

TRANSMISSION SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.

This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.

Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

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

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

AUTOMATIC TRANSMISSION

4AT

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Transmission Mounting System

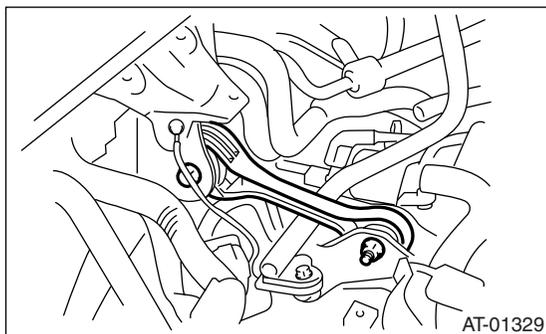
AUTOMATIC TRANSMISSION

10. Transmission Mounting System

A: REMOVAL

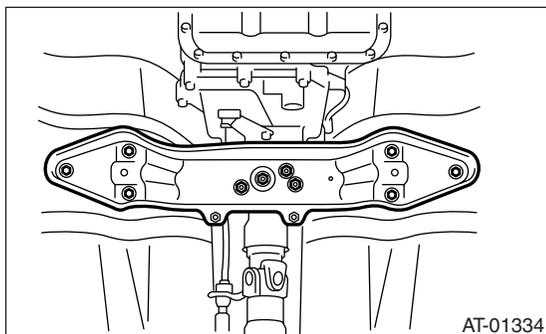
1. PITCHING STOPPER

- 1) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
- 2) Remove the pitching stopper.



2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

- 1) Disconnect the ground cable from battery.
- 2) Jack-up the vehicle and support it with study racks.
- 3) Remove the front, center, rear, exhaust pipes and muffler.
<Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>
- 4) Remove the heat shield cover.
- 5) Set the transmission jack under the transmission. Make sure that the support plate of transmission jack does not touch the oil pan.
- 6) Remove the transmission rear crossmember.



- 7) Remove the rear cushion rubber.

B: INSTALLATION

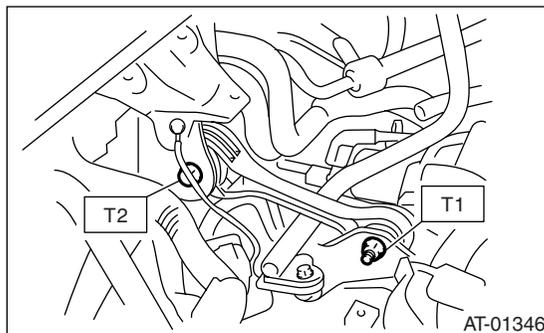
1. PITCHING STOPPER

- 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 chamber.
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

- 1) Install the rear cushion rubber.

Tightening torque:

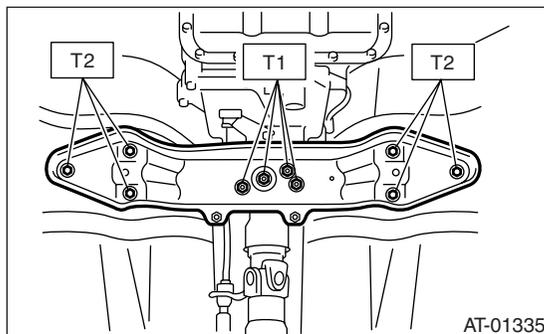
40 N·m (4.1 kgf-m, 29.5 ft-lb)

- 2) Install the crossmember.

Tightening torque:

T1: 35 N·m (3.6 kgf-m, 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.
- 5) Install the front, center and rear exhaust pipes and muffler.
<Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>

C: INSPECTION

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

1. PITCHING STOPPER

Make sure that the pitching stopper is not bent or damaged. Ensure there are no cracks, hardening, or damage on rubbers.

2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

Make sure that the crossmember is not bent or damaged. Ensure there are no cracks, hardening, or damage on cushion rubbers.

Extension Case Oil Seal

AUTOMATIC TRANSMISSION

11.Extension Case Oil Seal

A: INSPECTION

Make sure that the ATF does not leak from the joint of transmission and propeller shaft. If so, replace the oil seal. <Ref. to 4AT-50, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT

- 1) Lift-up the vehicle.
- 2) Clean the transmission exterior.
- 3) Remove the ATF drain plug to drain ATF.

CAUTION:

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

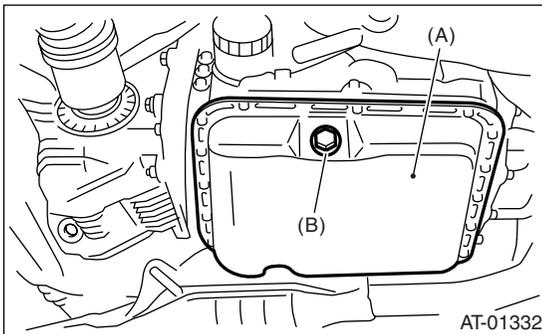
- 4) Tighten the ATF drain plug.

NOTE:

Use a new gasket.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



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

- 5) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
- 6) Remove the heat shield cover.
- 7) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
- 8) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY
- 9) Using the ST, install the oil seal.
ST 498057300 INSTALLER
- 10) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
- 11) Install the heat shield cover.
- 12) Install the rear exhaust pipe and muffler. <Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>

- 13) Pour ATF into the oil charge pipe.

Recommended fluid:

SUBARU ATF (Part No. K0410Y0700) or Idemitsu "Apolloil ATF HP", Castrol "Transmax J".

NOTE:

If the ATF's above are not available, use Dexron III.

Capacity:

Fill the same amount of ATF drained.

- 14) Bleed the air of control valve. <Ref. to 4AT-63, Air Bleeding of Control Valve.>
- 15) Check the level and leaks of ATF. <Ref. to 4AT-31, Automatic Transmission Fluid.>

12. Differential Side Retainer Oil Seal

A: INSPECTION

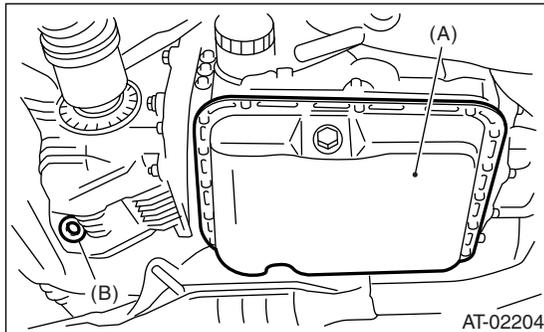
Check the leakage of gear oil from differential side retainer oil seal part. If there is oil leakage, replace the oil seal.

B: REPLACEMENT

- 1) Lift-up the vehicle.
- 2) Remove the front and center exhaust pipe. <Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.>
- 3) Remove the differential gear oil drain plug using TORX® BIT T70, and drain the differential gear oil.

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.



- (A) Oil pan
(B) Differential gear oil drain plug

- 4) Tighten the differential gear oil drain plug.

NOTE:

Use a new gasket.

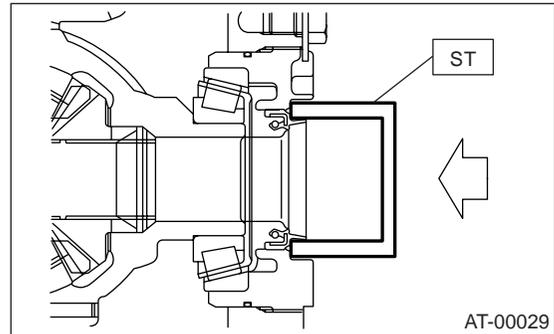
Tightening torque:

70 N·m (7.1 kgf·m, 51.6 ft·lb)

- 5) Separate the front drive shaft from transmission. <Ref. to DS-22, REMOVAL, Front Drive Shaft.>
- 6) Remove the differential side retainer oil seal using a driver wrapped with vinyl tape or etc.

- 7) Using the ST, install the differential side retainer by slightly tapping with hammer.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



- 8) Apply gear oil to the oil seal lips.
- 9) Install the front drive shaft. <Ref. to DS-22, INSTALLATION, Front Drive Shaft.>
- 10) Install the front and center exhaust pipe. <Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>
- 11) Lower the vehicle.
- 12) Pour the gear oil into the gauge hole.

Recommended gear oil:

<Ref. to 4AT-3, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>

Differential gear oil capacity:

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

- 13) Check the level of differential gear oil. <Ref. to 4AT-33, INSPECTION, Differential Gear Oil.>

Inhibitor Switch

AUTOMATIC TRANSMISSION

13. Inhibitor Switch

A: INSPECTION

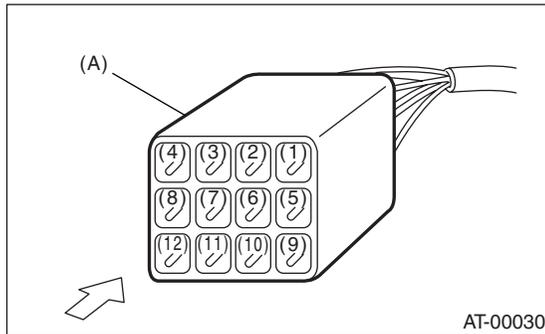
When the driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

- 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" and "D" ranges.
- If the inhibitor switch is inoperative, check for poor contact of connector on transmission side.

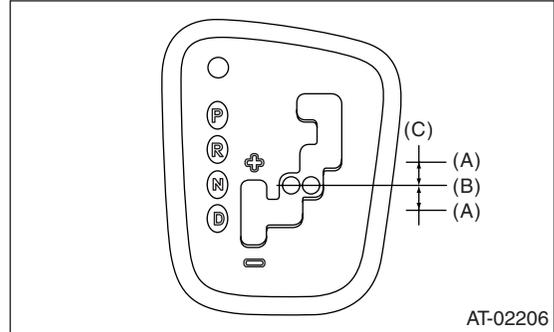
Signal sent to TCM	Range	Pin No.
	P	4 — 3
R	4 — 2	
N	4 — 1	
D	4 — 8	
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



(A) Inhibitor switch connector

- 3) Check 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 or in other points, adjust the inhibitor switch. <Ref. to 4AT-52, ADJUSTMENT, Inhibitor Switch.>

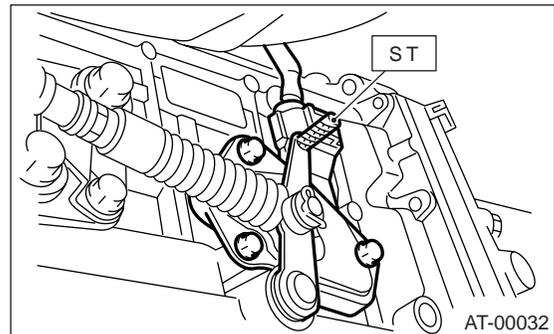


- (A) Continuity does not exist.
- (B) Continuity exists.
- (C) 1.5°

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

B: ADJUSTMENT

- 1) Set 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 the inhibitor switch lever and switch body.
ST 499267300 STOPPER PIN



- 4) Tighten the three inhibitor switch securing bolts.

Tightening torque:

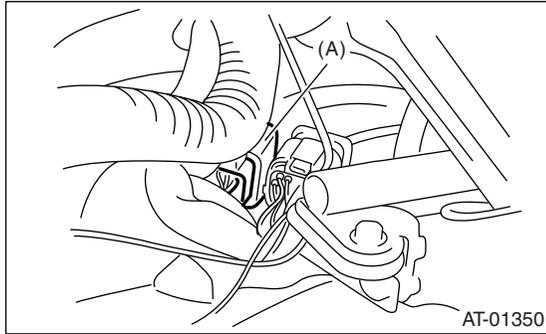
3.4 N·m (0.35 kgf·m, 2.5 ft·lb)

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

C: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Set the select lever to "N" range.
- 3) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>

4) Disconnect the inhibitor switch connector.



(A) Inhibitor switch connector

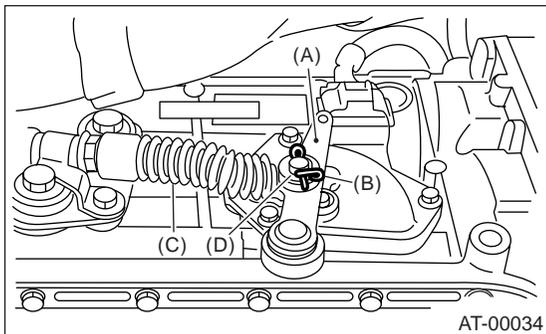
5) Remove the inhibitor switch connector from stay.

6) Lift-up the vehicle.

7) Remove the front and center exhaust pipe.

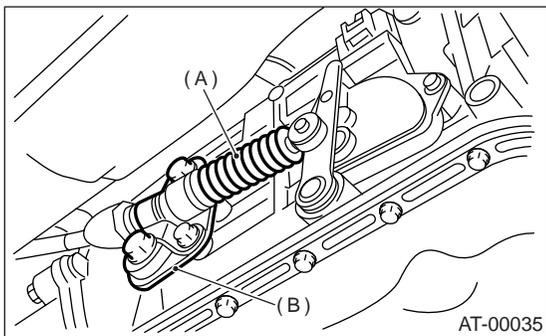
<Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.>

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



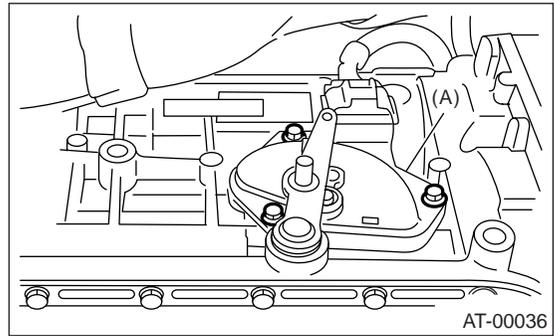
- (A) Range select lever
- (B) Snap pin
- (C) Select cable
- (D) Washer

9) Remove the plate assembly from transmission case.



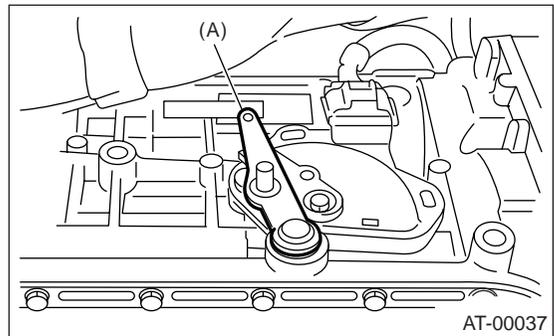
- (A) Select cable
- (B) Plate ASSY

10) Remove the three bolts which secure inhibitor switch.



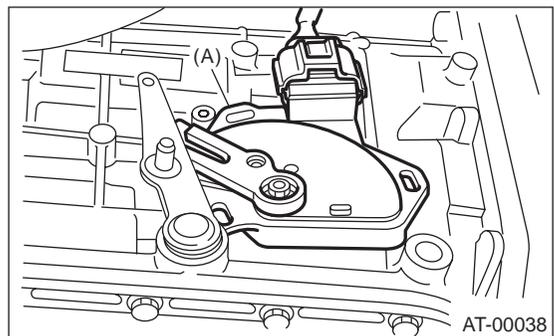
(A) Inhibitor switch

11) Shift the range select lever to parking position (left side).



(A) Range select lever

12) Remove the inhibitor switch from transmission.



(A) Inhibitor switch

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

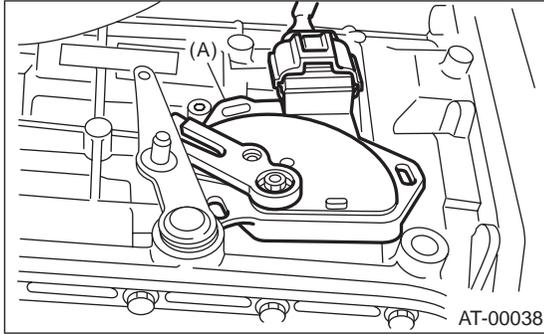
D: INSTALLATION

1) Connect the inhibitor switch harness connector to inhibitor switch.

Inhibitor Switch

AUTOMATIC TRANSMISSION

2) Install the inhibitor switch to transmission case.



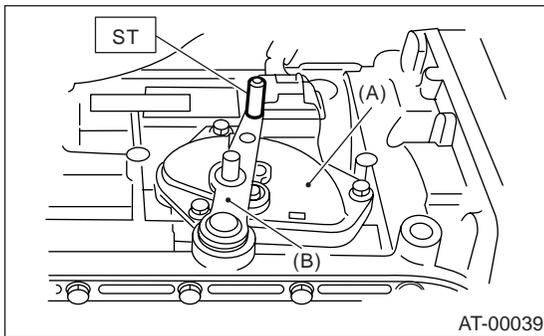
(A) Inhibitor switch

3) Move the range select lever to neutral position.
4) Tighten the three inhibitor switch securing bolts using ST.

ST 499267300 STOPPER PIN

Tightening torque:

3.5 N·m (0.36 kgf-m, 2.6 ft-lb)

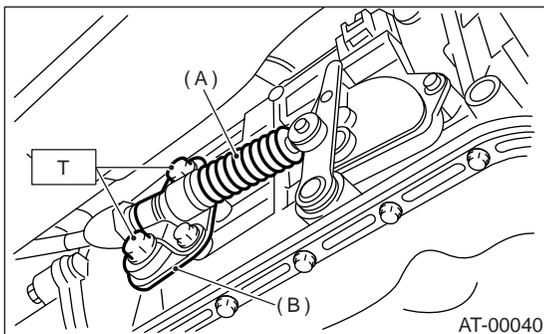


(A) Inhibitor switch
(B) Range select lever

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

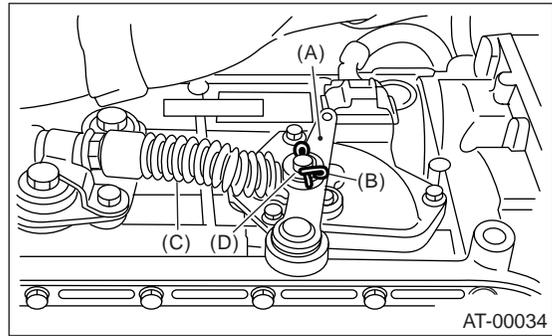
Tightening torque:

T: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Select cable
(B) Plate ASSY

7) Install the snap pin washers to range select lever.



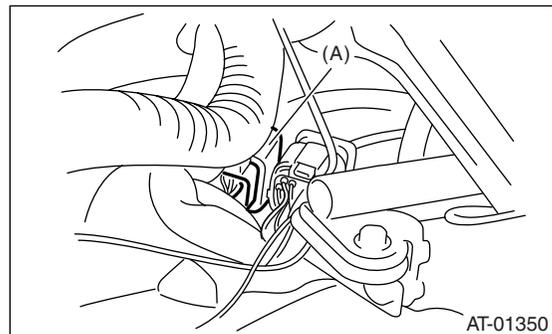
(A) Range select lever
(B) Snap ring
(C) Select cable
(D) Washer

8) Install the front and center exhaust pipe.
<Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>

9) Lower the vehicle.

10) Install the inhibitor switch connector to the stay.

11) Connect the inhibitor switch connector.



(A) Inhibitor switch connector

12) Install the air intake chamber.

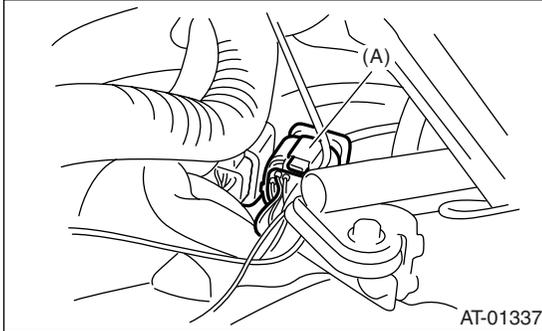
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

13) Inspect the inhibitor switch. <Ref. to 4AT-52, INSPECTION, Inhibitor Switch.>

14. Front Vehicle Speed Sensor

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
- 4) Disconnect the transmission connector.



(A) Transmission connector

- 5) Remove the pitching stopper. <Ref. to 4AT-48, REMOVAL, Transmission Mounting System.>
- 6) Remove the transmission connector from the stay.
- 7) Lift-up the vehicle.
- 8) Clean the transmission exterior.
- 9) Remove the ATF drain plug to drain ATF.

CAUTION:

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

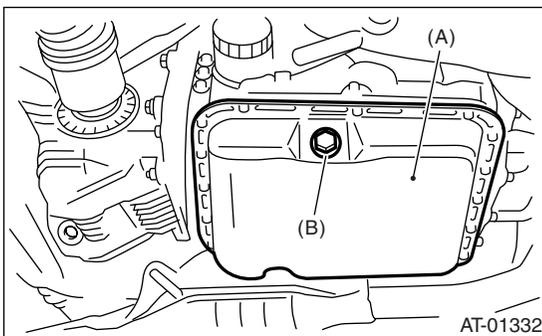
- 10) Tighten the ATF drain plug.

NOTE:

Use a new gasket.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



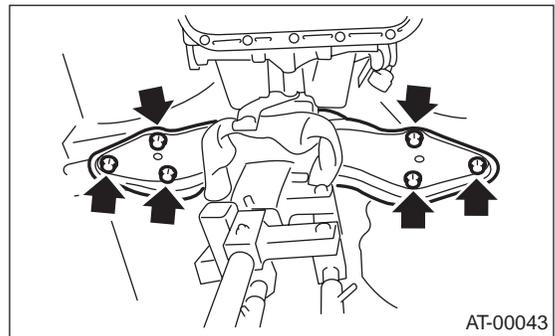
(A) Oil pan
(B) ATF drain plug

- 11) Remove the front and center exhaust pipe. <Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
- 12) Remove the shield cover.
- 13) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
- 14) Place the transmission jack under transmission.

NOTE:

Make sure that the support plates of transmission jack does not touch the oil pan.

- 15) Remove the transmission rear crossmember bolt.



- 16) Lower the transmission jack.

NOTE:

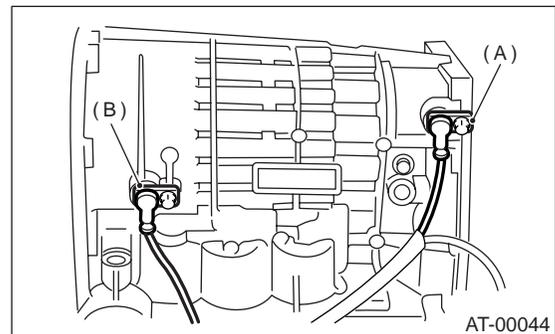
Do not separate the transmission jack and transmission.

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

NOTE:

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

- 18) Remove the front vehicle speed sensor and torque converter turbine speed sensor.



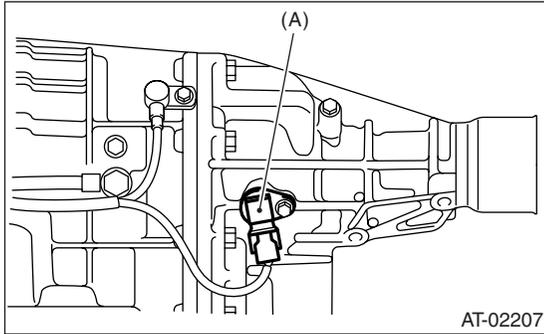
(A) Front vehicle speed sensor
(B) Torque converter turbine speed sensor

Front Vehicle Speed Sensor

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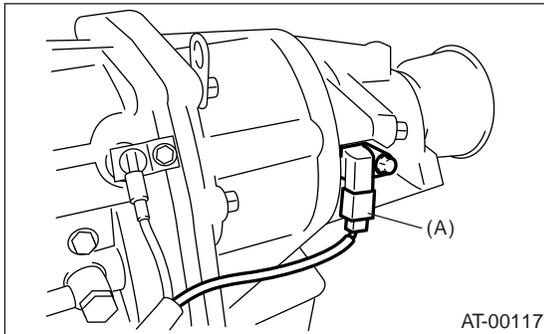
19) Disconnect the connector from rear vehicle speed sensor.

- MPT model



(A) Rear vehicle speed sensor

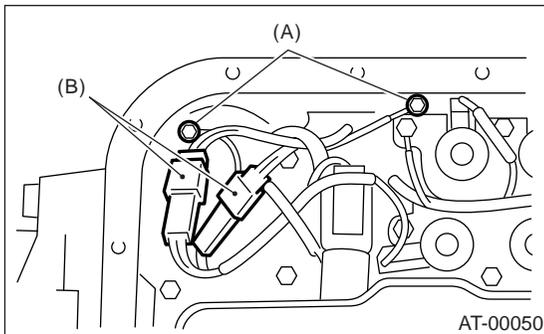
- VTD model



(A) Rear vehicle speed sensor

20) Remove the oil pan.

21) Disconnect the harness connector and transmission ground terminal.



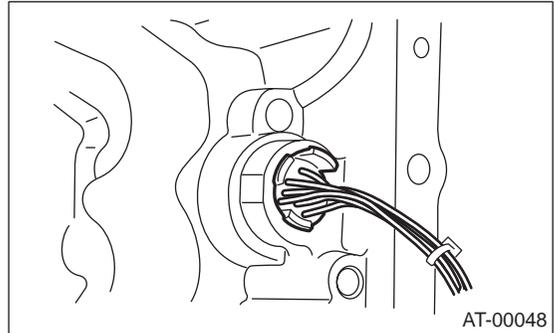
(A) Transmission ground

(B) Harness connector

22) Remove the harness assembly.

B: INSTALLATION

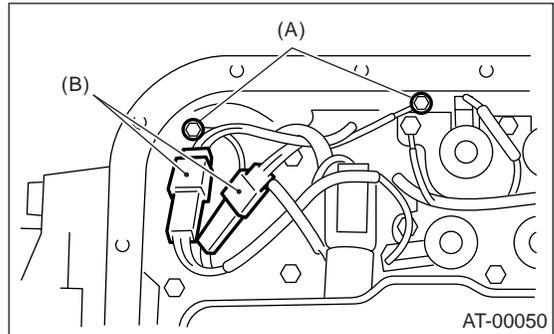
1) Pass the harness assembly through the hole in transmission case.



2) Connect the harness connector and transmission ground.

Tightening torque:

8 N·m (0.8 kgf·m, 5.8 ft·lb)



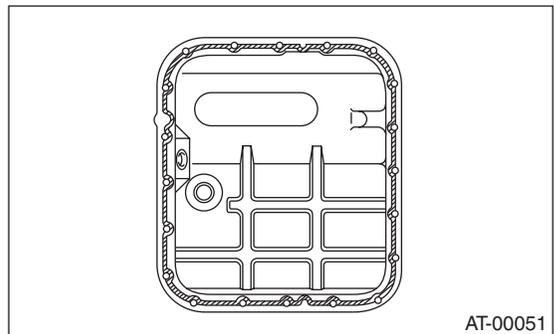
(A) Transmission ground

(B) Harness connector

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

Liquid gasket:

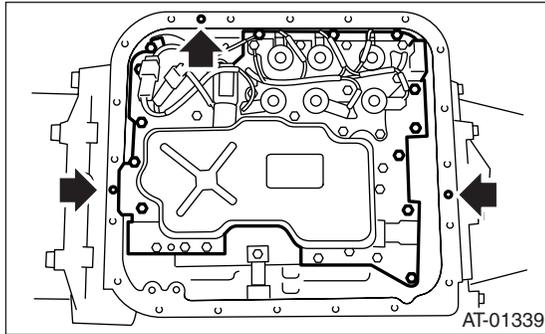
THREE BOND 1217B (Part No. K0877YA020)



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

Liquid gasket:

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 vehicle speed sensor and torque converter turbine speed sensor.

Tightening torque:

7 N·m (0.7 kgf·m, 5.1 ft·lb)

7) Connect the connector to rear vehicle speed sensor.

8) Install the oil cooler pipe.

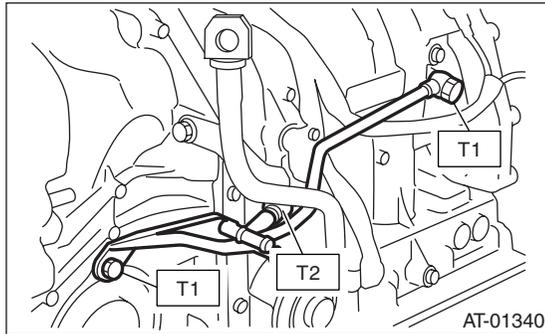
NOTE:

Use a copper washer.

Tightening torque:

T1: 25 N·m (2.5 kgf·m, 18.1 ft·lb)

T2: 44 N·m (4.5 kgf·m, 32.5 ft·lb)



9) Install the transmission rear crossmember bolt.

Tightening torque:

70 N·m (7.1 kgf·m, 51 ft·lb)

10) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>

11) Install the shield cover.

12) Install the front, center and rear exhaust pipes and muffler. <Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>

13) Lower the vehicle.

14) Install the transmission connector to the stay.

15) Install the pitching stopper. <Ref. to 4AT-48, INSTALLATION, Transmission Mounting System.>

16) Install the air intake chamber.

<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

17) Fill the same amount of ATF drained.

18) Bleed the air of control valve.

<Ref. to 4AT-63, Air Bleeding of Control Valve.>

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

20) Execute the learning control promotion. <Ref. to 4AT(diag)-19, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

Rear Vehicle Speed Sensor

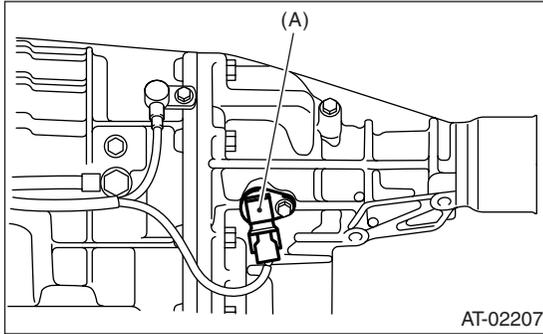
AUTOMATIC TRANSMISSION

15.Rear Vehicle Speed Sensor

A: REMOVAL

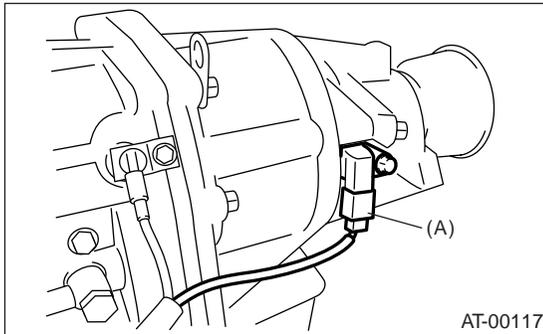
- 1) Set the vehicle on a lift, and then lift-up the vehicle.
- 2) Disconnect the connector from rear vehicle speed sensor.

- MPT model



(A) Rear vehicle speed sensor

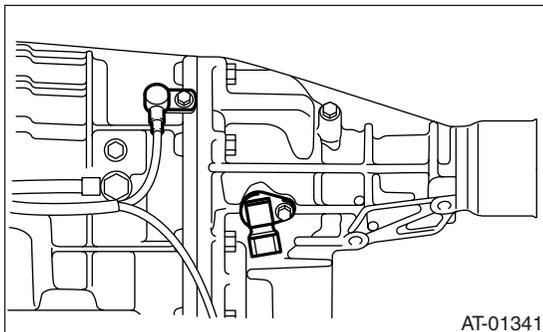
- VTD model



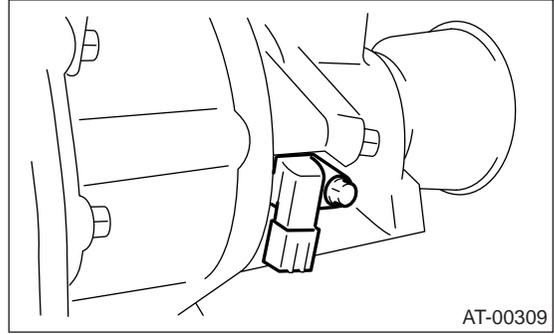
(A) Rear vehicle speed sensor

- 3) Remove the rear vehicle speed sensor.

- MPT model



- VTD model



B: INSTALLATION

Install in the reverse order of removal.

NOTE:

Replace O-ring with a new one.

Tightening torque:

7 N·m (0.7 kgf·m, 5.1 ft·lb)

16. Torque Converter Turbine Speed Sensor

A: REMOVAL

For removal procedure of torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor". <Ref. to 4AT-55, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

For installation procedure of torque converter turbine speed sensor, refer to "Front Vehicle Speed Sensor". <Ref. to 4AT-56, INSTALLATION, Front Vehicle Speed Sensor.>

Control Valve Body

AUTOMATIC TRANSMISSION

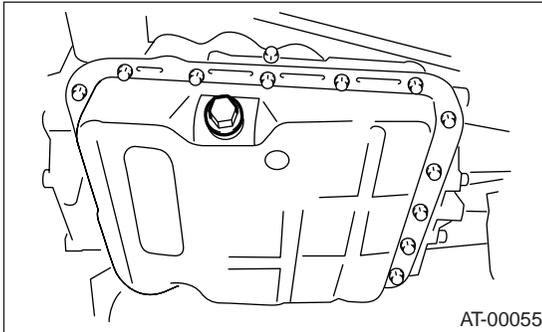
17. Control Valve Body

A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Lift-up the vehicle.
- 4) Clean the transmission exterior.
- 5) Remove the ATF drain plug to drain ATF.

CAUTION:

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



- 6) Tighten the ATF drain plug.

NOTE:

Use a new gasket.

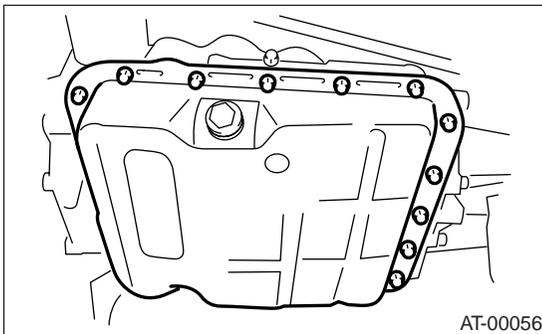
Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)

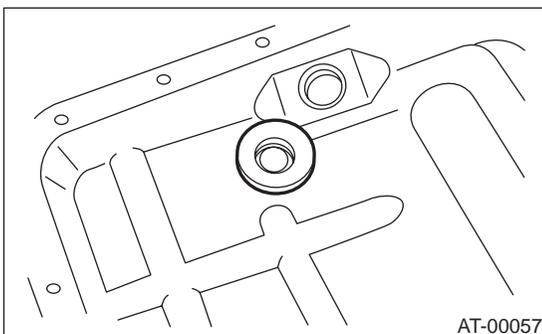
- 7) Remove the oil pan.

CAUTION:

Be sure to prevent the entering of dust and other foreign matters into oil pan.



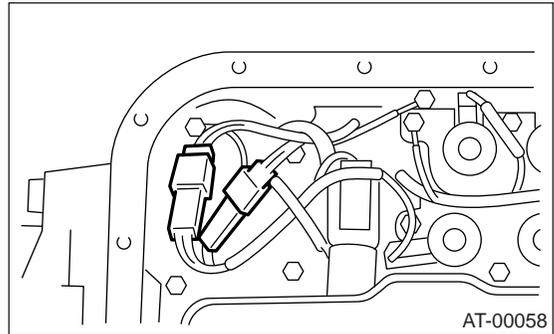
- 8) Remove the magnet.



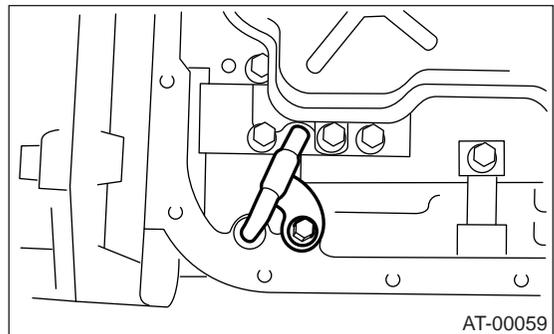
- 9) Clean the magnet.

- 10) Completely remove the remaining liquid gasket on transmission case and oil pan.

- 11) Disconnect the control valve connector.



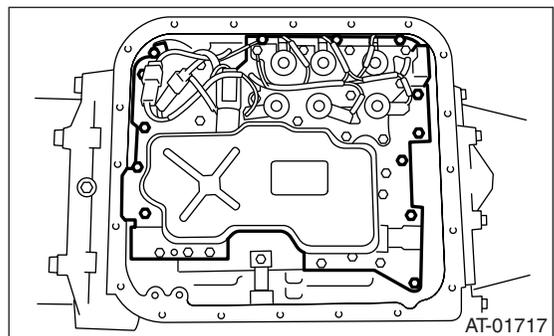
- 12) Remove the oil cooler pipe.



- 13) Remove the control valve body.

NOTE:

Replace the control valve body as assembly, because it is non-disassemble part.



B: INSTALLATION

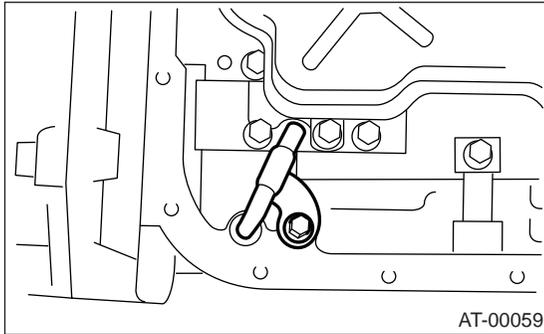
- 1) Check that the dust and other foreign matters are not on control valve body.
- 2) Temporarily install the control valve body to transmission.
- 3) Install the oil cooler pipe.

Control Valve Body

AUTOMATIC TRANSMISSION

Tightening torque:

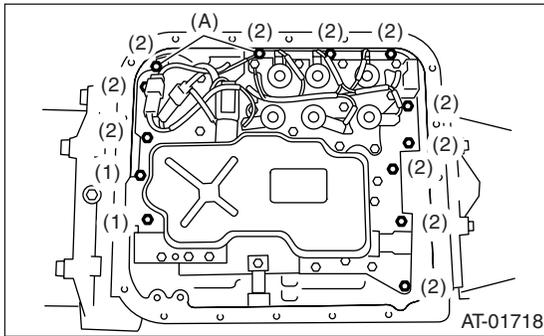
8 N·m (0.8 kgf·m, 5.8 ft·lb)



4) Tighten the bolts equally.

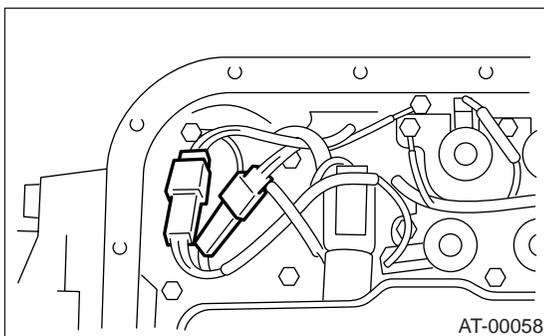
Tightening torque:

8 N·m (0.8 kgf·m, 5.8 ft·lb)

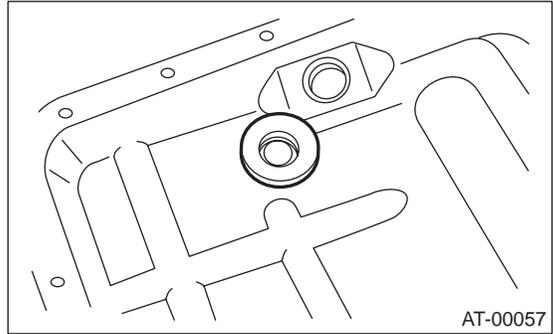


- (A) Transmission ground
Bolt length mm (in)
- (1) 35 (1.38)
 - (2) 30 (1.18)

5) Connect the control valve connector.



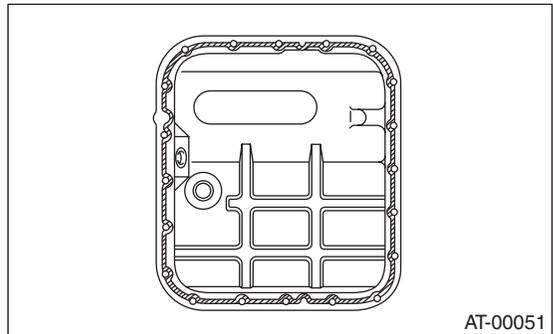
6) Attach the magnet at the specified position of oil pan.



7) Apply liquid gasket to the oil pan.

Liquid gasket:

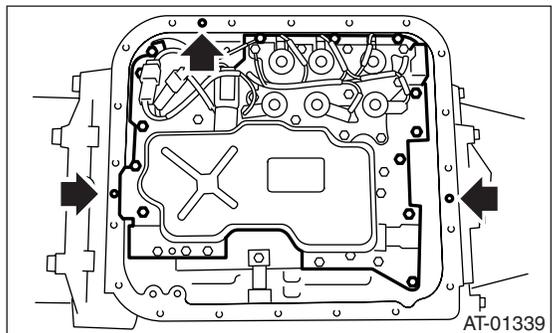
THREE BOND 1217B (Part No. K0877YA020)



8) Fill liquid gasket to the holes except for bolt holes (three) of transmission case.

Liquid gasket:

THREE BOND 1217B (Part No. K0877YA020)



9) Install the oil pan with equally tighten the bolts.

Tightening torque:

5 N·m (0.5 kgf·m, 3.6 ft·lb)

10) Fill ATF from oil charge pipe.

Recommended fluid:

SUBARU ATF (Part No. K0410Y0700) or Idemitsu "Apolloil ATF HP", Castrol "Transmax J".

NOTE:

If the ATFs above are not available, use Dexron III.

Control Valve Body

AUTOMATIC TRANSMISSION

Capacity:

Fill the same amount of ATF drained.

11) Bleed the air of control valve. <Ref. to 4AT-63, Air Bleeding of Control Valve.>

12) Check the ATF level.

<Ref. to 4AT-31, Automatic Transmission Fluid.>

13) Execute the learning control promotion. <Ref. to 4AT(diag)-19, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

C: INSPECTION

Check that the holes, damages or other foreign matters are not on each parts.

18. Air Bleeding of Control Valve

A: PROCEDURE

- 1) Lift-up the vehicle with setting the select lever to "P" range and applying the parking brake.
- 2) Connect the Subaru Select Monitor to the vehicle.
- 3) Using Subaru Select Monitor, check that the DTC is not output.
- 4) Using Subaru Select Monitor, check that the ATF temperature is less than 60°C (140°F). <Ref. to 4AT(diag)-17, OPERATION, Subaru Select Monitor.>
- 5) Turn the Subaru Select Monitor switch to OFF.
- 6) Release the manual mode, and then turn the ignition switch to OFF.
- 7) Set the select lever to "R" range.
- 8) Depress the brake pedal fully until the air bleeding is completed.
- 9) Turn the ignition switch to ON.
- 10) Set the select lever to "P" range, and then wait for more than 3 seconds.
- 11) Set the select lever to "R" range, and then wait for more than 3 seconds.
- 12) Set the select lever to "N" range, and then wait for more than 3 seconds.
- 13) Set the select lever to "D" range, and then wait for more than 3 seconds.
- 14) Set the select lever to "N" range, and then wait for more than 3 seconds.
- 15) Slowly depress the accelerator pedal fully.
- 16) Slowly release the accelerator pedal fully.
- 17) Start the engine.
- 18) Set the select lever to "D" range.
- 19) Turn the Subaru Select Monitor switch to ON.
- 20) Select {Each System Check} in «Main Menu» of Subaru Select Monitor.
- 21) On the «System Selection Menu» display screen, select "Transmission". Air bleeding of control valve starts on transmission. At this time, the SPORT indicator light in combination meter blinks at 2 Hz. When the SPORT indicator light does not blink, repeat the procedures from step 4).
- 22) Air bleeding of control valve is finished when blinking of SPORT indicator light in combination meter goes off from 2 Hz.

NOTE:

When blinking of SPORT indicator light changes from 2 Hz to 4 Hz during air bleeding, repeat the procedure from step 4).

- 23) Set the select lever to "N" range, and then turn the ignition switch to OFF.
- 24) Set the select lever to "P" range, and then finish the air bleeding.

19.ATF Filter

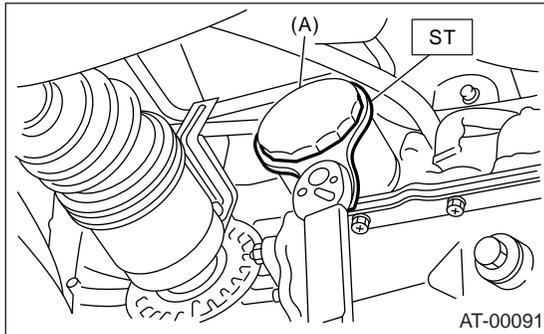
A: REMOVAL

NOTE:

The ATF filter is maintenance free.

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

ST 498545400 OIL FILTER WRENCH



(A) ATF filter

B: INSTALLATION

- 1) Apply a thin coat of ATF to the oil seal part of new ATF filter.
- 2) Install the ATF filter. Turn it by hand, being careful not to damage oil seal.
- 3) Tighten the ATF filter using ST.

Calculate the ATF filter tightening torque using following formula.

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

T1: 14 N·m (1.4 kgf·m, 10.1 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST length 78 mm (3.07 in)

L2: Torque wrench length

Example:

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

NOTE:

Install the ST straightly to converter case.

ST 498545400 OIL FILTER WRENCH

- 4) Fill the ATF.
- 5) Inspect the level of ATF. <Ref. to 4AT-31, Automatic Transmission Fluid.>

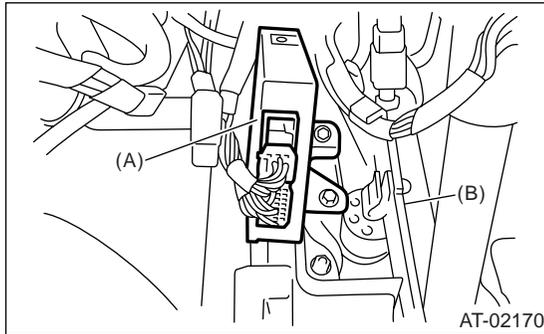
C: INSPECTION

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

20. Transmission Control Module (TCM)

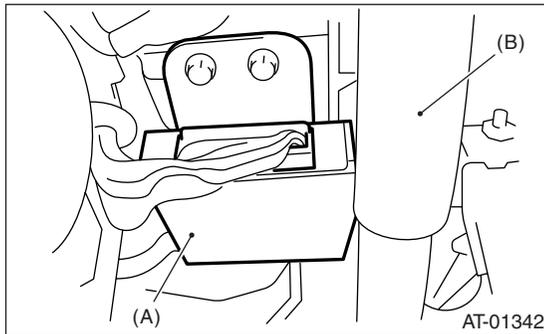
A: REMOVAL

- 1) Disconnect the ground cable from battery.
 - 2) Remove the lower cover and the connector.
 - 3) Replace the body integrated unit. <Ref. to SL-46, REMOVAL, Body Integrated Unit.>
 - 4) Disconnect the connector from TCM.
- LHD model



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

- RHD model



- (A) Transmission control module (TCM)
- (B) Steering column

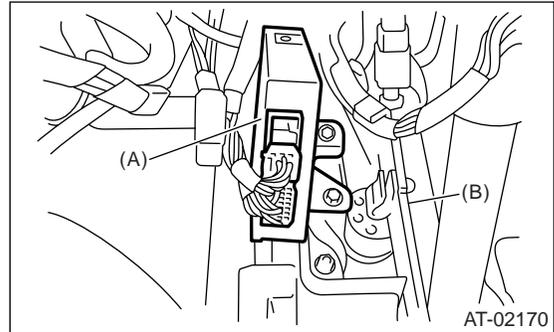
- 5) Remove the TCM.

B: INSTALLATION

- 1) Install the TCM.
- LHD model

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

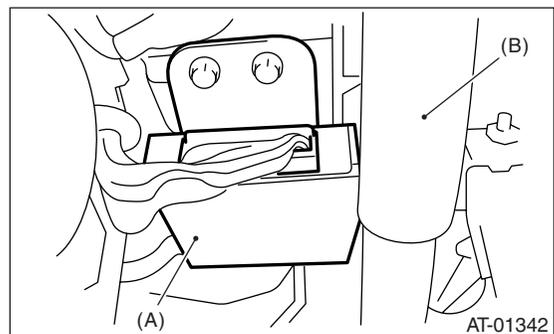


- (A) Transmission control module (TCM)
- (B) Brake pedal

- RHD model

Tightening torque:

7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



- (A) Transmission control module (TCM)
- (B) Steering column

- 2) Connect the connector to TCM.
- 3) Install in the reverse order of removal.
- 4) Execute the learning control promotion. <Ref. to 4AT(diag)-19, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

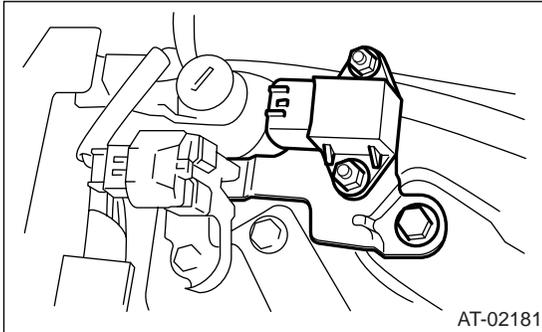
Lateral G Sensor

AUTOMATIC TRANSMISSION

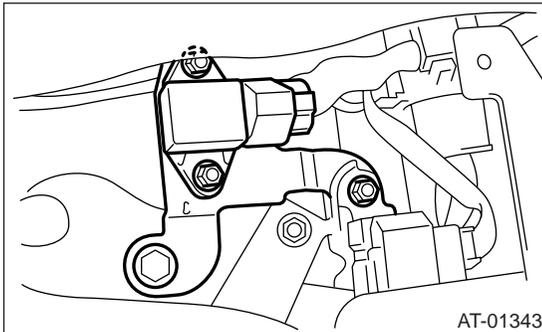
21. Lateral G Sensor

A: REMOVAL

- 1) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
 - 2) Disconnect the connector from lateral G sensor.
- LHD model



- RHD model



- 3) Remove the lateral G sensor.

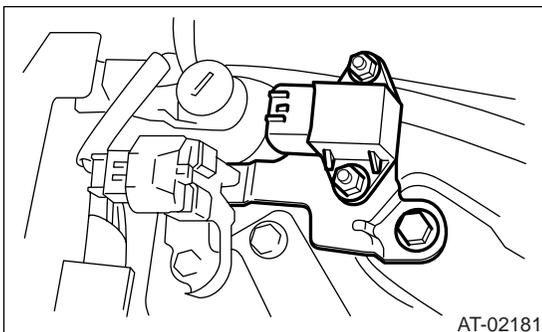
B: INSTALLATION

Install in the reverse order of removal.

- LHD model

Tightening torque:

24.5 N·m (2.5 kgf·m, 18.1 ft·lb)

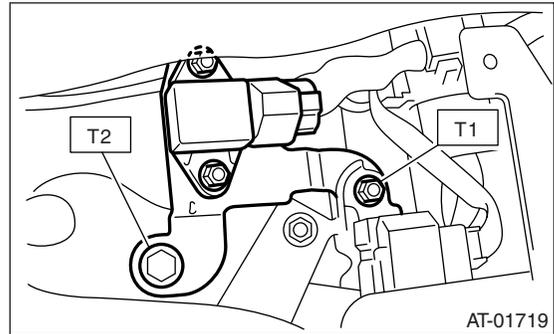


- RHD model

Tightening torque:

T1: 7.5 N·m (0.76 kgf·m, 5.5 ft·lb)

T2: 24.5 N·m (2.5 kgf·m, 18.1 ft·lb)

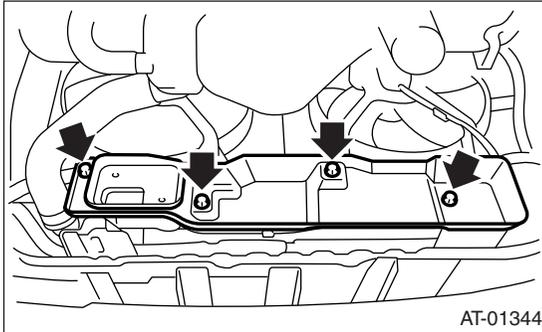


22. ATF Cooler Pipe and Hose

A: REMOVAL

1. MODEL WITHOUT ATF COOLER WITH WARMER FUNCTION

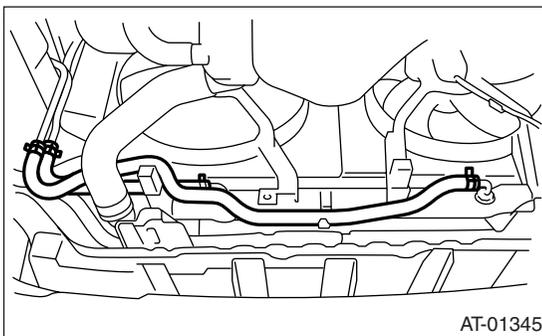
- 1) Set the vehicle on a lift.
- 2) Remove the battery.
- 3) Lift-up the vehicle.
- 4) Remove the under cover.
- 5) Remove the radiator under cover.



- 6) Disconnect the ATF cooler hose from radiator.

NOTE:

- Do not use a screwdriver or other pointed tools.
- When hard to remove the hose, wrap the hose with cloth to prevent from damaging, and then turn with pliers and pull out with hand straightly.

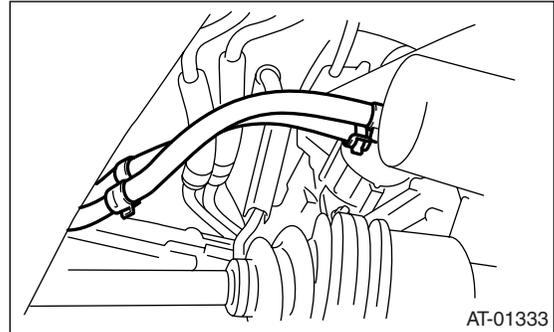


- 7) Disconnect the ATF cooler hoses from pipes.

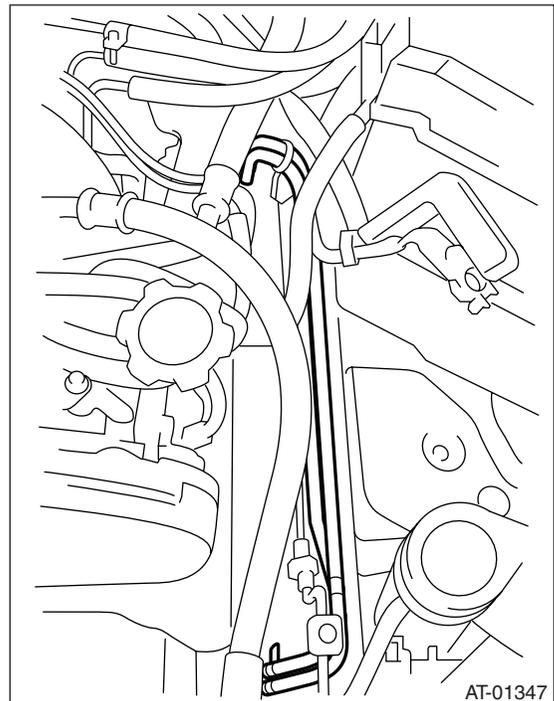
NOTE:

- Do not use a screwdriver or other pointed tools.

- When hard to remove the hose, wrap the hose with cloth to prevent from damaging, and then turn with pliers and pull out with hand straightly.



- 8) Disconnect the ATF cooler pipe from frame.



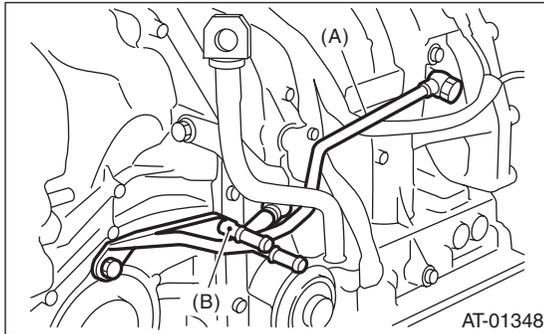
- 9) Remove the oil cooler inlet and outlet pipes.

ATF Cooler Pipe and Hose

AUTOMATIC TRANSMISSION

NOTE:

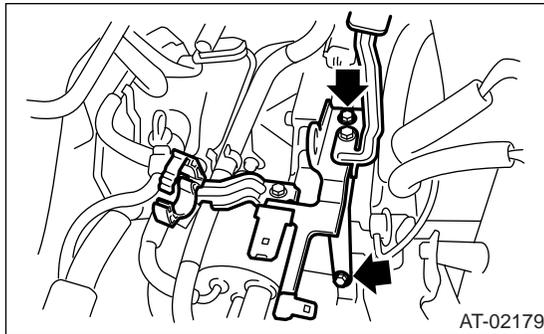
When disconnecting the outlet pipe, be careful not to lose the ball and spring used with retaining screw.



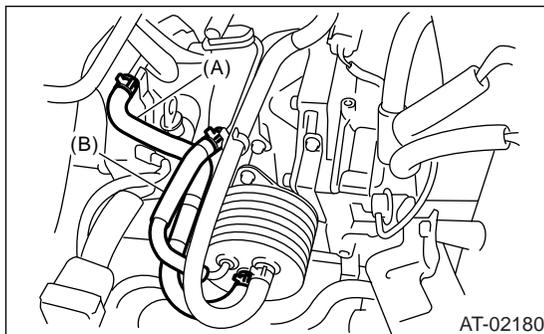
- (A) Inlet pipe
- (B) Outlet pipe

2. MODEL WITH ATF COOLER WITH WARMER FUNCTION

- 1) Set the vehicle on a lift.
- 2) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
- 3) Disconnect the transmission harness connector and remove it from stay.
- 4) Remove the harness bracket.

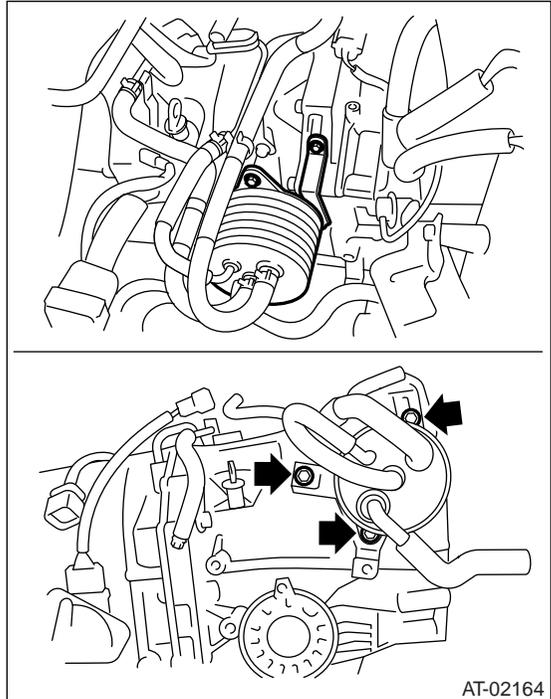


- 5) Disconnect the inlet and outlet hoses.



- (A) Inlet hose
- (B) Outlet hose

- 6) Remove the ATF cooler assembly from transmission body, and put it aside.

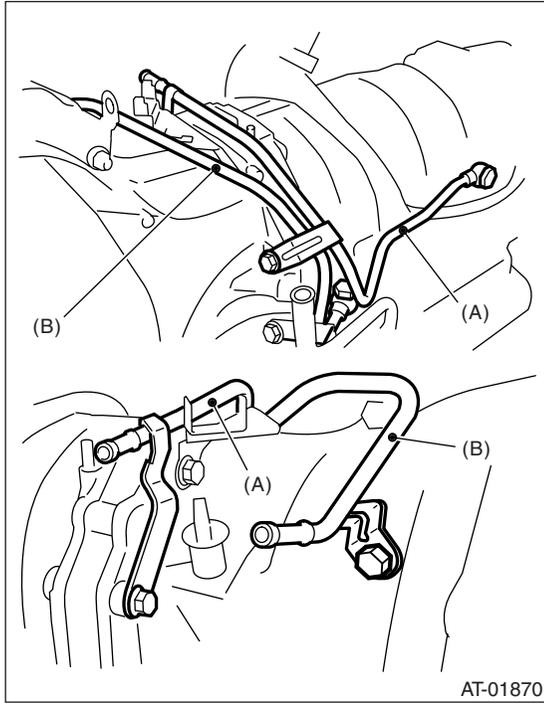


- 7) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
- 8) Remove the air breather hose. <Ref. to 4AT-78, REMOVAL, Air Breather Hose.>

9) Remove the oil cooler inlet and outlet pipes.

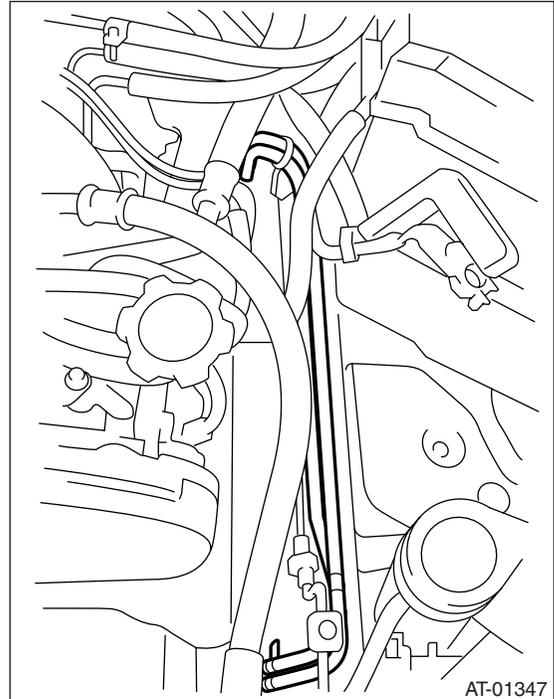
CAUTION:

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



(A) ATF cooler outlet pipe
(B) ATF cooler inlet pipe

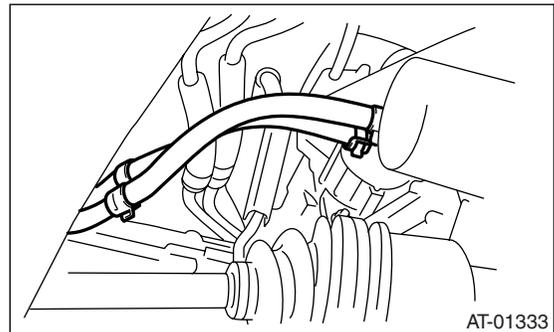
2) Install the ATF cooler pipe to frame.



3) Connect the ATF cooler hose to pipe on 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 the ATF cooler hose to pipe on radiator side.

NOTE:

- Install so that the hose is not folded over, excessively bent, or twisted.

B: INSTALLATION

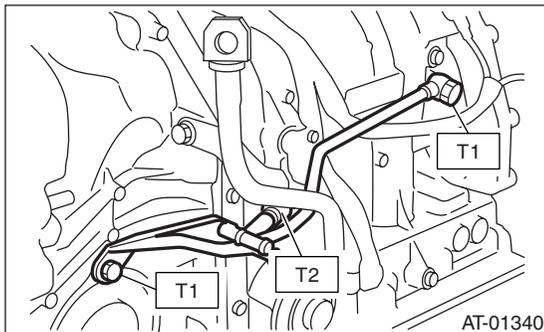
1. MODEL WITHOUT ATF COOLER WITH WARMER FUNCTION

1) Install the oil cooler inlet pipe and outlet pipe with new washer.

Tightening torque:

T1: 25 N·m (2.5 kgf·m, 18.1 ft·lb)

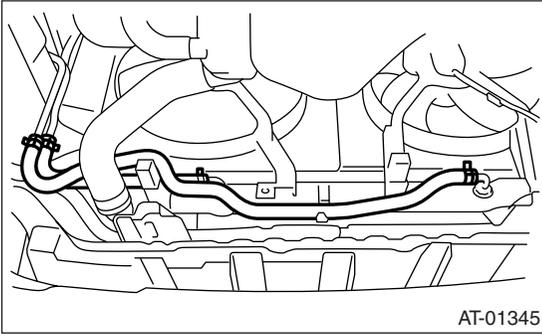
T2: 44 N·m (4.5 kgf·m, 32.5 ft·lb)



ATF Cooler Pipe and Hose

AUTOMATIC TRANSMISSION

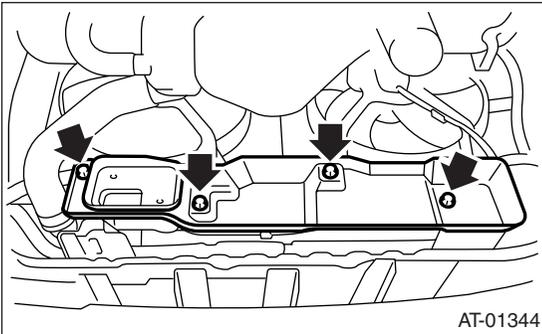
- Be careful to insert the hose to the specified position.



- 5) Install the radiator under cover.

Tightening torque:

4.9 N·m (0.5 kgf·m, 3.6 ft·lb)



- 6) Install the under cover.
7) Install the battery.
8) Fill the 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.

2. MODEL WITH ATF COOLER WITH WARMER FUNCTION

- 1) Install the ATF cooler inlet pipe and outlet pipe.

NOTE:

Use new washers.

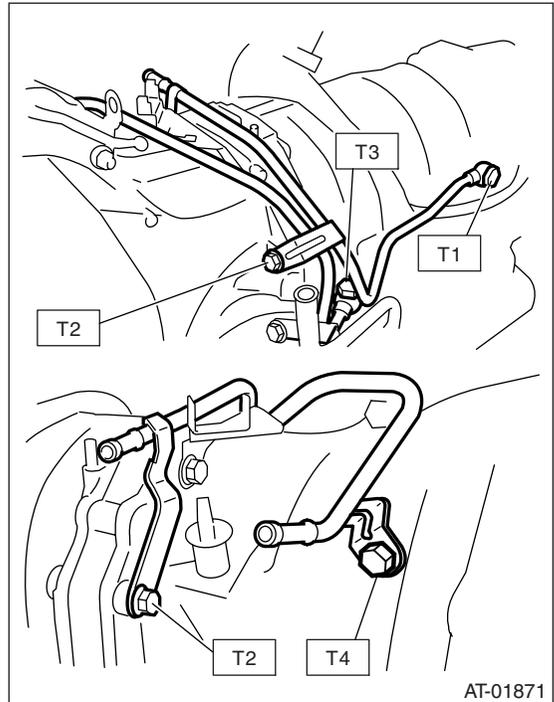
Tightening torque:

T1: 25 N·m (2.5 kgf·m, 18.1 ft·lb)

T2: 21 N·m (2.1 kgf·m, 15.5 ft·lb)

T3: 41 N·m (4.2 kgf·m, 30.4 ft·lb)

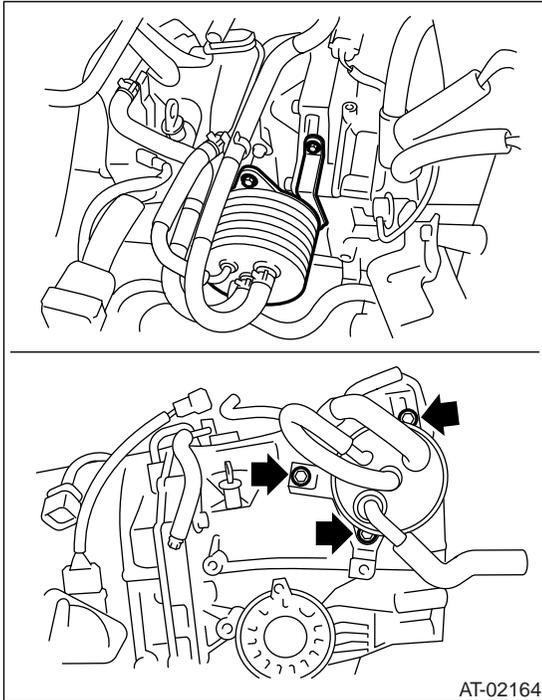
T4: 45 N·m (4.6 kgf·m, 33.2 ft·lb)



2) Install the ATF cooler assembly to transmission.

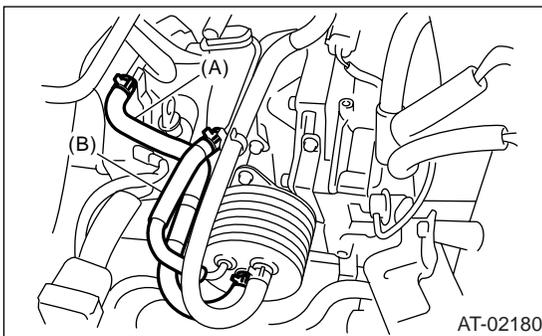
Tightening torque:

23 N·m (2.3 kgf·m, 16.6 ft-lb)



3) Install the oil charge pipe. <Ref. to 4AT-79, INSTALLATION, Oil Charge Pipe.>

4) Connect the inlet and outlet hoses.



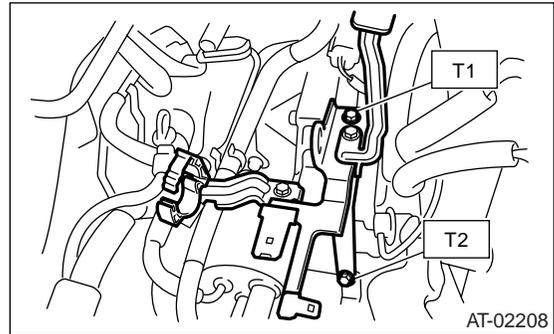
- (A) Inlet hose
- (B) Outlet hose

5) Install the harness bracket.

Tightening torque:

T1: 16 N·m (1.6 kgf·m, 11.6 ft-lb)

T2: 36 N·m (3.6 kgf·m, 26.0 ft-lb)



6) Install the inhibitor switch and transmission harness connector to the stay, and then connect the harness connector.

7) Install the air breather hose. <Ref. to 4AT-78, INSTALLATION, Air Breather Hose.>

8) Install the air intake chamber. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

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

C: INSPECTION

Repair or replace any defective hoses, pipes, clamps, and washers found in 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 installed by pressing with your fingernail.
- 5) Check for peeling, cracks and deformation at the tip of the hose.

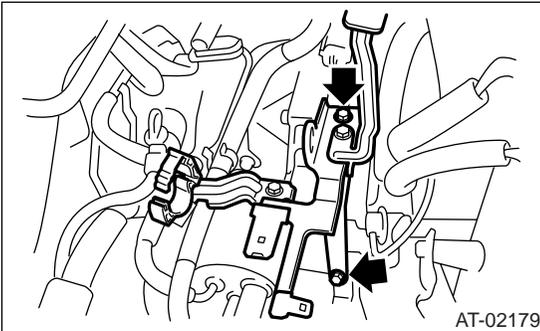
ATF Cooler (with warmer function)

AUTOMATIC TRANSMISSION

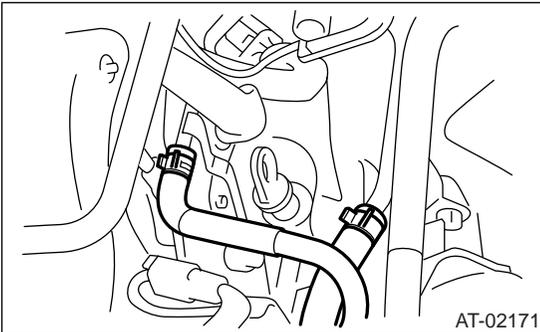
23. ATF Cooler (with warmer function)

A: REMOVAL

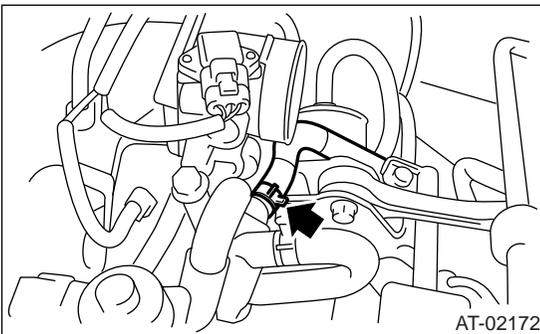
- 1) Drain the engine coolant. <Ref. to CO(H4SO 2.0)-13, REPLACEMENT, Engine Coolant.>
- 2) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
- 3) Disconnect the engine harness, and then remove the engine harness connector from engine harness bracket.
- 4) Remove the engine harness bracket.



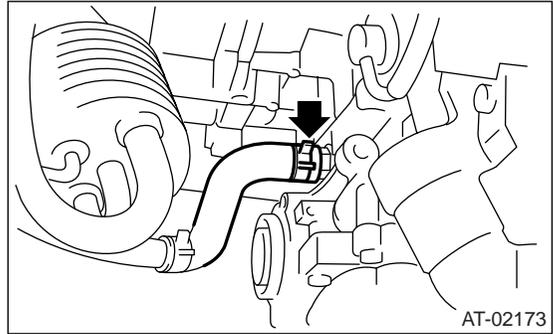
- 5) Disconnect the ATF cooler hose from the pipe on transmission side.



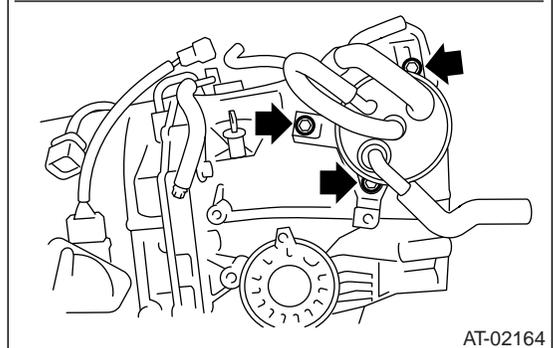
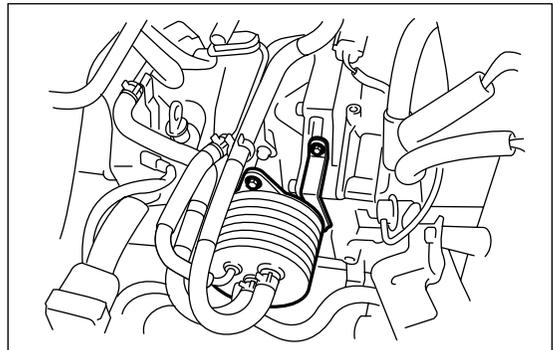
- 6) Disconnect the engine coolant outlet hose from warmer cock assembly.



- 7) Disconnect the engine coolant inlet hose from cylinder block.



- 8) Remove the ATF cooler assembly from transmission.



ATF Cooler (with warmer function)

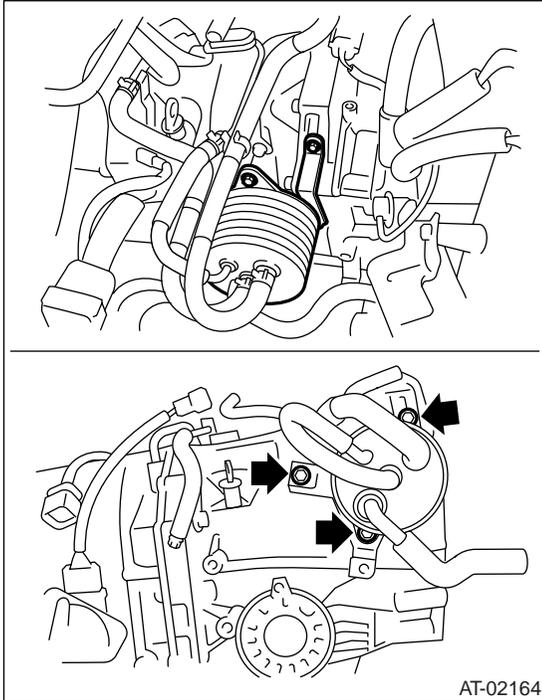
AUTOMATIC TRANSMISSION

B: INSTALLATION

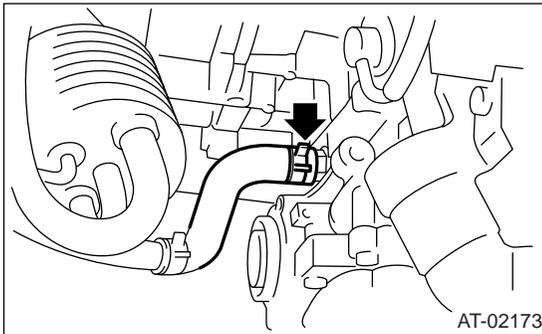
1) Install the ATF cooler assembly to transmission.

Tightening torque:

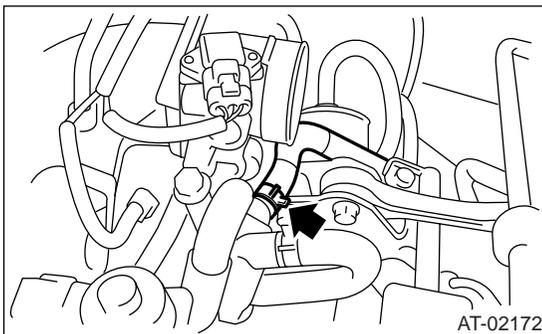
23 N·m (2.3 kgf·m, 16.6 ft·lb)



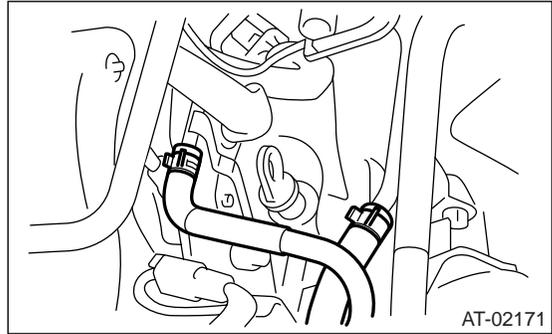
2) Connect the engine coolant inlet hose to cylinder block.



3) Connect the engine coolant outlet hose to warmer cock assembly.



4) Connect the ATF cooler hose to pipe on transmission side.

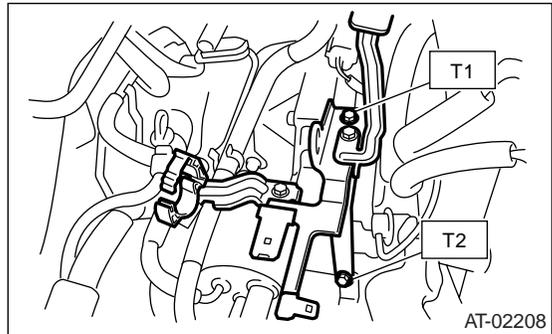


5) Install the engine harness bracket.

Tightening torque:

T1: 16 N·m (1.6 kgf·m, 11.6 ft·lb)

T2: 36 N·m (3.6 kgf·m, 26.0 ft·lb)



6) Install the harness connector to bracket, and then connect the harness.

7) Install the air intake chamber. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

8) Fill the engine coolant. <Ref. to CO(H4SO 2.0)-13, REPLACEMENT, Engine Coolant.>

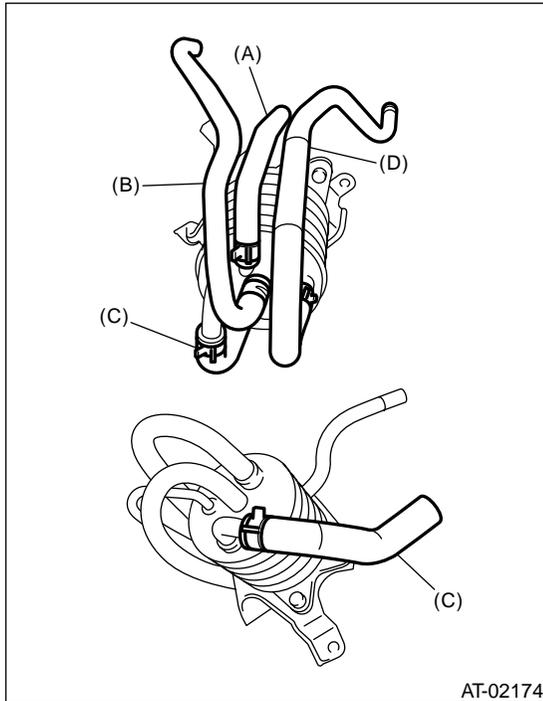
9) Check the ATF level. <Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>

ATF Cooler (with warmer function)

AUTOMATIC TRANSMISSION

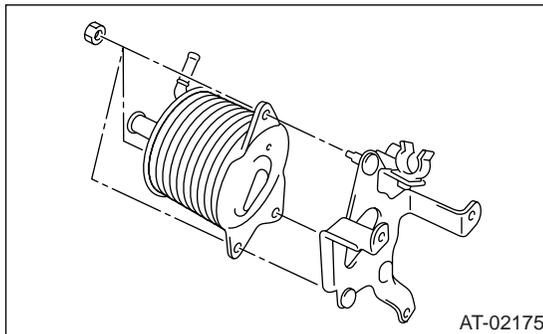
C: DISASSEMBLY

1) Remove each hose from ATF cooler.

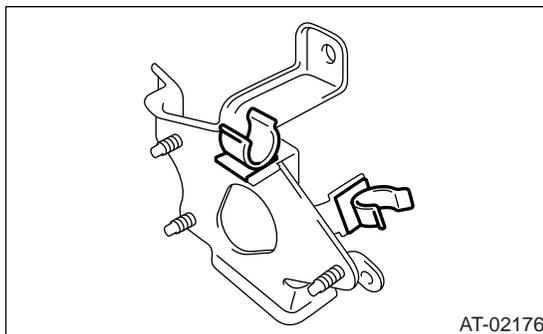


- (A) ATF cooler inlet hose
- (B) ATF cooler outlet hose
- (C) Engine coolant inlet hose
- (D) Engine coolant outlet hose

2) Remove the bracket from ATF cooler.

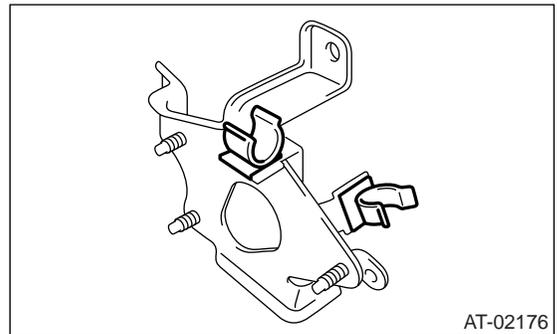


3) Remove the clip from bracket.



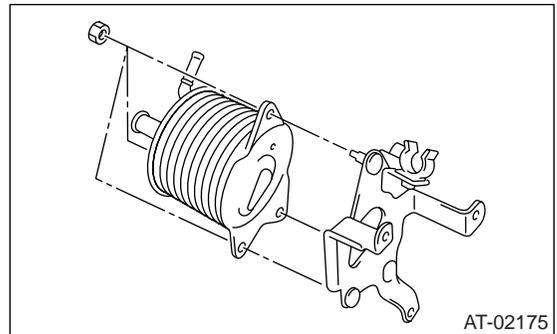
D: ASSEMBLY

1) Install the clip to bracket.



2) Install the bracket.

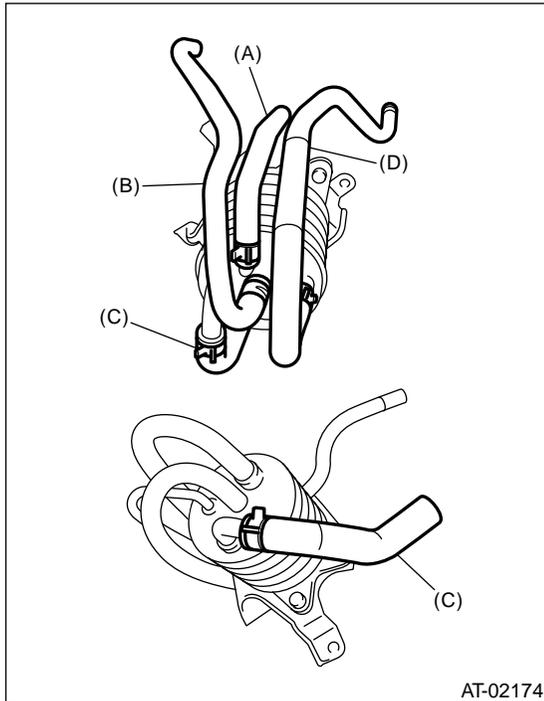
Tightening torque:
23 N·m (2.3 kgf-m, 16.6 ft-lb)



3) Install each hose to ATF cooler.

NOTE:

Pay attention to the orientation of hose.



- (A) ATF cooler inlet hose
- (B) ATF cooler outlet hose
- (C) Engine coolant inlet hose
- (D) Engine coolant outlet hose

E: INSPECTION

Repair or replace any defective hoses, pipes, clamps and washers found from the inspection below.

- 1) Check each connection for ATF or engine coolant leakage.
- 2) Check the clamp for deformation.
- 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 installed by pressing with your fingernail.
- 5) Check the end of each hose for peeling, cracks and deformation.
- 6) Check the ATF cooler for damage.

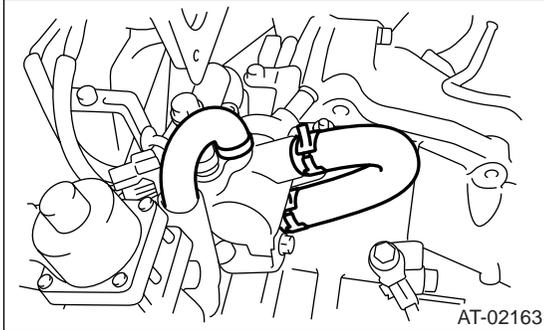
Warmer Cock

AUTOMATIC TRANSMISSION

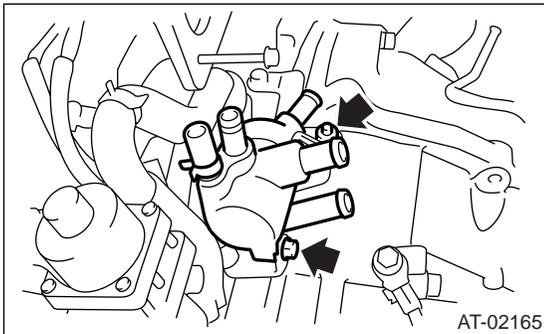
24. Warmer Cock

A: REMOVAL

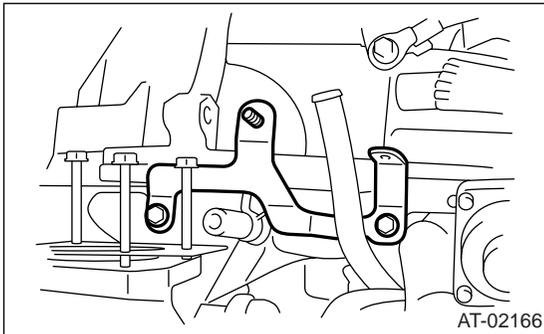
- 1) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
- 2) Remove all hoses from warmer cock.



- 3) Remove the warmer cock.



- 4) Remove the throttle body as necessary, and then remove the bracket.

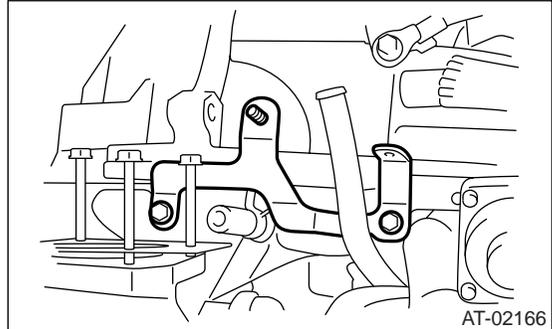


B: INSTALLATION

- 1) Install the bracket, and then install the throttle body.

Tightening torque:

16 N·m (1.6 kgf-m, 11.6 ft-lb)

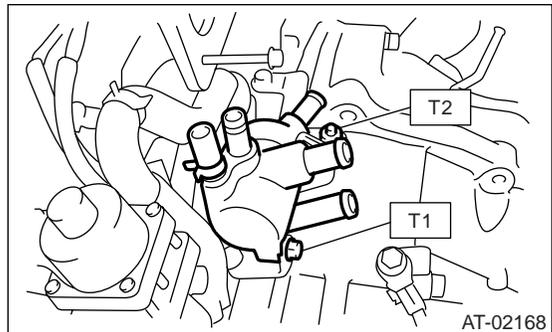


- 2) Install the warmer cock.

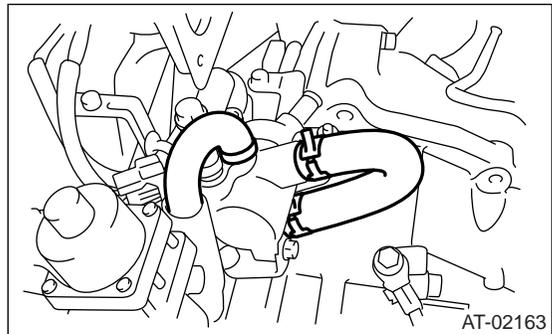
Tightening torque:

T1: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

T2: 15 N·m (1.5 kgf-m, 10.8 ft-lb)



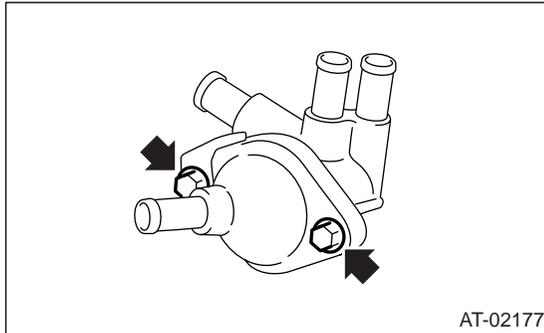
- 3) Connect the hoses to warmer cock.



- 4) Install the air intake chamber. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

C: DISASSEMBLY

Remove the bolt on warmer cock, and remove the thermostat.

**D: ASSEMBLY**

Assemble in the reverse order of disassembly.

Tightening torque:

6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

E: INSPECTION

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.

- Inspection method

Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should conform to the specification.

Starting temperature to open:

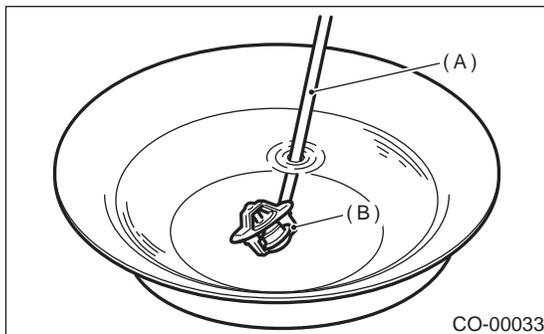
69 — 73°C (156 — 163°F)

Fully opens:

84°C (183°F)

Valve lift:

8.0 mm (0.315 in) or more

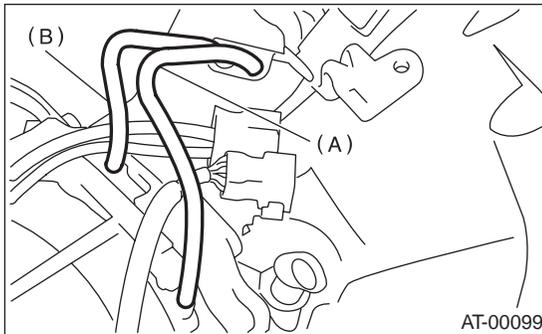


- (A) Thermometer
(B) Thermostat

25. Air Breather Hose

A: REMOVAL

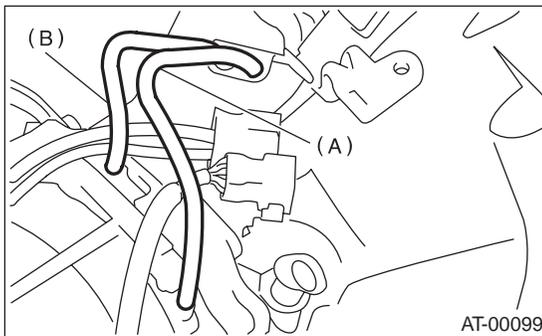
- 1) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
- 2) Disconnect the air breather hose.



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

B: INSTALLATION

- 1) Install the air breather hose.



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

- 2) Install the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

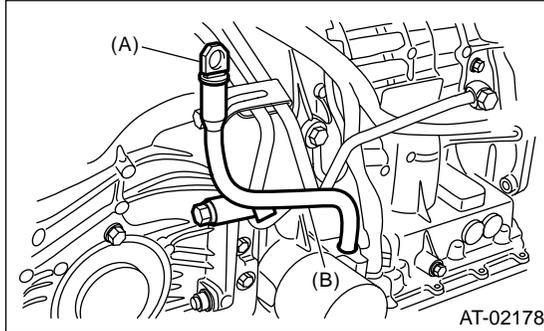
C: INSPECTION

Make sure the hose is not cracked or clogged.

26. Oil Charge Pipe

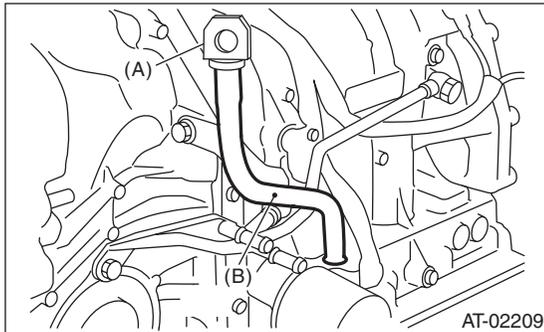
A: REMOVAL

- 1) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
 - 2) Remove the oil charge pipe, and then remove the O-ring from flange side.
- Model with ATF cooler with warmer function



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

- Model without ATF cooler with warmer function



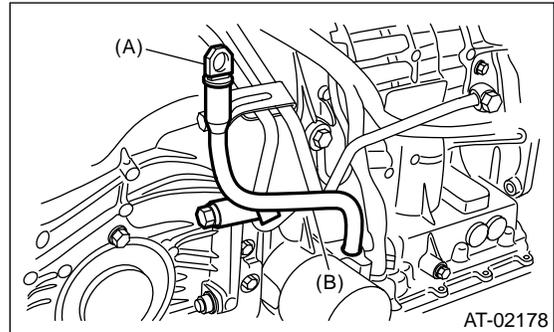
- (A) Oil level gauge
- (B) Oil charge pipe

B: INSTALLATION

- 1) Install the oil charge pipe with a new O-ring applied with ATF.
- Model with ATF cooler with warmer function

Tightening torque:

41 N·m (4.2 kgf-m, 30.4 ft-lb)

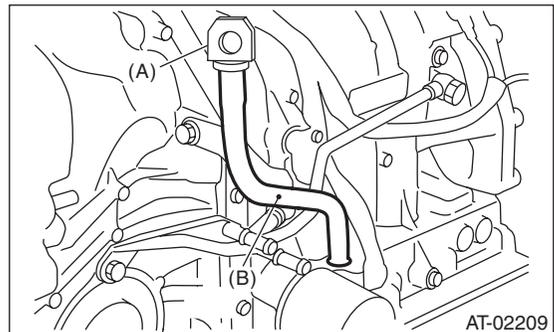


- (A) Oil level gauge
- (B) Oil charge pipe

- Model without ATF cooler with warmer function

Tightening torque:

41 N·m (4.2 kgf-m, 30.4 ft-lb)



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

- 2) Install the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

C: INSPECTION

Make sure the oil charge pipe is not deformed or damaged.

Torque Converter Clutch Assembly

AUTOMATIC TRANSMISSION

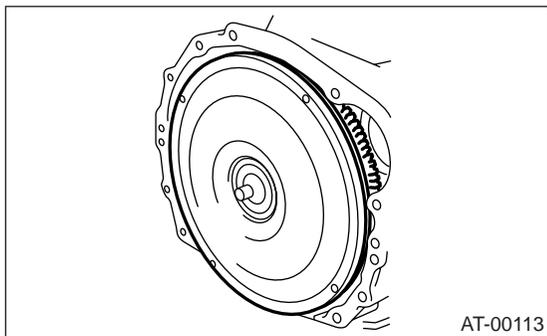
27. Torque Converter Clutch Assembly

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch and oil pump shaft horizontally.

NOTE:

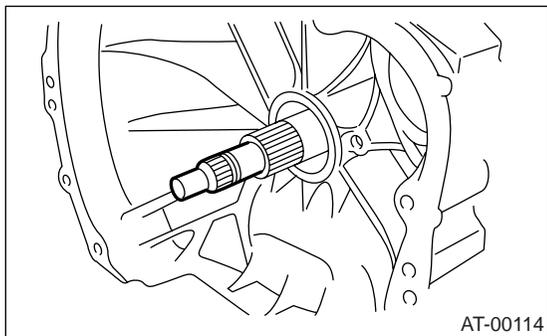
Be sure not to scratch the inside of bushing in oil pump shaft.



- 3) Remove the input shaft.

NOTE:

When removing the torque converter clutch assembly, the input shaft is also removed.



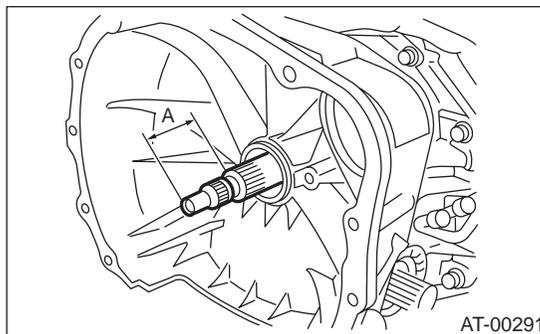
- 4) Remove the oil pump shaft from the torque converter clutch as necessary.

B: INSTALLATION

- 1) Install the shaft to the converter case when oil pump shaft is removed.
- 2) Install the oil pump shaft to torque converter clutch, and then make sure that the clip is secured on groove.
- 3) Apply ATF to O-ring and insert the input shaft with rotating it by hand lightly.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)

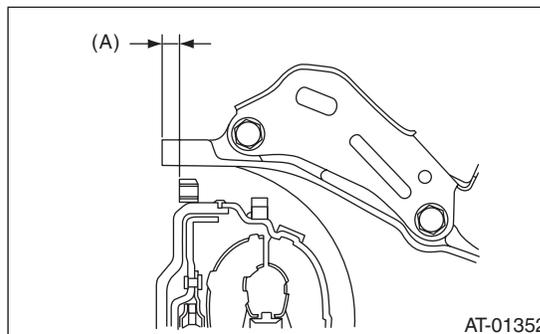


- 4) With holding the torque converter clutch assembly by hands, carefully install to the converter case. Take care not to damage the bushing. Do not contact the oil pump shaft bush with starter shaft part of oil pump cover inappropriately.
- 5) Lightly rotating the shaft by hands to engage the spline securely, and then check it is within the dimension A.

Dimension A:

2.0 L model

1.1 — 1.3 mm (0.043 — 0.051 in)



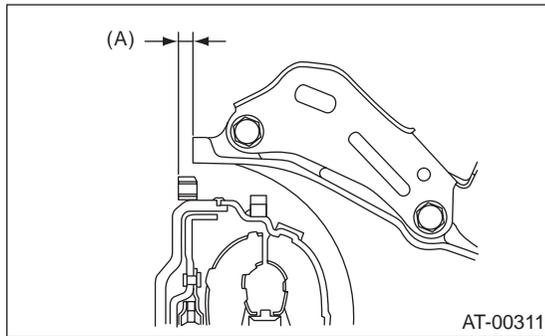
(A) Dimension A

Torque Converter Clutch Assembly

AUTOMATIC TRANSMISSION

2.5 L model

2.7 — 2.9 mm (0.106 — 0.114 in)



(A) Dimension A

6) Install the transmission assembly into vehicle.
<Ref. to 4AT-43, INSTALLATION, Automatic
Transmission Assembly.>

C: INSPECTION

Make sure the ring gear and protrusion of torque
converter clutch end are not deformed or damaged.

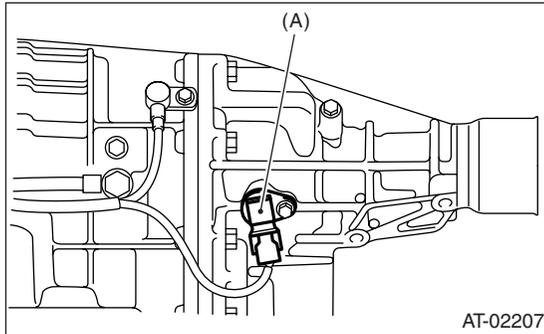
28.Extension Case

A: REMOVAL

1) Remove the transmission assembly.
 <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>

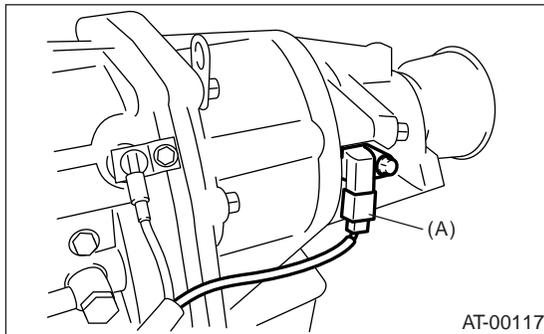
2) Remove the rear vehicle speed sensor.

- MPT model



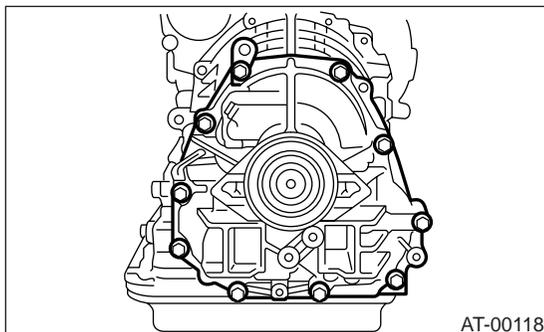
(A) Rear vehicle speed sensor

- VTD model



(A) Rear vehicle speed sensor

3) Separate the transmission case and extension case part.



B: INSTALLATION

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

NOTE:

Install the thrust needle bearing in correct direction.

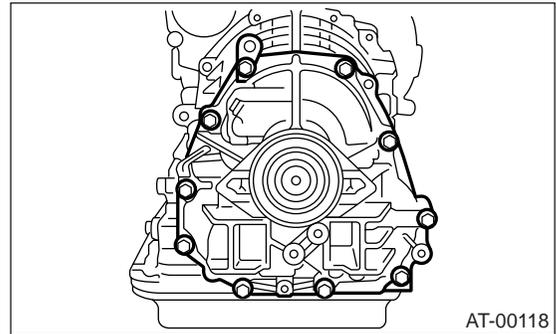
2) Install a new gasket.

3) Install the extension case to transmission case.

4) Tighten bolts to secure extension case.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)

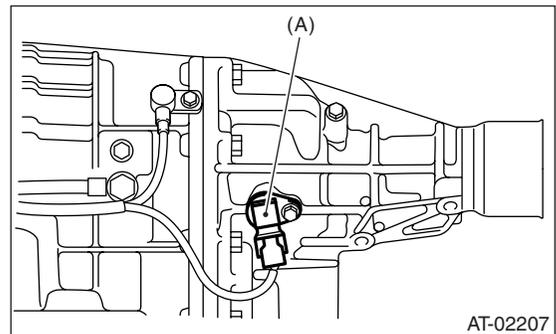


5) Install the rear vehicle speed sensor.

Tightening torque:

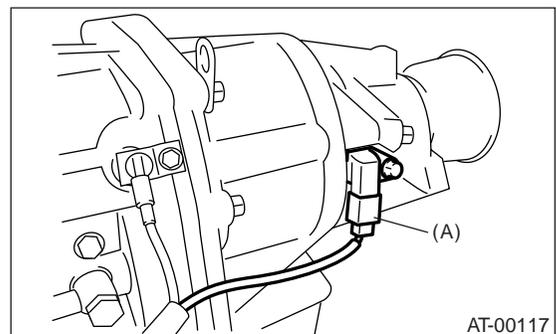
7 N·m (0.7 kgf·m, 5.1 ft·lb)

- MPT model



(A) Rear vehicle speed sensor

- VTD model



(A) Rear vehicle speed sensor

6) Install the transmission assembly.

<Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

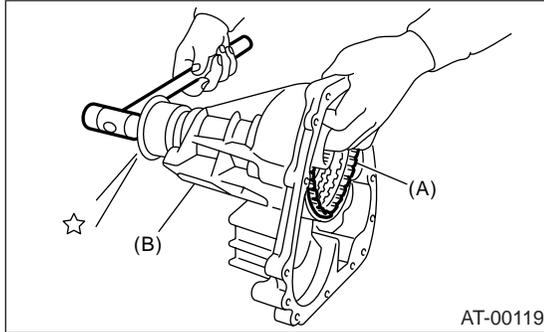
C: DISASSEMBLY

1. MPT MODEL

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

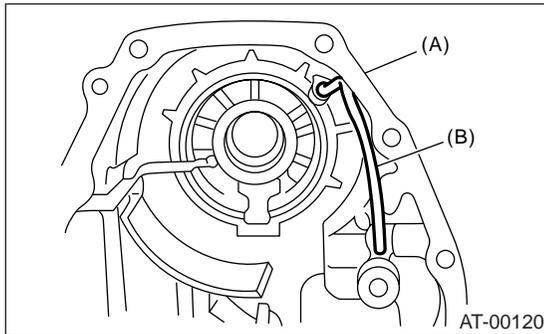
NOTE:

Be careful not to damage the oil seal of extension case.



(A) Extension case
(B) Transfer clutch

2) Remove the transfer clutch pipe without deforming the pipe.



(A) Extension case
(B) Transfer clutch pipe

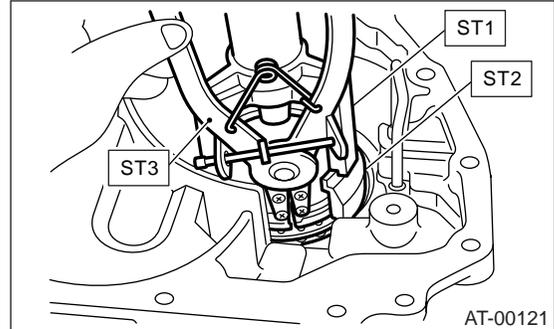
3) Remove the dust cover from extension case.

4) Remove the oil seal from extension case.

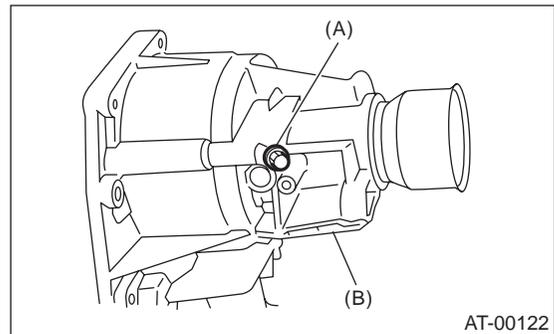
2. VTD MODEL

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

- ST1 398673600 COMPRESSOR
- ST2 498627100 SEAT
- ST3 398663600 PLIERS

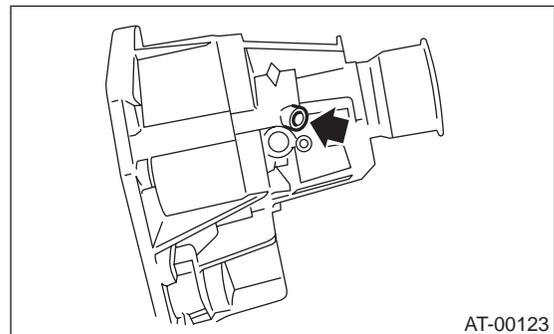


2) Remove the test plug.



(A) Extension case
(B) Test plug

3) Remove the clutch piston using compressed air.

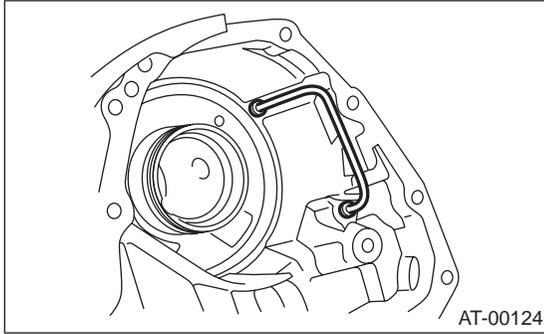


AT-00123

Extension Case

AUTOMATIC TRANSMISSION

4) Remove transfer clutch pipe without deforming the pipe.

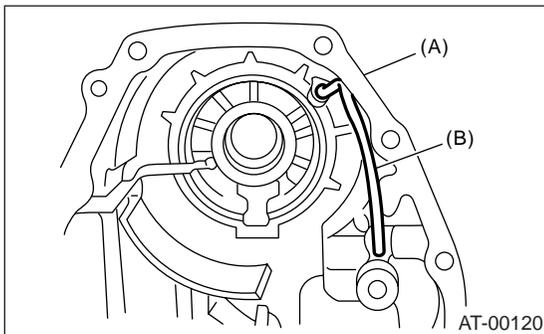


5) Remove the dust cover from extension case.
6) Remove the oil seal from extension case.

D: ASSEMBLY

1. MPT MODEL

- 1) Press-fit new oil seal using ST and press.
ST 498057300 INSTALLER
- 2) Press-fit the dust cover.
- 3) Install the transfer clutch pipe to extension case without deforming the pipe.



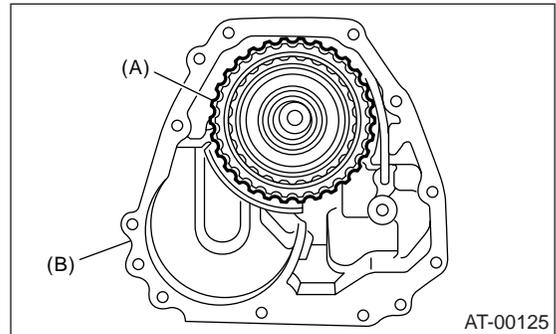
- (A) Extension case
- (B) Transfer pipe

4) Install the transfer clutch assembly to the case.

NOTE:

- Be careful not to damage the seal ring.

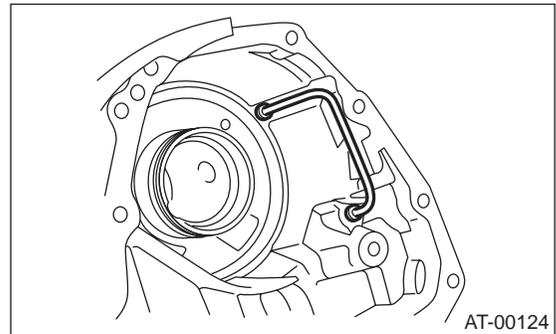
- Press-fit the clutch assembly to bottom of bearing shoulder completely.



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

2. VTD MODEL

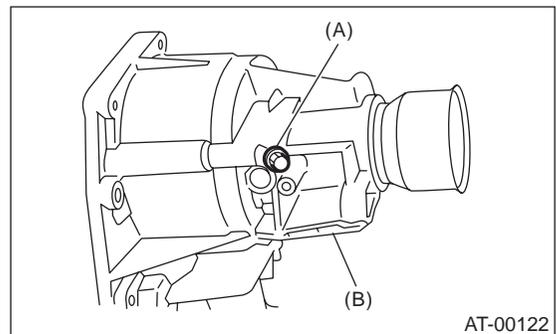
- 1) Press new oil seal using ST and press.
ST 498057300 INSTALLER
- 2) Press-fit the dust cover.
- 3) Install the transfer clutch pipe to extension case without deforming the pipe.



4) Apply ATF to a new O-ring and install the test plug.

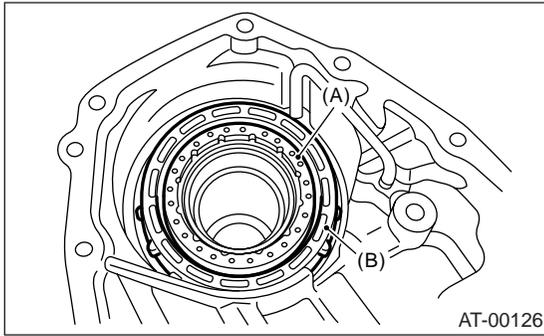
Tightening torque:

13 N·m (1.3 kgf-m, 9.4 ft-lb)



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

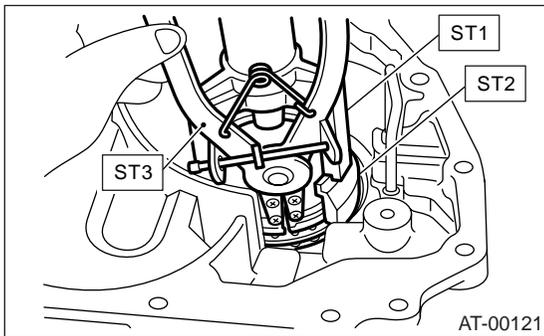
5) Insert the multi-plate clutch, drive plates, driven plates, and spring retainer.



- (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

- Spray compressed air, and make sure the transfer pipe and extension case routes are not clogged and have no leaks.
- Measure the extension end play and adjust it to within specifications.

MPT model

<Ref. to 4AT-89, MPT MODEL, ADJUSTMENT, Transfer Clutch.>

VTD model

<Ref. to 4AT-90, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

Transfer Clutch

AUTOMATIC TRANSMISSION

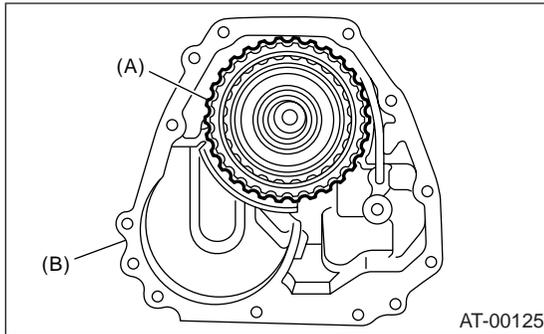
29. Transfer Clutch

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the extension case, and then remove the transfer clutch. <Ref. to 4AT-82, REMOVAL, Extension Case.> <Ref. to 4AT-83, DISASSEMBLY, Extension Case.>

B: INSTALLATION

- 1) Select the thrust needle bearing. <Ref. to 4AT-89, ADJUSTMENT, Transfer Clutch.>
- 2) Install the transfer clutch assembly to the case.

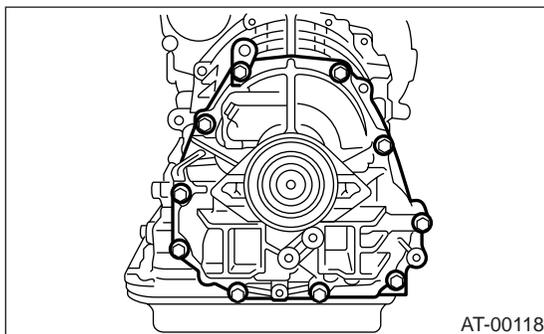


- (A) Transfer clutch
(B) Extension case

- 3) Tighten the bolts to secure the case.

Tightening torque:

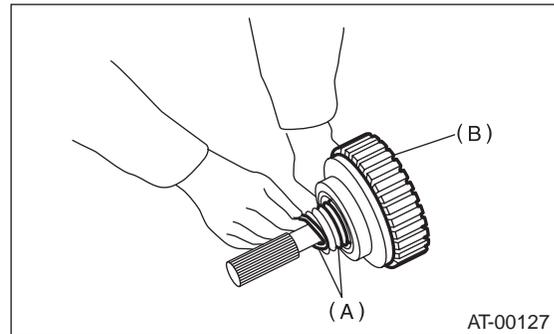
25 N·m (2.5 kgf·m, 18.1 ft·lb)



- 4) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

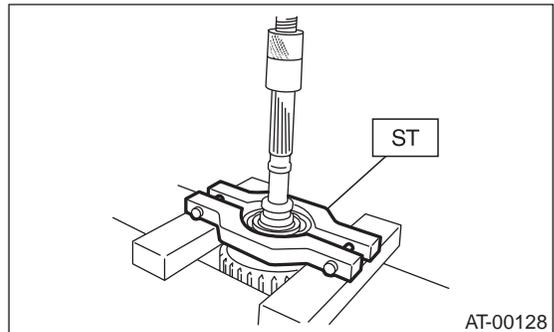
C: DISASSEMBLY

- 1) Remove the seal ring.

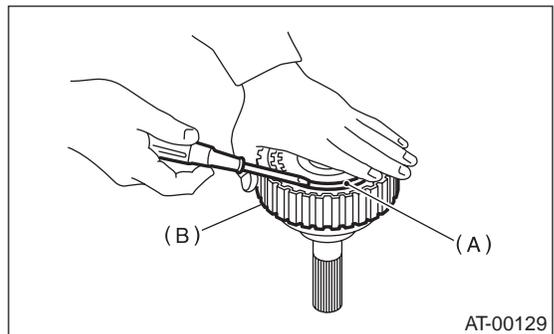


- (A) Seal ring
(B) Transfer clutch

- 2) Remove the ball bearing using ST and press. ST 498077600 REMOVER



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



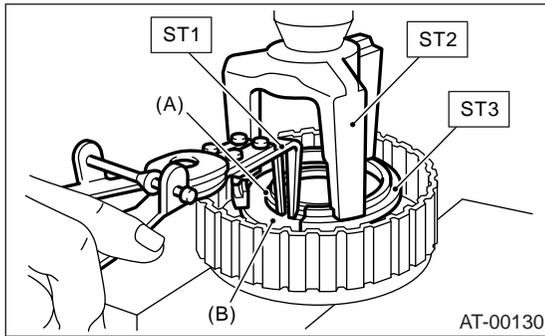
- (A) Snap ring
(B) Transfer clutch

- 4) Using the ST1, ST2 and ST3, remove the snap ring, and then take out the return spring and transfer clutch piston seal.

Transfer Clutch

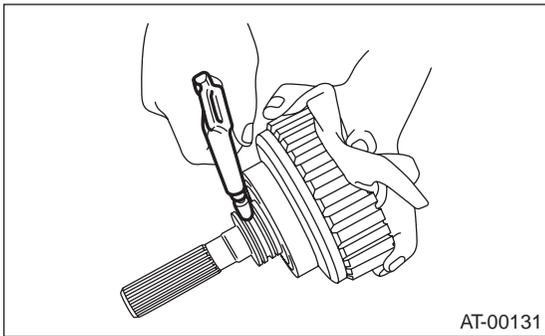
AUTOMATIC TRANSMISSION

ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR
ST3 398623600 SEAT



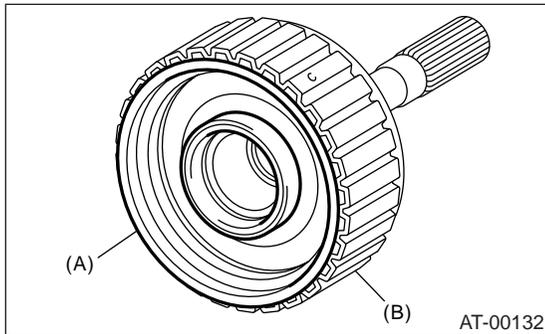
(A) Snap ring
(B) Transfer piston seal

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



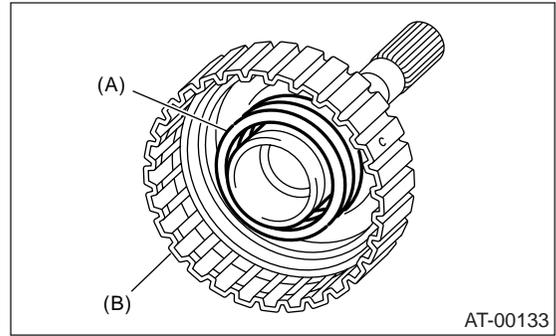
D: ASSEMBLY

1) Install the transfer clutch piston.



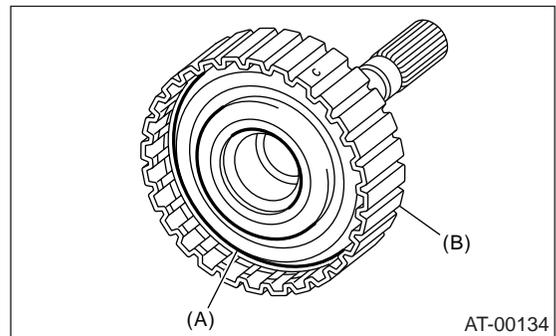
(A) Transfer clutch piston
(B) Rear drive shaft

2) Install the return spring to transfer clutch piston.



(A) Return spring
(B) Rear drive shaft

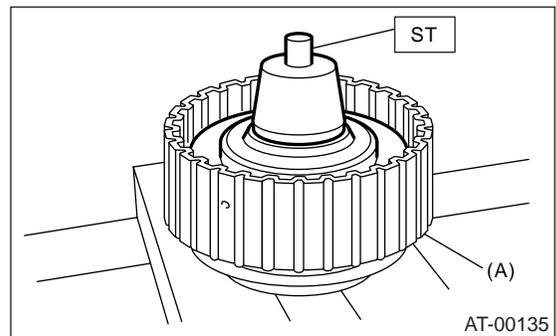
3) Apply ATF to the lip of transfer clutch piston seal and install it.



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

4) Install the ST to the rear drive shaft.

ST 499257300 SNAP RING OUTER GUIDE

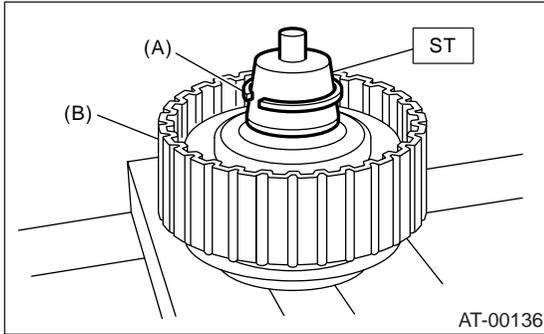


(A) Transfer clutch

Transfer Clutch

AUTOMATIC TRANSMISSION

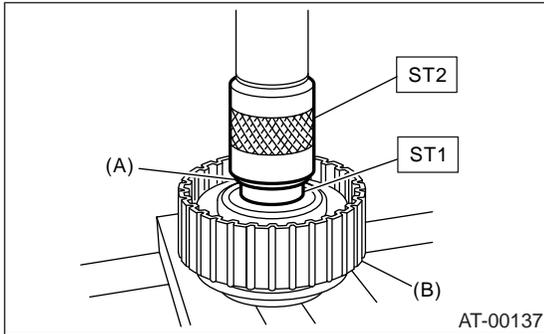
5) Install the snap ring to ST.
ST 499257300 SNAP RING OUTER GUIDE



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

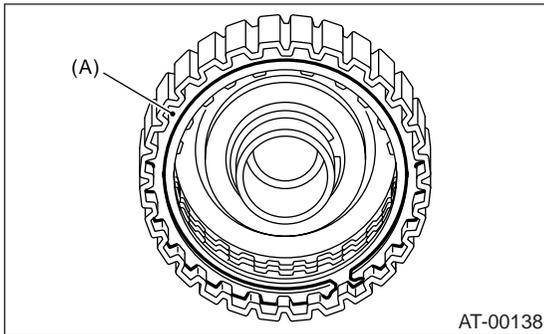
6) Install the snap ring to rear drive shaft using ST1 and ST2.

ST1 499257300 SNAP RING OUTER GUIDE
ST2 499247400 INSTALLER



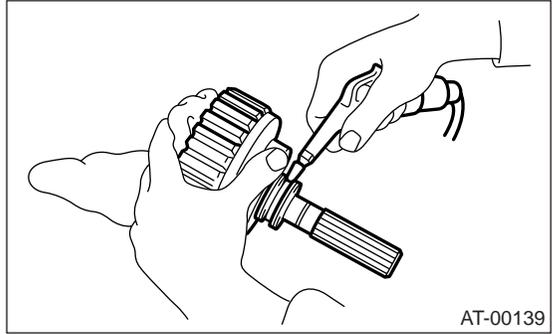
- (A) Snap ring
- (B) Transfer clutch

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



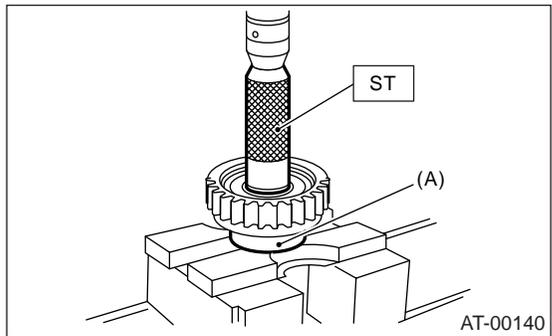
- (A) Snap ring

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



9) Check clearance between snap ring and pressure plate. <Ref. to 4AT-89, INSPECTION, Transfer Clutch.>

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

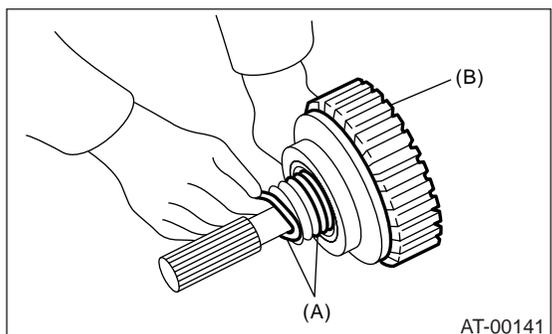


- (A) Ball bearing

11) Apply vaseline to a new seal ring and attach to the seal ring groove of the shaft.

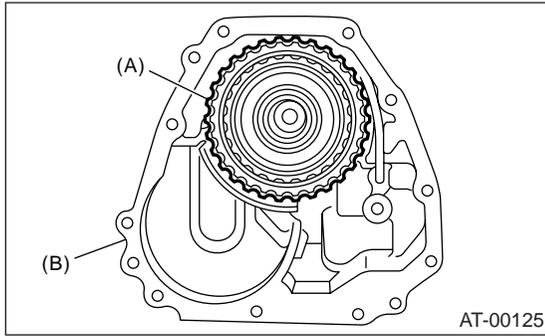
NOTE:

While installing the seal ring, not to expand the seal ring excessively.



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

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



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

E: INSPECTION

- Inspect the drive plate facing for wear and damage.
- Inspect the snap ring for wear, return spring for permanent distortion, breakage and deformation.
- Inspect the D-ring for damage.
- Inspect the extension end play and adjust it to within specifications. <Ref. to 4AT-89, ADJUSTMENT, Transfer Clutch.>

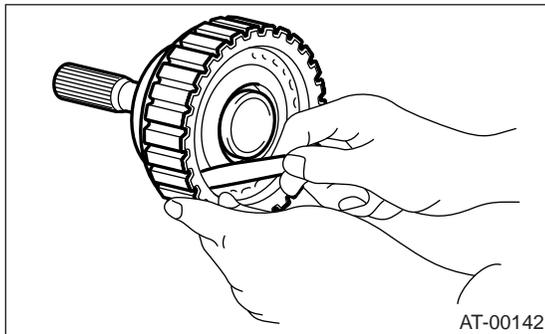
- 1) Check clearance between snap ring and pressure gauge.
- 2) Before measuring clearance, place the same thickness of shim on both sides to prevent pressure plate from tilting.
- 3) If the clearance is not within specification, adjust it by selecting a suitable pressure plate on transfer clutch piston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

Initial standard:

0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:

1.6 mm (0.063 in)



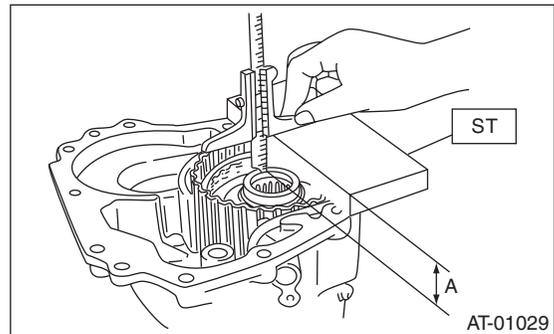
4) Check that the tight corner braking does not occur when the vehicle is started with steering wheel held at fully turned position. If tight corner braking occurs, perform the following procedures.

- (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

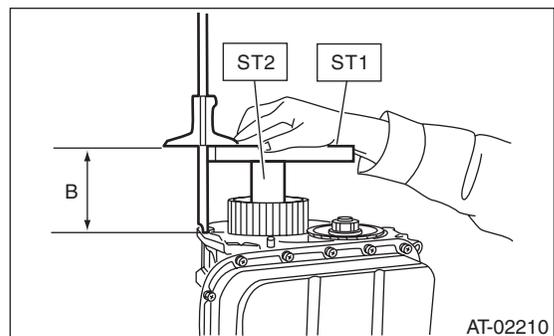
1. MPT MODEL

- 1) Measure the distance “A” from the end of extension case to rear drive shaft using ST.
- ST 398643600 GAUGE



- 2) Measure the distance “B” from the transmission case mating surface to the reduction drive gear end surface using ST1 and ST2.

ST1 398643600 GAUGE
ST2 499577000 GAUGE



Pressure plate	
Part number	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

Transfer Clutch

AUTOMATIC TRANSMISSION

3) Calculation formula:

NOTE:

Calculate "T":

$$T = A - B + 35.4 \text{ mm}$$

$$[T = A - B + 1.3937 \text{ in}]$$

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 "T" becomes 3.95, therefore select bearing thickness of 3.8 mm (0.150 in).

NOTE:

Calculation formula for "T" is applied when measuring using ST (398643600 GAUGE, 499577000 GAUGE). When not using ST, apply

$$T = (A - \alpha + 0.45 \text{ mm}) - (B - \beta) - H$$

$$[T = (A - \alpha + 0.0177 \text{ in}) - (B - \beta) - H]$$

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)

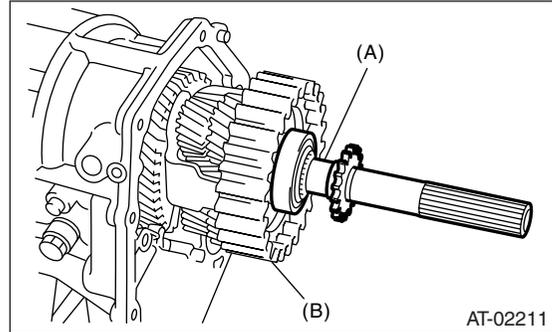
0.0177: Gasket thickness (in)

H: Shim clearance

Thrust needle bearing	
Part number	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 drive shaft into the reduction drive gear and center differential assembly.

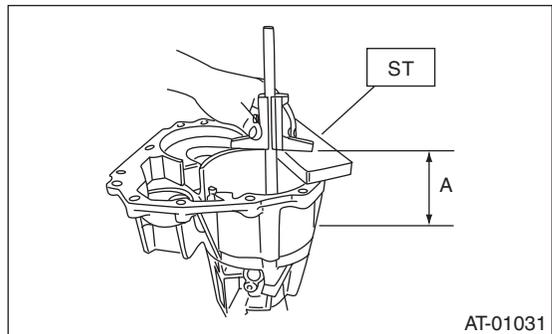


(A) Rear drive plate

(B) Center differential carrier

2) Using the ST, measure the distance "A" between the mating surface of extension case and the surface of rear drive shaft ball bearing outer race.

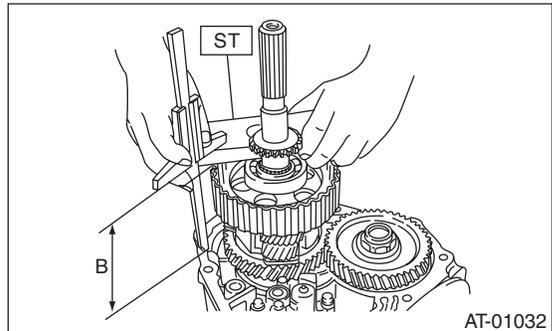
ST 398643600 GAUGE



A: Measured value

3) Using the ST, measure the distance "B" between the mating surface of transmission case and rear drive shaft ball bearing.

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)

$$T = A - B + 0.40 \text{ mm}$$

$$[T = A - B + 0.0157 \text{ in}]$$

When clearances are 0.25 mm (0.0098 in)

$$T = A - B + 0.20 \text{ mm}$$

$$[T = A - B + 0.0079 \text{ in}]$$

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 GAUGE). When not using ST, apply

$$T = (A - \alpha + 0.45 \text{ mm}) - (B - \beta) - H$$

$$[T = (A - \alpha + 0.0177 \text{ in}) - (B - \beta) - H].$$

T: Thrust needle bearing thickness

A: Distance from end of extension case to end of surface of rear drive shaft ball bearing outer race

B: Distance from end of transmission case to end of rear drive shaft ball bearing

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)

Multi-plate Clutch

AUTOMATIC TRANSMISSION

30. Multi-plate Clutch

A: REMOVAL

Remove the multi-plate clutch following the same instructions as for the extension case. <Ref. to 4AT-82, REMOVAL, Extension Case.>

B: INSTALLATION

Install the multi-plate clutch following the same instructions as for the extension case. <Ref. to 4AT-82, INSTALLATION, Extension Case.>

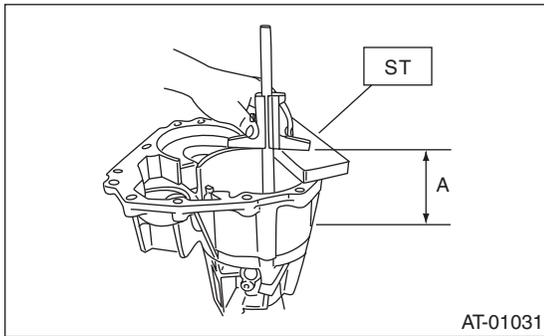
C: INSPECTION

- Inspect the drive plate facing for wear and damage.
- Make sure the snap ring is not worn and the return spring has no permanent distortion, damage, or deformation.
- Inspect the lathe cut seal ring for damage.
- Measure the multi-plate clutch clearance and adjust it to within the specification range. <Ref. to 4AT-92, ADJUSTMENT, Multi-plate Clutch.>

D: ADJUSTMENT

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

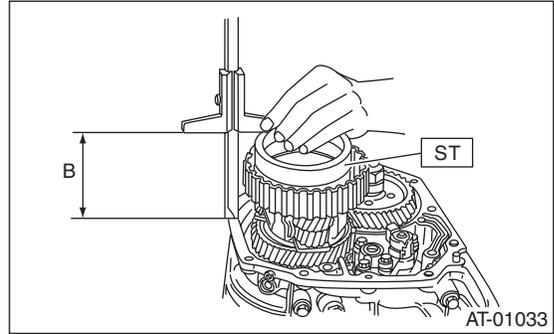
ST 398643600 GAUGE



A: Measured value

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

ST 398744300 GAUGE



B: Measured value

4) Calculation formula

$$T = A - B + 0.45 \text{ mm}$$

$$[T = A - B + 0.0177 \text{ in}]$$

NOTE:

- Calculation formula for “T” is applied when measuring using ST (398643600 GAUGE, 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 the multi-plate clutch (LSD) driven and drive plate thickness to find the clearance between measurement value and “T”.

Initial standard:

0.2 — 0.6 mm (0.008 — 0.024 in)

Limit thickness:

1.6 mm (0.063 in)

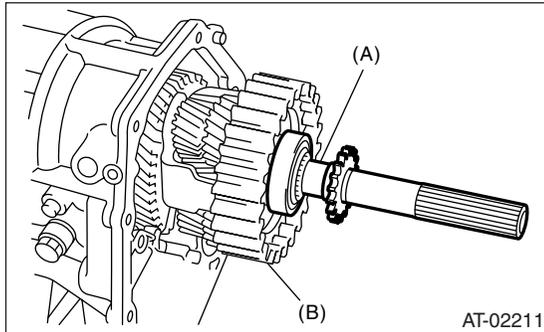
If the clearance exceeds the limit thickness, replace the plate set (drive and driven plate). Select a multi-plate clutch (LSD) piston driven plate that will bring clearance within the standard value.

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)

31.Rear Drive Shaft

A: REMOVAL

- 1) Remove the transmission assembly. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 3) Pull out the rear driveshaft from center differential assembly.



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

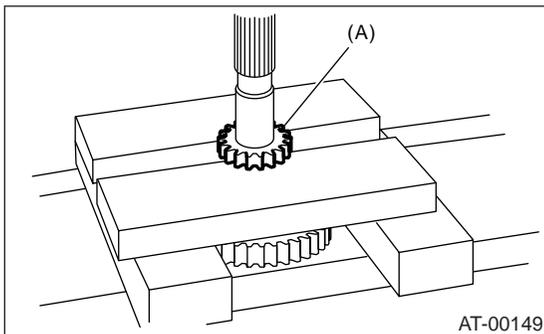
- 4) Remove the drive plate and driven plate.

B: INSTALLATION

- 1) Select the appropriate shim. <Ref. to 4AT-90, VTD MODEL, ADJUSTMENT, Transfer Clutch.>
- 2) Install the drive plate and driven plate.
- 3) Insert the rear driveshaft into center differential assembly.
- 4) Combine the transmission case and extension case. Install the rear wheel speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

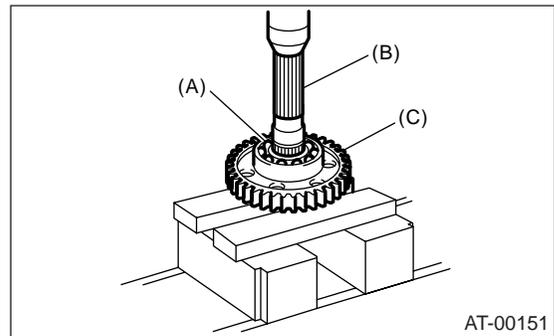
C: DISASSEMBLY

- 1) Using a press, remove the revolution gear.



- (A) Revolution gear

- 2) Using a press, remove the front and rear side ball bearings and clutch hub.



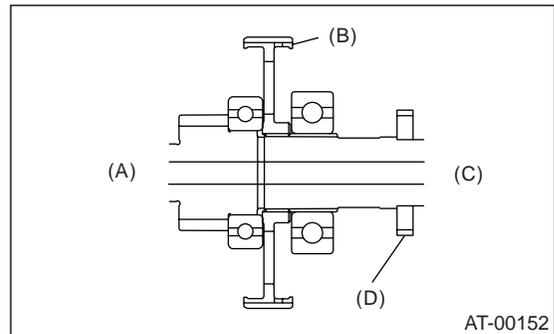
- (A) Rear ball bearing
- (B) Rear driveshaft
- (C) Clutch hub

D: ASSEMBLY

Assemble in the reverse order of disassembly.

NOTE:

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



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

E: INSPECTION

- Inspect the parts to make sure there are no holes, cuts, and that they are not dusty.
- Inspect the extension end play, and adjust it to within the standard value. <Ref. to 4AT-90, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

Reduction Driven Gear

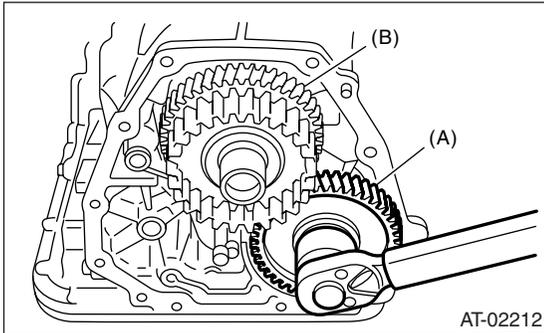
AUTOMATIC TRANSMISSION

32.Reduction Driven Gear

A: REMOVAL

1. MPT MODEL

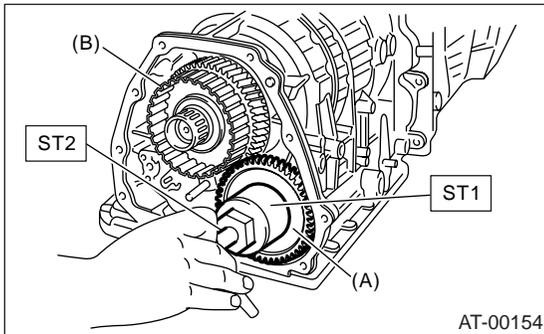
- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor, and then separate the extension case from transmission case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 3) Set the select lever to "P" range.
- 4) Remove the caulking part, and then 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

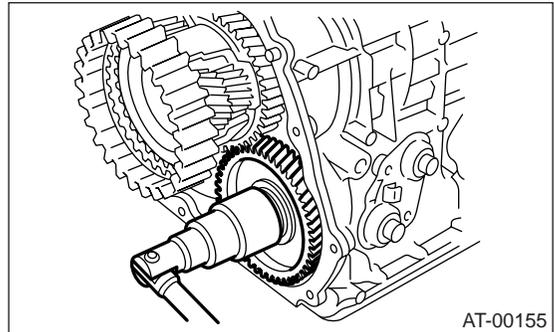


- (A) Reduction driven gear
- (B) Reduction drive gear

2. VTD MODEL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-82, REMOVAL, Extension Case.>

- 3) Remove the rear drive shaft. <Ref. to 4AT-93, 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-98, REMOVAL, Center Differential Carrier.>

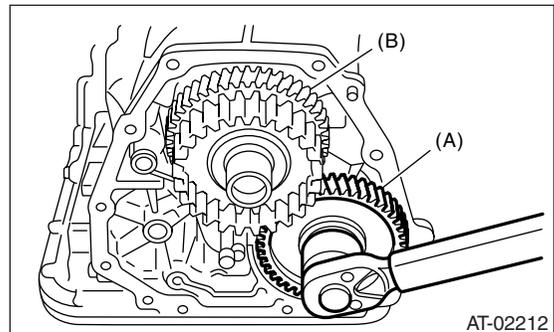
B: INSTALLATION

1. MPT MODEL

- 1) Set the select lever to "P" range.
- 2) Using a plastic hammer, install the 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

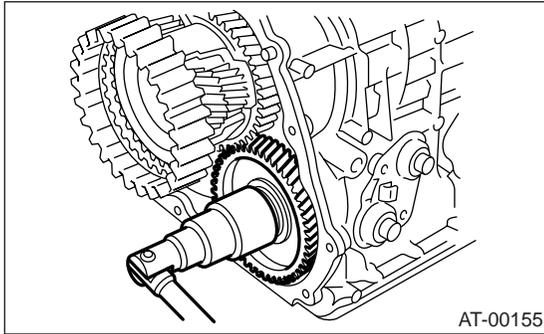
- 3) After tightening, stake the lock nut securely.
- 4) Combine the transmission case with extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

2. VTD MODEL

- 1) Set the select lever to "P" range.
- 2) Using a plastic hammer, install the 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:

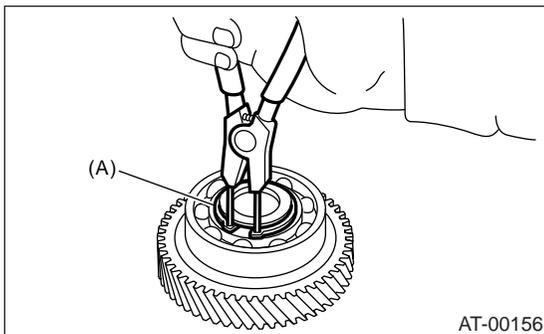
100 N·m (10.2 kgf·m, 73.8 ft·lb)



- 5) After tightening, stake the lock nut securely.
- 6) Insert the rear drive shaft assembly. **<Ref. to 4AT-93, INSTALLATION, Rear Drive Shaft.>**
- 7) Combine the transmission case with extension case, and install the rear vehicle speed sensor. **<Ref. to 4AT-82, INSTALLATION, Extension Case.>**
- 8) Install the transmission assembly to vehicle. **<Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>**

C: DISASSEMBLY

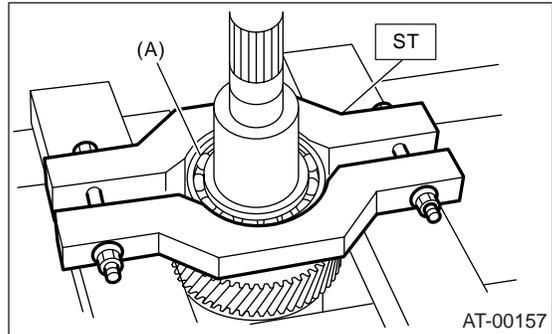
- 1) Remove the snap ring from reduction driven gear.



(A) Snap ring

- 2) Remove the ball bearing from reduction driven gear using ST.

ST 498077600 REMOVER

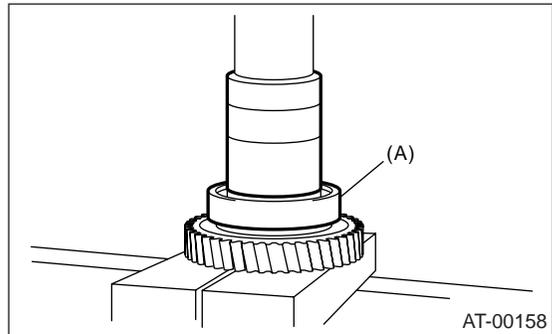


(A) Ball bearing

- 3) Remove the snap ring from reduction driven gear.

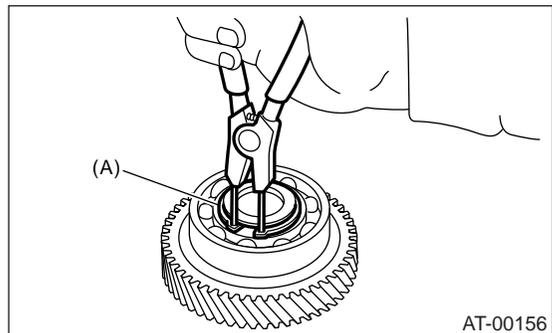
D: ASSEMBLY

- 1) Install the snap ring to reduction driven gear.
- 2) Install the new ball bearing to reduction driven gear using press.



(A) Ball bearing

- 3) Install the snap ring to reduction driven gear.



(A) Snap ring

E: INSPECTION

Make sure the ball bearing and gear is not deformed or damaged.

Reduction Drive Gear

AUTOMATIC TRANSMISSION

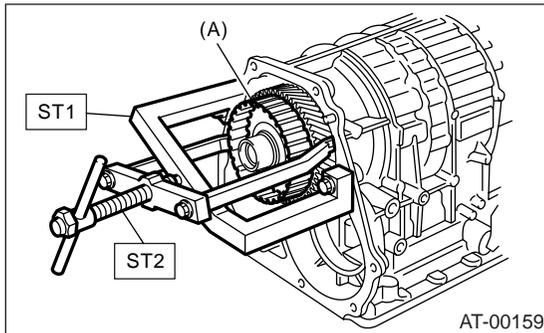
33.Reduction Drive Gear

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor, and then separate the extension case from transmission case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 3) Remove the reduction driven gear. <Ref. to 4AT-94, REMOVAL, Reduction Driven Gear.>
- 4) Using the ST, extract the reduction drive gear.

ST1 499737100 PULLER

ST2 899524100 PULLER SET



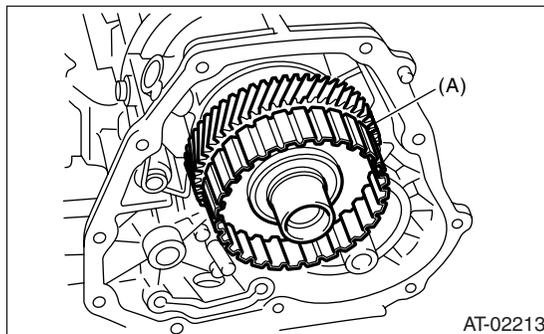
(A) Reduction drive gear

B: INSTALLATION

- 1) Install the reduction drive gear assembly.

NOTE:

Press-fit it to the bottom of bearing shoulder completely.

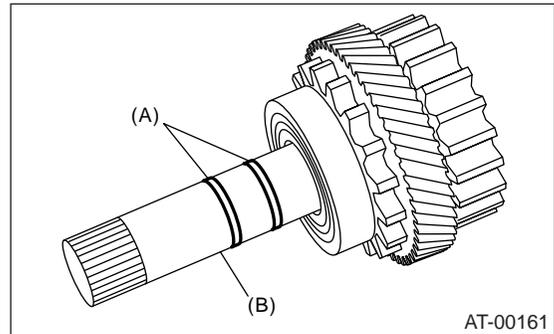


(A) Reduction drive gear

- 2) Install the reduction driven gear. <Ref. to 4AT-94, INSTALLATION, Reduction Driven Gear.>
- 3) Combine the transmission case with extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

- 1) Take out the seal ring.

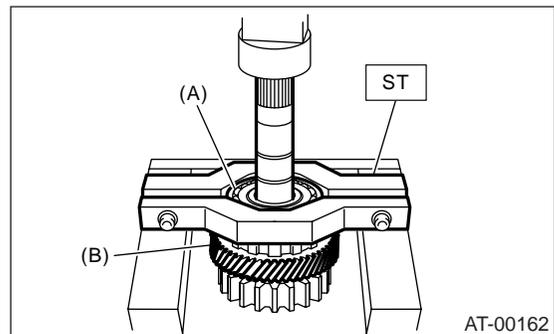


(A) Seal ring

(B) Reduction drive shaft

- 2) Remove the ball bearing using ST.

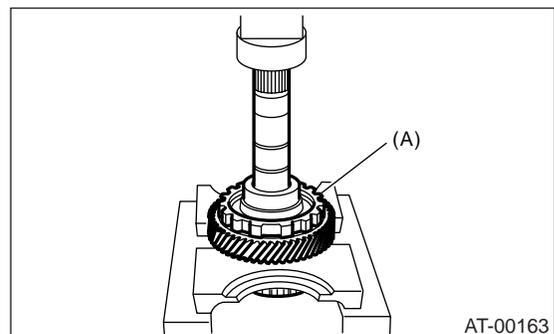
ST 498077600 REMOVER



(A) Ball bearing

(B) Reduction drive gear

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

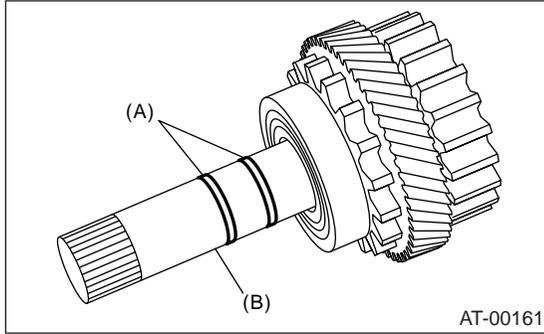


(A) Reduction drive gear

D: ASSEMBLY

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

4) Apply ATF to new seal rings and install them.



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

E: INSPECTION

- Rotate the bearing by hand, make sure it rotates smoothly.
- Check that the holes, damages or other foreign matters are not on each parts.
- Measure the extension end play and adjust it to within specifications. <Ref. to 4AT-89, ADJUSTMENT, Transfer Clutch.>

Center Differential Carrier

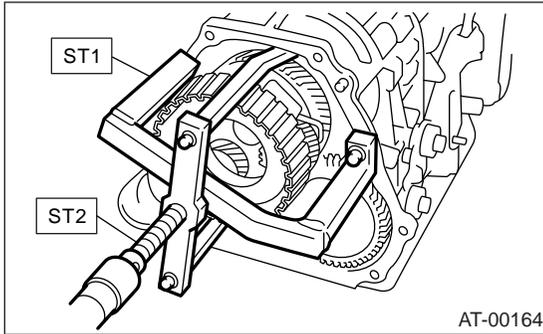
AUTOMATIC TRANSMISSION

34.Center Differential Carrier

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 3) Pull out the rear driveshaft. <Ref. to 4AT-93, REMOVAL, Rear Drive Shaft.>
- 4) Using the STs, pull out the center differential carrier assembly.

ST1 499737100 PULLER
ST2 899524100 PULLER SET



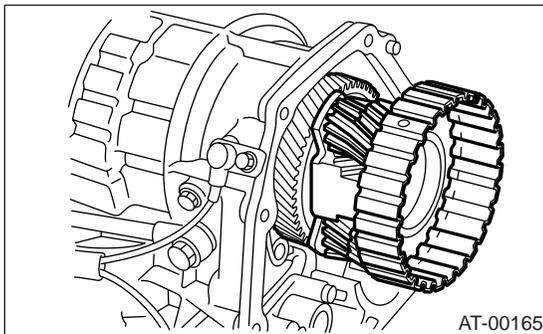
- 5) Pull out the shim(s) from transmission case.

B: INSTALLATION

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

NOTE:

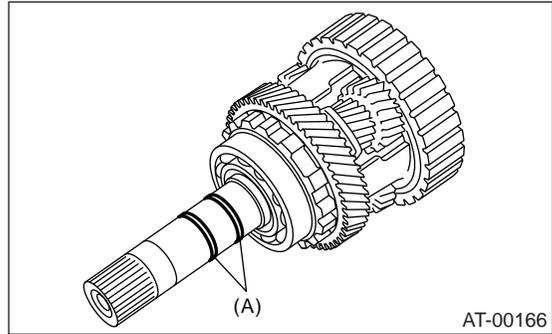
Insert the center differential assembly and shim(s) completely into bearing shoulder bottom.



- 2) Insert the rear driveshaft. <Ref. to 4AT-93, INSTALLATION, Rear Drive Shaft.>
- 3) Connect the transmission case and extension case, and install the rear wheel speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly onto vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

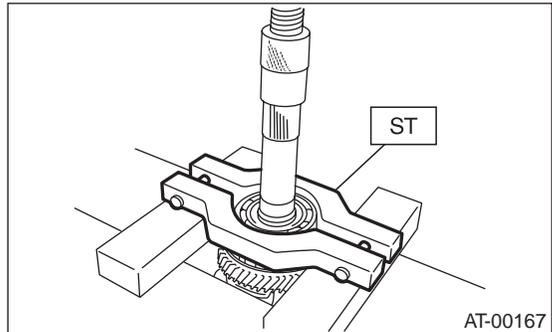
- 1) Remove the seal rings.



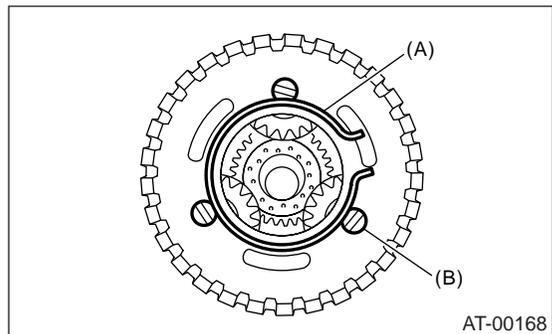
(A) Seal ring

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

ST 498077600 REMOVER



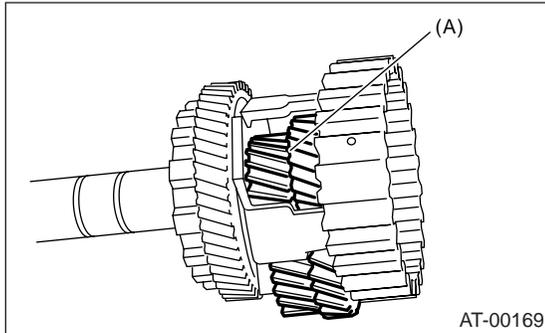
- 3) Remove the snap ring, and pull out the shaft from center differential assembly.



(A) Snap ring

(B) Shaft

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



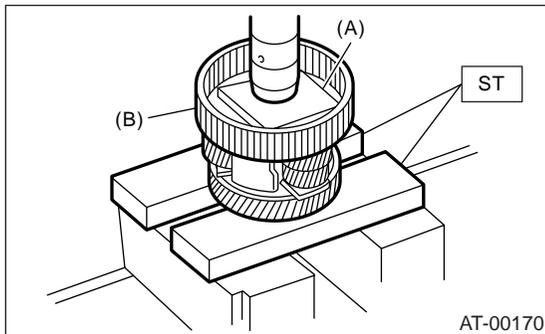
(A) Pinion gear

- 5) Pull out the intermediate shaft and thrust bearing.

D: ASSEMBLY

- 1) Install the thrust washer onto intermediate shaft.
- 2) Install the thrust bearing onto the intermediate shaft.
- 3) Install the pinion gears and washers.
- 4) Insert the shaft into center differential assembly.
- 5) Install the snap ring.
- 6) Using a press, install a new ball bearing into 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 the parts for hole, score, or dirt.
- Check the play of the extension end, and if necessary, adjust it. <Ref. to 4AT-90, VTD MODEL, ADJUSTMENT, Transfer Clutch.>