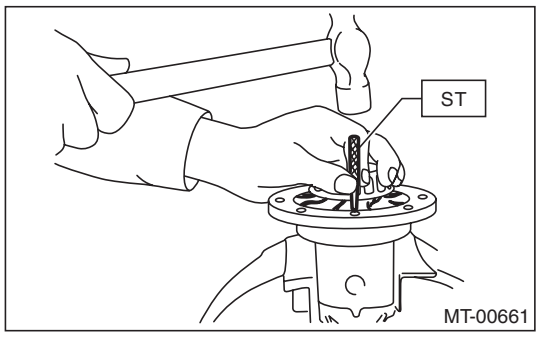
C: DISASSEMBLY

1. DIFFERENTIAL CASE

1) Secure the differential assembly on a vise, and then remove the hypoid driven gear.

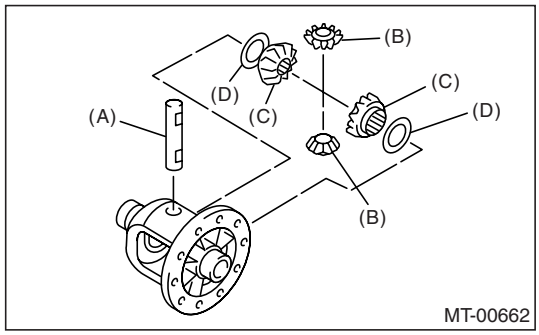


2) Drive out straight pin from the differential assembly toward hypoid driven gear. (Without LSD)
ST 899904100 REMOVER



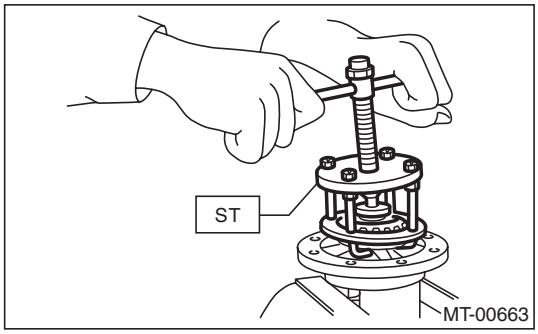
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3) Pull out the pinion shaft, and then remove the bevel pinion gear and bevel gear and washer. (Without LSD)



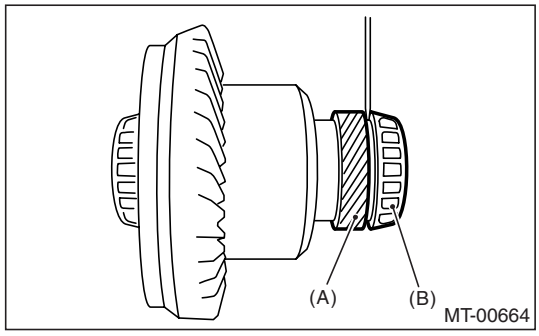
(A) Pinion shaft
(B) Bevel pinion gear
(C) Bevel gear
(D) Washer

4) Using the ST, remove the hypoid driven gear side bearing.
ST 399527700 PULLER SET



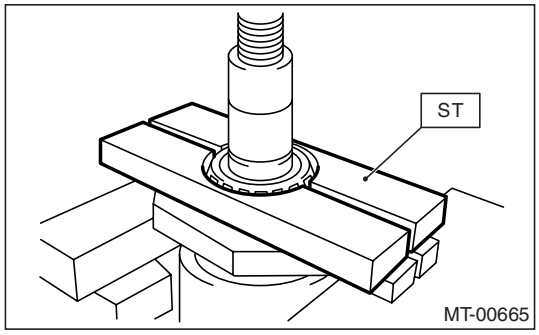
5) Using a screw driver, make clearance of 2 — 3 mm (0.079 — 0.118 in) between the speedometer drive gear and roller bearing.

NOTE:
Be careful not to damage the differential case.



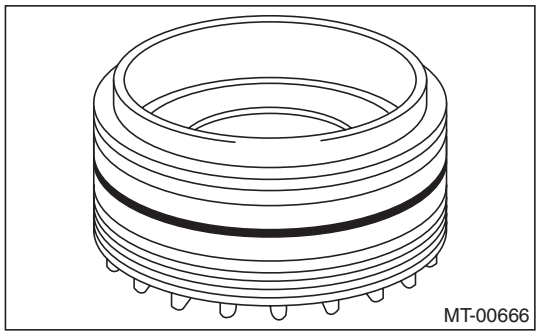
(A) Speedometer drive gear
(B) Roller bearing

6) Using the ST, remove the roller bearing.
ST 498077000 REMOVER

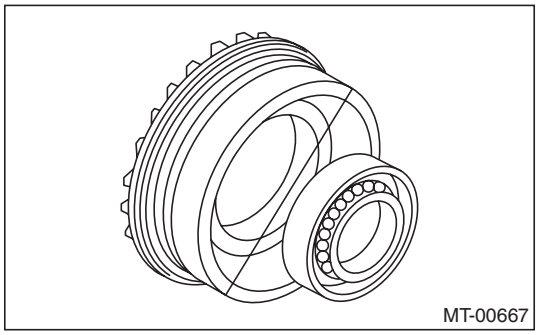


2. SIDE RETAINER

1) Remove the O-ring from side retainer.

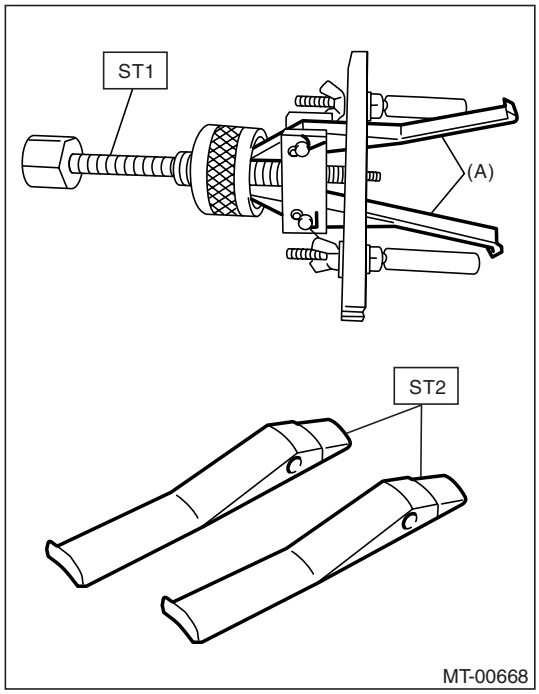


2) Remove the oil seal from side retainer.



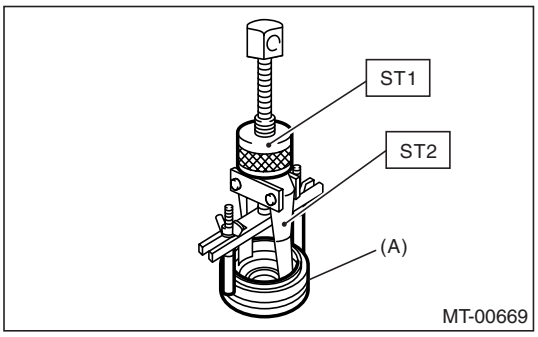
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3) Remove the claw of ST1, and then install the claw of ST2.
ST1 398527700PULLER ASSY
ST2 18760AA000 CLAW



(A) Claw

4) Remove the bearing outer race from side retainer.
ST1 398527700 PULLER ASSY
ST2 398527705 CLAW



(A) Side retainer

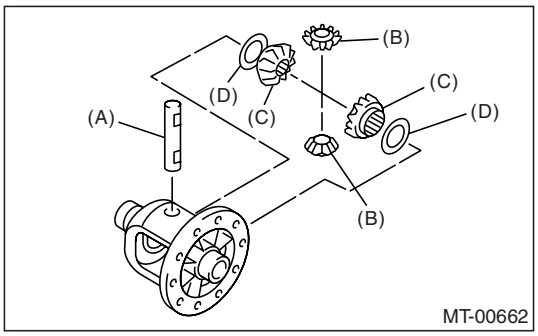
D: ASSEMBLY

1. DIFFERENTIAL CASE

1) Install the washer to bevel gear.

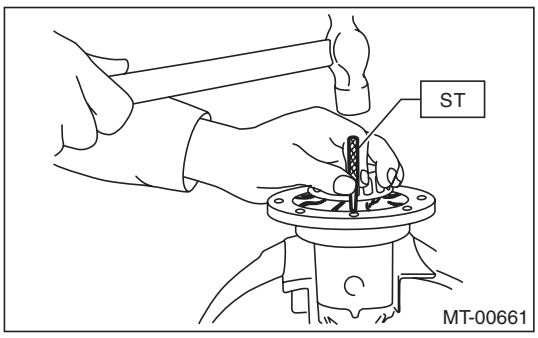
NOTE:
Face the chamfered side of washer toward gear.

2) Install the bevel gear and bevel pinion gear washer to differential case, and then insert the pinion shaft.



(A) Pinion shaft
(B) Bevel pinion gear
(C) Bevel gear
(D) Washer

3) Check the bevel pinion gear backlash. <Ref. to 6MT-110, BEVEL PINION GEAR BACKLASH, INSPECTION, Front Differential Assembly.>
4) Using the ST, align the pinion shaft and differential case at their holes, and then drive the straight pin into holes.
ST 899904100 REMOVER

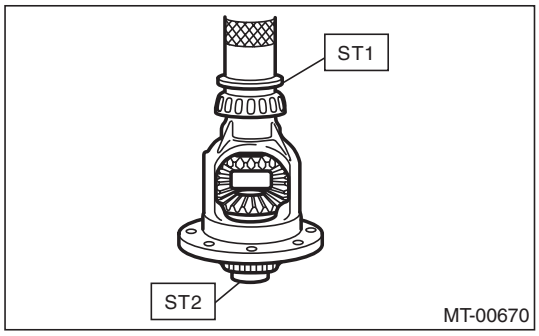


5) Stake around the hole, and then verify that the straight pin is secured.
6) Using the ST, install a new speedometer drive gear and right and left side bearing inner race to differential case.
ST1 398437700 INSTALLER
ST2 398497701 SEAT

CAUTION:
Do not apply pressure in excess of 20 kN (2.0 ton, 2.2 US ton, 2.0 Imp ton).

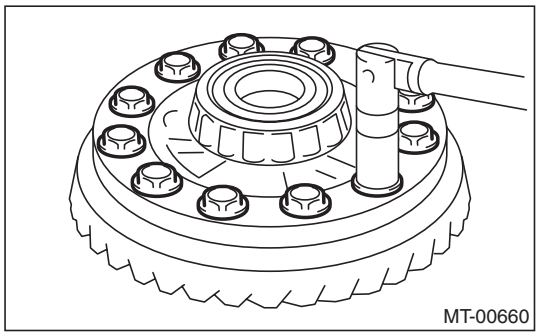
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NOTE:
Always replace the inner race and outer race as a set.



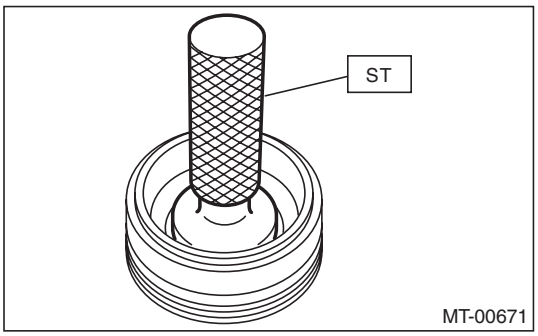
7) Install the hypoid driven gear to differential case.

Tightening torque:
69 N·m (7.0 kgf-m, 50.9 ft-lb)



2. SIDE RETAINER

1) Using the ST, install the oil seal.
ST 499797000 OIL SEAL INSTALLER



2) Install the bearing outer race to retainer on both side.
3) Install the O-ring to retainer on both side.

NOTE:
Be careful not to damage the O-ring.

E: INSPECTION

Repair or replace the front differential in following cases.
- Each gear is damaged, seized, or excessively worn.
- Sliding surfaces of the differential case is damaged, seized or excessively worn.
- Bearings and bearings part is damaged, rusted or worn.
- Bearings that fail to turn smoothly or make abnormal noise when turned.

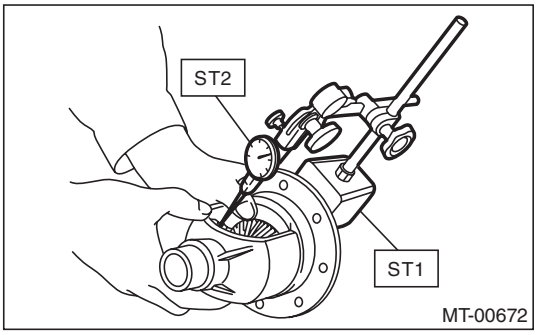
1. BEVEL PINION GEAR BACKLASH

Measure the bevel pinion gear backlash. If it is not within specifications, install a suitable washer to adjust it. <Ref. to 6MT-111, ADJUSTMENT, Front Differential Assembly.>

NOTE:
- Be sure the pinion gear teeth contacts adjacent gear teeth during measurement.
- Before measuring the backlash, rotate each gear to get each part accustomed.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



2. HYPOID GEAR BACKLASH

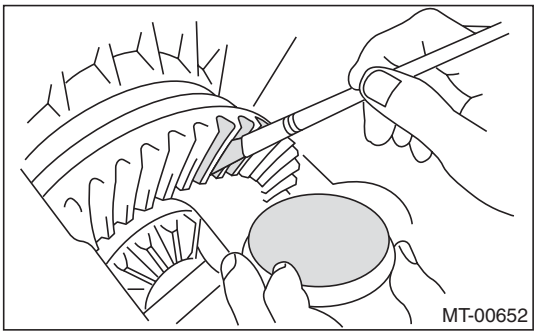
Check the hypoid gear backlash. If it is not within specifications, adjust it. <Ref. to 6MT-111, HYPOID GEAR BACKLASH, Front Differential Assembly.>

3. TOOTH CONTACT OF HYPOID GEAR

1) Be sure the hypoid gear backlash is within specifications. If it is not within specifications, adjust it. <Ref. to 6MT-111, HYPOID GEAR BACKLASH, Front Differential Assembly.>

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2) Apply a uniform thin coat of red lead on both tooth surfaces of three or four teeth of the hypoid driven gear.



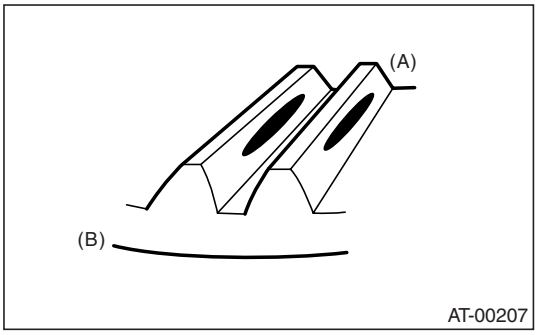
3) Install the drive pinion shaft assembly, and then secure with four bolts.

NOTE:
Use the old gasket and washer to prevent the mating surface of housing from damaging.

Tightening torque:
50 N·m (5.0 kgf-m, 36.9 ft-lb)

4) Rotate the drive pinion shaft to right and left for several times.
5) Remove the drive pinion shaft assembly, and then check tooth contact. If tooth contact is inaccurate, adjust it. <Ref. to 6MT-103, ADJUSTMENT, Drive Pinion Shaft Assembly.>
- Correct tooth contact.

NOTE:
Under no load, tooth contacts 50—60% from center to toe side (tooth contact shifts to heel side when driving).

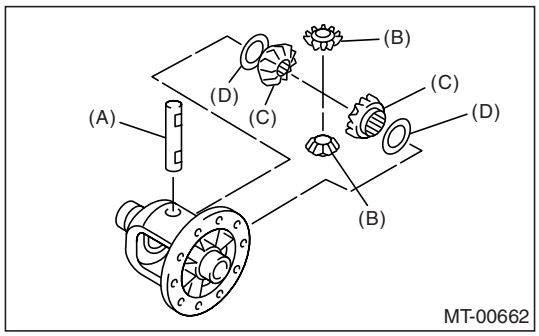


(A) Toe side
(B) Heel side

F: ADJUSTMENT

1. BEVEL PINION GEAR BACKLASH

1) Measure the bevel pinion gear backlash. <Ref. to 6MT-110, BEVEL PINION GEAR BACKLASH, INSPECTION, Front Differential Assembly.>
2) Disassemble the differential case. <Ref. to 6MT-107, DIFFERENTIAL CASE, DISASSEMBLY, Front Differential Assembly.>
3) Select a washer from the following table, and then assemble the differential case. <Ref. to 6MT-109, DIFFERENTIAL CASE, ASSEMBLY, Front Differential Assembly.>



(A) Pinion shaft
(B) Bevel pinion gear
(C) Bevel gear
(D) Washer

NOTE:
If the backlash is excessive, select a thicker shim. If the backlash is insufficient, select a thinner new shim.

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)

2. HYPOID GEAR BACKLASH

1) Install the right and left side retainer.
ST1 499787000 WRENCH ASSY (RIGHT SIDE)
ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

NOTE:
Screw in the right side retainer a bit further than left side.

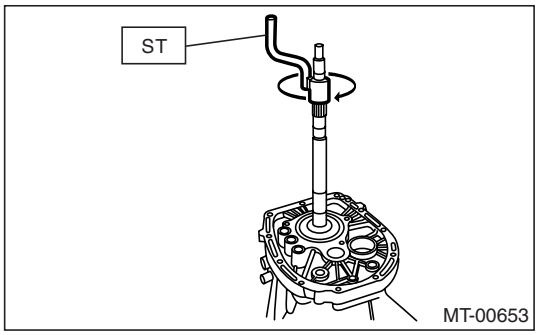
2) Install the drive pinion shaft assembly, and then secure with four bolts.

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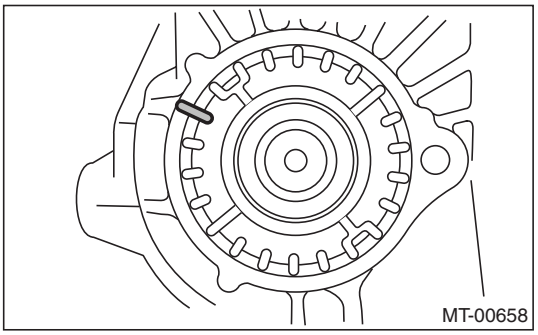
NOTE:
Use the old gasket and washer to prevent the mating surface of housing from damaging.

Tightening torque:
50 N·m (5.0 kgf-m, 36.9 ft-lb)

3) Using the ST, screw in the left side retainer until the drive pinion and hypoid driven gear contacts lightly. Then loosen the right side retainer.
ST1 499787000 WRENCH ASSY (RIGHT SIDE)
ST2 18630AA000 WRENCH ASSY (LEFT SIDE)
4) Using the ST, rotate the drive pinion shaft several times.
ST 18631AA000 HANDLE

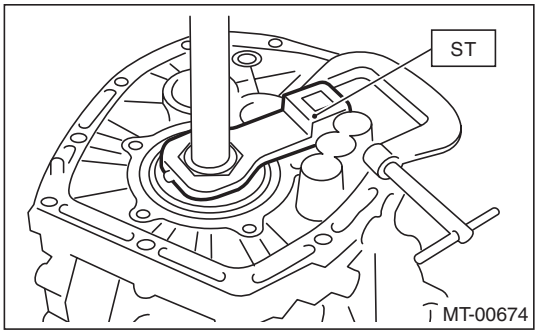


5) Repeat step 3) and 4) until the left side retainer can not be rotated. For the right side retainer, screw in until the inner race and outer race contacts lightly. This condition is “0” backlash.
6) Mark an engagement point on the right and left side retainer and clutch housing.



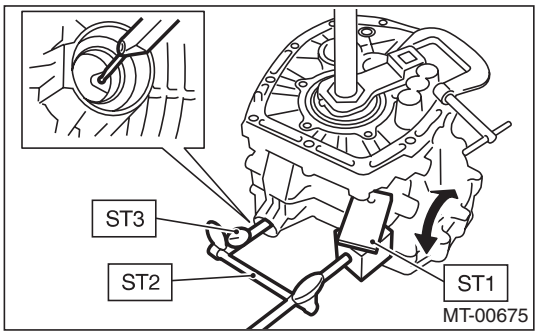
7) Return the left side retainer for three teeth, and screw in the right side retainer for three teeth.

8) Using the ST, secure the drive pinion shaft.
ST 18621AA000 ADAPTER WRENCH



9) After rotating the drive pinion shaft several times, measure the hypoid gear backlash using the ST.
ST1 498255400 PLATE
ST2 498247001 MAGNET BASE
ST3 498247100 DIAL GAUGE

Hypoid gear backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



10) If the backlash is out of specification, adjust it by turning the right and left side retainers.
11) Screw in the right side retainer for further 1.75 teeth.

3. TOOTH CONTACT OF HYPOID GEAR

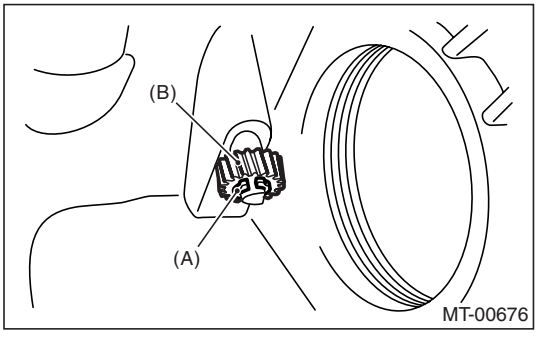
Refer to the section of drive pinion shaft for checking of tooth contact. <Ref. to 6MT-110, TOOTH CONTACT OF HYPOID GEAR, INSPECTION, Front Differential Assembly.>

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24.Speedometer Gear

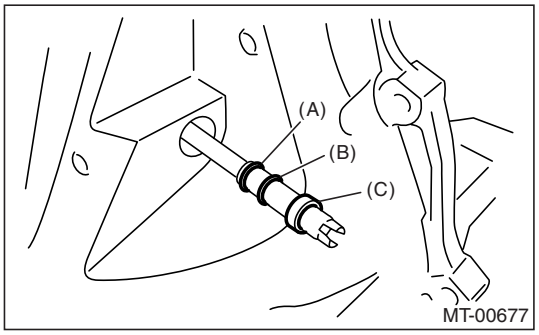
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove each gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly. <Ref. to 6MT-99, REMOVAL, Drive Pinion Shaft Assembly.>
11) Remove the front differential assembly. <Ref. to 6MT-105, REMOVAL, Front Differential Assembly.>
12) Remove the vehicle speed sensor. <Ref. to 6MT-34, REMOVAL, Vehicle Speed Sensor.>
13) Remove the snap ring, and then remove the speedometer driven gear.



(A) Snap ring
(B) Speedometer driven gear

14) Remove the speedometer shaft from clutch housing.
15) Remove the oil seal, speedometer shaft and washer.

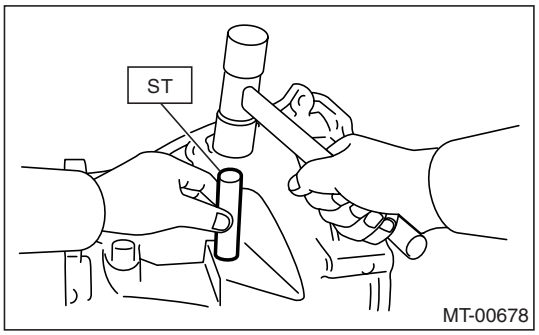


(A) Washer
(B) Snap ring
(C) Oil seal

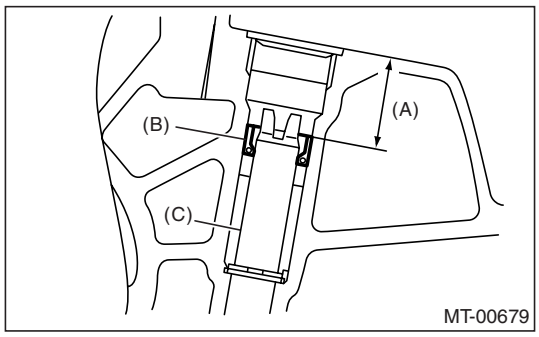
16) Remove the snap ring from speedometer shaft.

B: INSTALLATION

1) Install the oil seal, washer and snap ring to speedometer shaft.
2) Insert the speedometer shaft. Using the ST, press the oil seal.
ST 899824100 or 499827000 PRESS



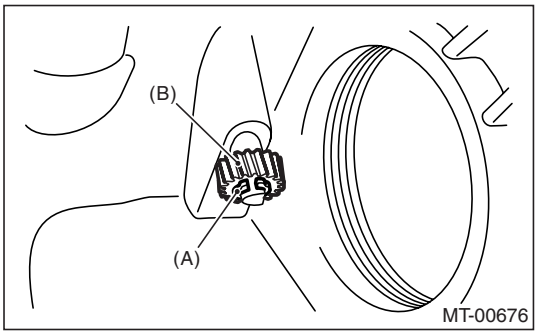
NOTE:
• Replace the oil seal with a new one.
• Insert the oil seal approx. 24 mm (0.94 in) from the edge of clutch case.



(A) Approx. 24 mm (0.94 in)
(B) Oil seal
(C) Speedometer shaft

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3) Install the speedometer driven gear and snap ring.



(A) Snap ring
(B) Speedometer driven gear

4) Install the vehicle speed sensor. <Ref. to 6MT-34, INSTALLATION, Vehicle Speed Sensor.>
5) Install the front differential assembly. <Ref. to 6MT-106, INSTALLATION, Front Differential Assembly.>
6) Install the drive pinion shaft assembly. <Ref. to 6MT-99, INSTALLATION, Drive Pinion Shaft Assembly.>
7) Install each gear assembly at once. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
8) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
9) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
10) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
11) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
12) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
13) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
14) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

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25.Shifter Fork and Rod

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove each gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>

B: INSTALLATION

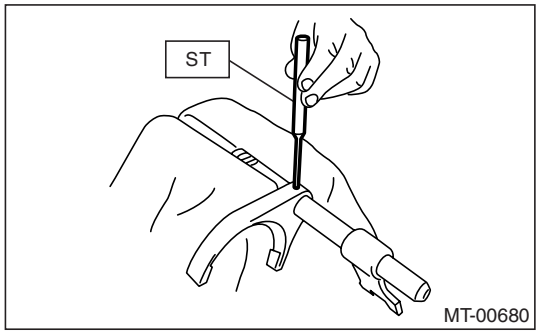
1) Install each gear assembly at once. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
2) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
3) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
4) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
5) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
6) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
7) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
8) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

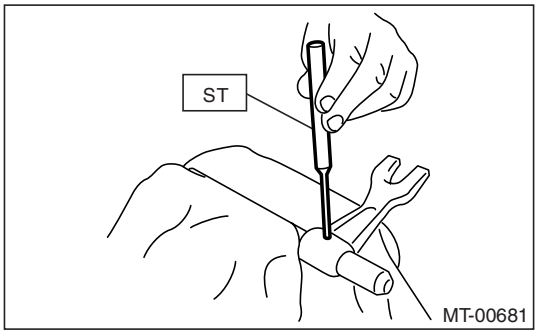
NOTE:
Discard the removed spring pin and replace with a new one.

1. REVERSE SHIFTER FORK

1) Using the ST, remove the reverse fork.
ST 398791700 REMOVER

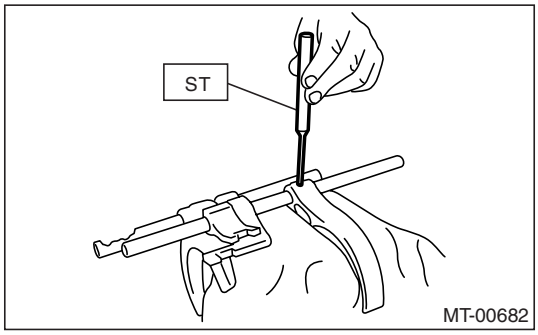


2) Using the ST, remove the reverse shifter arm.
ST 398791700 REMOVER



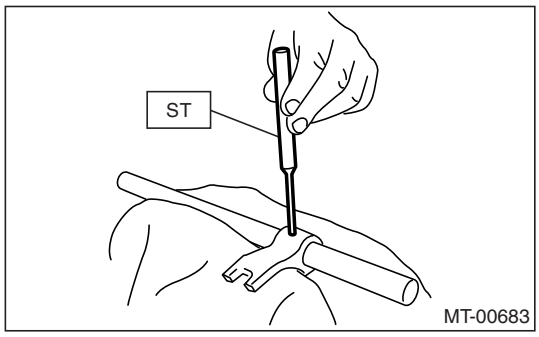
2. 1st-2nd, 3rd-4th SHIFTER FORK

1) Using the ST, remove the 3rd-4th shifter fork.
ST 398791700 REMOVER

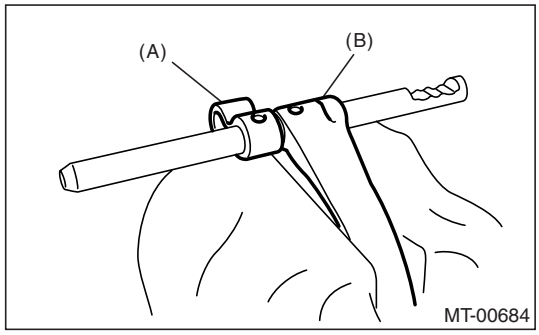


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2) Using the ST, remove the 3rd-4th shifter arm.
ST 398791700 REMOVER



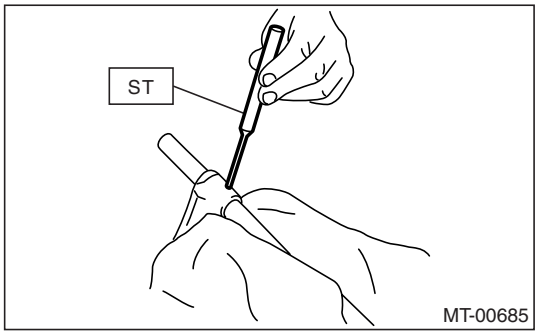
3) Using the ST, remove the 1st-2nd shifter arm and 1st-2nd shifter fork.
ST 398791700 REMOVER



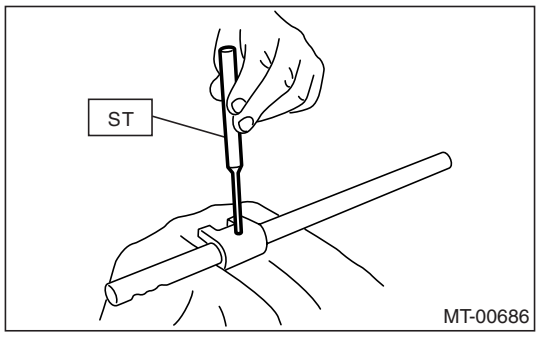
(A) 1st-2nd shifter arm
(B) 1st-2nd shifter fork

3. 5th-6th SHIFTER FORK

1) Using the ST, remove the 5th-6th shifter fork.
ST 398791700 REMOVER

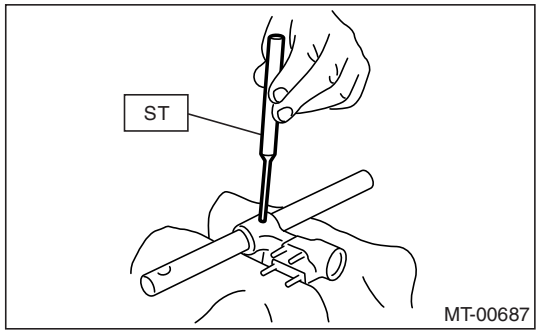


2) Using the ST, remove the 5th-6th shifter arm.
ST 398791700 REMOVER



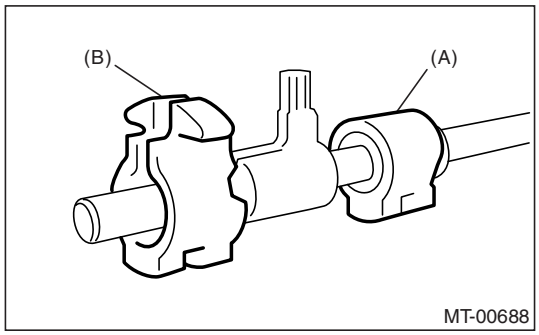
4. SHIFT ARM SHAFT

Using the ST, remove the selector arm.
ST 398791700 REMOVER



5. STRIKING ROD

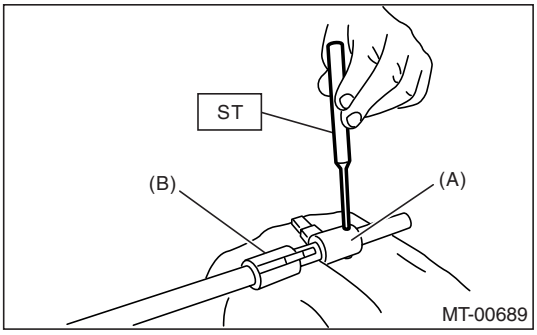
1) Remove the reverse interlock block and interlock block from striking rod.



(A) Reverse interlock block
(B) Interlock block

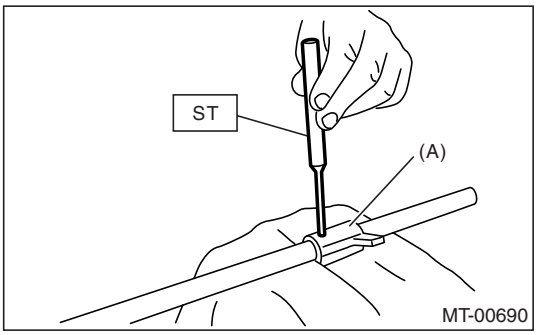
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2) Using the ST, remove the reverse interlock arm.
ST 398791700 REMOVER



(A) Reverse interlock arm
(B) Interlock arm

3) Using the ST, remove the interlock arm.
ST 398791700 REMOVER



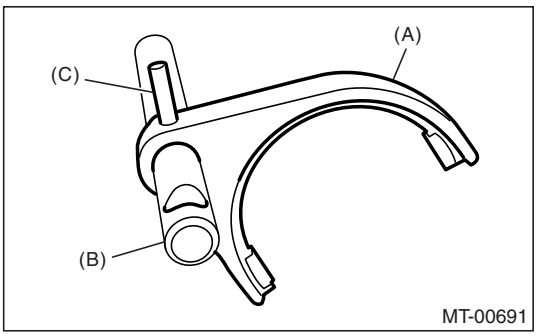
(A) Interlock arm

D: ASSEMBLY

1. REVERSE SHIFTER FORK

1) Using the ST, install the reverse fork.
ST 398791700 REMOVER

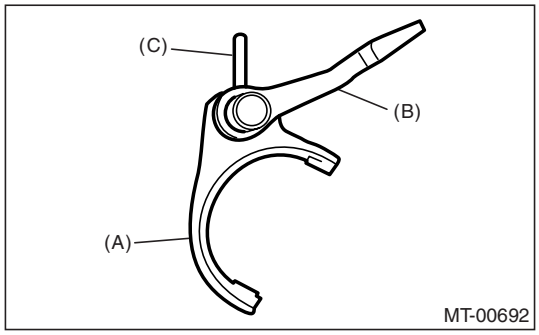
NOTE:
Make sure to install the reverse fork and rod in proper direction.



(A) Reverse fork
(B) Reverse rod
(C) Spring pin

2) Using the ST, install the reverse arm.
ST 398791700 REMOVER

NOTE:
Make sure to install the reverse arm and rod in proper direction.

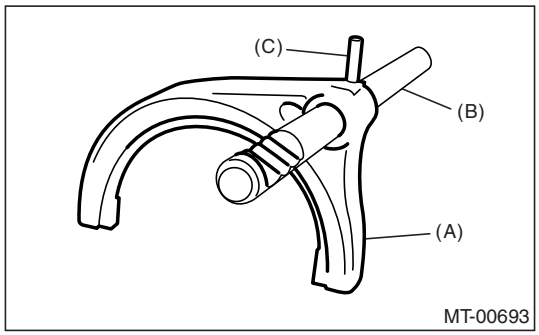


(A) Reverse arm
(B) Reverse rod
(C) Spring pin

2. 1st-2nd, 3rd-4th SHIFTER FORK

1) Using the ST, install the 1st-2nd shifter fork.
ST 398791700 REMOVER

NOTE:
Make sure to install the 1st-2nd shifter fork and rod in proper direction.

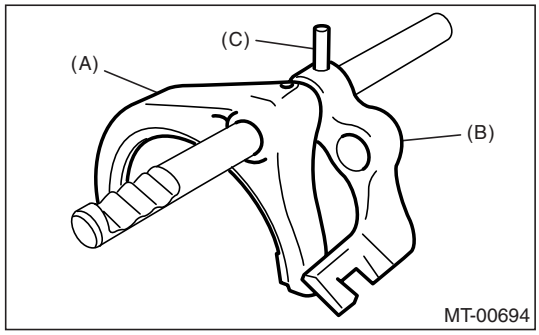


(A) 1st-2nd shifter fork
(B) 1st-2nd shifter rod
(C) Spring pin

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2) Using the ST, install the 1st-2nd shifter arm.
ST 398791700REMOVER

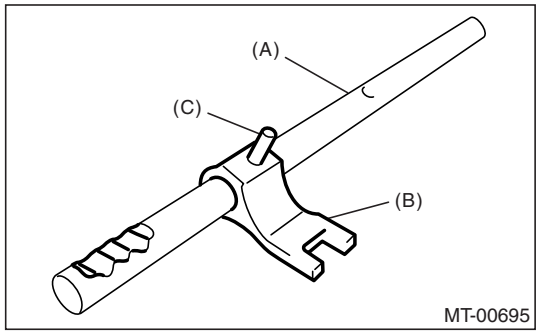
NOTE:
Make sure to install the 1st-2nd shifter arm and fork in proper direction.



(A) 1st-2nd shifter fork
(B) 1st-2nd shifter arm
(C) Spring pin

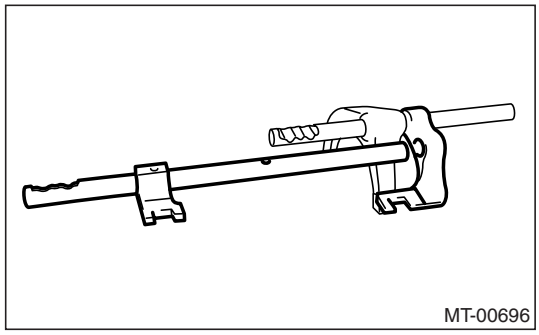
3) Using the ST, install the 3rd-4th shifter arm.
ST 398791700 REMOVER

NOTE:
Make sure to install the 3rd-4th shifter arm and rod in proper direction.



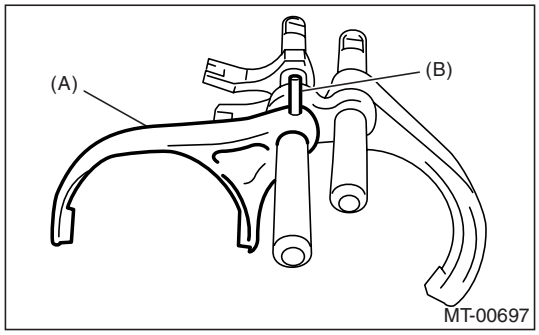
(A) 3rd-4th shifter rod
(B) 3rd-4th shifter arm
(C) Spring pin

4) Install the 3rd-4th fork rod into 1st-2nd shifter arm.



5) Using the ST, install the 3rd-4th shifter fork.
ST 398791700 REMOVER

NOTE:
Make sure to install the 3rd-4th shifter fork in proper direction.

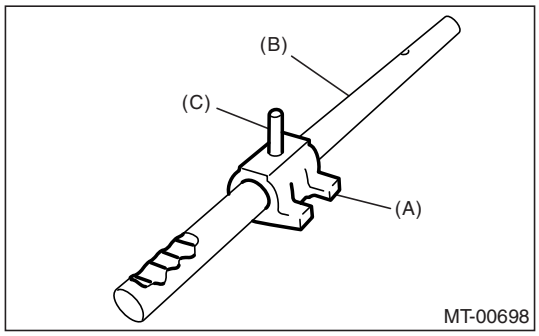


(A) 3rd-4th shifter fork
(B) Spring pin

3. 5th-6th SHIFTER FORK

1) Using ST, install the 5th-6th shifter arm.
ST 398791700 REMOVER

NOTE:
Make sure to install the 5th-6th shifter arm and rod in proper direction.

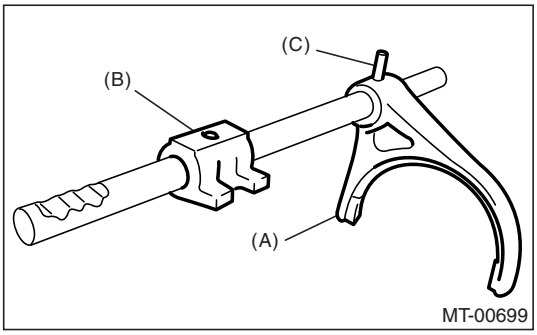


(A) 5th-6th shifter arm
(B) 5th-6th shifter rod
(C) Spring pin

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2) Using the ST, install the 5th-6th shifter fork.
ST 398791700REMOVER

NOTE:
Make sure to install the 5th-6th shifter fork and arm in proper direction.

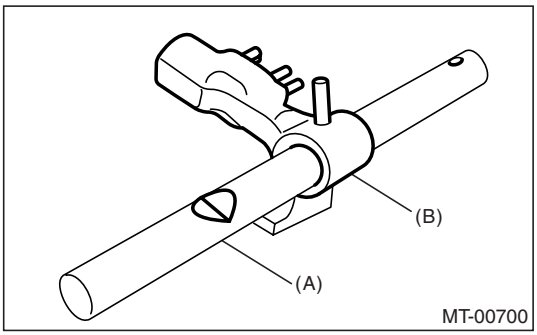


(A) 5th-6th shifter fork
(B) 5th-6th shifter arm
(C) Spring pin

4. SHIFT ARM SHAFT

Using the ST, install the selector arm.
ST 398791700 REMOVER

NOTE:
Make sure to install the selector arm and rod in proper direction.



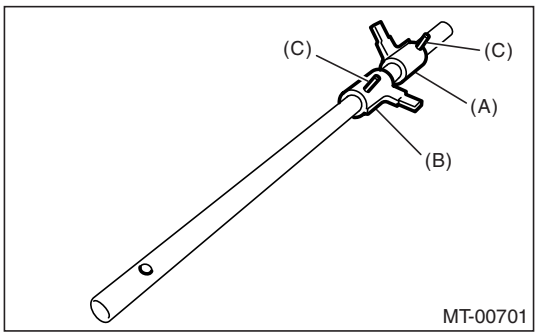
(A) Selector rod
(B) Selector arm

5. STRIKING ROD

1) Using the ST, install the reverse interlock arm and interlock arm.
ST 398791700 REMOVER

NOTE:
• Make sure to install the reverse interlock arm and rod in proper direction.

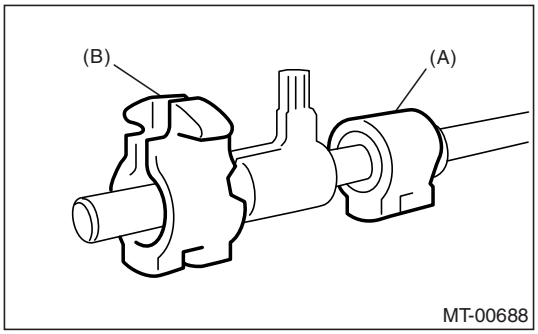
• Make sure to install the interlock arm and rod in proper direction.



(A) Reverse interlock arm
(B) Interlock arm
(C) Spring pin

2) Install the reverse interlock block and interlock block to striking rod.

NOTE:
Make sure to install the reverse interlock block and interlock block in proper direction.



(A) Reverse interlock block
(B) Interlock block

E: INSPECTION

1) Check the shift shaft and shift rod for damage. Replace if damaged.
2) Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

F: ADJUSTMENT

1. SELECTION OF 1st-2nd FORK ROD

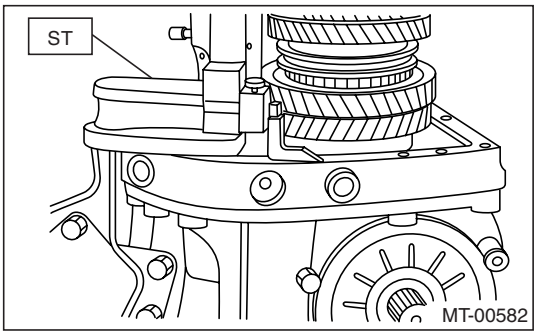
NOTE:
• Perform the following procedures when.
Replacing the 1st, 2nd driven gear.
• Replacing the 1st, 2nd synchro ring assembly.
• Replacing the adapter plate.
• Replacing the driven shaft.
• Replacing the 1st-2nd hub, sleeve assembly.

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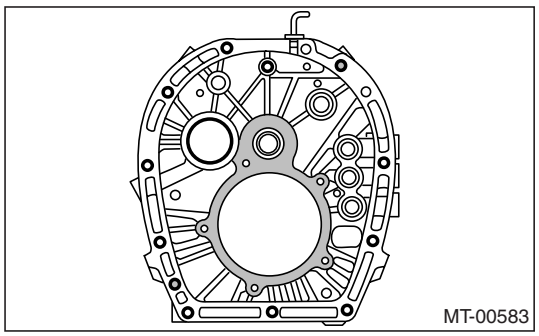
1) Insert the drive pinion assembly in adapter plate.

NOTE:
Make sure the thrust bearing outer race is not removed and drive pinion is not lift-up.

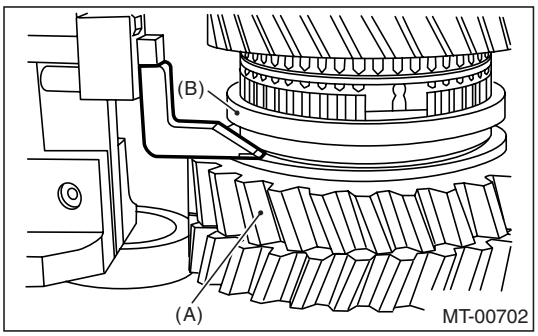
2) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.
ST 18853AA000 HEIGHT GAUGE



NOTE:
• Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.
• Do not place the height gauge on shaded area in the figure during measurement.

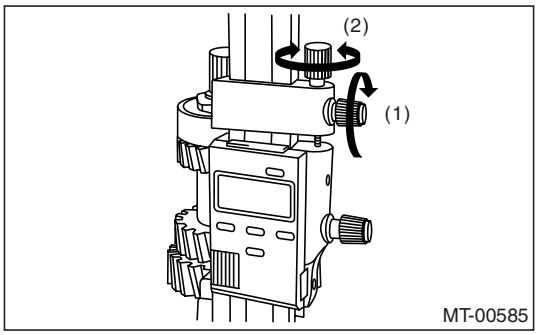


3) Select the main shaft snap ring. <Ref. to 6MT-83, ADJUSTMENT, Main Shaft Assembly.>
4) Shift the 1st-2nd sleeve to 1st driven gear side, then press down to the stopper and measure “B1”.

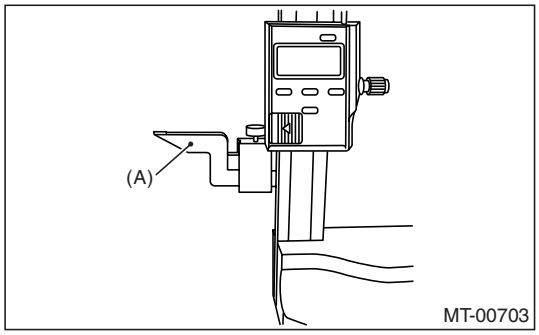


(A) 1st driven gear
(B) 1st-2nd sleeve

NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 1st side.
• Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

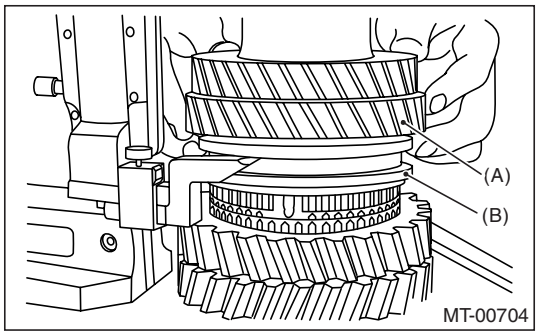


5) Set the height gauge indicator upside down.



(A) Indicator

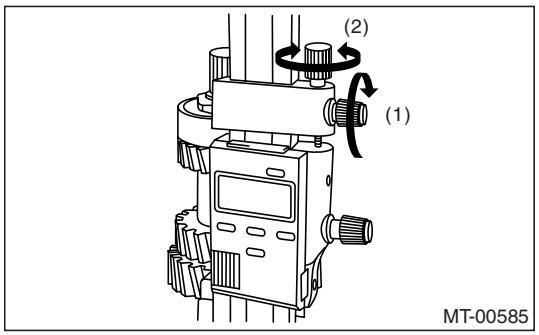
6) Shift the 1st-2nd sleeve to 2nd driven gear side, then press up to the stopper and measure “B2”.



(A) 2nd driven gear
(B) 1st-2nd sleeve

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NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 2nd side.
• Perform the measuring procedure with two people, and measure the sleeve lifted up straight.
• Measure five points of the sleeve turning every approx. 72° apart. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

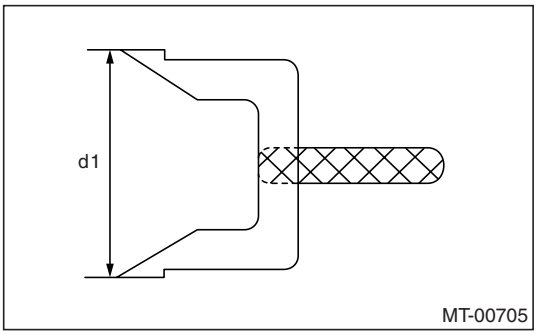


7) According to both measurements, calculate the 1st-2nd sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

Equation: T = (B1 + B2) / 2

T: 1st-2nd sleeve center position
B1: Height from adapter plate edge to sleeve edge when shifted to 1st gear.
B2: Height from adapter plate edge to sleeve edge when shifted to 2nd gear. [measurement value + 55 mm (2.17 in)]

NOTE:
The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing value: 55 mm (2.17 in)] from the following figure to “B2”, to obtain measurement value of “B2”.

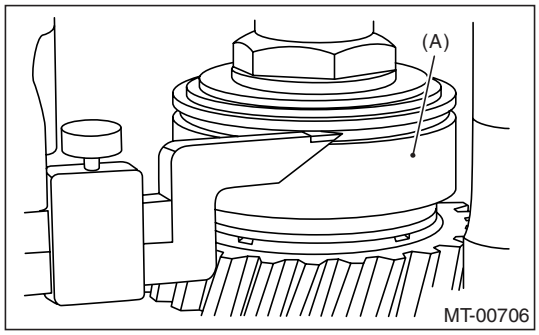


T mm (in)	Lot No. (Mark)
62.93 — 63.23 (2.4776 — 2.4894)	32801AA111 (1)
63.23 — 63.53 (2.4894 — 2.5012)	32801AA131 (None)
63.53 — 63.83 (2.5012 — 2.5130)	32801AA141 (2)

2. SELECTION OF 3rd-4th FORK ROD

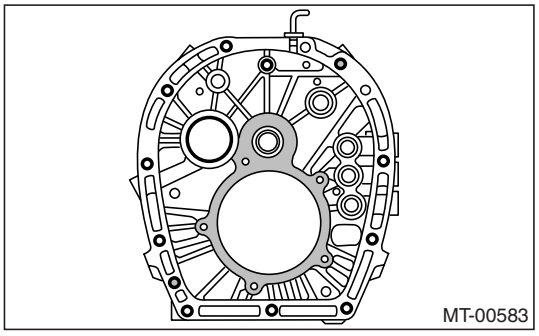
NOTE:
Perform the following procedures when.
• Replacing the main shaft.
• Replacing the 3rd, 3rd to 6th drive gear and bush.
• Replacing the 3rd, 3rd to 6th synchro assembly.
• Replacing the 3rd-4th hub, sleeve assembly.

1) Insert the main shaft assembly in adapter plate.
2) Set the height gauge to adapter plate. Lower the indicator of height gauge to upper surface of snap ring groove, on the upper side of main rear bearing, then set to zero point.
ST 18853AA000 HEIGHT GAUGE



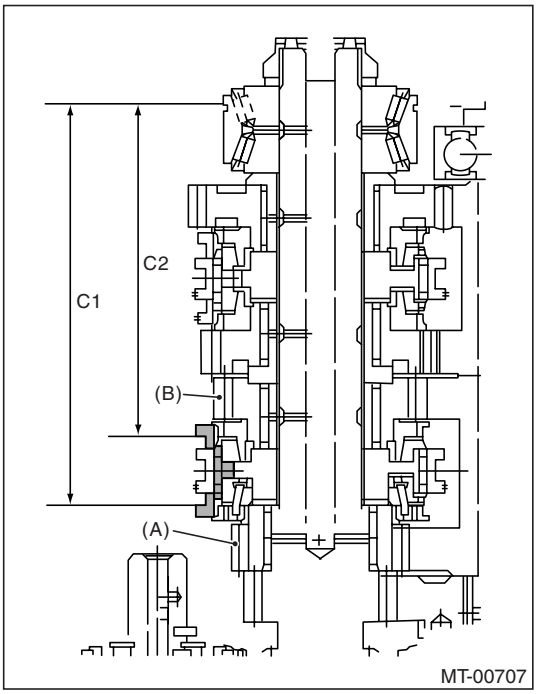
(A) Ball bearing

NOTE:
• Remove the remaining gasket on edge surface with scraper, since the height gauge is set on adapter plate during measurement.
• Do not put the height gauge on shaded area in the figure during the measurement.



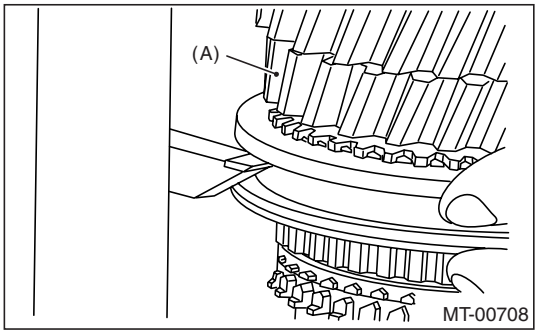
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3) Using the height gauge, measure “C1” and “C2” shown in the figure.



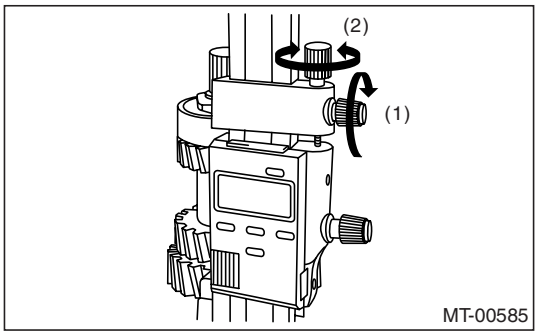
(A) 3rd drive gear
(B) 4th drive gear

(1) Shift the 3rd-4th sleeve to 4th gear side, then press up to the stopper and measure “C2”.

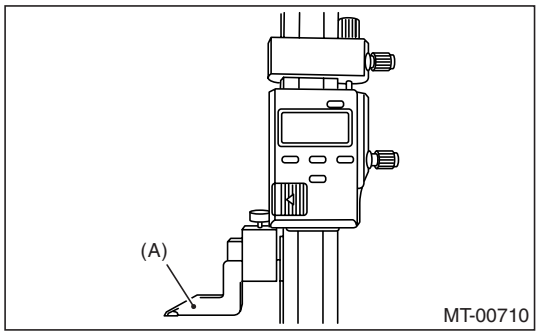


(A) 4th drive gear

NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure.
• Turn dial (2) to set the indicator to edge surface of sleeve 4th side.
• Perform the measuring procedure with two people, and measure the sleeve lifted up straight.
• Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

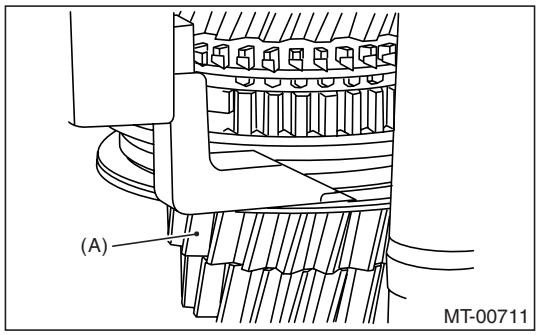


(2) Set the height gauge indicator upside down.



(A) Indicator

(3) Shift the 3rd-4th sleeve to 3rd drive gear side, then press down to the stopper and measure “C1”.

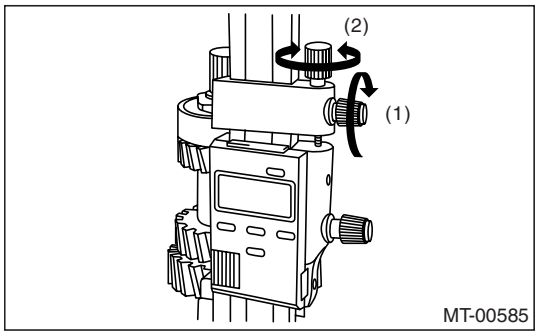


(A) 3rd drive gear

NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 3rd side.

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• Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

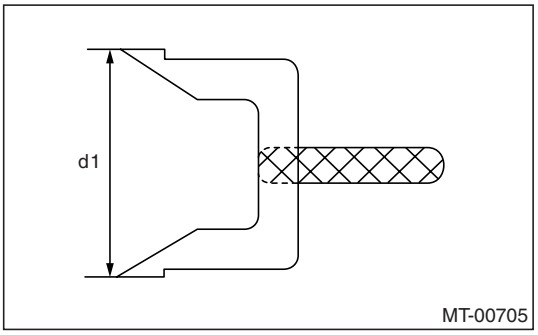


4) According to both measurements, calculate the 3rd-4th sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

Equation: T = (C1 + C2) / 2

T: 3rd-4th sleeve center position
C1: Length from main shaft rear bearing snap ring groove to sleeve edge when shifted to 3rd gear. [measurement value +55 mm (2.17 in)]
C2: Length from main shaft rear bearing snap ring groove to sleeve edge when shifted to 4th gear.

NOTE:
The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing value: 55 mm (2.17 in)] from the following figure to “C1”, to obtain measurement value of “C1”.



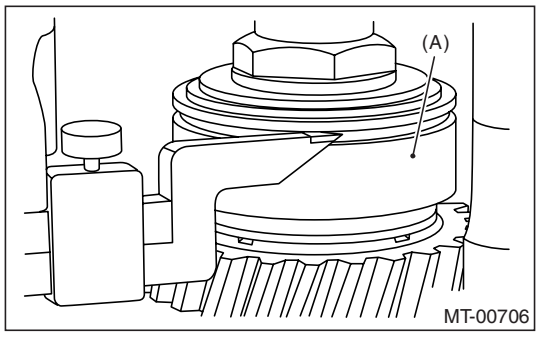
T mm (in)	Lot No. (Mark)		
	M.SFT Snap ring 805072010 [t=1.65 mm (0.065 in)]	M.SFT Snap ring 805072011 [t=1.95 mm (0.077 in)]	M.SFT Snap ring 805072012 [t=2.25 mm (0.089 in)]
137.22 — 137.52 (5.4024 — 5.4142)	32809AA171 (None)	32809AA181 (2)	32809AA191 (4)
137.52 — 137.82 (5.4142 — 5.4260)	32809AA161 (1)	32809AA171 (None)	32809AA181 (2)
137.82 — 138.12 (5.4260 — 5.4379)	32809AA141 (3)	32809AA161 (1)	32809AA171 (None)

T = Thickness

3. SELECTION OF 5th-6th FORK ROD

NOTE:
Perform the following procedures when.
• Replacing the main shaft.
• Replacing the 3rd to 6th drive gear and bush.
• Replacing the 3rd to 6th synchro ring assembly.
• Replacing the 3rd-4th hub, sleeve assembly.
• Replacing the 5th-6th hub, sleeve assembly.

1) Insert the main shaft assembly in adapter plate.
2) Set the height gauge to adapter plate. Lower the indicator of height gauge to upper surface of snap ring groove, or the upper side of main rear bearing. Then set to zero point.
ST 18853AA000 HEIGHT GAUGE

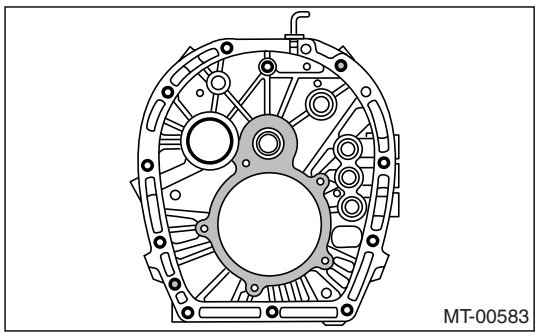


(A) Ball bearing

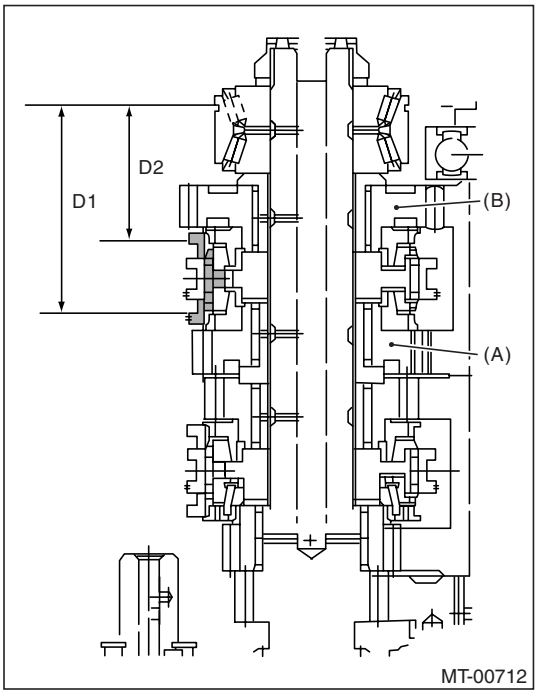
NOTE:
• Remove the remaining gasket on edge surface with scraper, since the height gauge is set on adapter plate during measurement.

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• Do not place the height gauge on shaded area in the figure during the measurement.

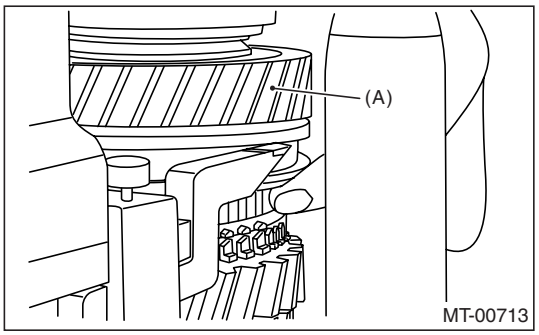


3) Using the height gauge, measure “D1” and “D2” shown in the figure.



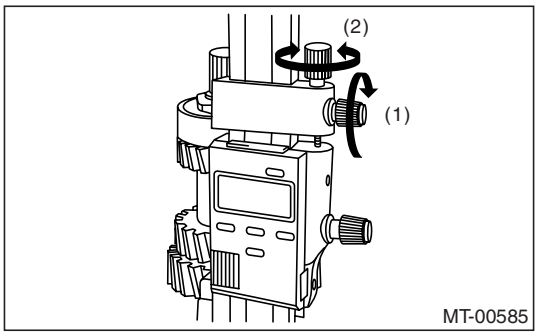
(A) 5th main gear
(B) 6th main gear

(1) Shift the 5th-6th sleeve to 6th main gear side, then press up to the stopper and measure “D2”.

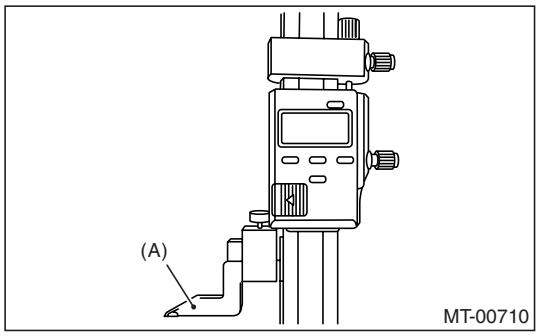


(A) 6th main gear

NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 6th side.
• Perform the measuring procedure with two people, and measure the sleeve lifted up straight.
• Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



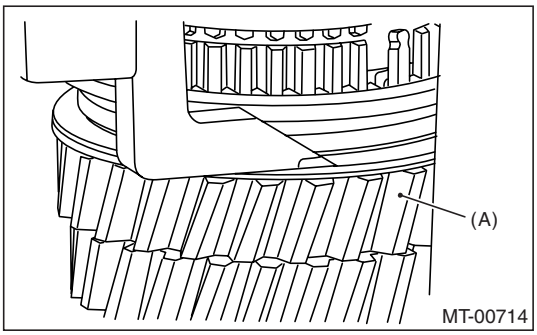
(2) Set the height gauge indicator upside down.



(A) Indicator

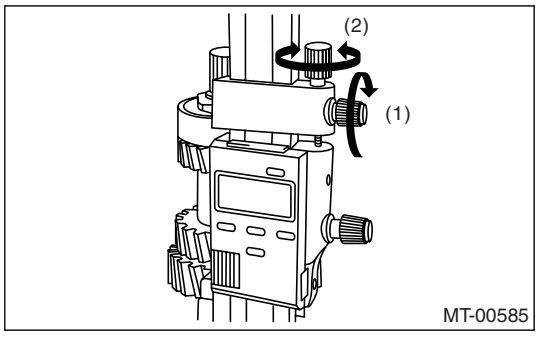
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(3) Shift the 5th-6th sleeve to 5th main gear side, then press down to the stopper and measure “D1”.



(A) 5th main gear

NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 5th side.
• Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

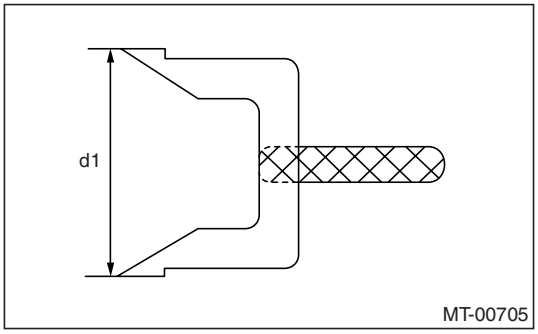


4) According to both measurements, calculate the 5th-6th sleeve neutral position. Select the fork rod, which applies to the calculated value from following equation.

Equation: T = (D1 + D2) / 2

T: 5th-6th sleeve center position
D1: Length from the shaft rear bearing snap ring groove to sleeve groove edge when shifted to 5th gear. [measurement value + 55 mm (2.17 in)]
D2: Length from main shaft rear bearing snap ring groove to sleeve groove edge when shifted to 6th gear.

NOTE:
The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing value: 55 mm (2.17 in)] from the following figure to “D1”, to obtain measurement value of “D1”.



T mm (in)	Lot No. (Mark)		
	M.SFT Snap ring 805072010 [t=1.65 mm (0.065 in)]	M.SFT Snap ring 805072011 [t=1.95 mm (0.077 in)]	M.SFT Snap ring 805072012 [t=2.25 mm (0.089 in)]
64.12 — 64.42 (2.5244 — 2.5362)	32945AA021 (None)	32945AA031 (2)	32945AA041 (4)
64.42 — 64.72 (2.5362 — 2.5480)	32945AA011 (1)	32945AA021 (None)	32945AA031 (2)
64.72 — 65.02 (2.5480 — 2.5598)	32945AA001 (3)	32945AA011 (1)	32945AA021 (None)

T = Thickness

4. SELECTION OF REVERSE FORK ROD

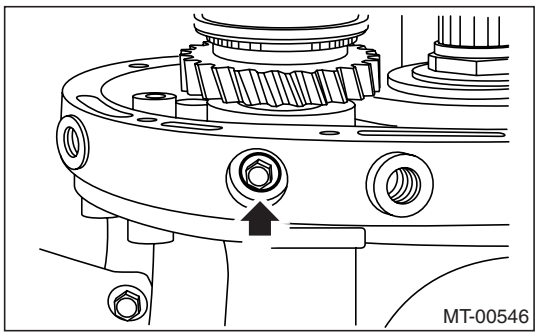
NOTE:
Perform the following procedures when.
• Replacing the reverse idler gear.
• Replacing the reverse idler gear No.2.
• Replacing the adapter plate.
• Replacing the base.

1) Insert the reverse idler gear assembly in adapter plate.

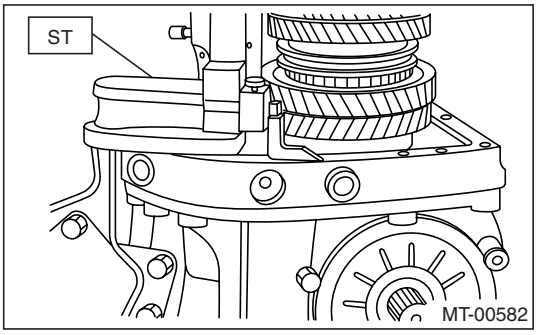
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2) Tighten the base COMPL fixing bolt.

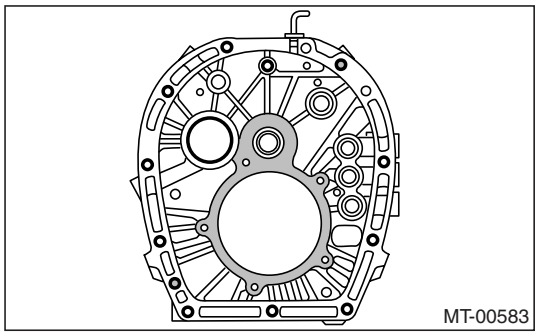
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



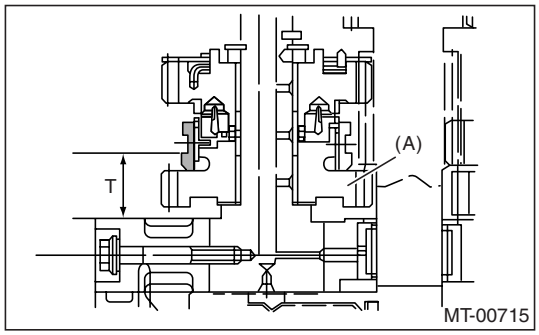
3) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.
ST 18853AA000 HEIGHT GAUGE



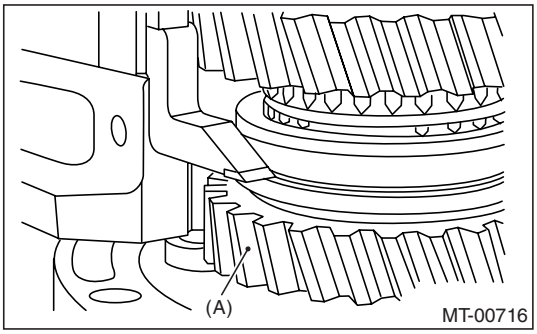
NOTE:
• Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.
• Do not place the height gauge on shaded area in the figure during measurement.



4) Press the reverse sleeve to reverse side idler gear No.2, then measure “T”.

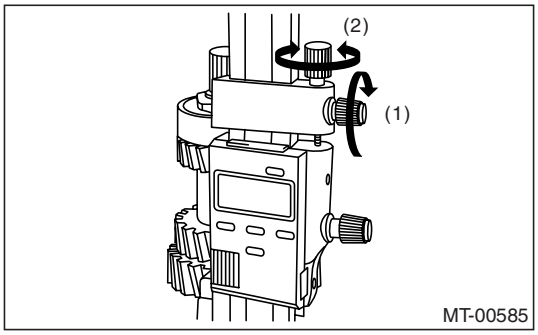


(A) Reverse idler gear No.2



(A) Reverse idler gear No.2

NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of reverse sleeve side.
• Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



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5) According to measurement, calculate the reverse sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

Equation: T + 4.8 mm (0.189 in)

T + 4.8 mm (0.189 in) mm (in)	Lot No. (Mark)
33.50 — 33.80 (1.3189 — 1.3307)	32816AA110 (1)
33.80 — 34.10 (1.3307 — 1.3425)	32816AA130 (None)
34.10 — 34.40 (1.3425 — 1.3543)	32816AA140 (2)

T = Thickness

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26.Clutch Housing

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-37, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.>, <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove each gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly. <Ref. to 6MT-99, REMOVAL, Drive Pinion Shaft Assembly.>
11) Remove the front differential assembly. <Ref. to 6MT-105, REMOVAL, Front Differential Assembly.>
12) Remove the vehicle speed sensor. <Ref. to 6MT-34, REMOVAL, Vehicle Speed Sensor.>
13) Remove the speedometer gear. <Ref. to 6MT-113, REMOVAL, Speedometer Gear.>

B: INSTALLATION

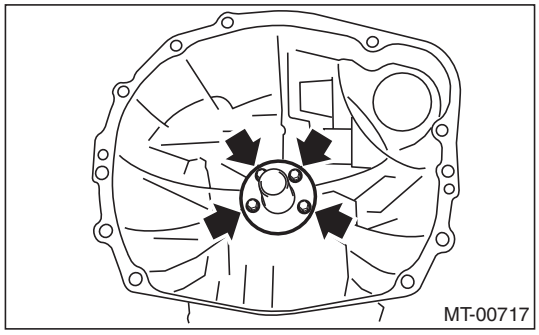
1) Install the pitching stopper bracket.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

2) Install the speedometer gear. <Ref. to 6MT-113, INSTALLATION, Speedometer Gear.>
3) Install the vehicle speed sensor. <Ref. to 6MT-34, INSTALLATION, Vehicle Speed Sensor.>
4) Install the front differential assembly. <Ref. to 6MT-106, INSTALLATION, Front Differential Assembly.>
5) Install the drive pinion shaft assembly. <Ref. to 6MT-99, INSTALLATION, Drive Pinion Shaft Assembly.>
6) Install each gear assembly at once. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
7) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
8) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
9) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
10) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
11) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
12) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.>, <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
13) Install the manual transmission assembly to vehicle. <Ref. to 6MT-39, INSTALLATION, Manual Transmission Assembly.>

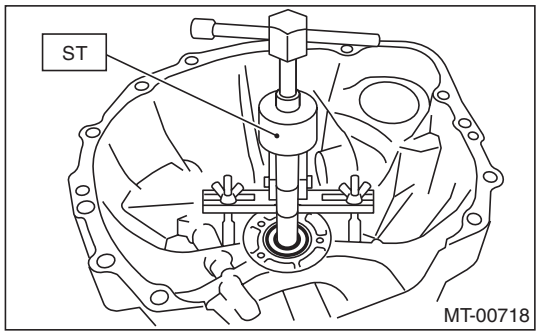
C: DISASSEMBLY

1) Remove the clutch release bearing guide.



2) Remove the oil seal.
ST 398527700 PULLER ASSY

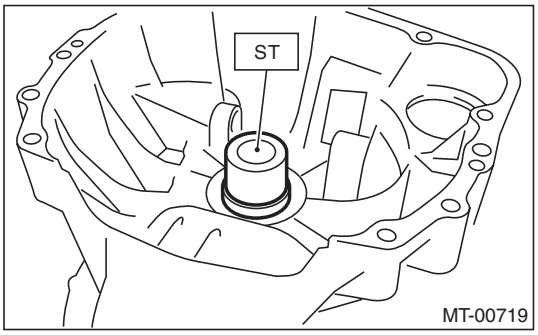
NOTE:
Do not reuse the oil seal.



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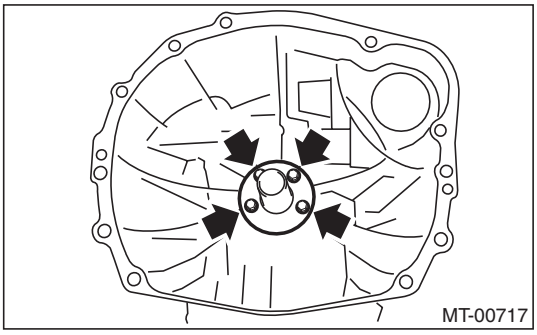
D: ASSEMBLY

1) Install the oil seal into clutch housing without damaging.
ST 399513600 INSTALLER



2) Install the clutch release bearing guide.

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



E: INSPECTION

1) Make sure there is no damage or crack on the clutch housing. Replace the clutch housing with a new one if there is excessive damage.
2) Check the clutch housing for gear oil leakage. If there is oil leakage, repair or replace the leakage part.

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27.General Diagnostic Table

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 adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear, needle bearing and race	Replace.
	(h) Worn 2nd driven gear, needle bearing and race	Replace.
	(i) Worn 3rd drive gear and bushing	Replace.
	(j) Worn 4th drive gear and bushing	Replace.
	(k) Worn 5th drive gear and bushing	Replace.
	(l) Worn 6th drive gear and bushing	Replace.
	(m) Worn reverse idler gear and bushing	Replace.
3. Unusual noise comes from transmission. NOTE: If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

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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. • Gear noise when driving: If noise increases as the 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 the 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.

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CLUTCH SYSTEM

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1. General Description

A: SPECIFICATIONS

Model			1.6 L	2.0 L NON-TURBO	2.0 L TURBO	2.5 L
Clutch cover	Type		Push type		Pull type	Push type
	Diaphragm set load	kgf (lb)	450 (992)		800 (1,764)	550 (1,213)
Clutch disc	Facing material		Woven (Non asbestos)			
	O.D. × I.D. × thickness	mm (in)	225 × 150 × 3.5 (8.86 × 5.91 × 0.138)		230 × 150 × 3.5 (9.06 × 5.91 × 0.138)	228.6 × 155 × 6.6 (9.00 × 6.10 × 0.260)
	Spline O.D.	mm (in)	25.2 (0.992), (No. of teeth: 24)			
Clutch release lever ratio			3.0	1.6	1.7	1.6
Release bearing			Grease-packed self-aligning			
Clutch pedal	Full stroke	mm (in)	130 — 135 (5.12 — 5.31)			
	Free play	mm (in)	10 — 20 (0.39 — 0.79)	4 — 11 (0.16 — 0.43)		
Release lever	Stroke	mm (in)	24 — 26 (0.94 — 1.02)		13.3 — 14.7 (0.524 — 0.579)	24 — 26 (0.94 — 1.02)
	Play at release lever center	mm (in)	3 — 4 (0.12 — 0.16)		—	3 — 4 (0.12 — 0.16)
Clutch disc	Depth of rivet head mm (in)	Standard	1.3 — 1.9 (0.051 — 0.075)			
		Limit of sinking	0.3 (0.012)			
	Limit for deflection	mm (in)	0.8 (0.031) at R = 107 (4.21)	0.8 (0.031) at R = 110 (4.33)		1.0 (0.039) at R = 110 (4.33)

Model			2.0 L TURBO STi
Clutch cover	Type		Pull type
	Diaphragm set load	kgf (lb)	930 (2,050)
Clutch disc	Facing material		Woven (Non asbestos)
	O.D. × I.D. × thickness	mm (in)	Flywheel side: 240 × 160 × 3.2 (9.45 × 6.30 × 0.126) Clutch cover side: 240 × 160 × 3.5 (9.45 × 6.30 × 0.138)
	Spline O.D.	mm (in)	25.2 (0.992), (No. of teeth: 24)
Clutch release lever ratio			1.7
Release bearing			Grease-packed self-aligning
Clutch pedal	Full stroke	mm (in)	130 — 135 (5.12 — 5.31)
	Free play	mm (in)	3 — 13 (0.12 — 0.51)
Release lever	Stroke	mm (in)	13.3 — 14.7 (0.524 — 0.579)
	Play at release lever center	mm (in)	—
Clutch disc	Depth of rivet head mm (in)	Standard	Flywheel side: 1.35 — 1.95 (0.053 — 0.077) Clutch cover side: 1.65 — 2.25 (0.065 — 0.089)
		Limit of sinking	0.3 (0.012)
	Limit for deflection	mm (in)	0.8 (0.031) at R = 110 (4.33)

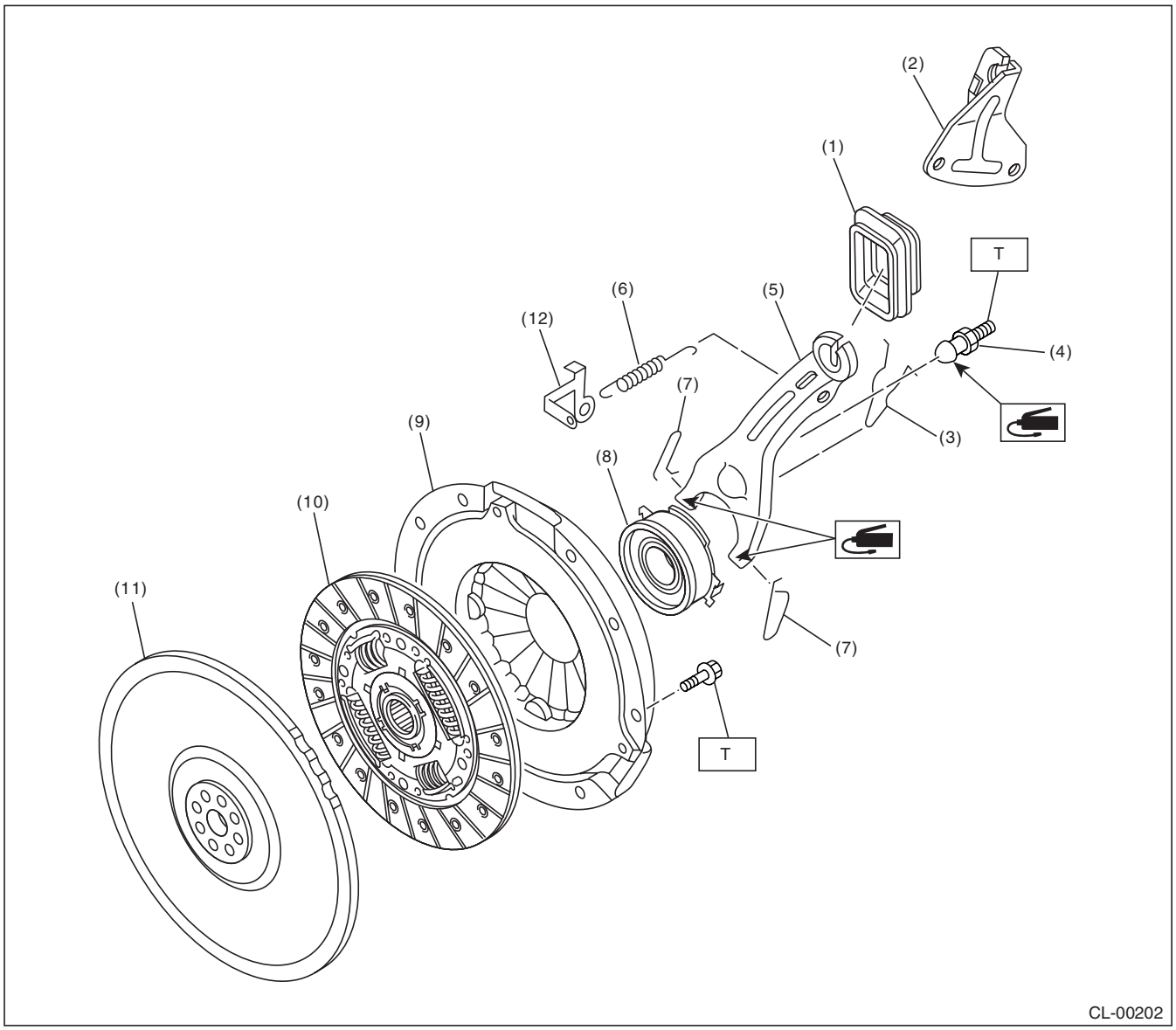
I.D.: Inner diameter O.D.: Outer diameter

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B: COMPONENT

1. CLUTCH ASSEMBLY

• 1.6 L SOHC MODEL

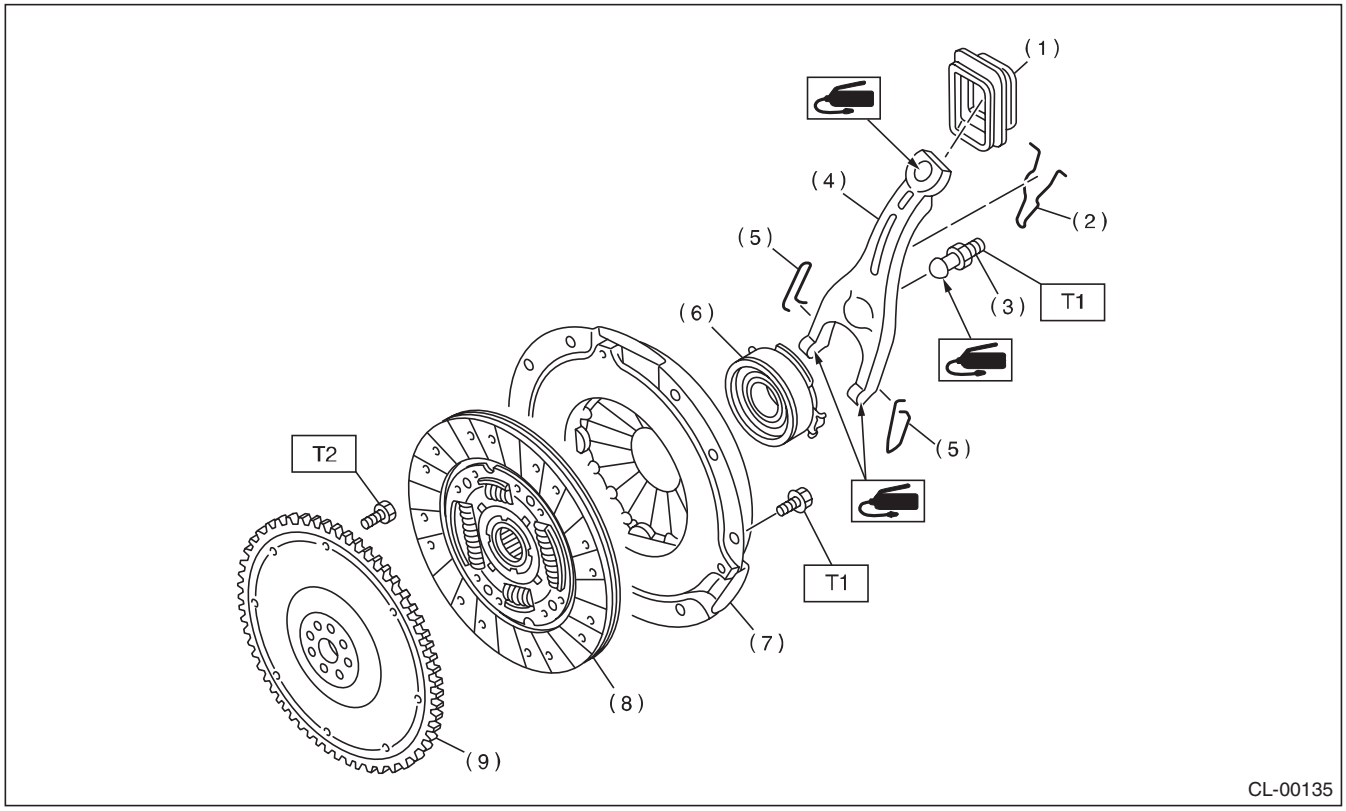


(1) Clutch release lever sealing
(2) Clutch cable bracket
(3) Retainer spring
(4) Pivot
(5) Clutch release lever
(6) Return spring
(7) Clip
(8) Clutch release bearing
(9) Clutch cover
(10) Clutch disk
(11) Flywheel
(12) Clutch return spring bracket

Tightening torque: N·m (kgf-m, ft-lb)
T: 16 (1.6, 11.8)

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• 2.0 L SOHC MODEL

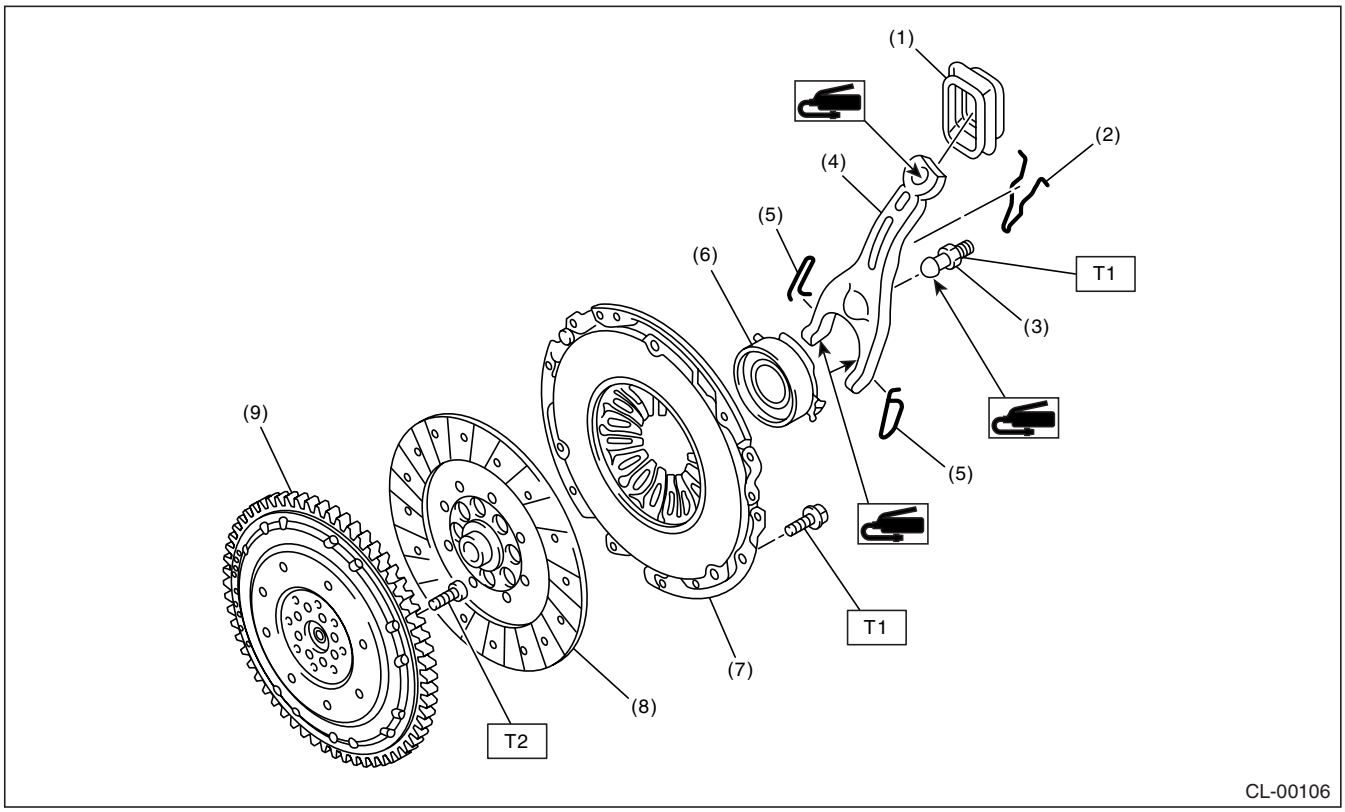


(1) Clutch release lever sealing
(2) Retainer spring
(3) Pivot
(4) Clutch release lever
(5) Clip
(6) Clutch release bearing
(7) Clutch cover
(8) Clutch disc
(9) Flywheel

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 72 (7.3, 52.8)

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• 2.5 L SOHC MODEL

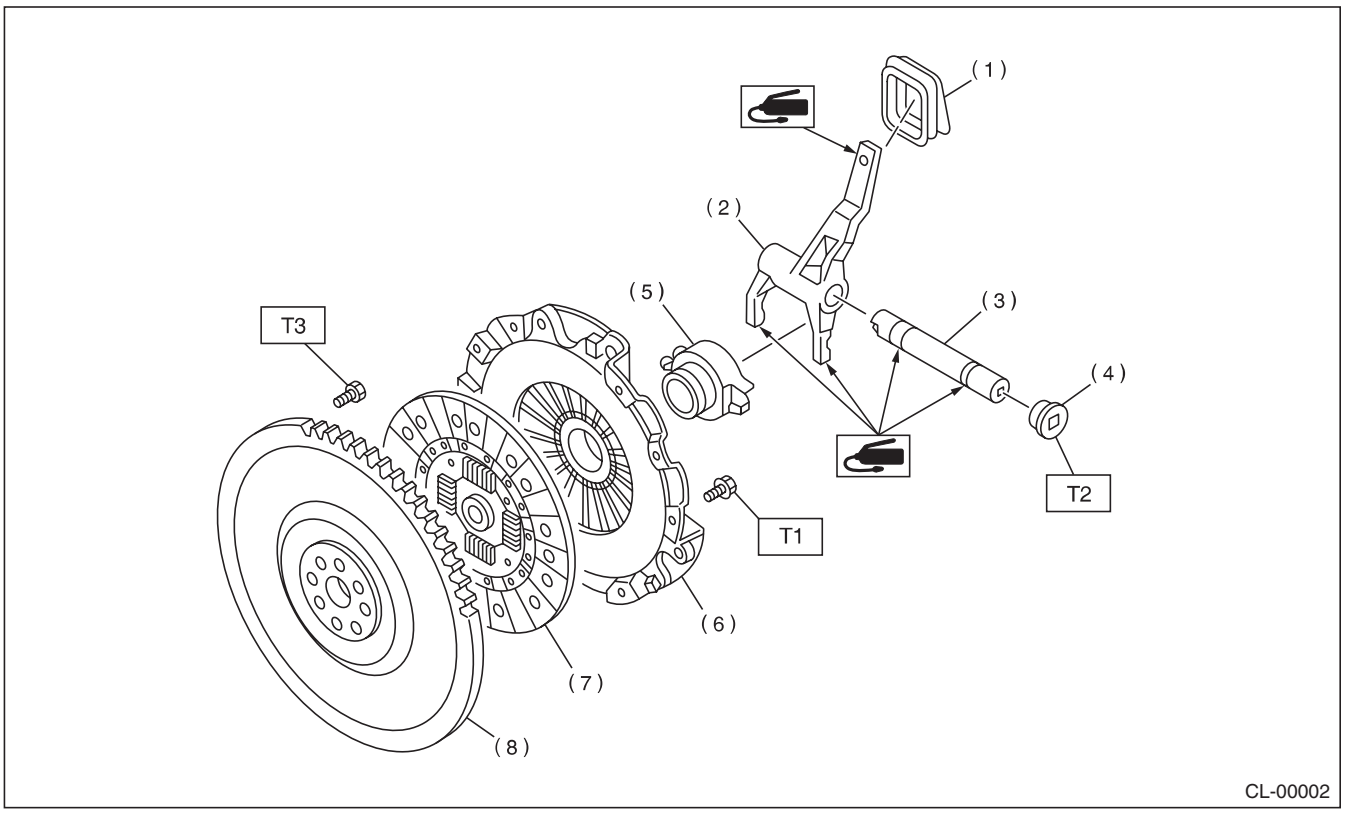


(1) Clutch release lever seal
(2) Retainer spring
(3) Pivot
(4) Release lever
(5) Clip
(6) Release bearing
(7) Clutch cover
(8) Clutch disc
(9) Double mass flywheel

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 72 (7.3, 52.8)

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• DOHC TURBO MODEL



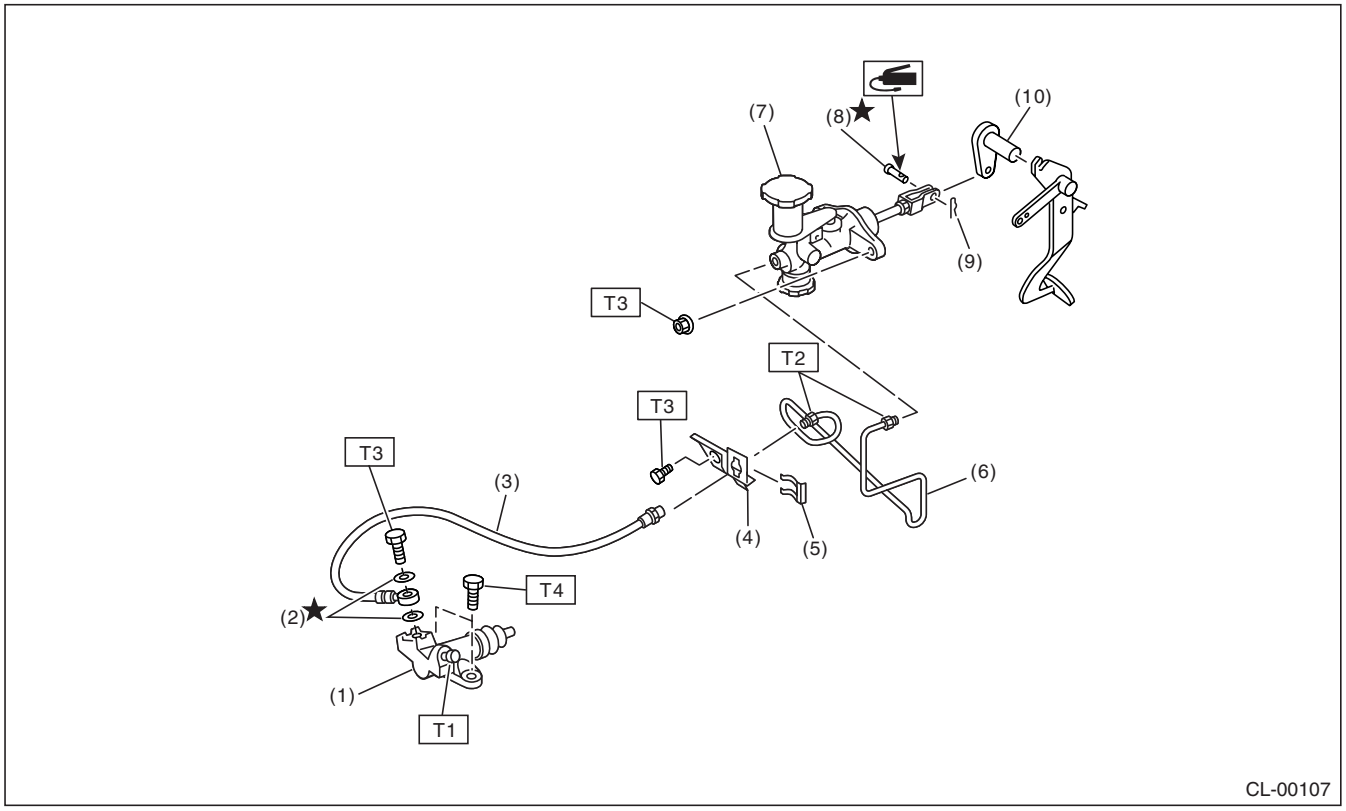
(1)	Clutch release lever sealing	(5)	Clutch release bearing
(2)	Clutch release lever	(6)	Clutch cover
(3)	Clutch release lever shaft	(7)	Clutch disc
(4)	Plug	(8)	Flywheel

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 44 (4.5, 32.5)
T3: 72 (7.3, 52.8)

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2. CLUTCH PIPE AND HOSE

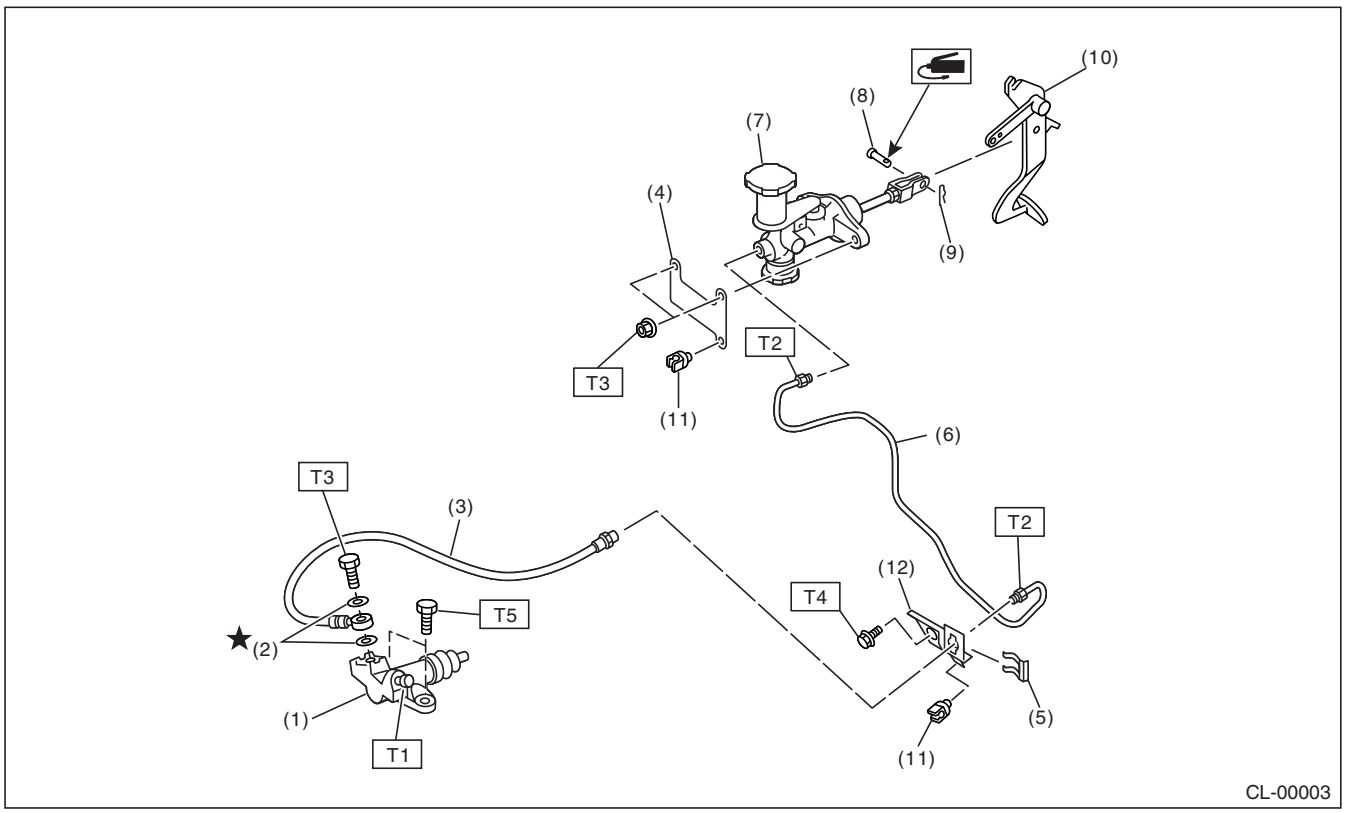
• LHD SOHC MODEL



(1)	Operating cylinder	(6)	Pipe	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Washer	(7)	Master cylinder ASSY	***T1: 8 (0.8, 5.8)***
(3)	Clutch hose	(8)	Clevis pin	***T2: 15 (1.5, 10.8)***
(4)	Bracket	(9)	Snap pin	***T3: 18 (1.8, 13.0)***
(5)	Clip	(10)	Lever	***T4: 37 (3.8, 27.5)***

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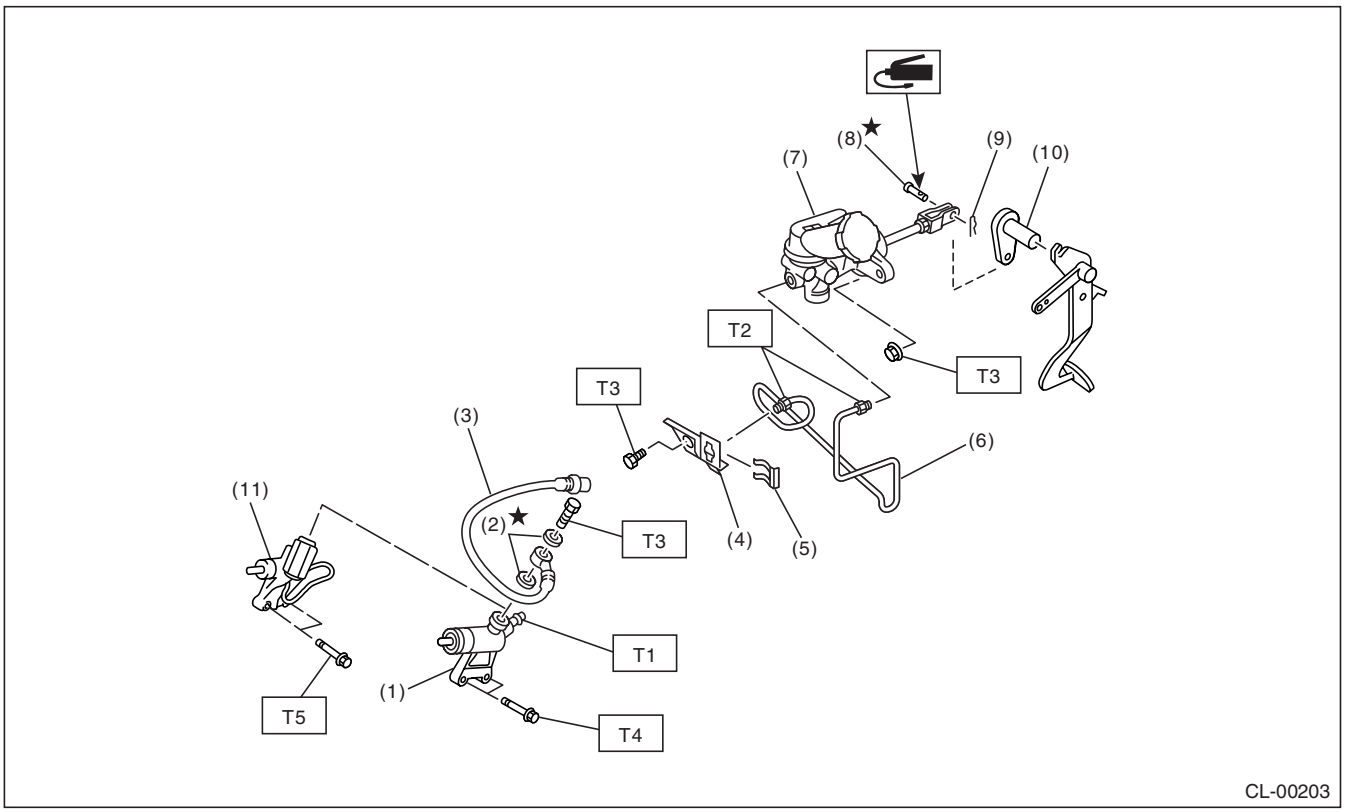
• RHD SOHC MODEL



(1)	Operating cylinder	(7)	Master cylinder ASSY	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Washer	(8)	Clevis pin	***T1: 8 (0.8, 5.8)***
(3)	Clutch hose	(9)	Snap pin	***T2: 15 (1.5, 10.8)***
(4)	Bracket	(10)	Pedal	***T3: 18 (1.8, 13.0)***
(5)	Clip	(11)	Clamp	***T4: 25 (2.5, 18.1)***
(6)	Clutch pipe	(12)	Bracket	***T5: 37 (3.8, 27.5)***

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• LHD DOHC TURBO MODEL

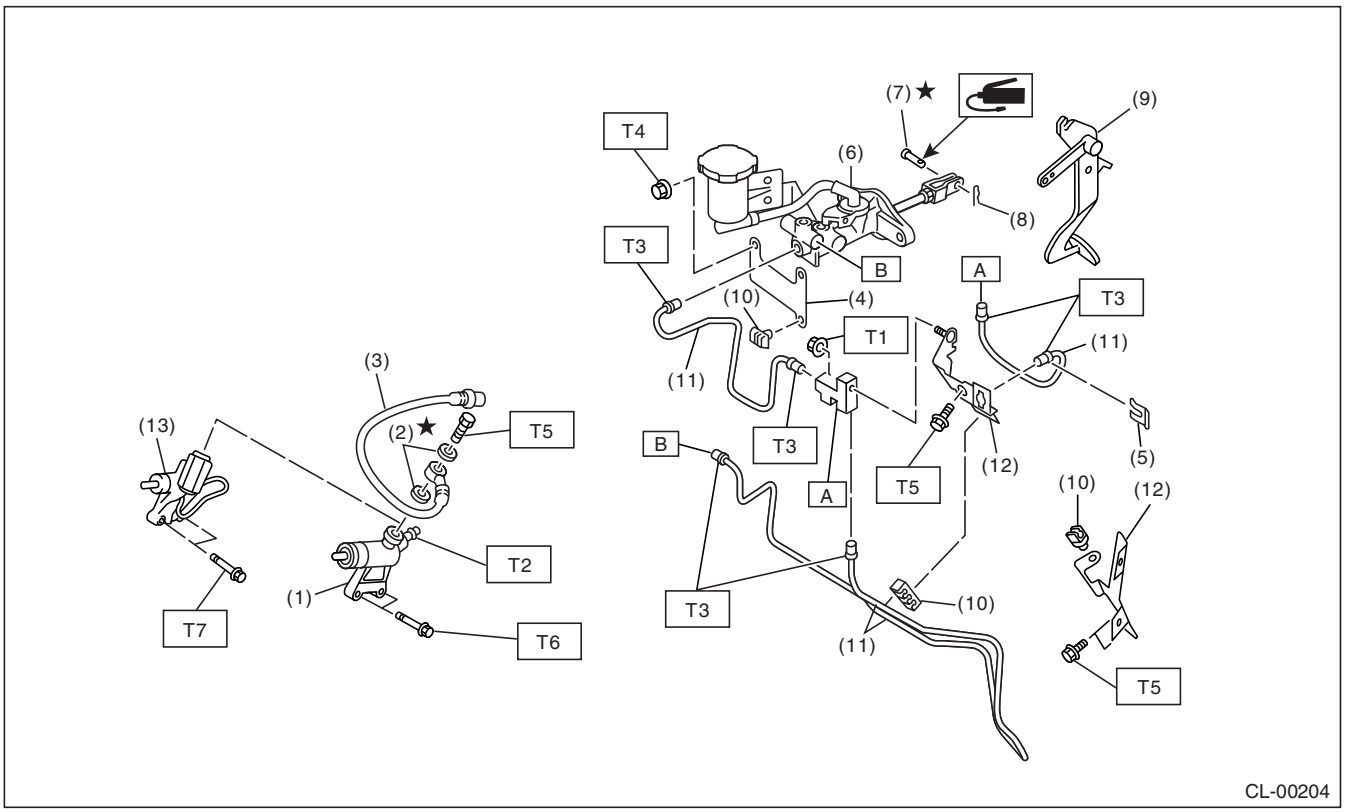


(1)	Operating cylinder (Except STi model)	(6)	Pipe
(2)	Washer	(7)	Master cylinder ASSY
(3)	Clutch hose	(8)	Clevis pin
(4)	Bracket	(9)	Snap pin
(5)	Clip	(10)	Lever
		(11)	Operating cylinder (STi model)

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)
T5: 41 (4.2, 30.2)

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• RHD DOHC TURBO MODEL



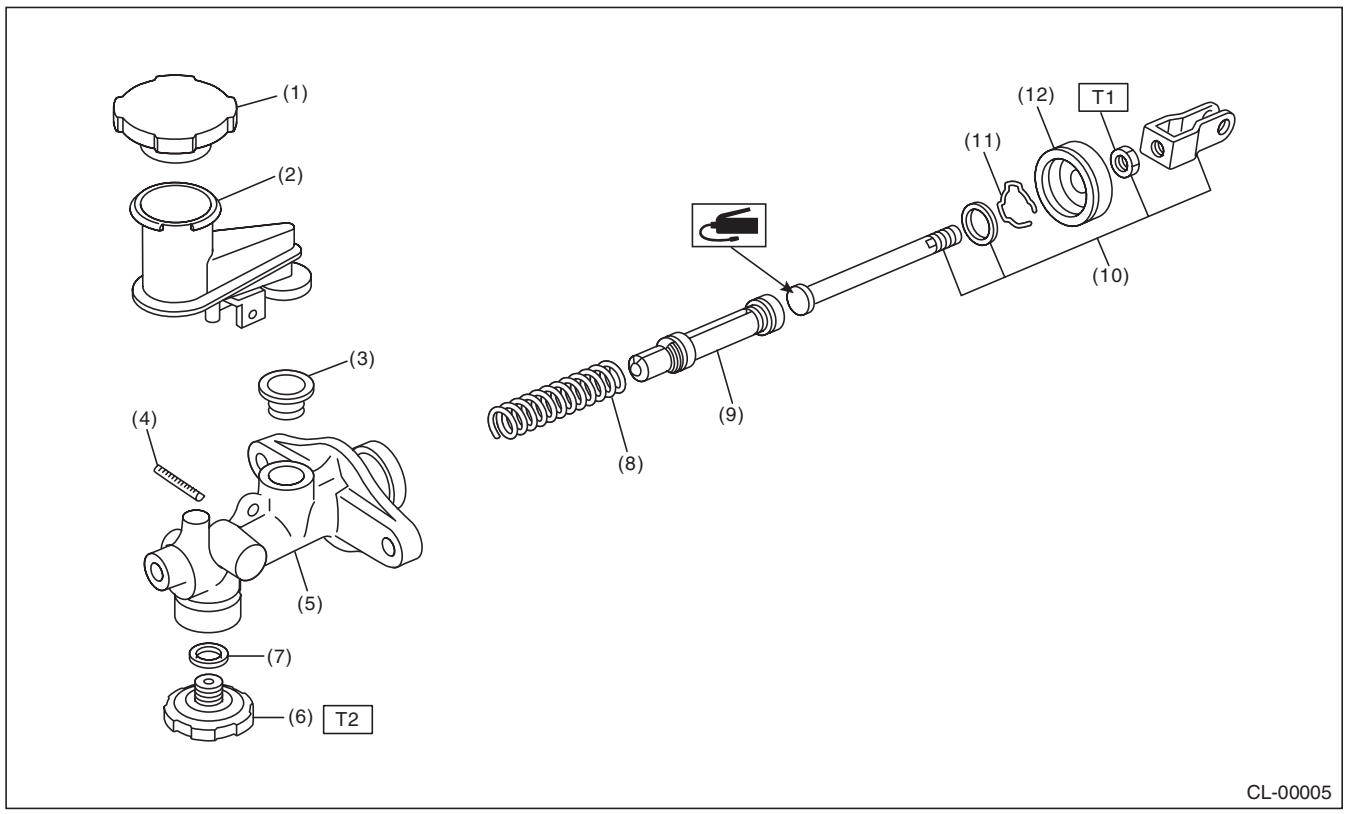
(1) Operating cylinder (Except STi model)
(2) Washer
(3) Clutch hose
(4) Bracket
(5) Clip
(6) Master cylinder ASSY
(7) Clevis pin
(8) Snap pin
(9) Pedal
(10) Clamp
(11) Clutch pipe
(12) Bracket
(13) Operating cylinder (STi model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.53)
T2: 8 (0.8, 5.8)
T3: 15 (1.5, 10.8)
T4: 18 (1.8, 13.0)
T5: 25 (2.5, 18.1)
T6: 37 (3.8, 27.5)
T7: 41 (4.2, 30.2)

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3. MASTER CYLINDER

• SOHC MODEL

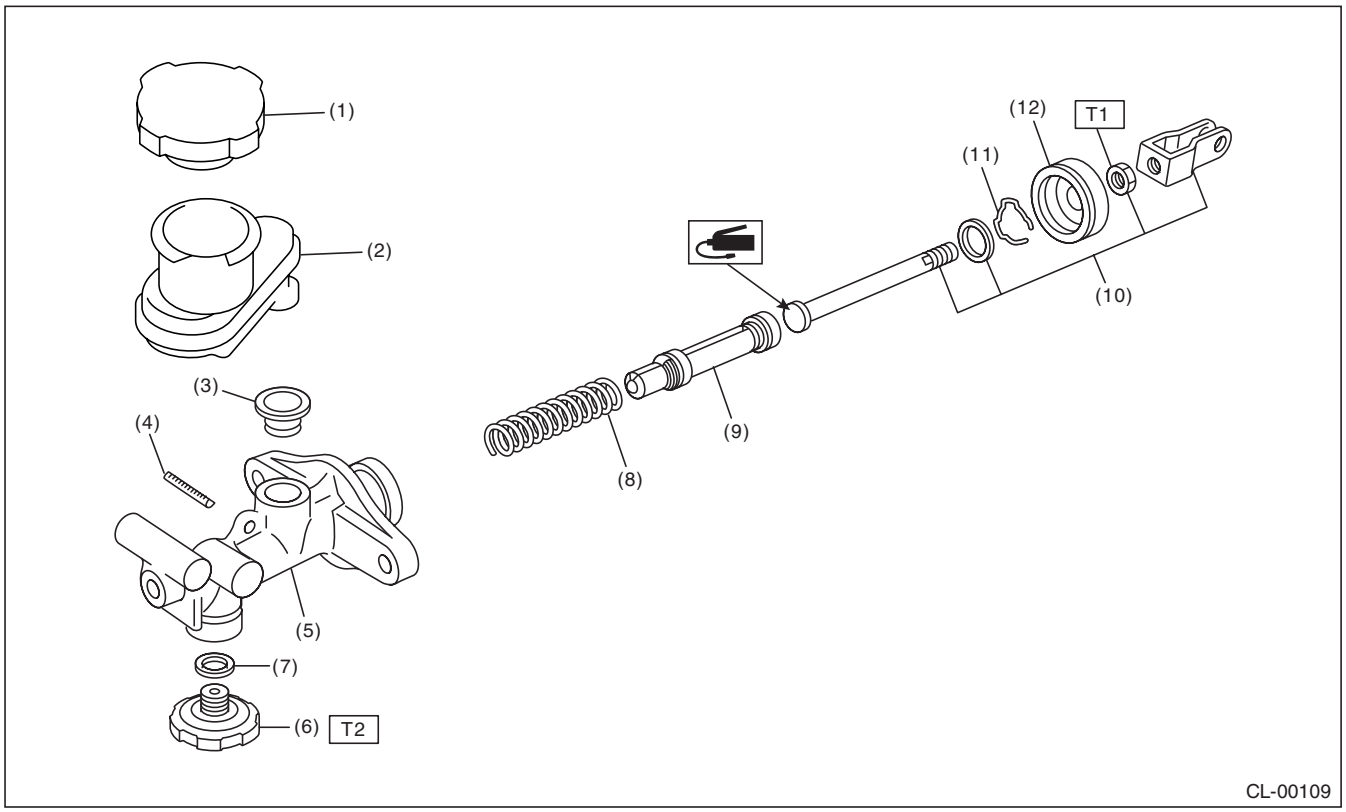


(1) Reservoir cap
(2) Reservoir tank
(3) Oil seal
(4) Straight pin
(5) Master cylinder
(6) Clutch damper
(7) Gasket
(8) Return spring
(9) Piston
(10) Push rod
(11) Piston stop ring
(12) Cylinder boot

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.0, 7)
T2: 46.6 (4.75, 34.4)

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• LHD DOHC TURBO MODEL

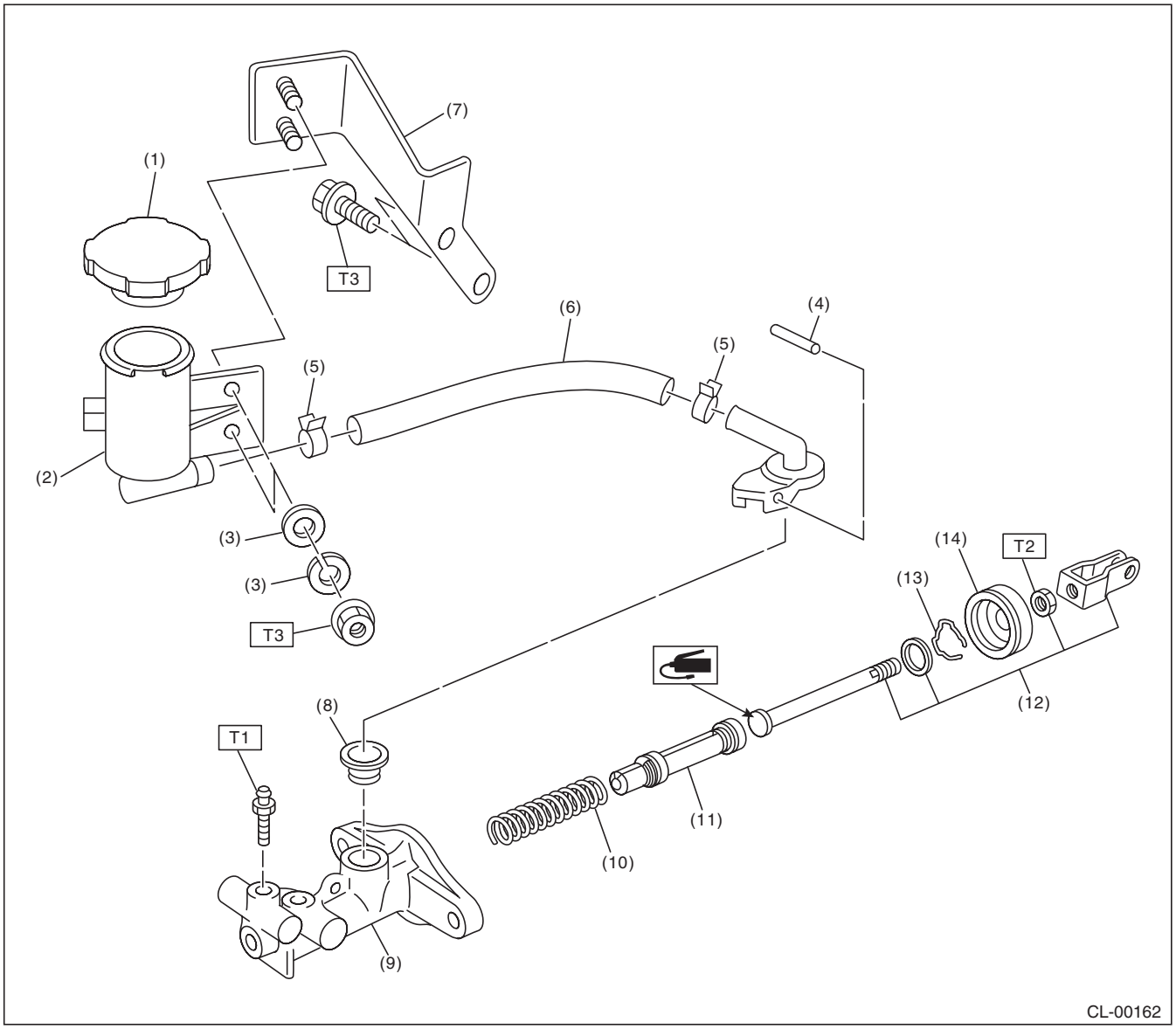


(1) Reservoir cap
(2) Reservoir tank
(3) Oil seal
(4) Straight pin
(5) Master cylinder
(6) Clutch damper
(7) Gasket
(8) Return spring
(9) Piston
(10) Push rod
(11) Piston stop ring
(12) Cylinder boot

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.0, 7)
T2: 46.6 (4.75, 34.4)

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• RHD DOHC TURBO MODEL



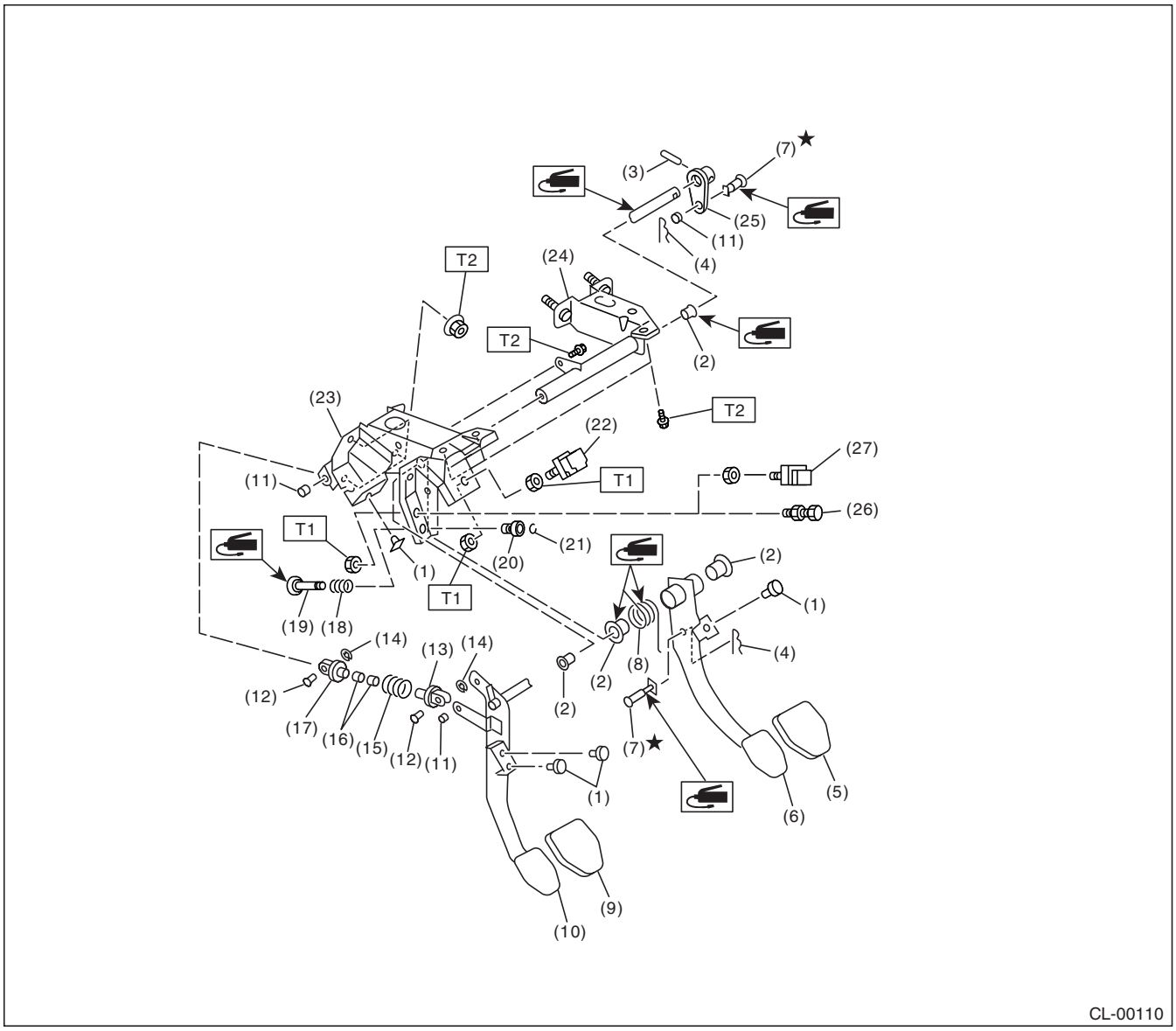
(1) Reservoir cap
(2) Reservoir tank
(3) Washer
(4) Straight pin
(5) Clip
(6) Hose
(7) Reservoir tank bracket
(8) Oil seal
(9) Master cylinder
(10) Return spring
(11) Piston
(12) Push rod
(13) Piston stop ring
(14) Cylinder boot

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 10 (1.0, 7)
T3: 18 (1.8, 13.3)

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4. CLUTCH PEDAL

• LHD 2.0 L MODEL

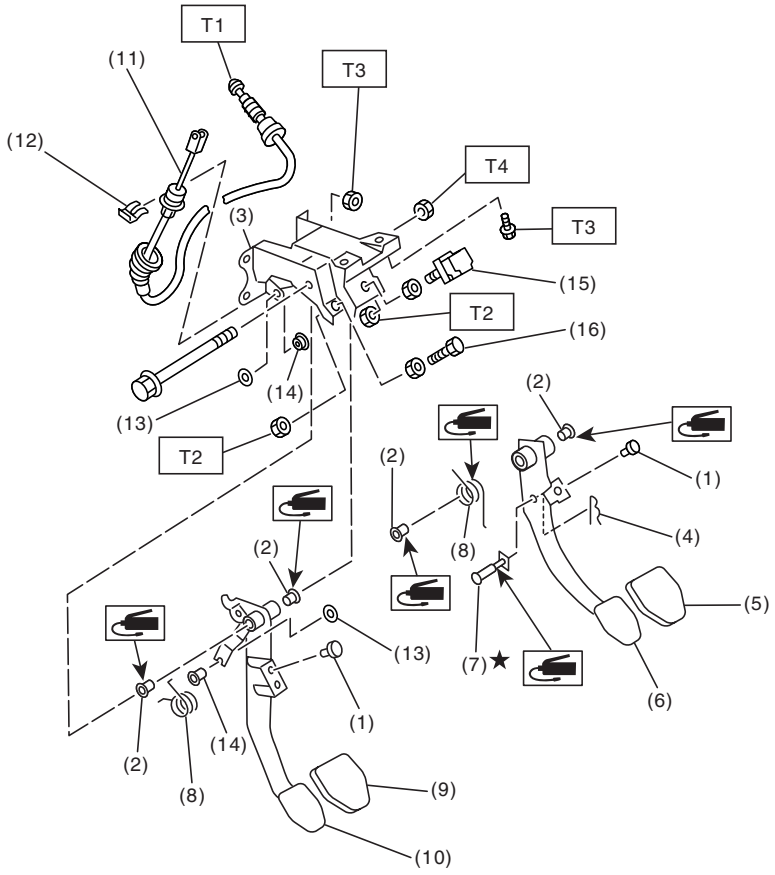


(1) Stopper
(2) Bushing
(3) Spring pin
(4) Snap pin
(5) Brake pedal pad
(6) Brake pedal
(7) Clevis pin
(8) Brake pedal spring
(9) Clutch pedal pad
(10) Clutch pedal
(11) Bushing C
(12) Clutch clevis pin
(13) Assist rod A
(14) Clip
(15) Assist spring
(16) Assist bushing
(17) Assist rod B
(18) Spring A
(19) Rod
(20) Bushing B
(21) Clip
(22) Stop light switch
(23) Pedal bracket
(24) Clutch master cylinder bracket
(25) Lever
(26) Adjust bolt
(27) Clutch switch (With cruise control)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)

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• LHD 1.6 L MODEL



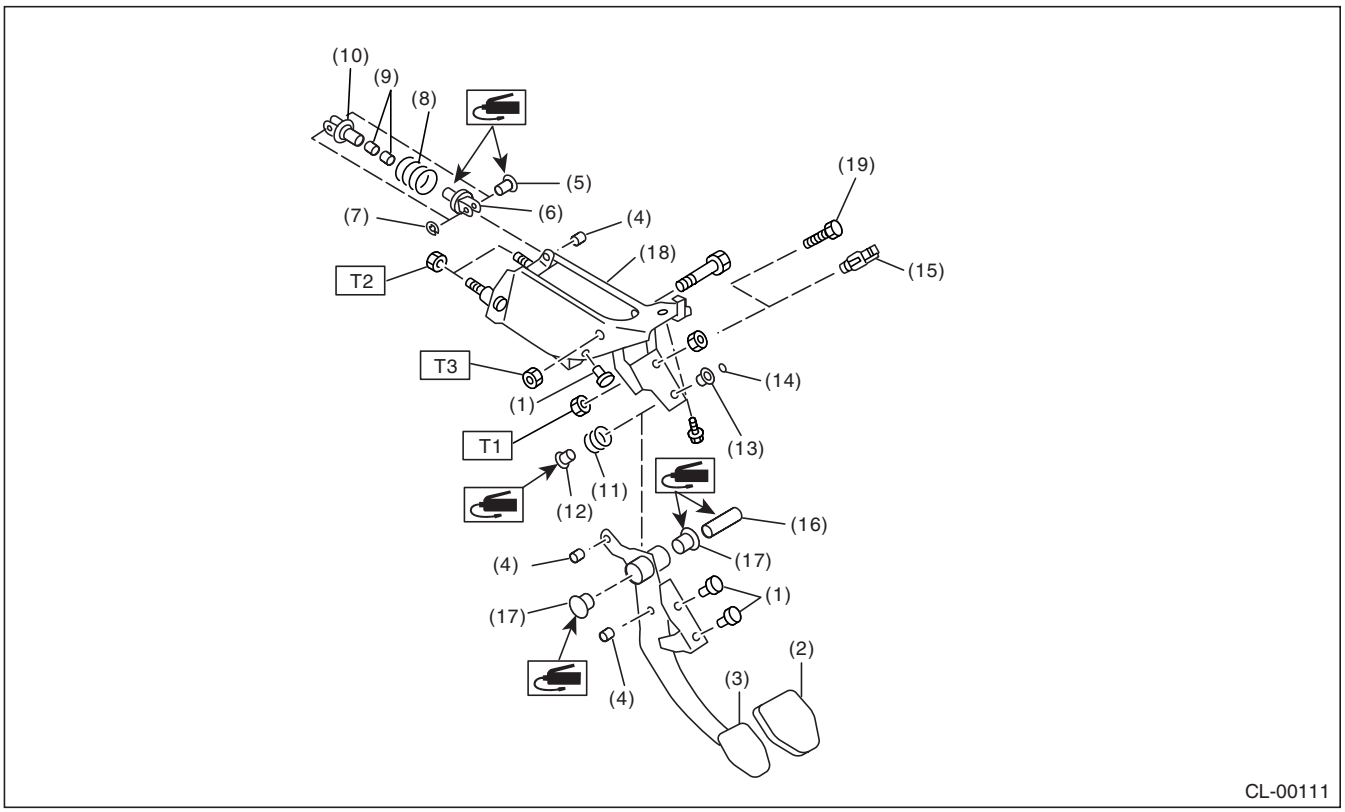
CL-00205

(1) Stopper
(2) Bushing
(3) Clutch pedal bracket
(4) Snap pin
(5) Brake pedal pad
(6) Brake pedal
(7) Clevis pin
(8) Spring
(9) Clutch pedal pad
(10) Clutch pedal
(11) Clutch cable
(12) Clutch cable clamp
(13) Clip
(14) Spring assist
(15) Stop light switch
(16) Adjust bolt

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5.9 (0.60, 4.3)
T2: 8 (0.8, 5.8)
T3: 18 (1.8, 13.0)
T4: 29 (3.0, 21.7)

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• RHD 2.0 L AND 2.5 L MODEL

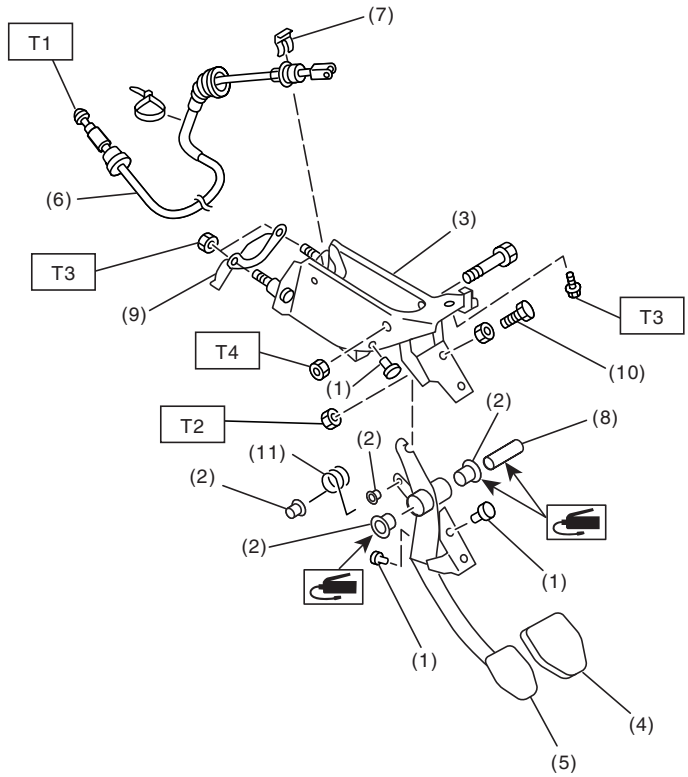


(1) Stopper
(2) Clutch pedal pad
(3) Clutch pedal
(4) Bushing
(5) Clutch clevis pin
(6) Assist rod A
(7) Clip
(8) Assist spring
(9) Assist bushing
(10) Assist rod B
(11) Spring A
(12) Rod S
(13) Bushing B
(14) O-ring
(15) Clip
(16) Clutch switch (With cruise control)
(17) Spacer
(18) Bushing
(19) Clutch pedal bracket

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*8 (0.8, 5.8)*
T2:	*18 (1.8, 13.0)*
T3:	*30 (3.1, 22.4)*

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• RHD 1.6 L MODEL



CL-00206

(1) Stopper
(2) Bushing
(3) Clutch pedal bracket
(4) Clutch pedal pad
(5) Clutch pedal
(6) Clutch cable
(7) Clutch cable clamp
(8) Spacer
(9) Bracket
(10) Adjust bolt
(11) Spring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5.9 (0.6, 4.3)
T2: 8 (0.8, 5.8)
T3: 18 (1.8, 13.0)
T4: 29 (3.0, 21.7)

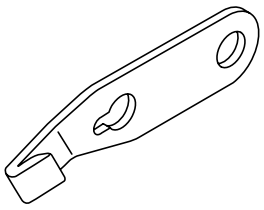
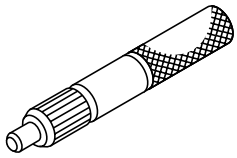
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C: CAUTION

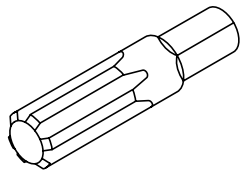
• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation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

D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening tightening bolt, etc.
 ST-499747100	499747100	CLUTCH DISC GUIDE	Used when installing clutch disc to flywheel.

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ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499057000	499057000	TORX® PLUS	• Used for removing flywheel (Dual mass flywheel type). • For 2.5 L model.

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.

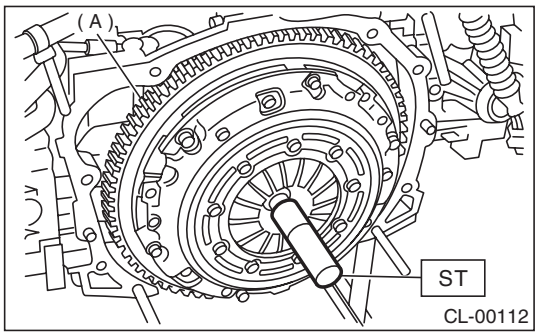
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2. Clutch Disc and Cover

A: REMOVAL

1. 2.5 L MODEL

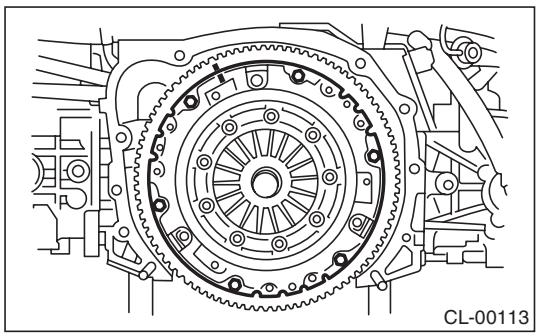
1) Remove the transmission assembly from vehicle body. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Insert the ST on flywheel.
ST 499747100 CLUTCH DISC GUIDE



(A) Double mass flywheel

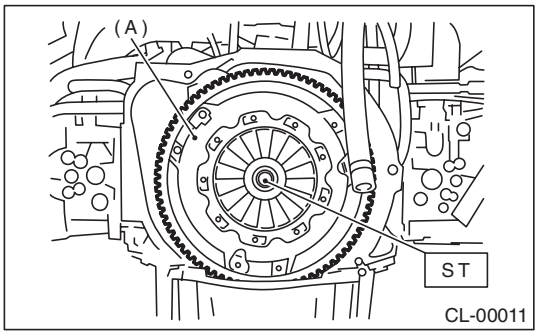
3) Remove the clutch cover and clutch disc.

NOTE:
• Take care not to allow oil on the clutch disc facing.
• Do not disassemble either the clutch cover or clutch disc.
• Put matching marks to the flywheel and clutch cover before removing the clutch cover.



2. EXCEPT 2.5 L MODEL

1) Remove the transmission assembly from vehicle body. <Ref. to 5MT-38, 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.

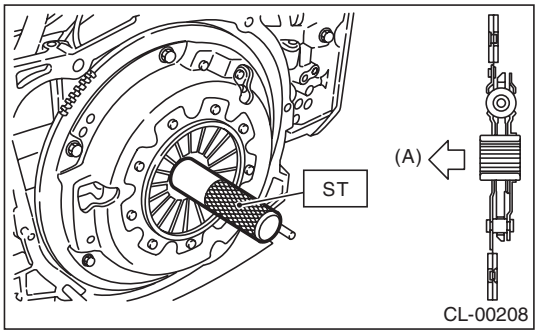
NOTE:
• Take care not to allow oil on the clutch disc facing.
• Do not disassemble either the clutch cover or clutch disc.

B: INSTALLATION

1. 2.5 L MODEL

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



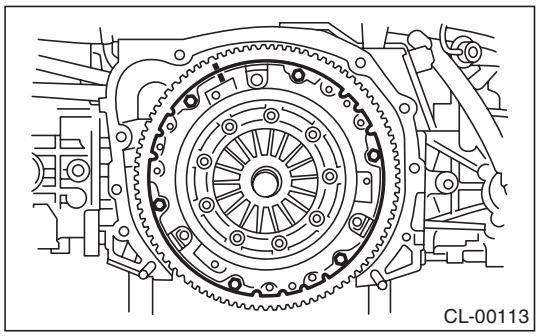
(A) Flywheel side

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2) Install the clutch cover on flywheel and tighten the bolts to specified torque.

NOTE:
• Align matching marks.
• Note the front and rear of the clutch disc when installing.
• Tighten the clutch cover installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)

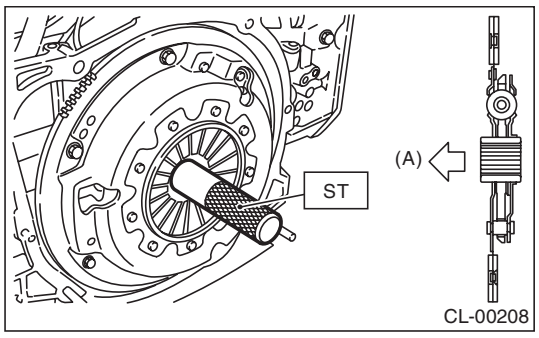


3) Remove the ST.
ST 499747100 CLUTCH DISC GUIDE

2. EXCEPT 2.5 L MODEL

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

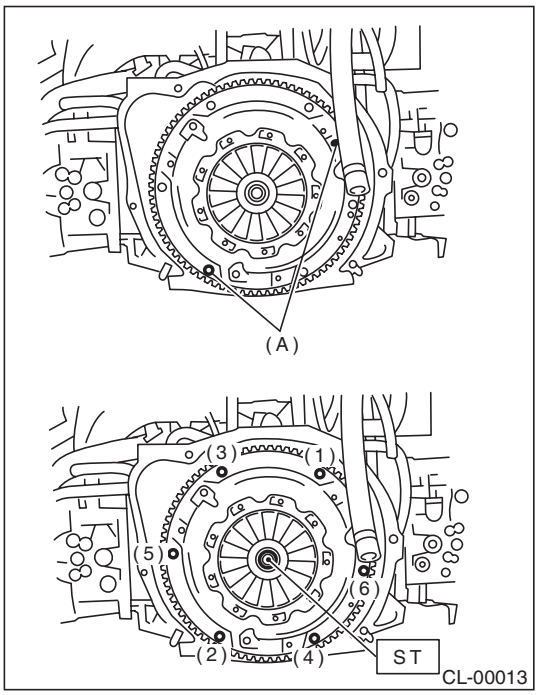


(A) Flywheel side

2) Install the clutch cover on flywheel and tighten the bolts to specified torque.

NOTE:
• When installing the clutch cover on flywheel, position the clutch cover so that there is a gap of 120° or more between "0" marks on the flywheel and clutch cover. ("0" marks indicate the directions of residual unbalance.)
• Note the front and rear of the clutch disc when installing.
• Temporarily tighten the bolts by hand. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) "0" marks

3) Remove the ST.
ST 499747100 CLUTCH DISC GUIDE
4) Install the transmission assembly. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1. CLUTCH DISC

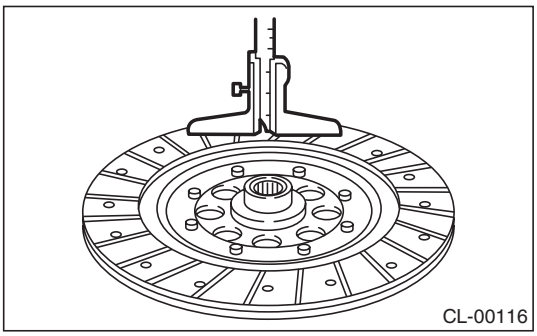
1) Facing wear
Measure the depth of rivet head from the surface of facing. Replace if facings are worn locally or worn down to less than the specified value.

Depth of rivet head:
Limit of sinking
0.3 mm (0.012 in)

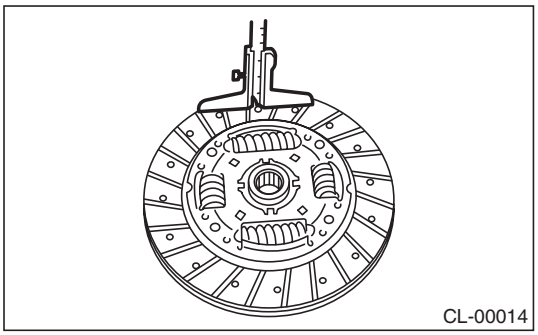
NOTE:
Do not wash the clutch disc with any cleaning fluid.

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• 2.5 L MODEL

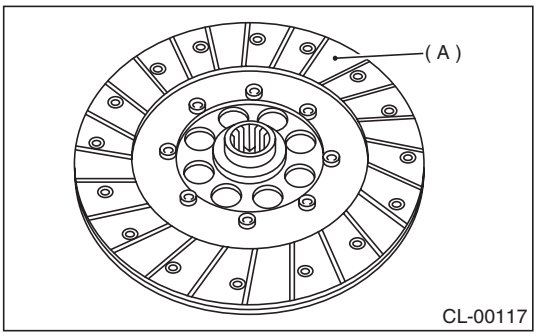


• Except 2.5 L MODEL



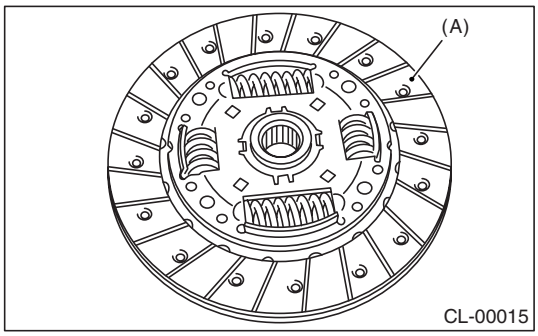
2) Hardened facing
Correct by using emery paper or replace.
3) Oil soakage on facing
Replace the clutch disc and inspect the transmission front oil seal, transmission case mating surface, engine rear oil seal and other points for oil leakage.

• 2.5 L MODEL



(A) Clutch facing

• Except 2.5 L MODEL

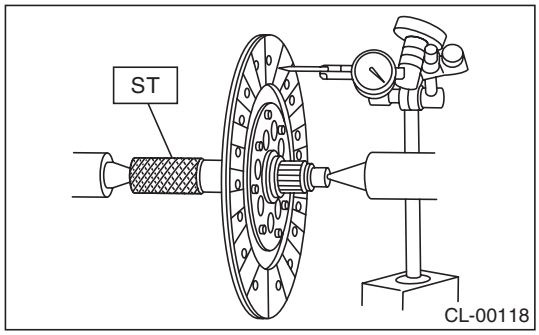


(A) Clutch facing

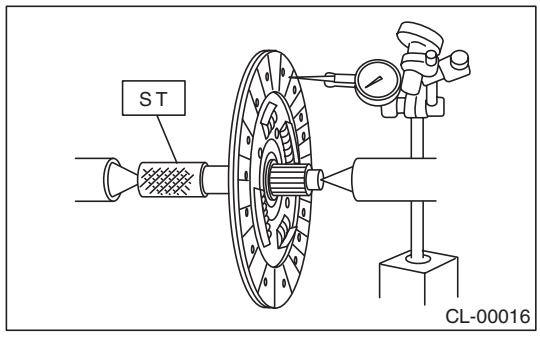
4) Deflection on facing
If deflection exceeds the specified value at the outer circumference of facing, repair or replace.
ST 499747100 CLUTCH DISC GUIDE

Limit for deflection:
1.6 L model
0.8 mm (0.031 in) at R = 107 mm (4.21 in)
2.0 L model
0.8 mm (0.031 in) at R = 110 mm (4.33 in)
2.5 L model
1.0 mm (0.039 in) at R = 110 mm (4.33 in)

• 2.5 L MODEL



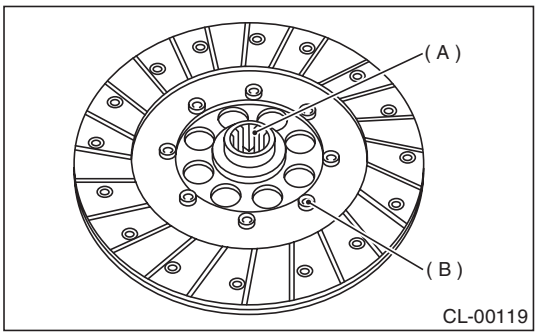
• Except 2.5 L MODEL



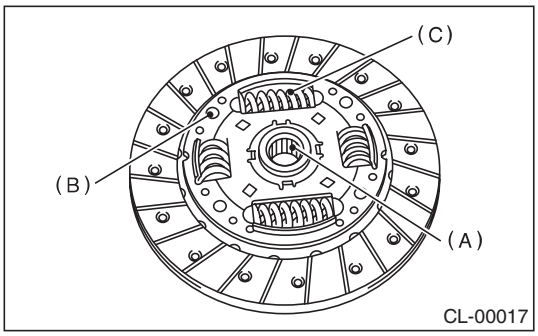
5) Worn spline, loose rivets and torsion spring failure
Replace defective parts.

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• 2.5 L MODEL



• Except 2.5 L MODEL



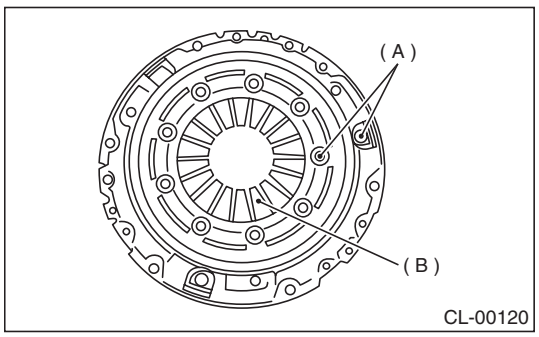
(A) Spline
(B) Rivet
(C) Torsion spring

2. CLUTCH COVER

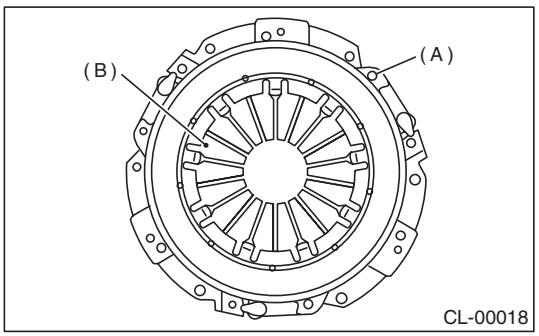
NOTE:
Visually check for the following items without disassembling, and replace or repair if defective.

1) Loose thrust rivet.
2) Damaged or worn bearing contact area at center of diaphragm spring.

• 2.5 L MODEL



• Except 2.5 L MODEL



(A) Thrust rivet
(B) Diaphragm spring

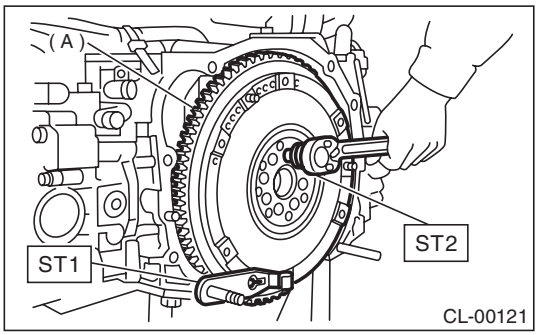
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3. Flywheel

A: REMOVAL

1. 2.5 L MODEL

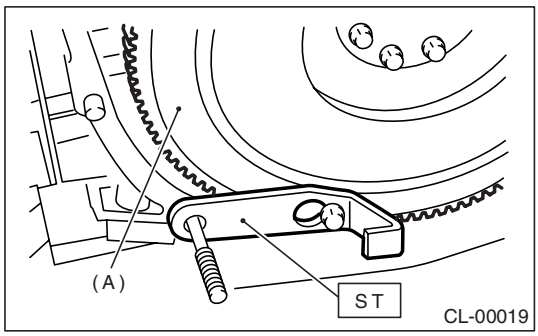
1) Remove the transmission assembly. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch cover and clutch disc. <Ref. to CL-20, REMOVAL, Clutch Disc and Cover.>
3) Remove the flywheel using ST1 and ST2.
ST1 498497100 CRANKSHAFT STOPPER
ST2 499057000 TORX PLUS



(A) Flywheel

2. EXCEPT 2.5 L MODEL

1) Remove the transmission assembly. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch cover and clutch disc. <Ref. to CL-20, REMOVAL, Clutch Disc and Cover.>
3) Using the ST, remove the flywheel.
ST 498497100 CRANKSHAFT STOPPER

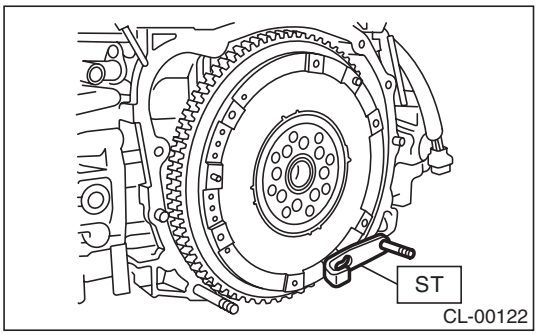


(A) Flywheel

B: INSTALLATION

1. 2.5 L MODEL

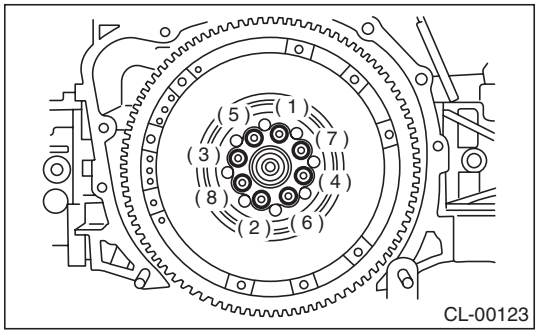
1) Install the flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



2) Tighten the flywheel attaching bolts to the specified torque.
ST 499057000 TORX PLUS

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)

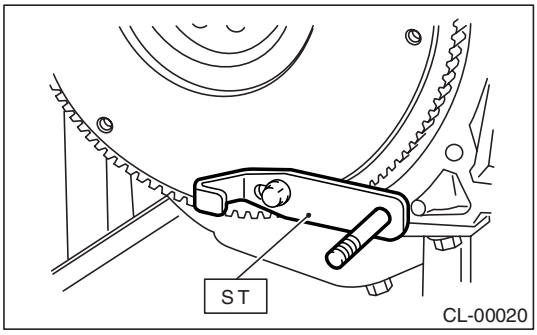


3) Install the clutch disc and cover. <Ref. to CL-20, 2.5 L MODEL, INSTALLATION, Clutch Disc and Cover.>
4) Install the transmission assembly. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

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2. EXCEPT 2.5 L MODEL

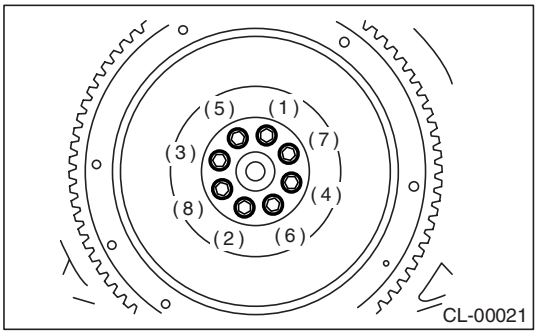
1) Install the flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



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)



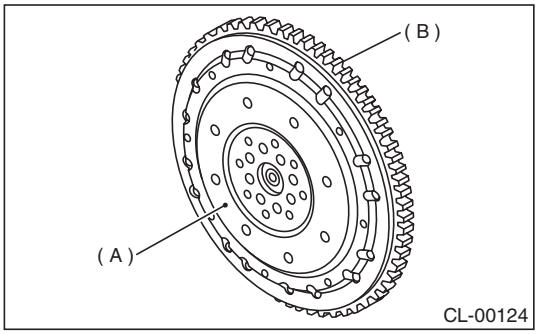
3) Install the clutch disc and cover. <Ref. to CL-21, EXCEPT 2.5 L MODEL, INSTALLATION, Clutch Disc and Cover.>
4) Install the transmission assembly. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

CAUTION:
Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent.

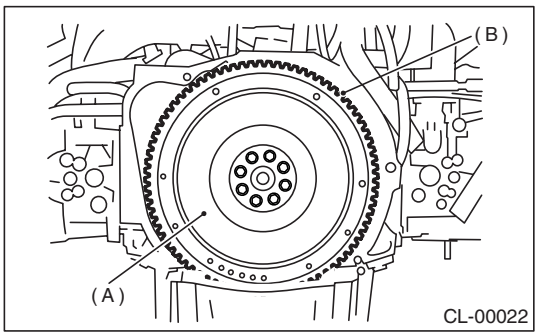
1) Damage of facing and ring gear
If defective, replace the flywheel.

- 2.5 L MODEL



(A) Flywheel
(B) Ring gear

- Except 2.5 L MODEL



(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.

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4. Release Bearing and Lever

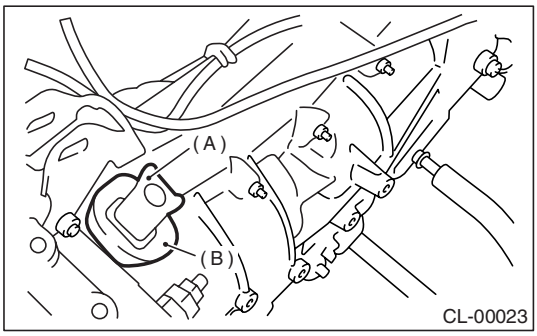
A: REMOVAL

1. EXCEPT DOHC TURBO MODEL

1) Remove the transmission assembly from vehicle body.
<Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the two clips from clutch release lever and remove the release bearing.

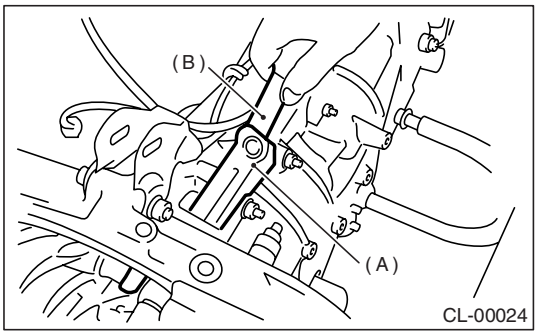
CAUTION:
Be careful not to deform clips.

3) Remove the release lever seal.



(A) Clutch release lever
(B) Release lever seal

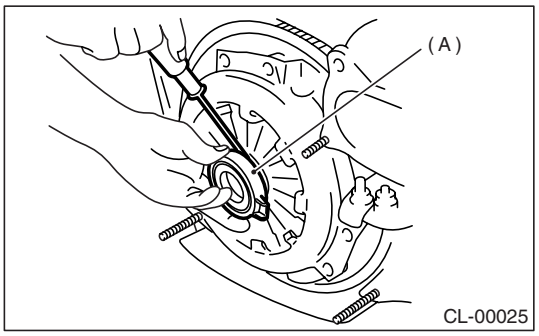
4) Remove the release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove the release lever.



(A) Clutch release lever
(B) Screwdriver

2. DOTC TURBO MODEL

1) Remove the transmission assembly from vehicle body. <Ref. to 5MT-38, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch release lever from transmission.
3) Put the clutch release bearing in engine side.
4) Remove the clutch release bearing from the clutch cover using flat-type screwdriver.



(A) Clutch release bearing

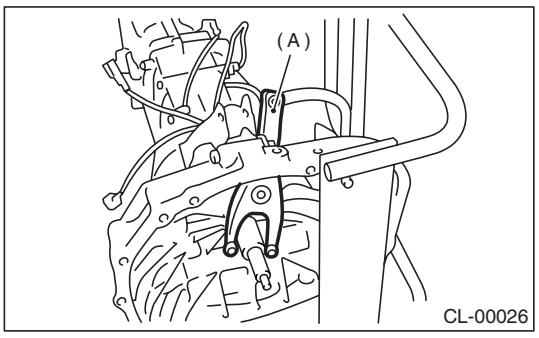
B: INSTALLATION

1. EXCEPT DOHC TURBO MODEL

NOTE:
Before or during assembling, lubricate the following points with a light coat of grease.
- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulphide.)

1) While pushing the release lever to pivot and twisting it to both sides, fit the retainer spring onto the constricted portion of pivot.

NOTE:
- Apply grease (KOPR-KOTE: Part No. 003603001) to the contact point of release lever and operating cylinder.
- Confirm that the retainer spring is securely fitted by observing it through the main case hole.

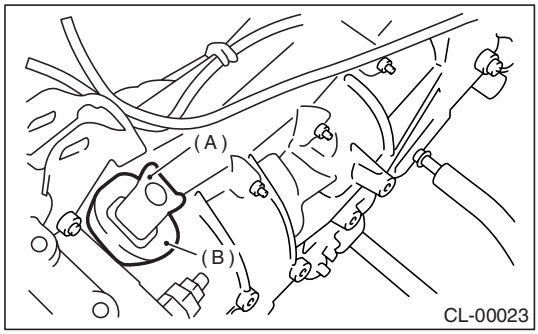


(A) Release lever

2) Install the release bearing and fasten it with two clips.

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3) Install the release lever seal.

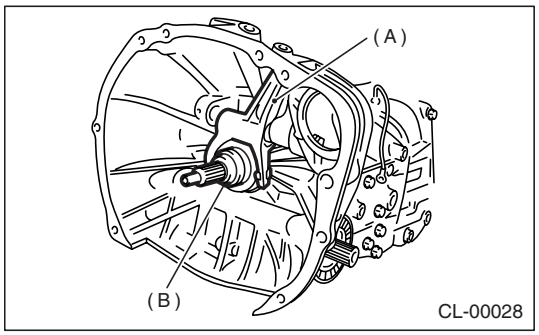


(A) Release lever
(B) Release lever seal

4) Install the transmission assembly.
<Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

2. DOHC TURBO MODEL

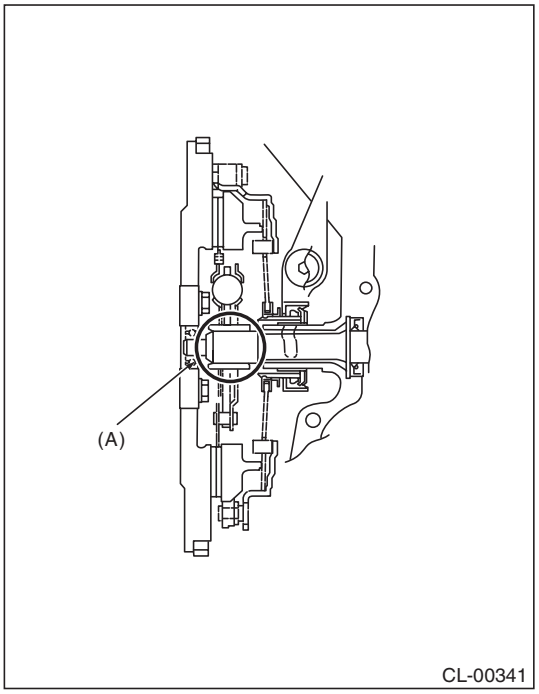
1) Install the release bearing on transmission.
2) Insert the release fork into release bearing tab.



(A) Release fork
(B) Release bearing

3) Apply grease to the specified points.

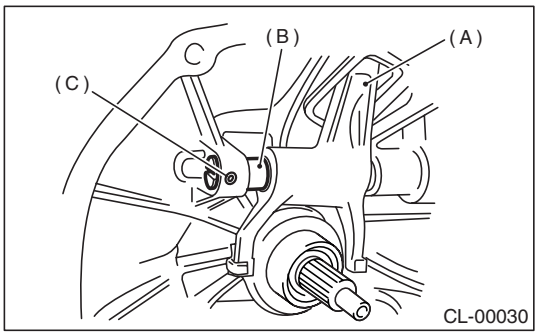
Grease:
NICHIMOLY N-130



(A) Spline

4) Insert the release fork shaft into release fork.

NOTE:
Make sure the cutout portion of release fork shaft contacts spring pin.

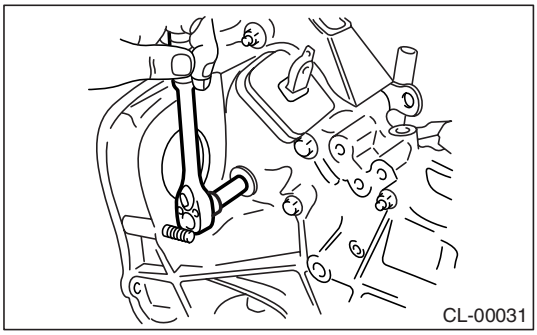


(A) Release fork
(B) Release shaft
(C) Spring pin

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5) Tighten the plug.

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



6) Install the transmission assembly. <Ref. to 5MT-41, INSTALLATION, Manual Transmission Assembly.>

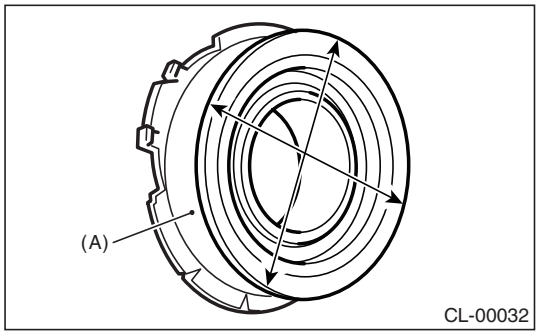
C: INSPECTION

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.

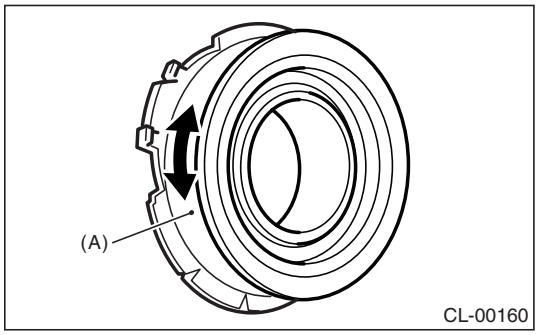
1) Check the bearing for smooth movement by applying force in the radial direction.

Radial direction stroke:
1.4 mm (0.055 in)



(A) Bearing case

2) Check the bearing for smooth rotation by applying pressure in the thrust direction.

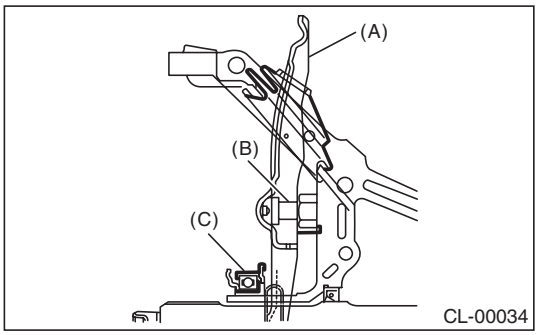


(A) Bearing case

3) Check wear and damage of 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

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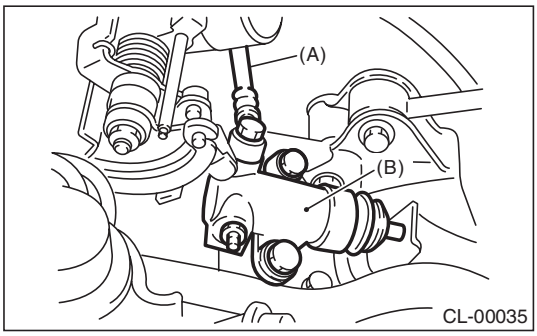
5. Operating Cylinder

A: REMOVAL

1) Remove the air cleaner case and air intake duct (Non-turbo model). <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
2) Remove the intercooler (Turbo model). <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
3) Remove the clutch hose from operating cylinder.

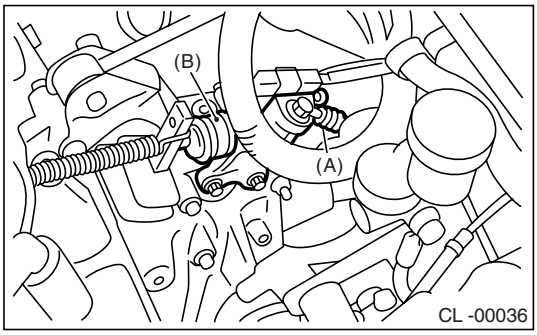
CAUTION:
Cover the hose joint to prevent clutch fluid from flowing out.

- NON-TURBO MODEL



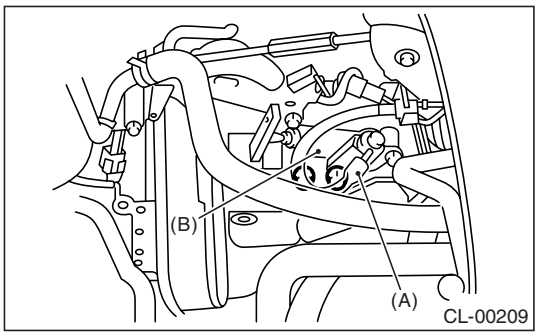
(A) Clutch hose
(B) Operating cylinder

- DOHC TURBO MODEL (5MT)



(A) Clutch hose
(B) Operating cylinder

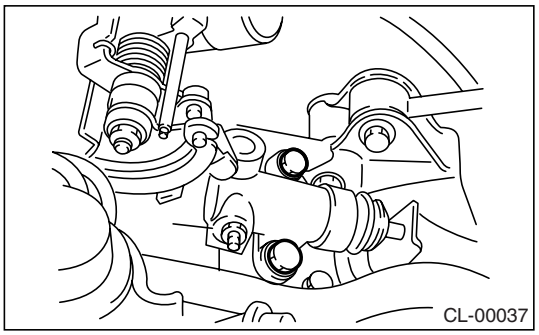
- DOHC TURBO MODEL (6MT)



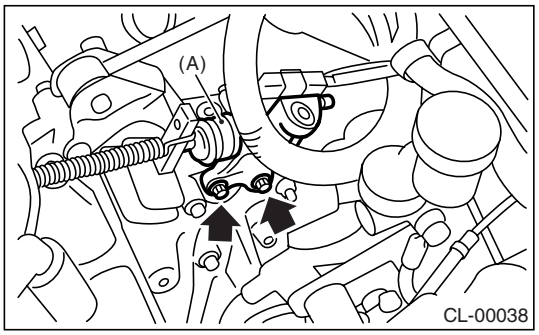
(A) Clutch hose
(B) Operating cylinder

4) Remove the operating cylinder from transmission.

- NON-TURBO MODEL



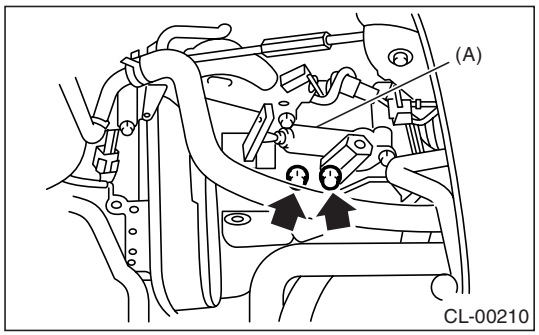
- DOHC TURBO MODEL (5MT)



(A) Operating cylinder

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• DOHC TURBO MODEL (6MT)



(A) Operating cylinder

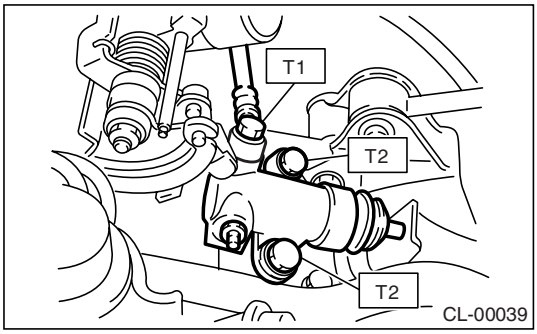
B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
Before installing the operating cylinder, apply grease (KOPR-KOTE: Part No. 003603001) to contact point of the release lever and operating cylinder.

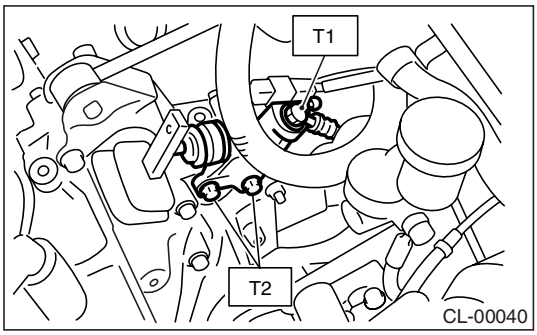
• NON-TURBO MODEL

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)



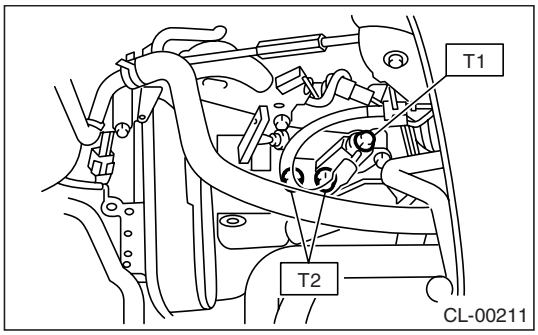
• DOHC TURBO MODEL (5MT)

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)

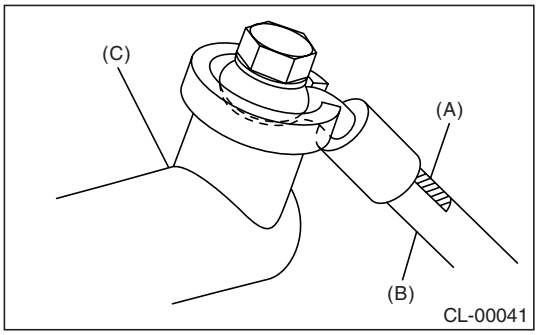


• DOHC TURBO MODEL (6MT)

Tightening torque:
T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T2: 41 N·m (4.2 kgf-m, 30.2 ft-lb)



NOTE:
• Be sure to install the clutch hose with the mark side facing upward.
• Be careful not to twist the clutch hose during installation.



(A) Marking
(B) Clutch hose
(C) Operating cylinder

2) After bleeding air from the operating cylinder, ensure that clutch operates properly.
<Ref. to CL-38, Clutch Fluid Air Bleeding.>

C: INSPECTION

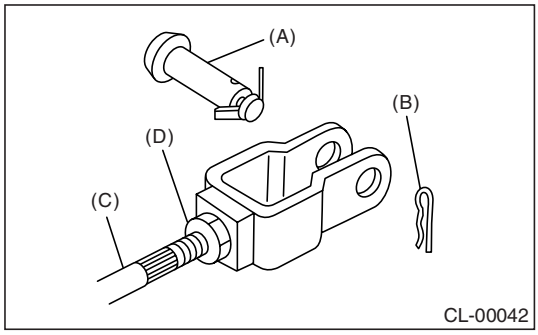
1) Check the operating cylinder for damage. If operating cylinder is damaged, replace it.
2) Check the operating cylinder for fluid leakage or damage on boot. If any leakage or damage is found, replace the operating cylinder.

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6. Master Cylinder

A: REMOVAL

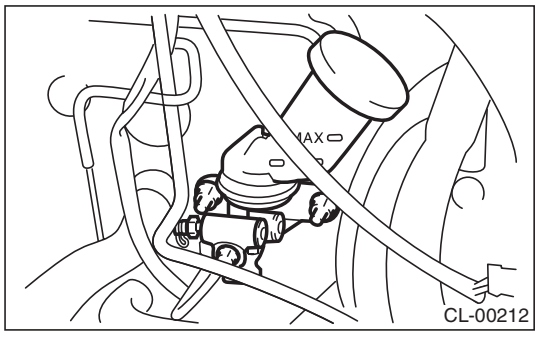
1) Thoroughly drain the brake fluid from reservoir tank.
2) Remove the snap pin, clevis pin and separate the push rod of master cylinder from clutch pedal.



(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Lock nut

3) Remove the air cleaner case and air intake duct (Non-turbo model). <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
4) Remove the intercooler (Turbo model). <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
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 spilt on the vehicle body will harm the paint surface; wipe it off quickly if spilt.

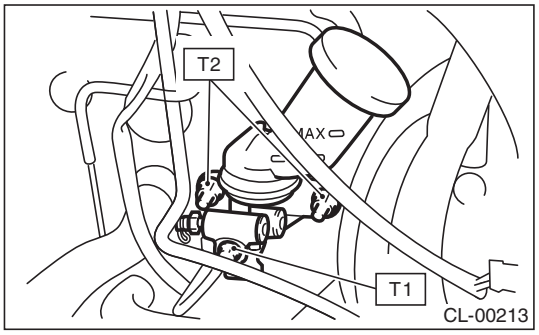


B: INSTALLATION

1) Install the master cylinder to body, and install the clutch pipe to master cylinder.

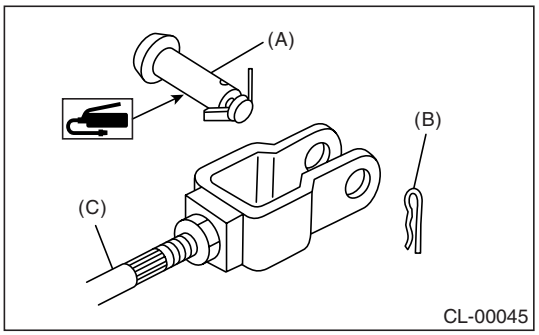
CAUTION:
Check that the pipe is routed properly.

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) Connect the push rod of master cylinder to clutch pedal, and install the clevis pin and snap pin.

NOTE:
Apply grease to the clevis pin.



(A) Clevis pin
(B) Snap pin
(C) Push rod

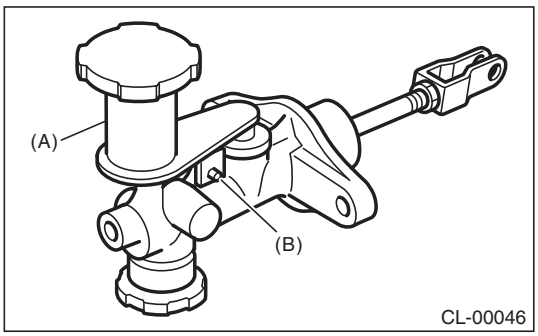
3) After bleeding air from the system, ensure that clutch operates properly.
<Ref. to CL-38, Clutch Fluid Air Bleeding.>
4) Install the air cleaner case and air intake duct (Non-turbo model). <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
5) Install the intercooler (Turbo model). <Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

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C: DISASSEMBLY

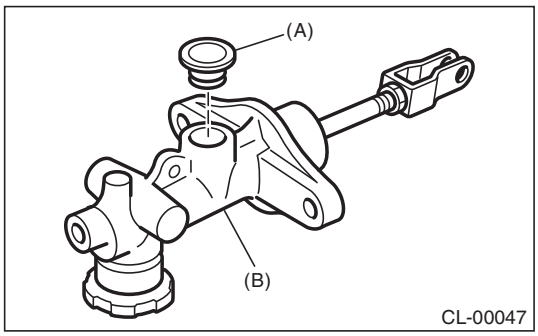
1. EXCEPT RHD DOHC TURBO MODEL

1) Remove the straight pin and reservoir tank.



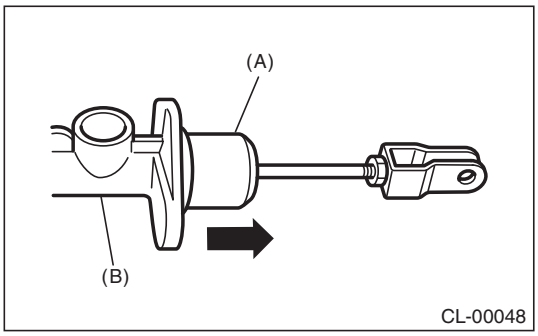
(A) Reservoir tank
(B) Straight pin

2) Remove the oil seal.



(A) Oil seal
(B) Master cylinder

3) Move the cylinder boot backward.



(A) Cylinder boot
(B) Master cylinder

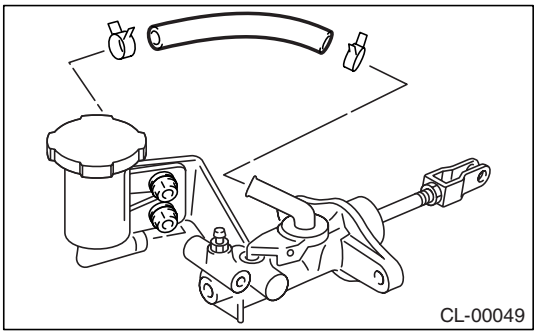
4) Remove the stop ring.

CAUTION:
Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

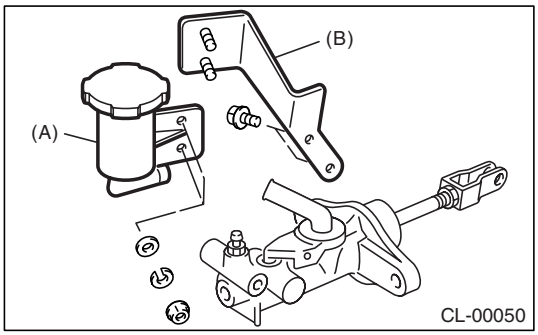
5) Remove the clutch damper.

2. RHD DOHC TURBO MODEL

1) Remove the hose.

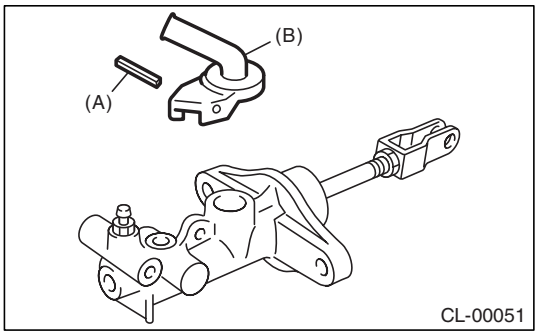


2) Remove the reservoir tank and bracket.



(A) Reservoir tank
(B) Bracket

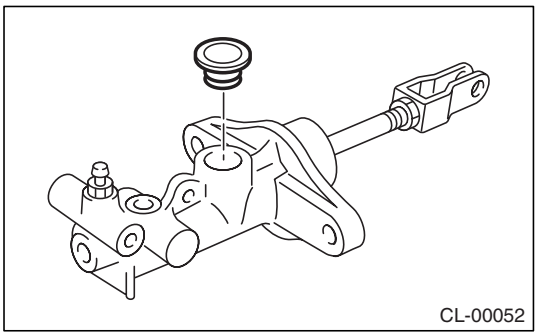
3) Remove the straight pin and adapter.



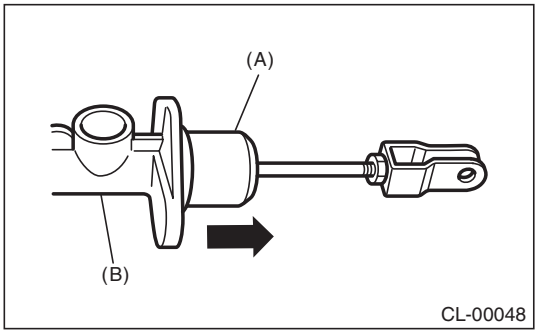
(A) Straight pin
(B) Adapter

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4) Remove the oil seal.



5) Move the cylinder boot backward.



(A) Cylinder boot
(B) Master cylinder

6) Remove the stop ring.

CAUTION:
Be careful when removing the snap ring to prevent the rod, washer, piston and return spring from flying out.

7) Remove the air bleeder.

D: ASSEMBLY

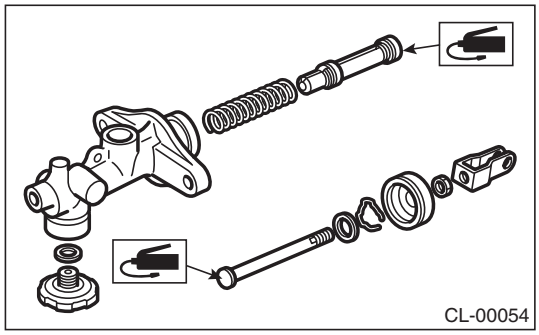
1. EXCEPT RHD DOHC TURBO MODEL

1) Install the clutch damper.

Tightening torque:
46.6 N·m (4.75 kgf-m, 34.4 ft-lb)

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)



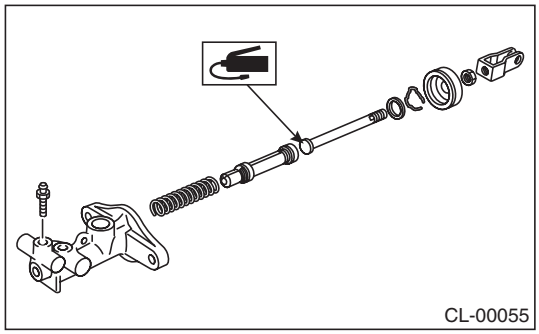
3) To assemble the master cylinder, reverse the sequence of disassembly procedure.

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

2. RHD DOHC TURBO MODEL

1) Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

Grease:
SILICONE GREASE G40M (Part No. 004404003)

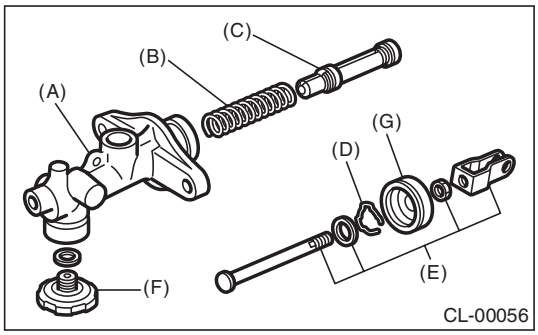


2) Assemble in the reverse order of disassemble.

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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, clutch damper, cylinder boot and hose replace the faulty part.



(A) Master cylinder body
(B) Return spring
(C) Piston
(D) Stop ring
(E) Rod ASSY
(F) Clutch damper
(G) Cylinder boot

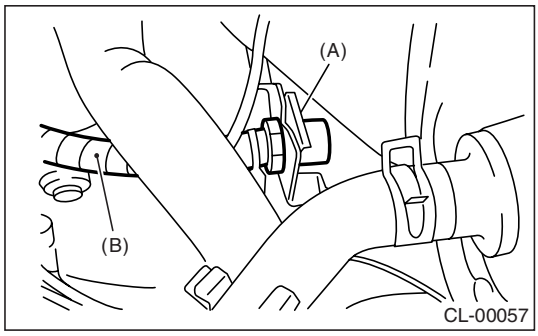
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7. Clutch Pipe and Hose

A: REMOVAL

1. EXCEPT RHD DOHC TURBO MODEL

1) Remove the air cleaner case and air intake duct.
2) Drain the clutch fluid. <Ref. to CL-37, Clutch Fluid.>
3) Remove the clutch pipe from the clutch hose and master cylinder.
4) Pull out the clamp, then remove the clutch hose from bracket.

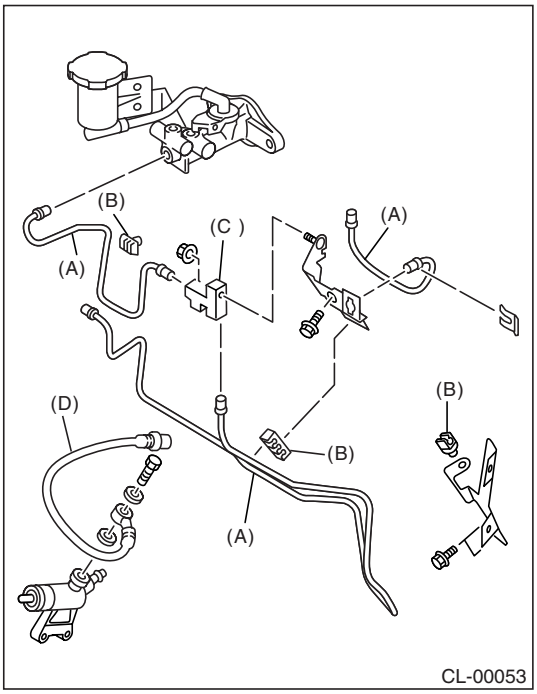


(A) Clamp
(B) Clutch hose

5) Remove the hose from operating cylinder.
6) Remove the bracket.

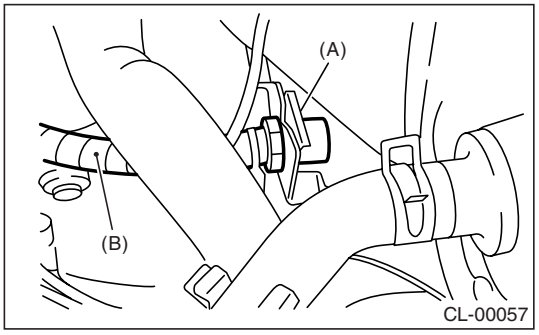
2. RHD DOHC TURBO MODEL

1) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
2) Drain the clutch fluid. <Ref. to CL-37, Clutch Fluid.>
3) Remove the clutch pipe from the master cylinder, connector and clutch hose.



(A) Clutch pipe
(B) Clip
(C) Connector
(D) Clutch hose

4) Pull out the clamp, then remove the clutch hose from bracket.



(A) Clamp
(B) Clutch hose

5) Remove the connector.
6) Remove the bracket.

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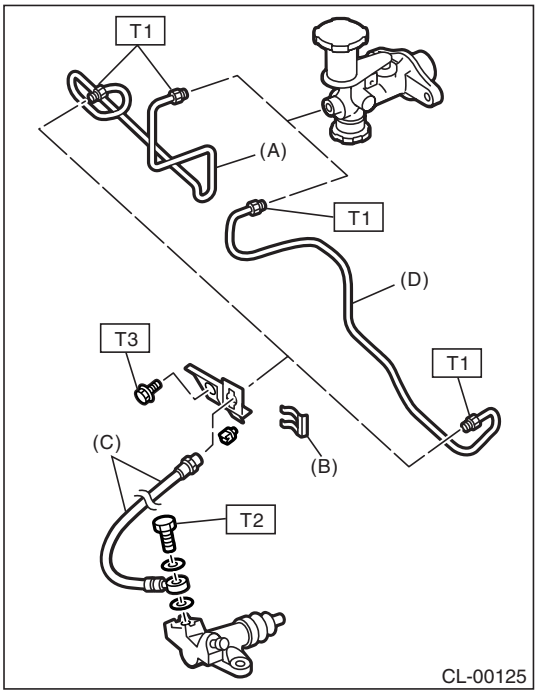
B: INSTALLATION

1. EXCEPT RHD DOHC TURBO MODEL

Install in the reverse order of removal.

NOTE:
Bleed the clutch fluid. <Ref. to CL-38, Clutch Fluid Air Bleeding.>

Tightening torque:
T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T3: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



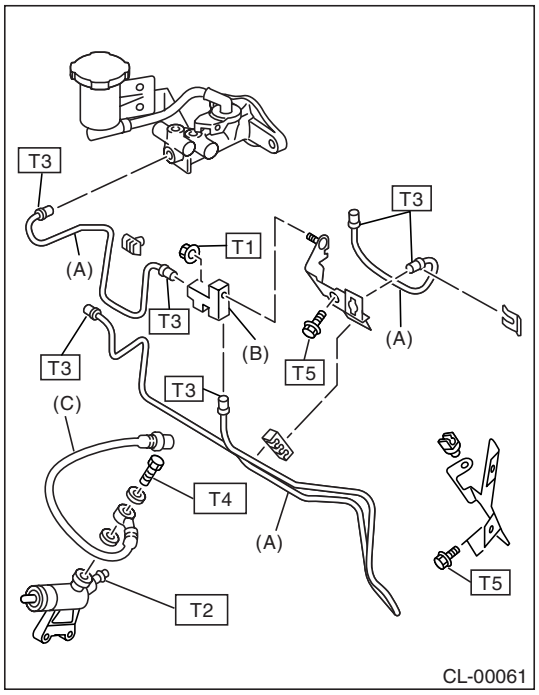
(A) Clutch pipe (LHD model)
(B) Clip
(C) Clutch hose
(D) Clutch pipe (RHD model)

2. RHD DOHC TURBO MODEL

Install in the reverse order of removal.

NOTE:
Bleed the clutch fluid. <Ref. to CL-38, Clutch Fluid Air Bleeding.>

Tightening torque:
T1: 7.5 N·m (0.76 kgf-m, 5.53 ft-lb)
T2: 8 N·m (0.8 kgf-m, 5.8 ft-lb)
T3: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T4: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T5: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Clutch pipe
(B) Connector
(C) Clutch hose

C: INSPECTION

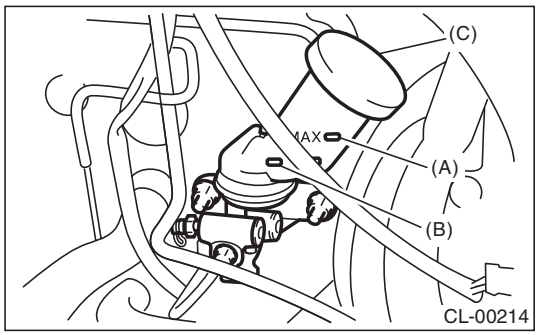
Check the pipes and hoses for cracks, breakage, or damage. Check the joints for fluid leakage. If any cracks, breakage, damage, or leakage is found, repair or replace the applicable pipe or hose.

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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) Max. level
(B) Min. level
(C) Reservoir tank

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:
• During bleeding operation, keep the clutch reservoir tank filled with brake fluid to eliminate entry of air.
• Clutch pedal operating must be very slow.
• For convenience and safety, it is advisable to have two men working.
• The amount of brake fluid required is approx. 70 mℓ (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.

1) Remove the air cleaner case and air duct.
2) Either jack-up the vehicle and place a safety stand under it, or lift-up the vehicle.
3) Draw out the brake fluid from reservoir tank with syringe.
4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:
FMVSS No. 116, fresh DOT3 or 4 brake fluid

5) Drain fluid in the same method as air bleeding.
6) Refill the brake fluid before reservoir tank becomes empty, and drain contaminated fluid again.
7) Repeat the above procedure until the contaminated fluid is completely drained.

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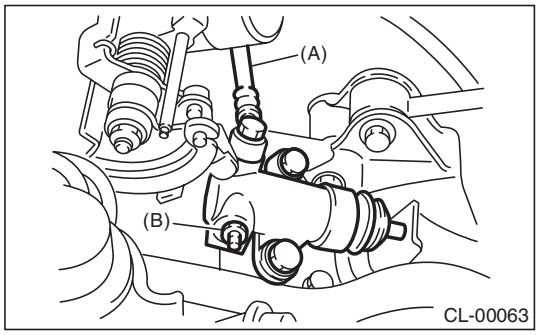
9. Clutch Fluid Air Bleeding

A: PROCEDURE

1. NON-TURBO MODEL

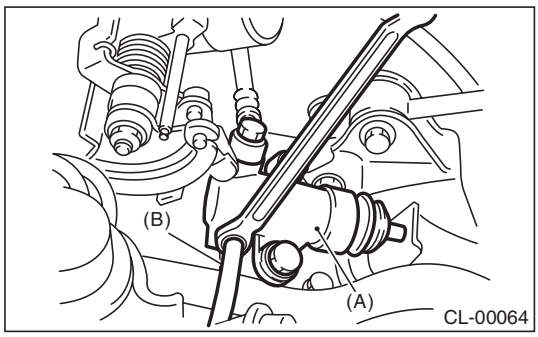
NOTE:
Bleed air from the oil line with help of a co-worker.

1) Remove the air cleaner case and air intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
2) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.



(A) Clutch hose
(B) Air bleeder

3) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.
Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.



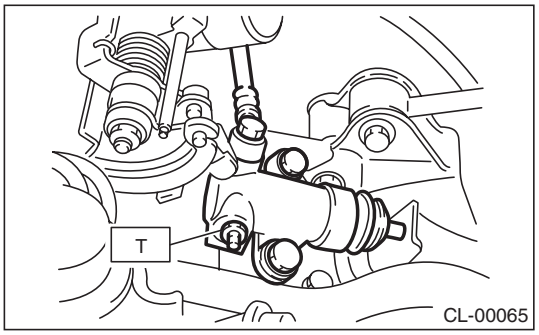
(A) Operating cylinder
(B) Vinyl tube

4) Repeat these steps until there are no more air bubbles in the vinyl tube.

CAUTION:
Cover the bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

5) Tighten the air bleeder.

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

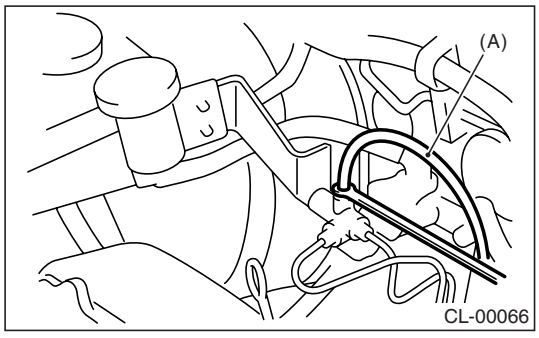


6) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.
7) After bleeding air from the system, ensure that clutch operates properly.

2. TURBO MODEL

NOTE:
Bleed air from the oil line with help of a co-worker.

1) Remove the intercooler. <Ref. to IN(H4DOTC)-11, REMOVAL, Intercooler.>
2) Fit one end of a vinyl tube into the air bleeder of master cylinder and put the air bleeder of other end into a brake fluid container. (RHD DOHC turbo model)
3) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid. Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal. (RHD DOHC turbo model)



(A) Vinyl tube

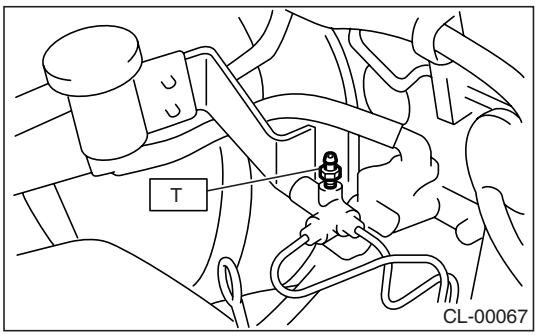
4) Repeat these steps until there are no more air bubbles in the vinyl tube. (RHD DOHC turbo model)

CAUTION:
Cover the bleeder with waste cloth when loosening to prevent brake fluid from being splashed over surrounding parts.

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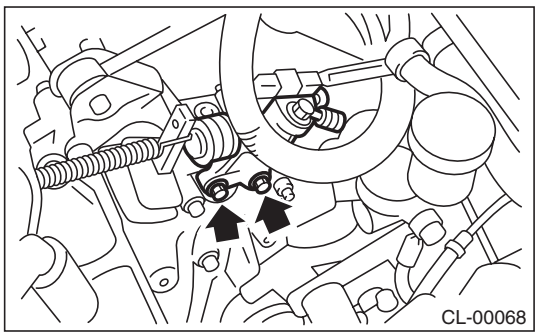
5) Tighten the air bleeder. (RHD DOHC turbo model)

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

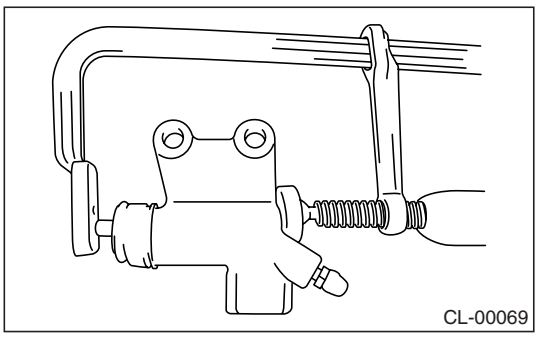


6) Remove the operating cylinder.

NOTE:
Do not remove the clutch hose.

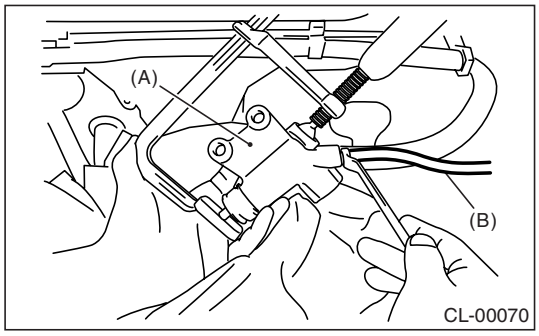


7) Fix the piston with clamp to avoid the piston from jumping out.



8) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.
9) 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.

NOTE:
Set the air breather screw part higher than tip of operating cylinder when performing this procedure.



(A) Operating cylinder
(B) Vinyl tube

10) Repeat these steps until there are no more air bubbles in the vinyl tube.

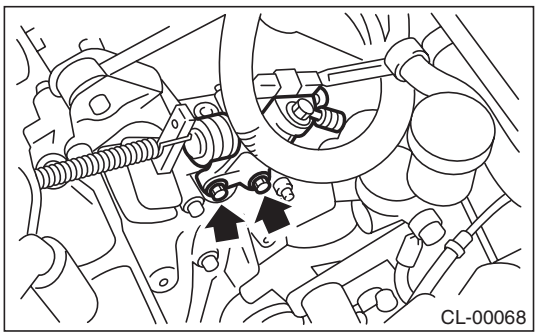
CAUTION:
Cover the bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

11) Tighten the air bleeder.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

12) Install the operating cylinder.

Tightening torque:
37 N·m (3.8 kgf-m, 27.5 ft-lb)



13) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.
14) After bleeding air from the system, ensure that clutch operates properly.
15) Install the intercooler. <Ref. to IN(H4DOTC)-11, INSTALLATION, Intercooler.>

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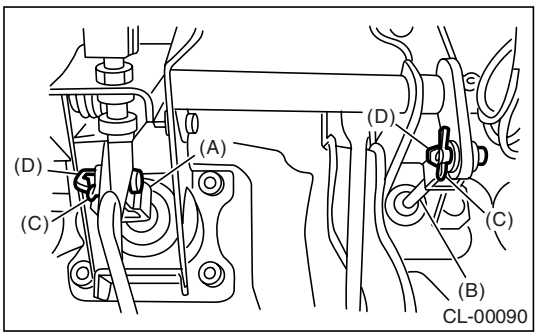
10.Clutch Pedal

A: REMOVAL

1. LHD MODEL

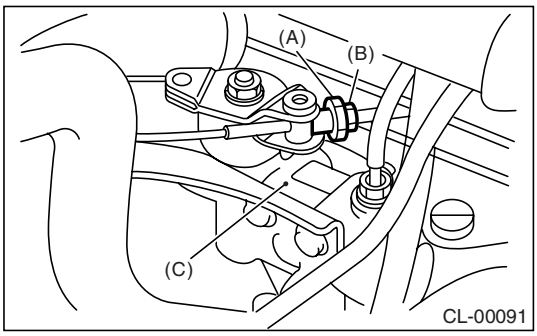
• Except 1.6 L MODEL

1) Remove the steering column. <Ref. to PS-26, 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

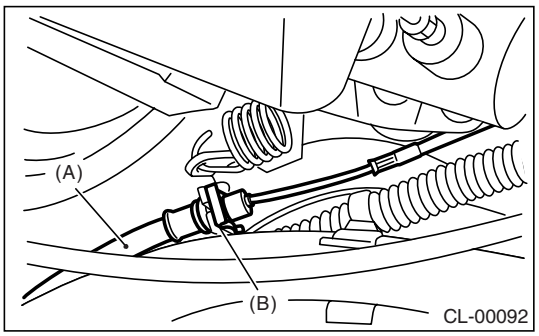
5) Remove the air cleaner case and intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
6) Remove the PHV adjusting nut and lock nut. (Model with hill holder)



(A) Adjusting nut
(B) Lock nut
(C) PHV

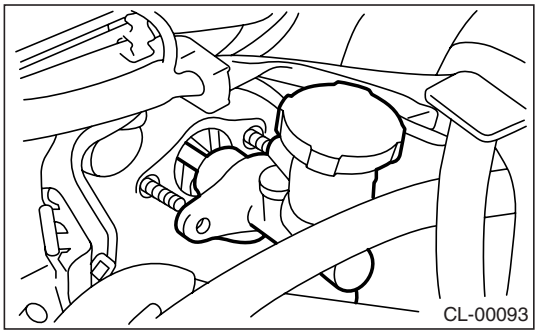
7) Remove the cable clamp, and disconnect the PHV cable from PHV. (Model with hill holder)

CAUTION:
Carefully protect the boot and inner cable from damage when disconnecting the PHV cable.



(A) PHV cable
(B) Clamp

8) Remove the nut which secures clutch master cylinder.



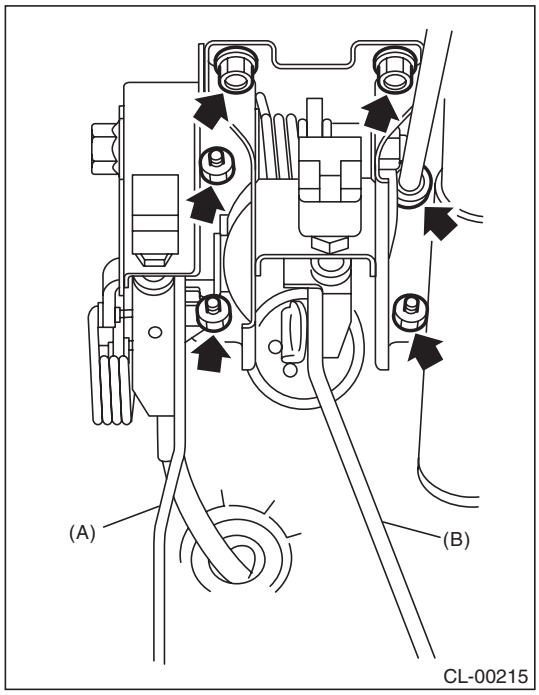
9) Remove the bolts and nuts which secure brake and clutch pedals, and remove the pedal assembly.

• 1.6 L MODEL

1) Disconnect the ground cable from battery.
2) Remove the air cleaner case and intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Disconnect the clutch cable from release lever.
4) Remove the instrument panel lower cover.
5) Disconnect the operating rod of brake pedal.
6) Remove the electrical connectors (for stop light switch, etc.)

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7) Remove the bolts and nuts which secure brake and clutch pedals, and remove pedal bracket and clutch cable as a unit.

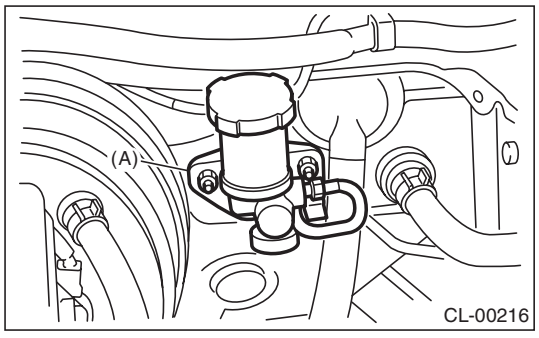


(A) Clutch pedal
(B) Brake pedal

8) Depress the clutch pedal, then disconnect the clutch cable from clutch pedal.

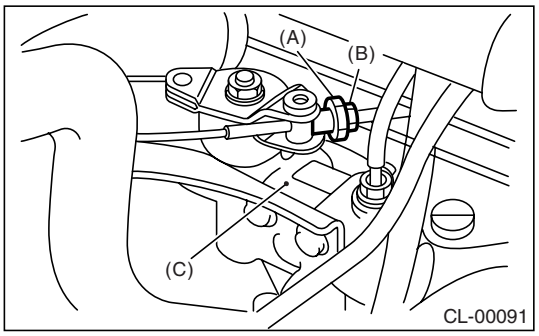
2. RHD MODEL

1) Disconnect the ground cable from battery.
2) Disconnect the connector from clutch. (Model with cruise control)
3) Remove the instrument panel lower cover.
4) Remove the snap pin and clevis pin that join push rod and clutch pedal. (Except 1.6 L model)
5) Remove the master cylinder mounting nuts. (Except 1.6 L model)



(A) Master cylinder

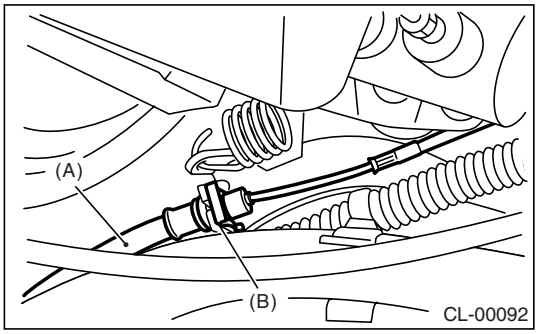
6) Remove the PHV adjusting nut and lock nut. (Model with hill holder)



(A) Adjusting nut
(B) Lock nut
(C) PHV

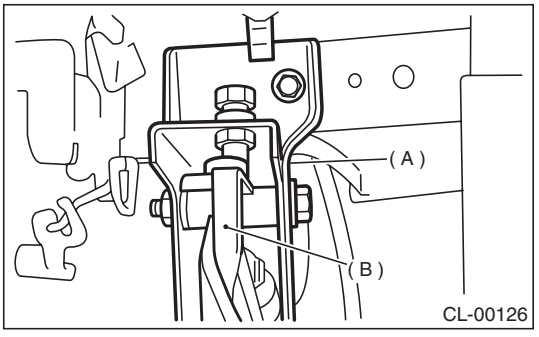
7) Remove the cable clamp and disconnect the PHV cable from PHV. (Model with hill holder)

CAUTION:
Carefully protect the boot and inner cable from damage when disconnecting the PHV cable.



(A) PHV cable
(B) Clamp

8) Disconnect the clutch cable from release lever. (1.6 L model)
9) Remove the clutch pedal and bracket as a unit.



(A) Clutch pedal bracket
(B) Clutch pedal

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10) Depress the clutch pedal, then disconnect the clutch cable from clutch pedal. (1.6 L model)

B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
• If the cable clamp is damaged, replace it with a new one.
• Never fail to cover the outer cable end with boot.
• Be careful not to kink the accelerator cable.
• Always use new clevis pins.

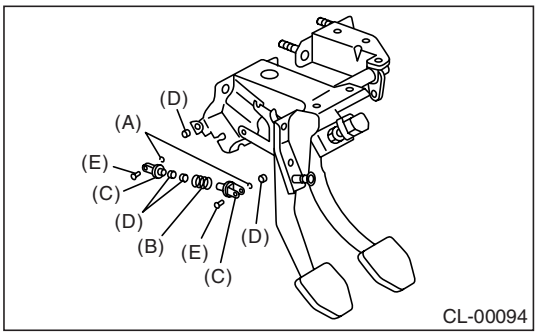
2) Adjust the clutch pedal after installation. <Ref. to CL-45, ADJUSTMENT, Clutch Pedal.>

C: DISASSEMBLY

1. LHD MODEL

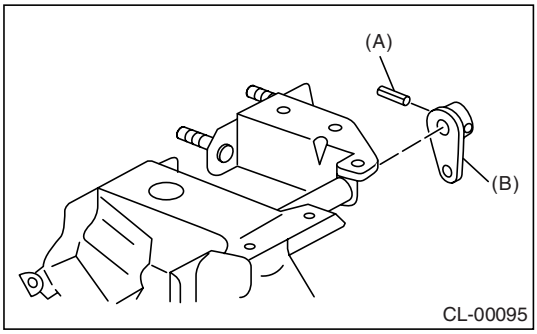
• Except 1.6 L MODEL

1) Remove the clips, assist spring, rod and bushing.



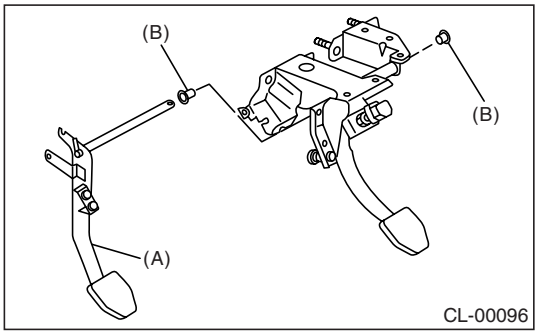
(A) Clip
(B) Assist spring
(C) Assist rod
(D) Bushing
(E) Clevis pin

2) Remove the spring pin and lever.



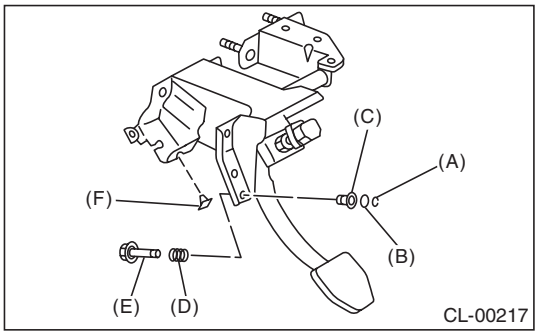
(A) Pin
(B) Lever

3) Remove the clutch pedal and bushings.



(A) Clutch pedal
(B) Bushing

4) Remove the stopper, clip, O-ring, rod S, and then remove the spring and bushing S.



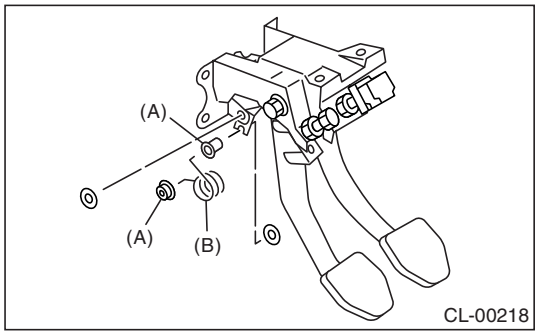
(A) Clip
(B) O-ring
(C) Bushing S
(D) Spring S
(E) Rod S
(F) Stopper

5) Remove the stoppers from clutch pedal.
6) Remove the clutch pedal pad. (Non-turbo model)

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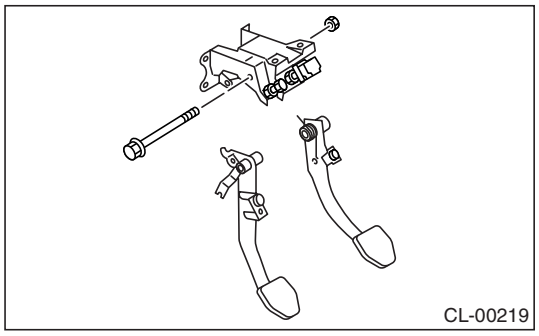
• 1.6 L MODEL

1) Remove the clip, and then remove the spring assist and spring.

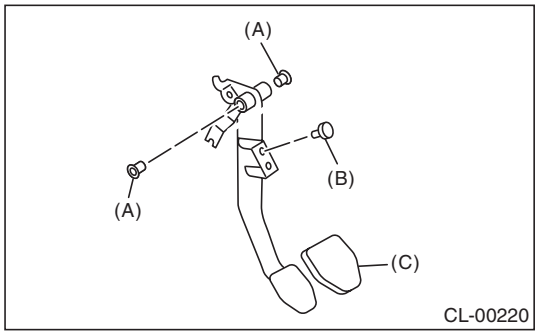


(A) Spring assist
(B) Spring

2) Remove the clutch pedal and brake pedal.



3) Remove the bushing, stopper and clutch pedal pad.



(A) Bushing
(B) Stopper
(C) Clutch pedal pad

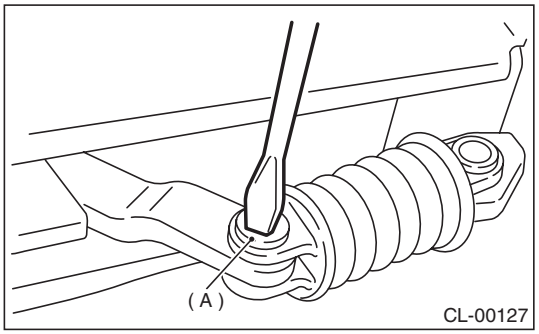
4) Remove the adjuster bolt.

2. RHD MODEL

• Except 1.6 L MODEL

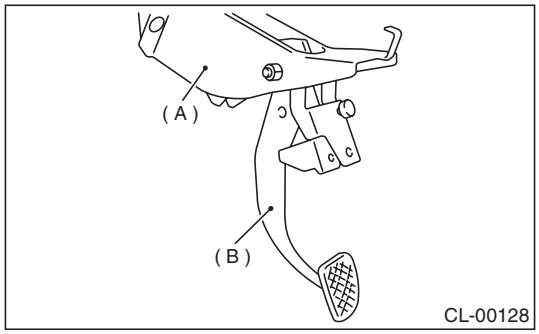
1) Remove the clutch switch. (Model with cruise control)

2) Remove the clip, then pull out the clevis pin.



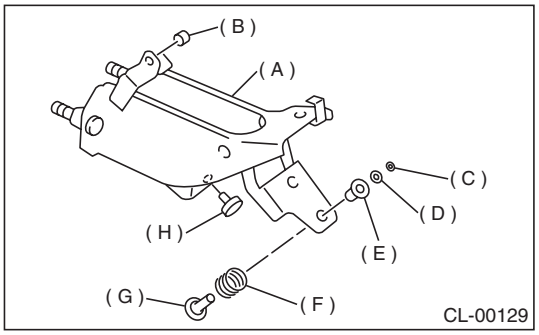
(A) Clevis pin

3) Remove the assist rod, spring and bushing.
4) Remove the clutch pedal from clutch pedal bracket.



(A) Clutch pedal bracket
(B) Clutch pedal

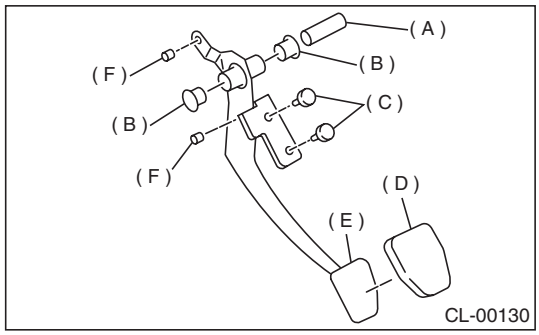
5) Remove the following parts (B to H) from clutch pedal bracket (A) as shown in the figure.



(A) Clutch pedal bracket
(B) Bushing C
(C) Clip
(D) O-ring
(E) Bushing S
(F) Spring S
(G) Rod S
(H) Bushing

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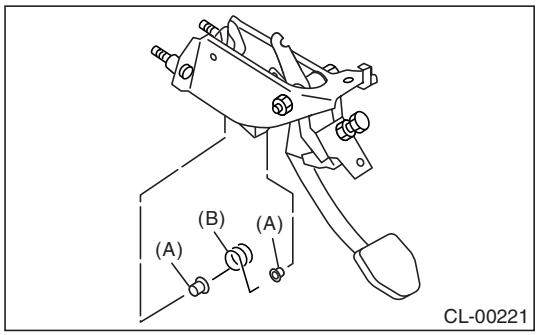
6) Remove the spacer, bushing and pedal pad from clutch pedal.



(A) Spacer
(B) Bushing
(C) Bushing
(D) Pedal pad
(E) Clutch pedal
(F) Bushing C

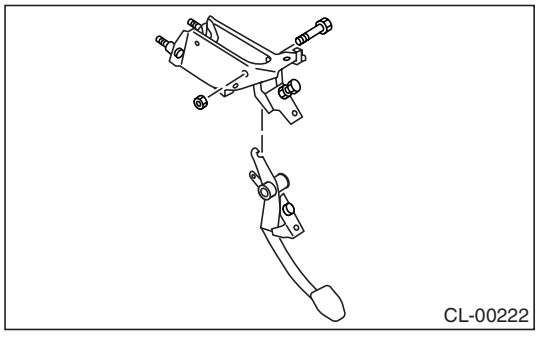
• 1.6 L MODEL

1) Remove the spring and bushing.

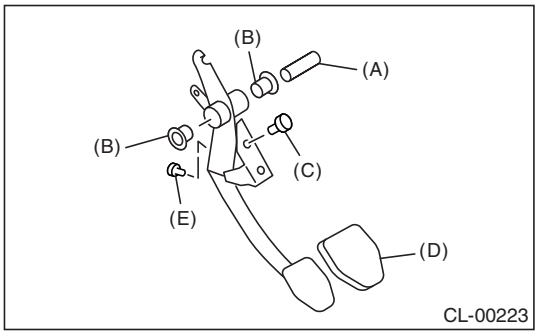


(A) Bushing
(B) Spring

2) Remove the clutch pedal.



3) Remove the spacer, bushing, stopper and clutch pedal pad.



(A) Spacer
(B) Bushing
(C) Stopper
(D) Clutch pedal pad
(E) Stopper

4) Remove the adjust bolt and stopper.

D: ASSEMBLY

1. LHD MODEL

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.
3) Align bores of pedal bracket, clutch pedal and brake pedal, attach the brake pedal return spring, assist rods, spring, and bushing. (Except 1.6 L model)

NOTE:
Clean up inside of bushings and apply grease before installing the spacer.

4) Align the bores of pedal bracket, clutch pedal and brake pedal, then attach the brake pedal, bushings, spring and clutch cable. (1.6 L model)
5) Install the hill holder cable to clutch pedal. (Model with hill holder)

2. RHD MODEL

1) Clean and apply grease to the hole of sliding portion between clutch pedal and bushing.
2) Install the pad, stopper, spacer and bushings to clutch pedal.

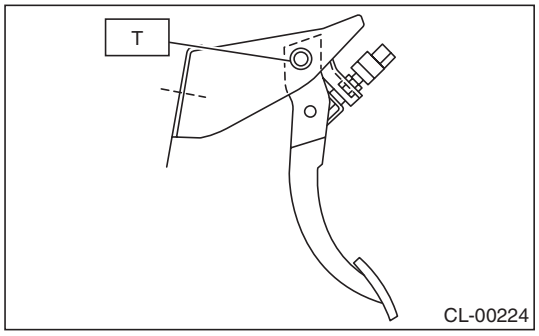
NOTE:
Clean up inside of bushings and apply grease before installing the spacer.

3) Install the rod S, spring S, bushing S, O-ring, clip, bushing, clutch switch and bushing C to clutch pedal bracket. (Except 1.6 L model)
4) Install the pedal assembly, stopper, adjust rod, clutch cable, bushings and spring to clutch pedal bracket.

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5) Install the clutch pedal to pedal bracket.

Tightening torque:
T: 29 N·m (3.0 kgf-m, 21.7 ft-lb)



6) Install the assist rod, bushing and assist spring to clutch pedal and pedal bracket.
7) Install the PHV cable to clutch pedal. (Model with hill holder).

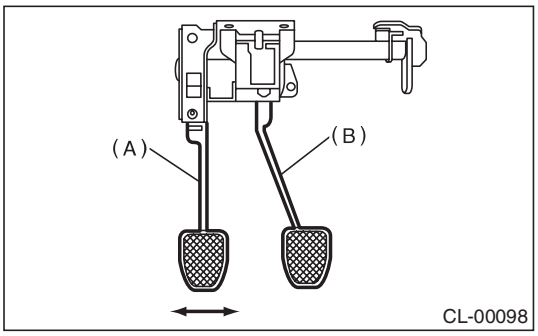
E: INSPECTION

1. CLUTCH PEDAL

Move the clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kgf, 2 lb) to ensure pedal play is in specified range.

CAUTION:
If excessive movement is noted, replace the bushings with new ones.

Play of clutch pedal:
Service limit
5.0 mm (0.197 in) or less



(A) Clutch pedal
(B) Brake pedal

F: ADJUSTMENT

1. CLUTCH PEDAL

• Except 1.6 L MODEL

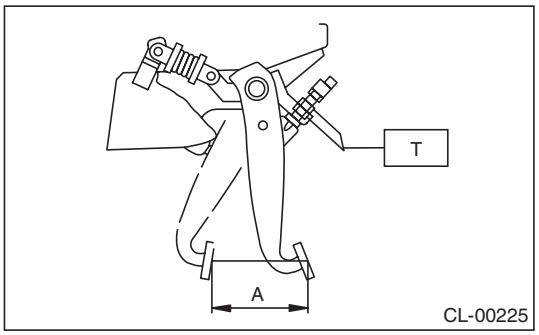
1) Turn the lock nuts until clutch pedal full stroke length is within specifications.

CAUTION:
Do not attempt to turn the clutch switch to adjust clutch pedal full stroke length.

NOTE:
If lock nuts cannot adjust the clutch pedal full stroke length to specifications, turn the master cylinder push rod to adjust it.

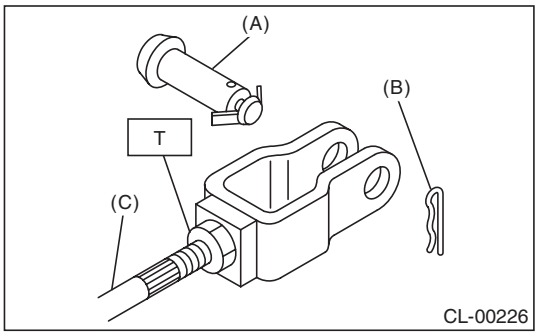
Specified clutch pedal full stroke: A
130 — 135 mm (5.12 — 5.31 in)

Tightening torque (Clutch switch lock nut):
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



2) Turn the master cylinder push rod so that clevis pin moves to the left and then to the right. Clevis pin must move without resistance while it is rattling.

Tightening torque (Push rod lock nut):
T: 10 N·m (1.0 kgf-m, 7 ft-lb)



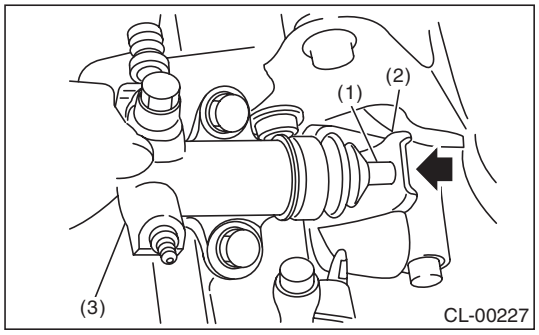
(A) Clevis pin
(B) Snap pin
(C) Push rod

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3) Depress and release the clutch pedal two to three times to ensure that clutch pedal and release fork operates smoothly. If the clutch pedal and release fork do not operate smoothly, bleed air from the clutch hydraulic system. <Ref. to CL-38, Clutch Fluid Air Bleeding.>
4) Measure the clutch pedal full stroke length again to ensure that it is within specifications. If it is not, repeat adjustment procedures again from the beginning.

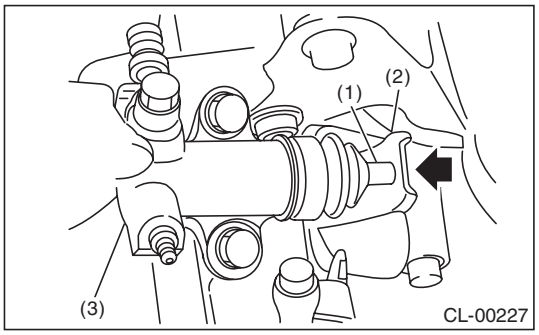
Specified clutch pedal full stroke:
130 — 135 mm (5.12 — 5.31 in)

5) Move the clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.
6) Push the release lever until operating cylinder push rod retracts. Ensure that clutch fluid level in reservoir tank increases. If the clutch fluid level increases, hydraulic the clutch is properly adjusted; if fluid level does not increase or push rod does not retract, replace the master cylinder with a new one.<Ref. to CL-31, Master Cylinder.>



(1) Push rod
(2) Release lever
(3) Operating cylinder

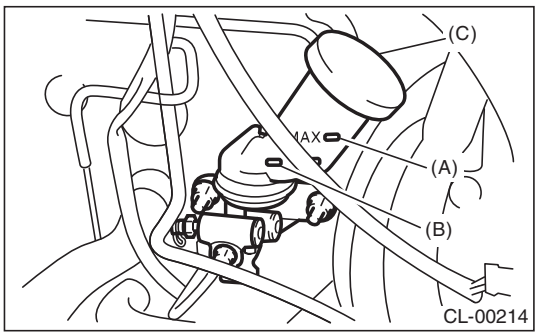
7) Push the release lever until operating cylinder push rod retracts. Check that the clutch fluid level in reservoir tank increases.



(1) Push rod
(2) Release lever
(3) Operating cylinder

8) If the clutch fluid level increases, hydraulic clutch play is correct.
9) If the clutch fluid level does not increase or push rod does not retract, clutch pedal must be readjusted.
10) Check the fluid level on the outside of the reservoir tank. If the level is below “MIN”, add clutch fluid to bring it up to “MAX”.

Recommended clutch fluid:
FMVSS No. 116, fresh DOT 3 or DOT 4 brake fluid



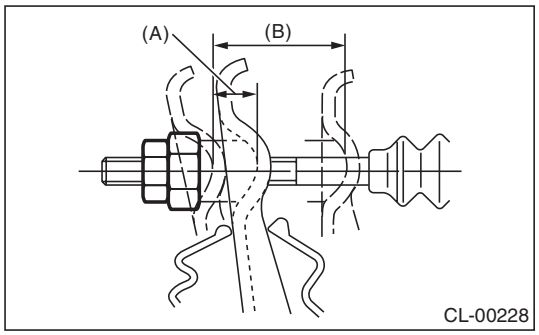
(A) Max. level
(B) Min. level
(C) Reservoir tank

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• 1.6 L MODEL

1) Disconnect the ground cable from battery.
2) Remove the air cleaner case and intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Remove the release lever return spring from lever.
4) Loosen the lock nut.
5) Adjust the spherical nut of the lever end so that the play and full stroke is within the specified value, (center of spherical nut).

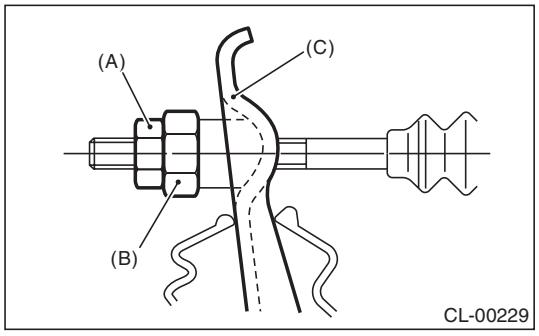
CAUTION:
Take care not to twist the cable during adjustment.
Play: 3 — 4 mm (0.12 — 0.16 in)
Full stroke: 24 — 26 mm (0.94 — 1.02 in)



(A) Play
(B) Full stroke

6) Upon completion of adjustment, securely lock the spherical nut with lock nut.

Tightening torque:
5.9 N·m (0.60 kgf-m, 4.3 ft-lb)



(A) Lock nut
(B) Spherical nut
(C) Clutch release lever

7) Install the return spring on lever.

NOTE:
Hook the long hook side of the return spring with the lever.

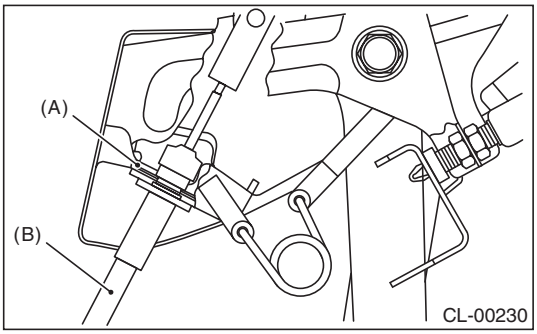
8) Depress the clutch pedal to assure there is no abnormality in the clutch system.
9) Install the air cleaner case and intake duct. <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>

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11.Clutch Cable

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the air cleaner case and intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Disconnect the clutch cable from release lever.
4) Depress the clutch pedal to the floor.
5) Remove the clutch cable clamp from pedal bracket.



(A) Clamp
(B) Clutch cable

6) Remove the clutch cable from body.

B: INSTALLATION

1) Clean the clutch pedal fitting hole, and apply grease. Connect the clutch cable to body.
2) Fit the clutch pedal to pedal bolt, and connect the clutch cable to bracket with clamp.
3) Connect the clutch cable end to pedal end.
4) Connect the clutch cable to release lever.
5) Install the grommet to toe board.
6) Adjust the cable after installation. <Ref. to CL-45, ADJUSTMENT, Clutch Pedal.>
7) Install the air cleaner case and intake duct. <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>

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.

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12.Clutch Switch

A: REMOVAL

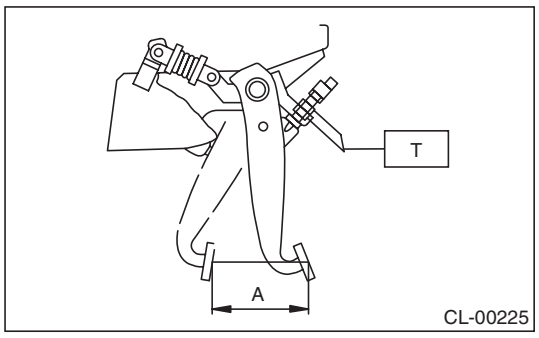
1) Disconnect the ground cable from battery.
2) Disconnect the connector from clutch switch.
3) Remove the clutch switch.

B: INSTALLATION

1) Move the clevis pin of the push rod right and left and hold where it moves smoothly, then measure stroke of clutch pedal.

Specified clutch pedal full stroke: A
130 — 135 mm (5.12 — 5.31 in)

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

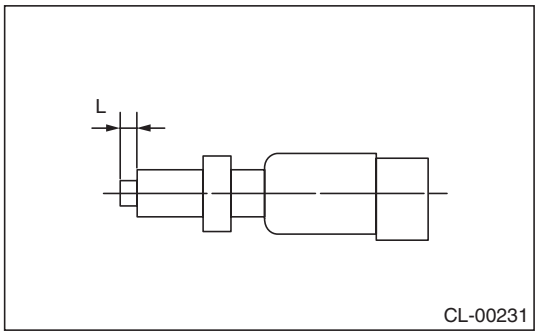


2) If the clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-45, ADJUSTMENT, Clutch Pedal.>
3) Connect clutch switch connector.

C: INSPECTION

1) If the clutch switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position: L
$2^{+1.5}_{0}$ mm ($0.079^{+0.059}_{0}$ in)

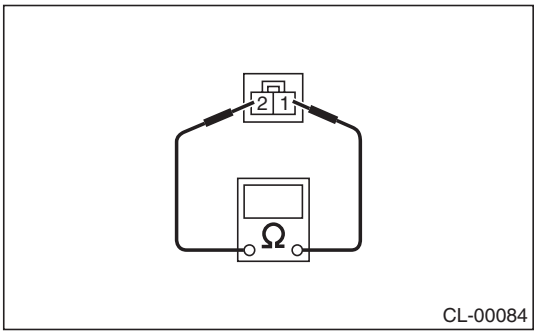


2) Check the clutch switch continuity. If continuity is not as specified, replace the switch.
(1) Disconnect the clutch switch connector.
(2) Measure the resistance between 1 and 2 of switch terminal.

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 MΩ

Clutch switch



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13.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 • Engine speed up when shifting. • High speed driving is impossible; especially rapid acceleration impossible and vehicle speed does not increase in proportion to an increase in engine speed. • Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing. • Method of testing: Put the vehicle in stationary condition with parking brake fully applied. Disengage the clutch and shift the transmission gear into the first. Gradually allow the clutch to engage while gradually increasing the engine speed. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not start off and the engine does not stall.	(a) Clutch facing smeared by oil	Replace.
	(b) Worn clutch facing	Replace.
	(c) Deteriorated diaphragm spring	Replace.
	(d) Distorted pressure plate or flywheel	Correct or replace.
	(e) Defective release bearing holder	Correct or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise develops and control becomes quite difficult when shifting gears. The symptom becomes more apparent when shifting into the first gear. However, because much trouble of this sort is due to defective synchronization mechanism, carry out the test as described after. • Method of testing: <Ref. to CL-50, CLUTCH, 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	Correct or replace.
	(c) Seized crankshaft pilot needle bearing	Replace.
	(d) Cracked clutch disc facing	Replace.
	(e) Stuck 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 wear	Replace the defective clutch disc.
	(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	Apply grease.
	(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.

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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	Check	Yes	No
1	**CHECK GEAR NOISE.** 1)Start the engine. 2)Disengage the clutch and shift quickly from neutral to reverse in idling condition.	Is there any abnormal noise from the 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?	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?	Defect in clutch disengaging. Inspect the clutch disc, clutch cover, clutch release, and clutch pedal free play.	Clutch and flywheel seizure. Inspect the clutch disc, spline of clutch disc hub.

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