

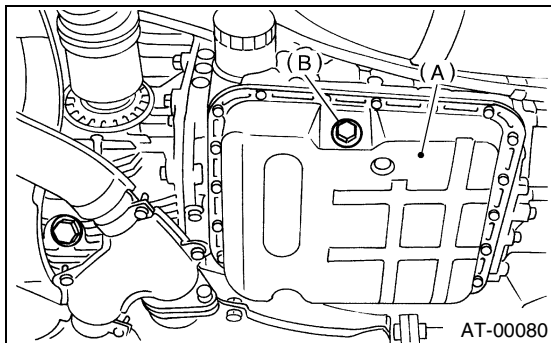
## 18. Shift Solenoids, Duty Solenoids and ATF Temperature Sensor

### A: REMOVAL

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

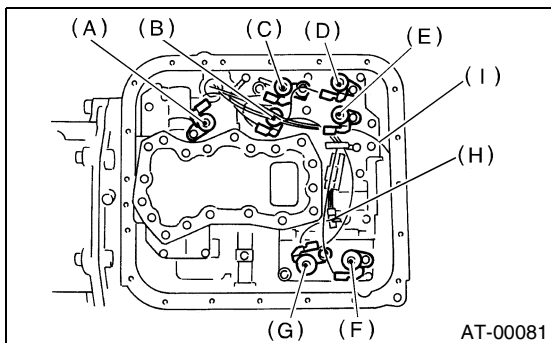
#### Tightening torque:

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



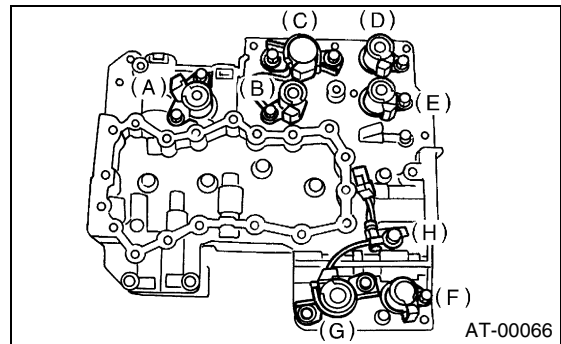
- (A) Oil pan
- (B) Drain plug

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



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

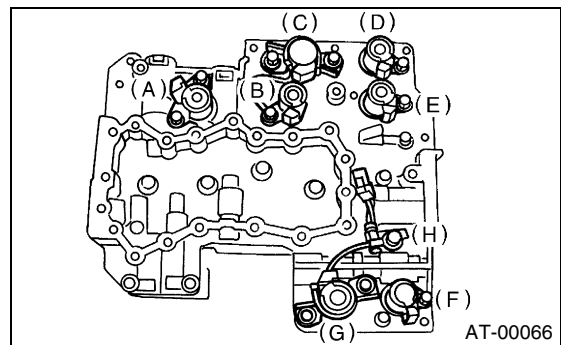
- 7) Remove the solenoids, duty solenoids and ATF temperature sensor.



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

### B: INSTALLATION

- 1) Insert the sensor, solenoid, duty solenoid to specified position.



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

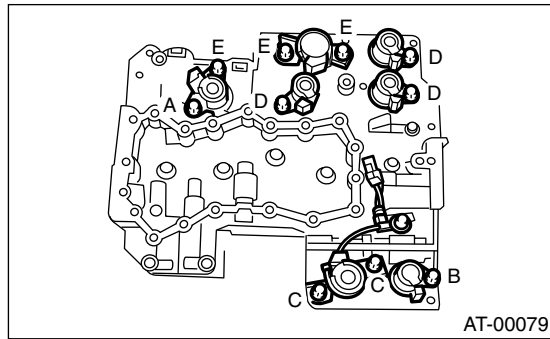
# SHIFT SOLENOIDS, DUTY SOLENOIDS AND ATF TEMPERATURE SENSOR

AUTOMATIC TRANSMISSION

2) Tighten the bolts and nuts.

**Tightening torque:**

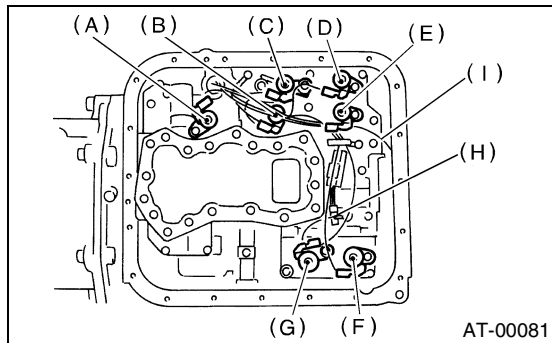
**8 N-m (0.8 kgf-m, 5.8 ft-lb)**



Bolt length mm (in)

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

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

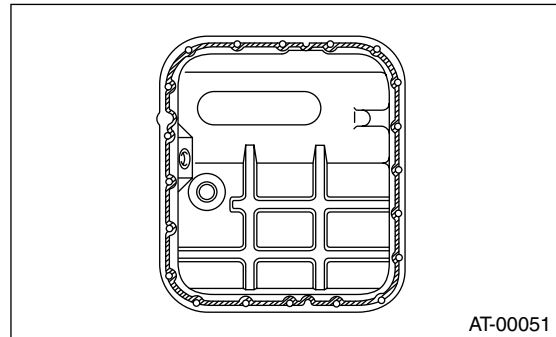


- (A) Lock-up duty solenoid (Blue)
- (B) Low clutch timing solenoid (Gray)
- (C) Line pressure duty solenoid (Red)
- (D) Shift solenoid 2 (Yellow)
- (E) Shift solenoid 1 (Green)
- (F) 2-4 brake timing solenoid (Black)
- (G) 2-4 brake duty solenoid (Red)
- (H) ATF temperature sensor
- (I) Transfer duty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

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

**Fluid packing:**

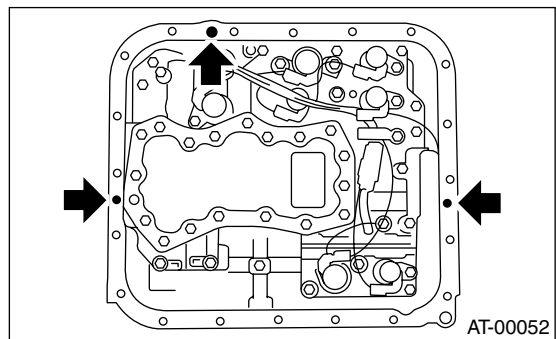
**THREE BOND 1217B (Part No. K0877YA020)**



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

**Fluid packing:**

**THREE BOND 1217B (Part No. K0877YA020)**



6) Install the oil pan.

**Tightening torque:**

**5 N-m (0.5 kgf-m, 3.6 ft-lb)**

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

8) Check the ATF level. <Ref. to AT-29, Automatic Transmission Fluid.>

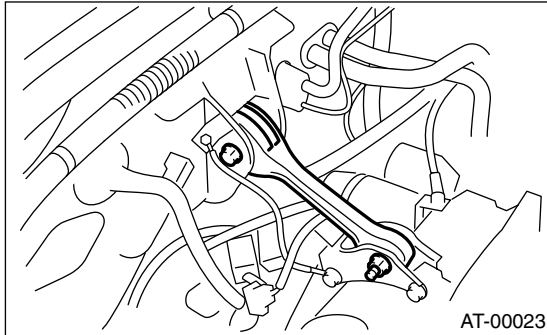
# TRANSFER DUTY SOLENOID AND VALVE BODY

AUTOMATIC TRANSMISSION

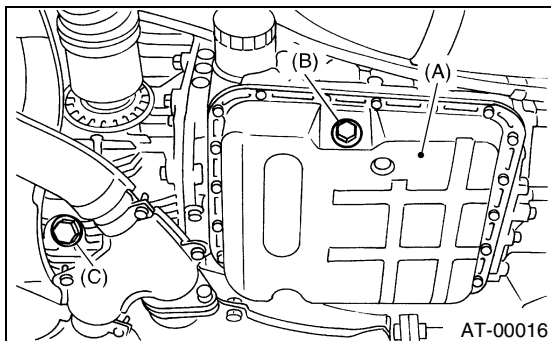
## 19. Transfer Duty Solenoid and Valve Body

### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Disconnect the ground cable from battery.
- 3) Remove the air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-6, INSTALLATION, Air Cleaner Case.>
- 4) Remove the intercooler. (Turbo model) <Ref. to IN(TURBO)-10, REMOVAL, Intercooler.>
- 5) Remove the pitching stopper.



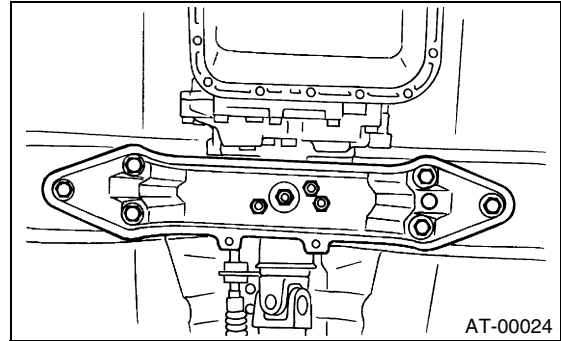
- 6) Remove the front exhaust pipe with center exhaust pipe. (Non-turbo model) <Ref. to EX(SOHC)-7, REMOVAL, Front Exhaust Pipe.>
- 7) Remove the rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(SOHC)-11, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-13, REMOVAL, Muffler.>
- 8) Remove the center, rear exhaust pipes and muffler. (Turbo model) <Ref. to EX(TURBO)-7, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(TURBO)-12, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(TURBO)-14, REMOVAL, Muffler.>
- 9) Raise the vehicle and drain the ATF.



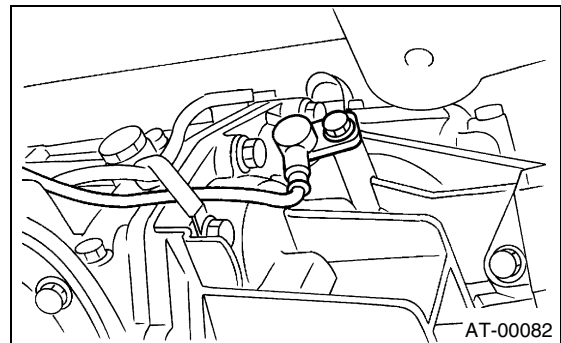
- (A) Oil pan
- (B) Drain plug
- (C) Differential oil drain plug

- 10) Remove the heat shield cover.
- 11) Remove the propeller shaft. <Ref. to DS-14, REMOVAL, Propeller Shaft.>
- 12) Remove the transmission rear crossmember.

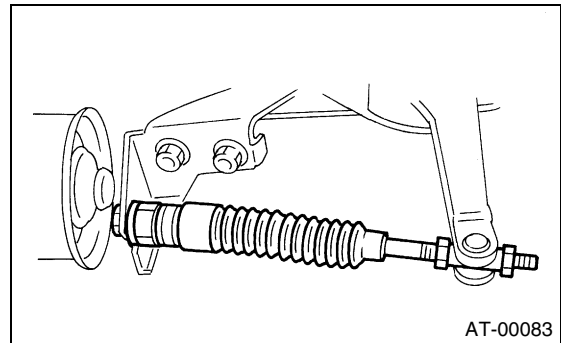
- (1) Support the transmission using a transmission jack and raise slightly.
- (2) Remove the bolts and nuts as shown in the figure.



- 13) Remove the rear vehicle speed sensor.



- 14) Remove the select cable nut.



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

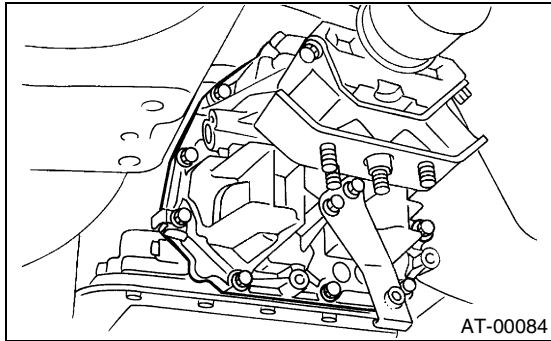
# TRANSFER DUTY SOLENOID AND VALVE BODY

AUTOMATIC TRANSMISSION

17) Remove the extension case.

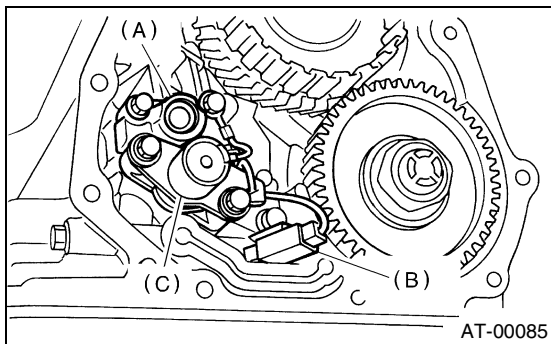
**NOTE:**

Use a container to catch oil flowing from extension.



18) Disconnect the transfer duty solenoid connector.

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



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

## B: INSTALLATION

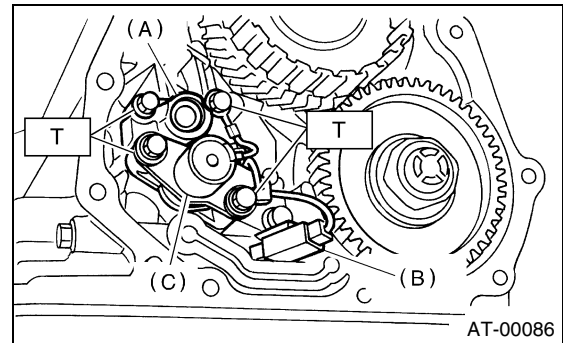
1) Install the transfer duty solenoid and transfer valve body.

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

**Tightening torque:**

**T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)**

(2) Connect the transfer duty solenoid connector.



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

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

(1) Tighten eleven bolts.

**Tightening torque:**

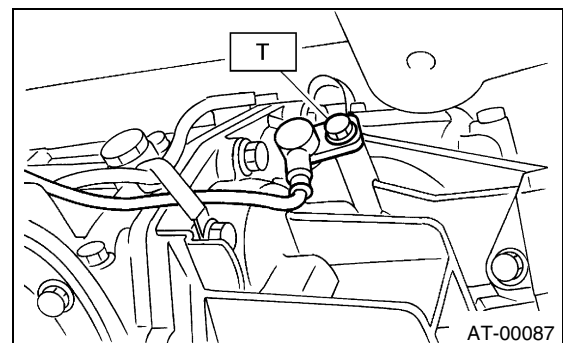
**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

(2) Adjust the select cable. <Ref. to CS-10, ADJUSTMENT, Select Cable.>

3) Install the rear vehicle speed sensor.

**Tightening torque:**

**T: 7 N·m (0.7 kgf-m, 5.1 ft-lb)**



# TRANSFER DUTY SOLENOID AND VALVE BODY

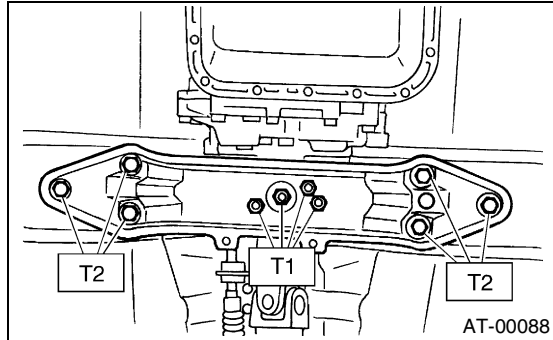
## AUTOMATIC TRANSMISSION

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

### Tightening torque:

**T1: 35 N·m (3.6 kgf-m, 26 ft-lb)**

**T2: 70 N·m (7.1 kgf-m, 51 ft-lb)**



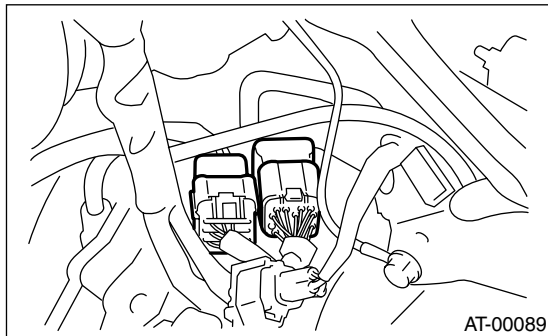
- (2) Remove the transmission jack.

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

6) Install the front, center rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(SOHC)-8, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(SOHC)-11, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(SOHC)-13, INSTALLATION, Muffler.>

7) Install the center, rear exhaust pipes and muffler. (Turbo model) <Ref. to EX(TURBO)-8, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(TURBO)-12, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(TURBO)-14, INSTALLATION, Muffler.>

- 8) Connect the transmission harness connector.

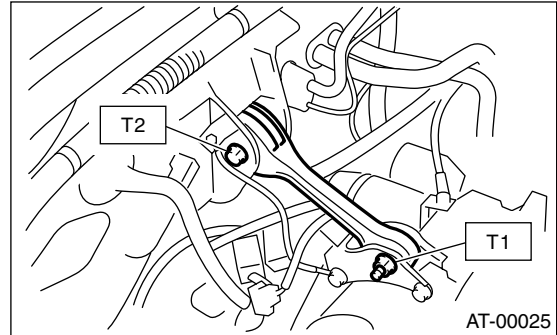


- 9) Install the pitching stopper.

### Tightening torque:

**T1: 50 N·m (5.1 kgf-m, 37 ft-lb)**

**T2: 58 N·m (5.9 kgf-m, 43 ft-lb)**



10) Install the air cleaner case. (Non-turbo model) <Ref. to IN(SOHC)-6, INSTALLATION, Air Cleaner Case.>

11) Install the intercooler. (Turbo model) <Ref. to IN(TURBO)-11, INSTALLATION, Intercooler.>

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

13) Check the ATF level. <Ref. to AT-29, Automatic Transmission Fluid.>

## 20.ATF Filter

### A: REMOVAL

**NOTE:**

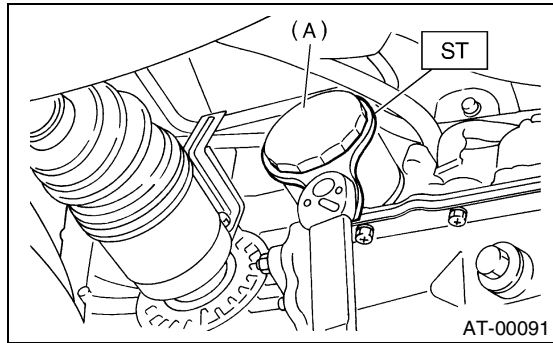
The ATF filter is maintenance free.

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

ST 498545400 OIL FILTER WRENCH

ST 18332AA000 OIL FILTER WRENCH

- 5) Inspect the level of ATF. <Ref. to AT-29, Automatic Transmission Fluid.>



(A) ATF filter

### B: INSTALLATION

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

ST 498545400 OIL FILTER WRENCH

ST 18332AA000 OIL FILTER WRENCH

- When using ST 18332AA000, tighten the ATF filter to 14 N·m (1.4 kgf·m, 10.1 ft·lb).
- When using ST 49854500, calculate the ATF filter torque specifications using the following formula.

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

T1: 14 N·m (1.4 kgf·m, 10.1 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST length 0.078 m (3.07 in)

L2: Torque wrench length

Example:

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

**NOTE:**

Align the ST with torque wrench while tightening ATF filter.

- 4) Add ATF.

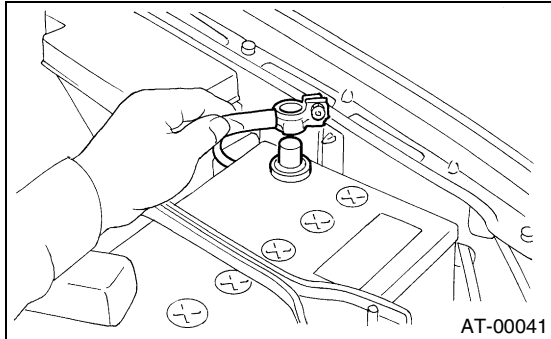
# TRANSMISSION CONTROL MODULE (TCM)

AUTOMATIC TRANSMISSION

## 21. Transmission Control Module (TCM)

### A: REMOVAL

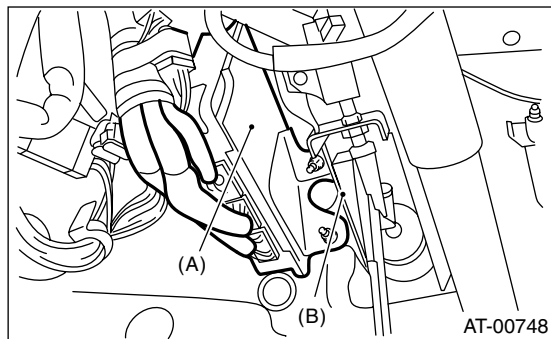
1) Disconnect the ground cable from battery.



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

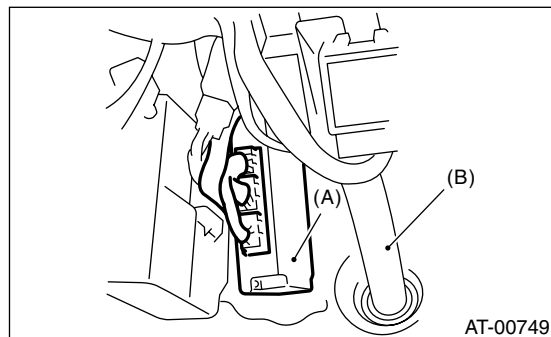
3) Disconnect the connectors from transmission control module.

#### • LHD MODEL



(A) Transmission control module  
(B) Brake pedal

#### • RHD MODEL



(A) Transmission control module  
(B) Steering column

4) Remove the transmission control module.

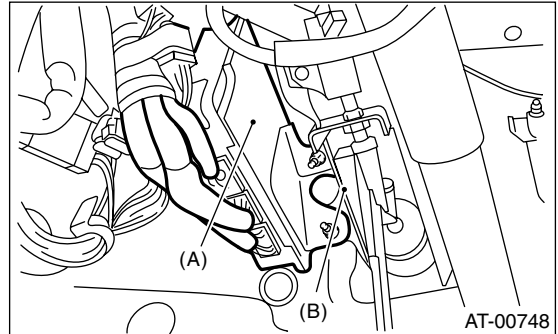
### B: INSTALLATION

1) Install the transmission control module.

#### • LHD MODEL

**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**

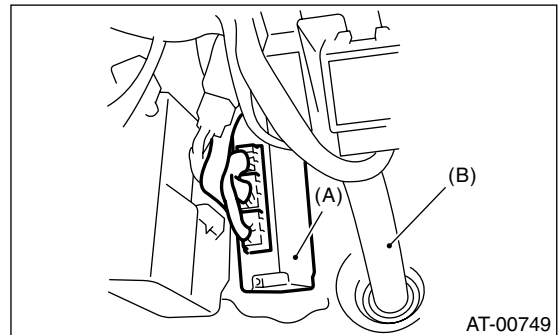


(A) Transmission control module  
(B) Brake pedal

#### • RHD MODEL

**Tightening torque:**

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**



(A) Transmission control module  
(B) Steering column

2) Connect the connectors to transmission control module.

3) Install in the reverse order of removal.

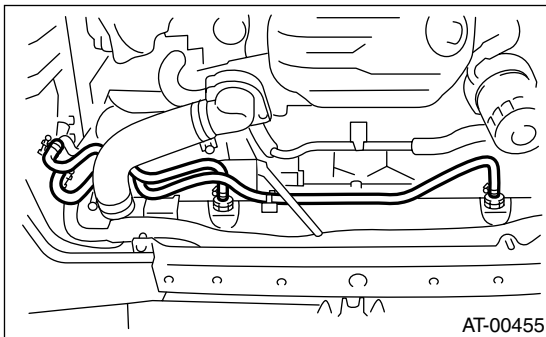
## 22. ATF Cooler Pipe and Hose

### A: REMOVAL

- 1) Set the vehicle on a lift.
- 2) Remove the battery and washer tank.
- 3) Disconnect the ATF cooler hose from radiator.  
(Turbo model)
  - (1) Remove the radiator. <Ref. to CO(SOHC)-28, TURBO MODEL, REMOVAL, Radiator.>
  - (2) Remove the radiator under cover.
  - (3) Disconnect the ATF cooler hose from radiator.
- 4) Lift-up the vehicle.
- 5) Remove the under cover.
- 6) Disconnect the ATF cooler hose from radiator.

**NOTE:**

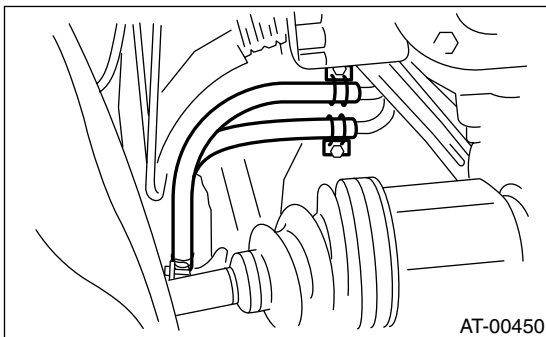
- Do not remove with a screwdriver or other pointed tools.
- When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.



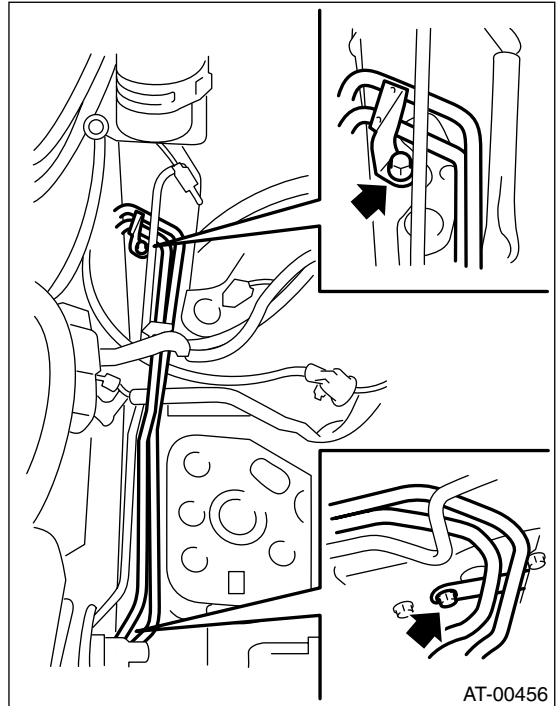
- 7) Disconnect the ATF cooler hoses from pipes.

**NOTE:**

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



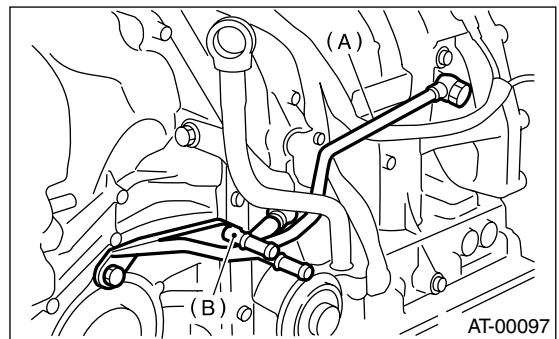
- 8) Disconnect the ATF cooler pipe from frame.



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

**NOTE:**

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



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



# ATF COOLER PIPE AND HOSE

## AUTOMATIC TRANSMISSION

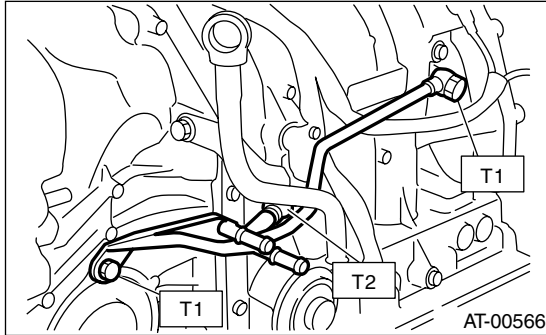
### B: INSTALLATION

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

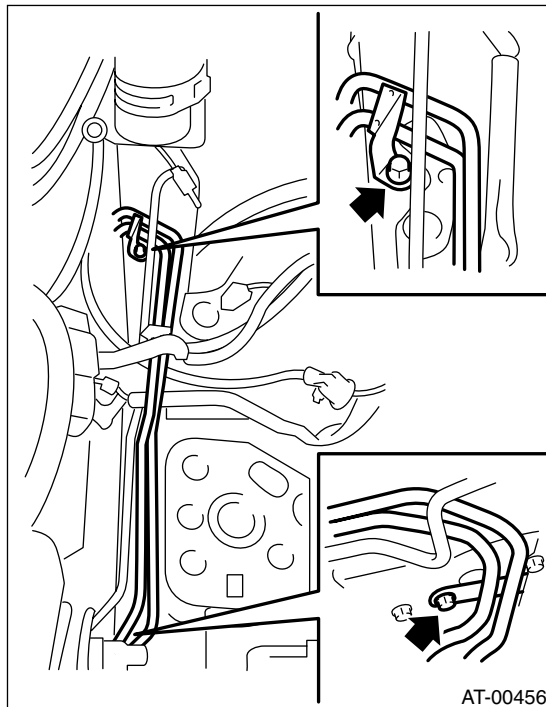
#### Tightening torque:

**T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)**

**T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)**



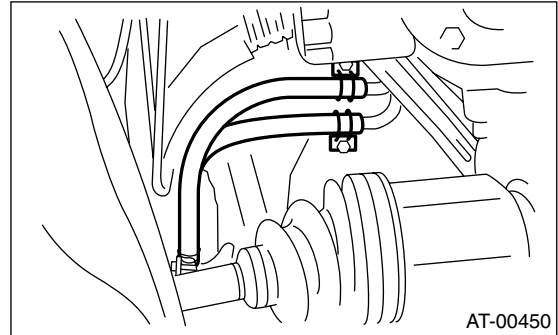
2) Install the ATF cooler pipe to frame.



3) Connect the ATF cooler hose to pipe transmission side.

#### NOTE:

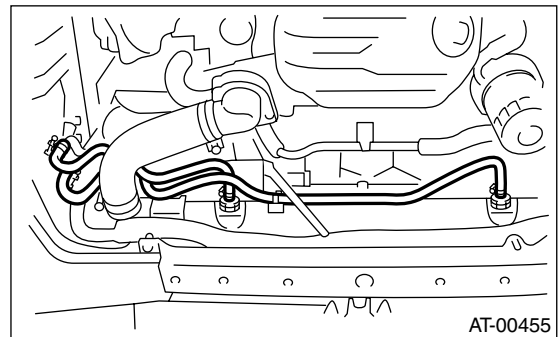
- Install so that the hose is not folded over, excessively bent, or twisted.
- Be careful to insert the hose to the specified position.



4) Connect the ATF cooler hose to the pipe of radiator side. (Non-turbo model)

#### NOTE:

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



5) Connect the ATF cooler hose to radiator. (Turbo model)

- (1) Connect the ATF cooler hose to radiator.
- (2) Install the radiator under cover.
- (3) Install the radiator. <Ref. to CO(SOHC)-31, TURBO MODEL, INSTALLATION, Radiator.>

6) Install the under cover.

7) Install the battery and washer tank.

8) Fill ATF. <Ref. to AT-29, Automatic Transmission Fluid.>

#### NOTE:

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

## **C: INSPECTION**

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

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

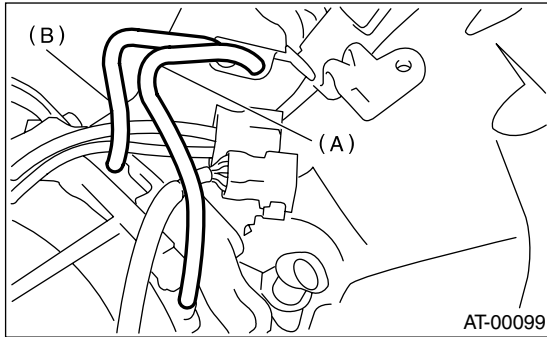
# AIR BREATHER HOSE

AUTOMATIC TRANSMISSION

## 23. Air Breather Hose

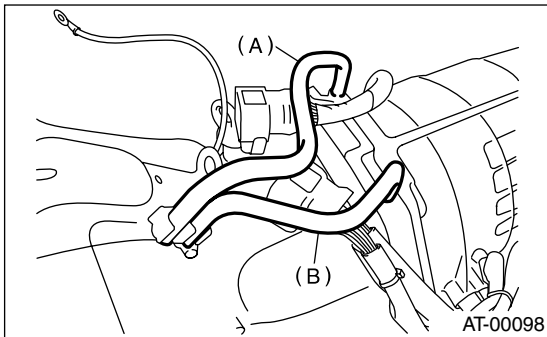
### A: REMOVAL

- 1) Remove the air cleaner case. (Non-turbo model)  
<Ref. to IN(SOHC)-6, REMOVAL, Air Cleaner Case.>
  - 2) Remove the intercooler. (Turbo model) <Ref. to IN(TURBO)-10, REMOVAL, Intercooler.>
  - 3) Disconnect the air breather hoses.
- NON-TURBO MODEL



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

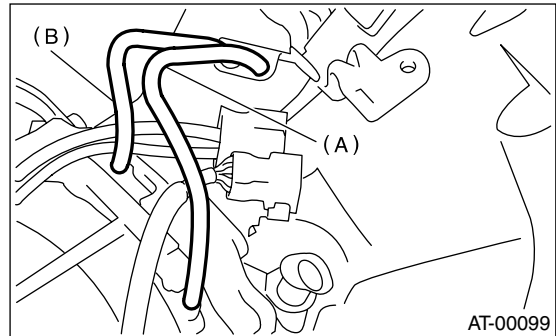
- TURBO MODEL



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

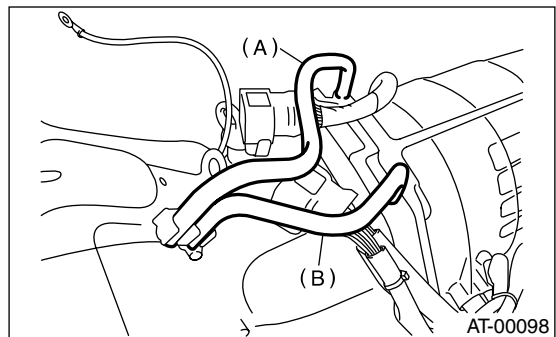
### B: INSTALLATION

- 1) Install the air breather hoses.
- NON-TURBO MODEL



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

- TURBO MODEL



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

- 2) Install the air cleaner case. (Non-turbo model)  
<Ref. to IN(SOHC)-6, INSTALLATION, Air Cleaner Case.>
- 3) Install the intercooler. (Turbo model)  
<Ref. to IN(TURBO)-11, INSTALLATION, Intercooler.>

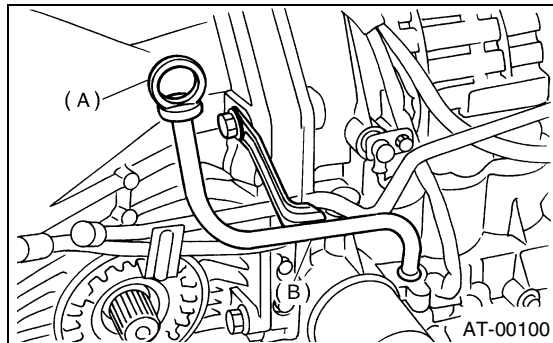
### C: INSPECTION

Make sure the hose is not cracked or clogged.

## 24.Oil Charger Pipe

### A: REMOVAL

- 1) Remove the air cleaner case. (Non-turbo model)  
<Ref. to IN(SOHC)-6, REMOVAL, Air Cleaner Case.>
- 2) Remove the intercooler. (Turbo model) <Ref. to IN(TURBO)-10, REMOVAL, Intercooler.>
- 3) Remove the oil charger pipe, and remove the O-ring from flange face.



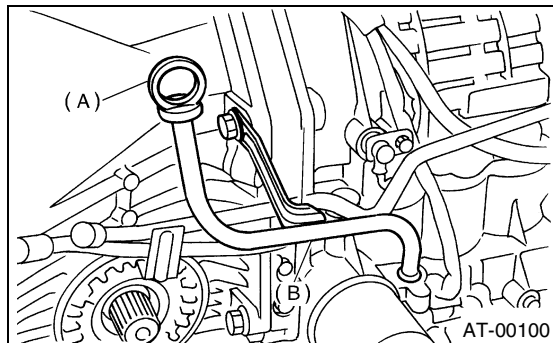
- (A) Oil level gauge  
(B) Oil charger pipe

### B: INSTALLATION

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

#### **Tightening torque:**

**41 N·m (4.2 kgf·m, 30.4 ft-lb)**



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

- 2) Install the air cleaner case. (Non-turbo model)  
<Ref. to IN(SOHC)-6, INSTALLATION, Air Cleaner Case.>
- 3) Install the intercooler. (Turbo model) <Ref. to IN(TURBO)-11, INSTALLATION, Intercooler.>

### C: INSPECTION

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

# TORQUE CONVERTER CLUTCH ASSEMBLY

## AUTOMATIC TRANSMISSION

### 25. Torque Converter Clutch Assembly

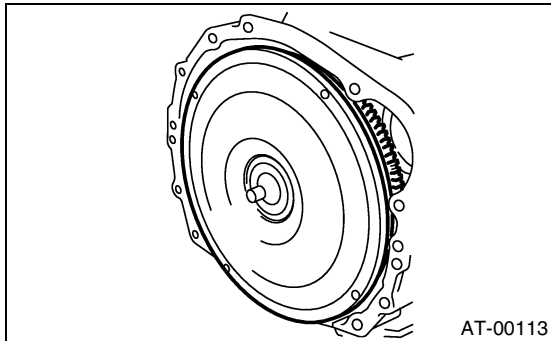
#### A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to AT-38, REMOVAL, Automatic Transmission Assembly.>

2) Extract the torque converter clutch horizontally.

#### NOTE:

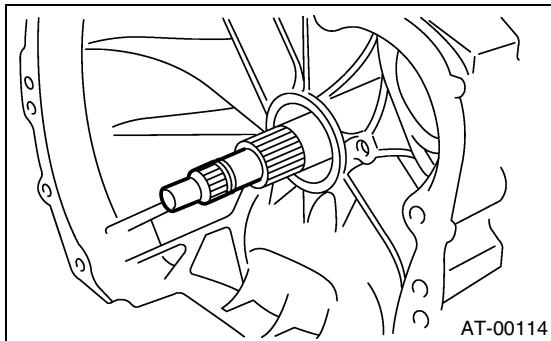
- Be careful not to scratch the bushing inside oil pump shaft.
- Note that oil pump shaft also comes out.



3) Remove the input shaft.

#### NOTE:

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



4) Extract the oil pump shaft from torque converter clutch.

5) Remove the clip from torque converter clutch.

#### B: INSTALLATION

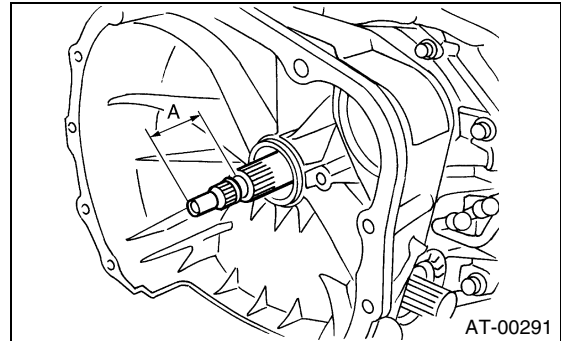
1) Install the clip to torque converter clutch.

2) Install the oil pump shaft to torque converter clutch, and then check the clip fits securely in its groove.

3) Insert the input shaft while turning lightly by hand.

#### Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



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

5) Rotate the shaft lightly by hand to engage the splines securely.

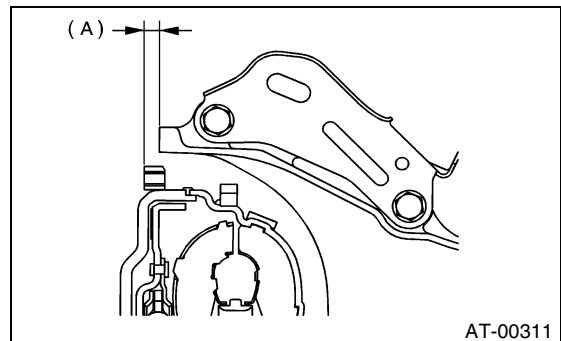
#### Dimension A:

##### Non-turbo model

-1.3 — -1.1 mm (-0.051 — -0.043 in)

##### Turbo model

2.7 — 2.9 mm (0.106 — 0.114 in)



(A) Dimension A

6) Install the transmission assembly to vehicle. <Ref. to AT-40, INSTALLATION, Automatic Transmission Assembly.>

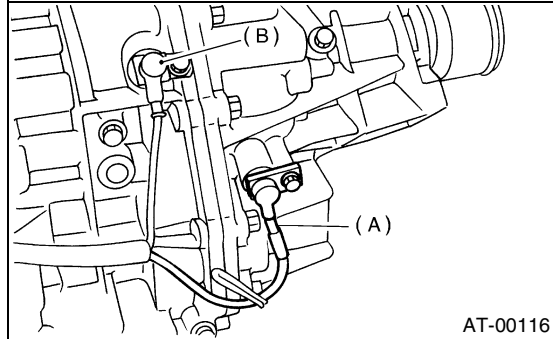
#### C: INSPECTION

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

## 26.Extension Case

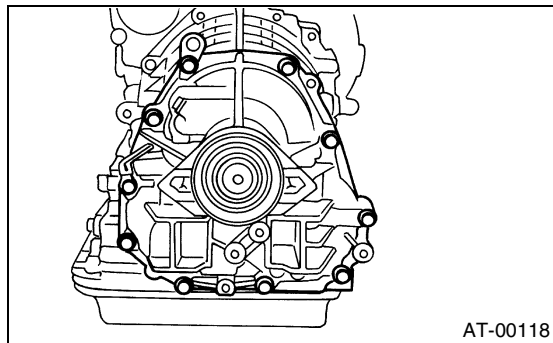
### A: REMOVAL

- 1) Remove the transmission assembly. <Ref. to AT-38, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor.



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

- 3) Separate the transmission case and extension case sections.



### B: INSTALLATION

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

**NOTE:**

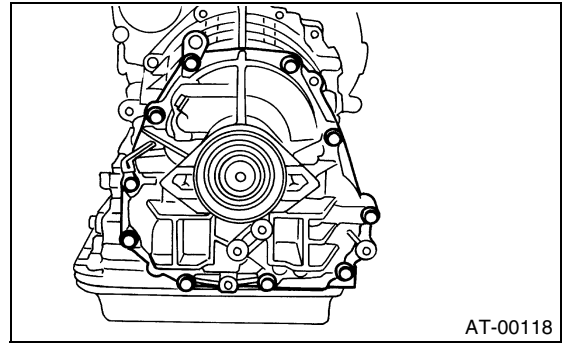
Install the thrust needle bearing in correct direction.

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

- 4) Tighten the bolts to secure extension case.

**Tightening torque:**

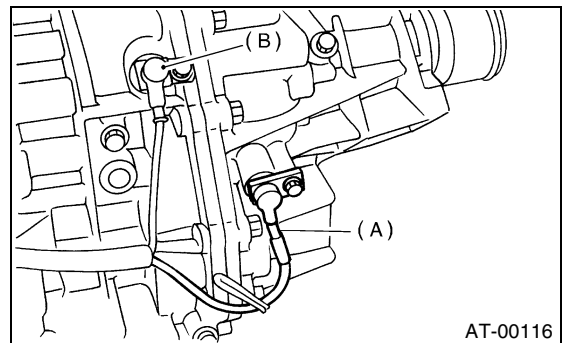
**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



- 5) Install the rear vehicle speed sensor.

**Tightening torque:**

**7 N·m (0.7 kgf-m, 5.1 ft-lb)**



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

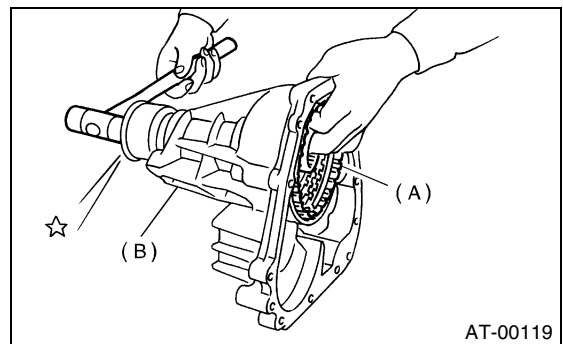
- 6) Install the transmission assembly. <Ref. to AT-40, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

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

**NOTE:**

Be careful not to damage the oil seal in extension.

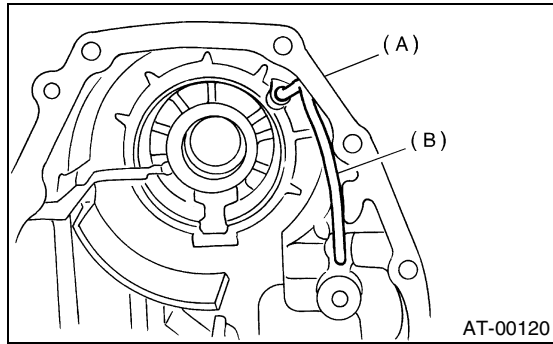


- (A) Extension case
- (B) Transfer clutch

# EXTENSION CASE

## AUTOMATIC TRANSMISSION

2) Remove the transmission clutch pipe without bending pipe.



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

3) Remove the dust cover from extension case.  
4) Remove the oil seal from extension case.

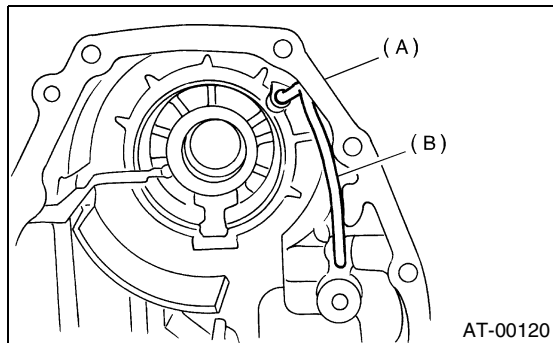
### D: ASSEMBLY

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

ST 498057300 INSTALLER

2) Press in the dust cover.

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

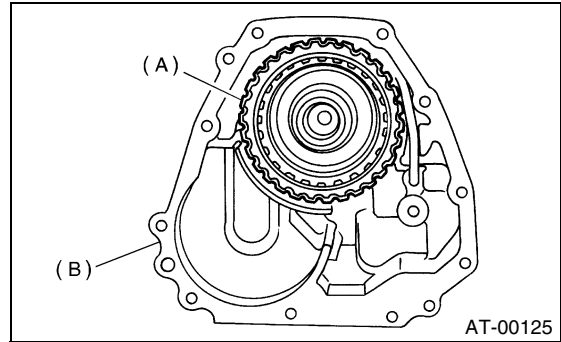


- (A) Extension case
- (B) Transfer clutch pipe

4) Install the transfer clutch assembly to extension case.

### NOTE:

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



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

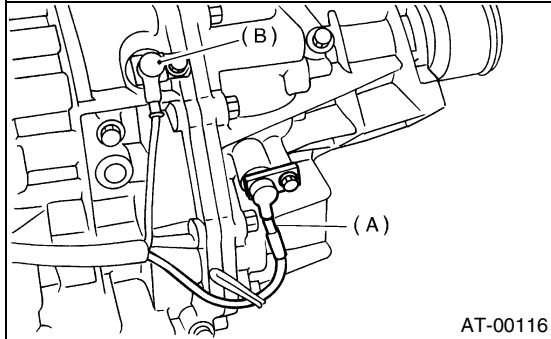
### E: INSPECTION

- Use forced air to make sure the transfer pipe and extension case routes are not clogged and do not leak.
- Measure the extension end play and adjust it to within specifications. <Ref. to AT-83, ADJUSTMENT, Transfer Clutch.>

## 27. Transfer Clutch

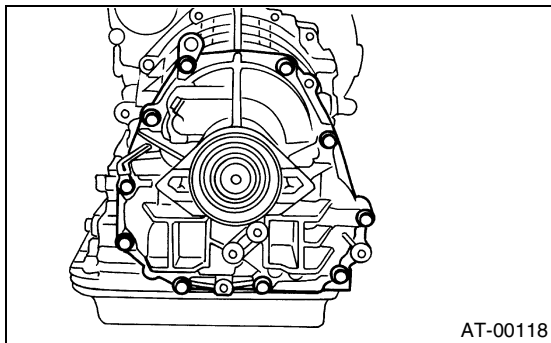
### A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to AT-38, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor.

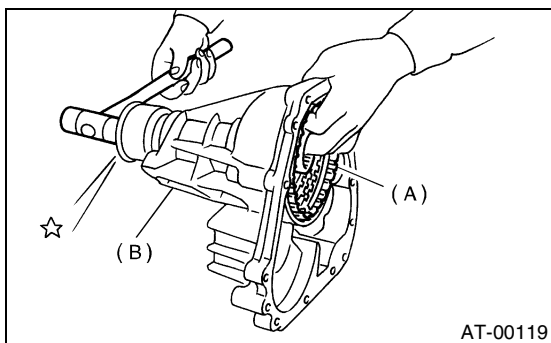


- (A) Rear vehicle speed sensor
- (B) Front vehicle speed sensor

- 3) Separate the transmission case and extension case sections.



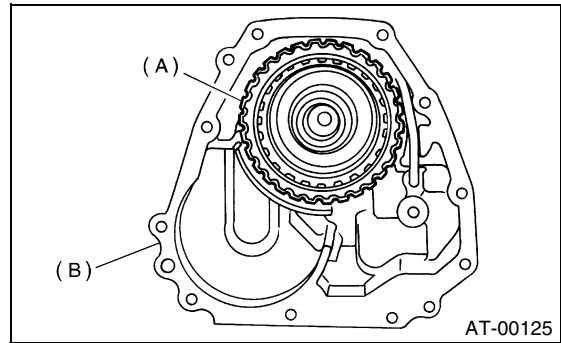
- 4) Take out the transfer clutch by lightly tapping the end of rear drive shaft.



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

### B: INSTALLATION

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

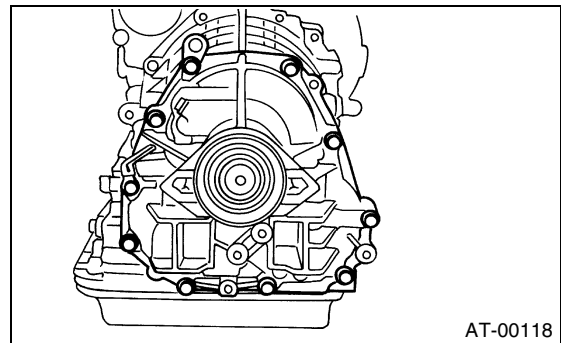


- (A) Transfer clutch
- (B) Extension case

- 3) Tighten the bolts to secure extension case.

#### Tightening torque:

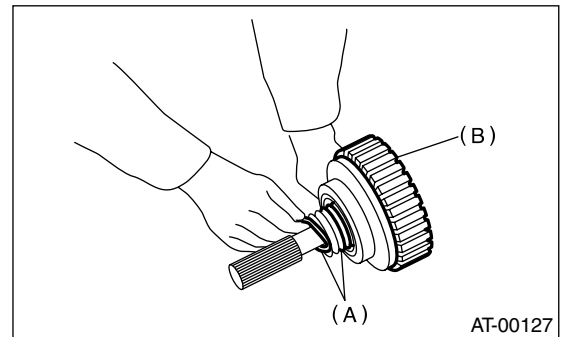
**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



- 4) Install the transmission assembly to vehicle. <Ref. to AT-40, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

- 1) Remove the seal ring.



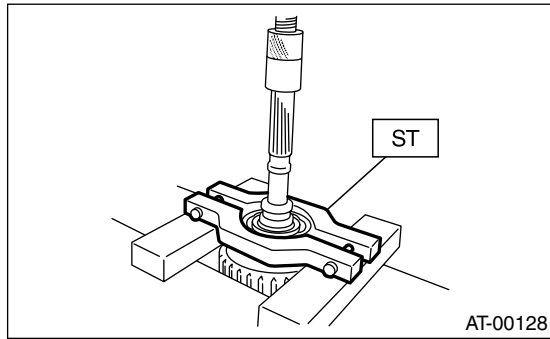
- (A) Seal ring
- (B) Transfer clutch



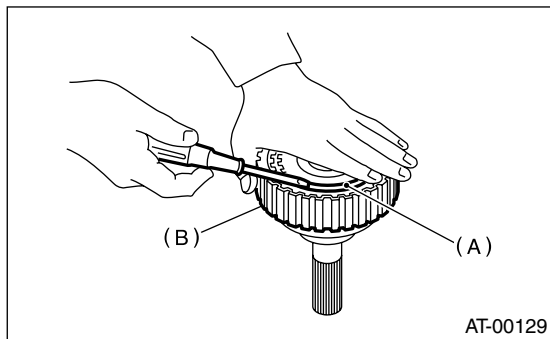
# TRANSFER CLUTCH

## AUTOMATIC TRANSMISSION

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



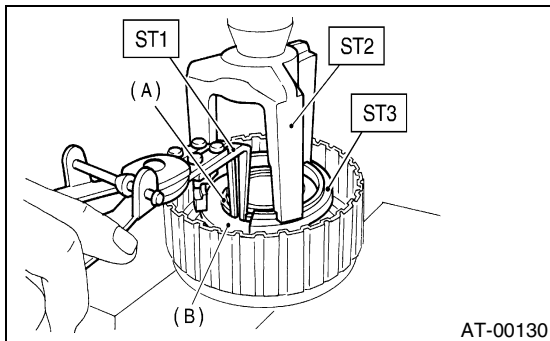
3) Remove the snap ring, and take out the pressure plate, drive plates and driven plates.



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

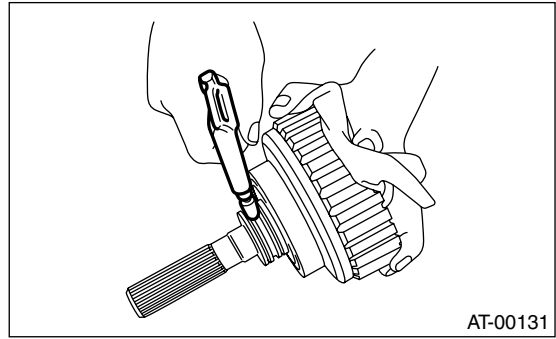
4) Remove the snap ring with ST1, ST2 and ST3, and take out the return spring and transfer clutch piston seal.

ST1 399893600 PLIERS  
ST2 398673600 COMPRESSOR  
ST3 398623600 SEAT



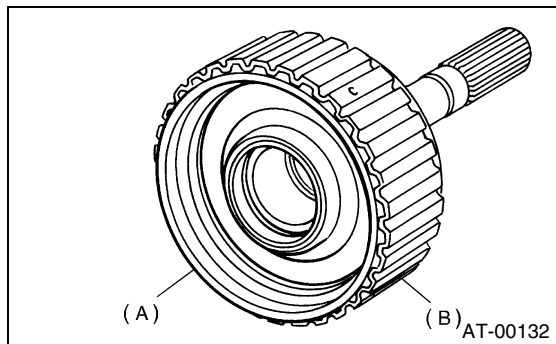
- (A) Snap ring
- (B) Transfer piston seal

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



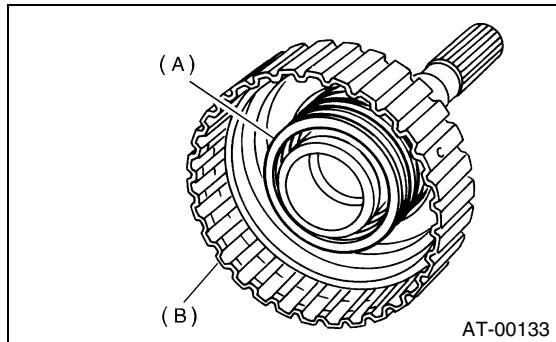
## D: ASSEMBLY

1) Install the transfer clutch piston.



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

2) Install the return spring to transfer piston.

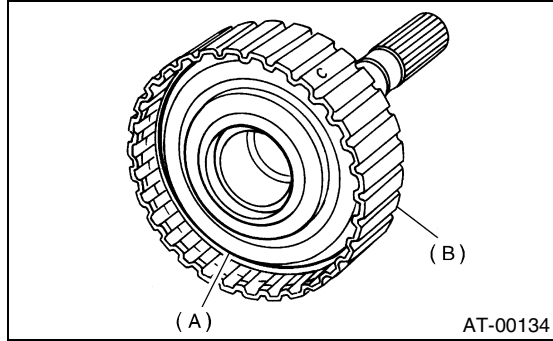


- (A) Return spring
- (B) Rear drive shaft

# TRANSFER CLUTCH

AUTOMATIC TRANSMISSION

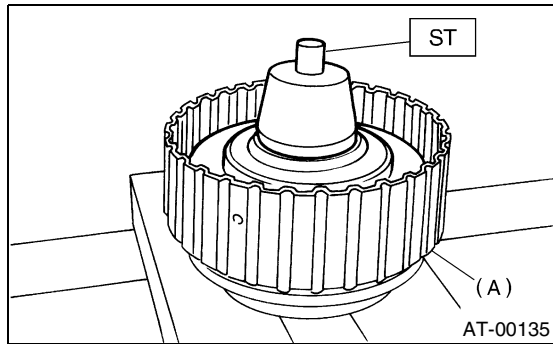
3) Install the transfer clutch piston seal.



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

4) Install the ST to rear drive shaft.

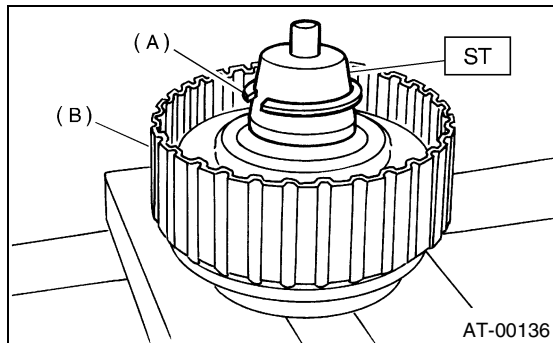
ST 499257300 SNAP RING OUTER GUIDE



- (A) Transfer clutch

5) Install the snap ring to ST.

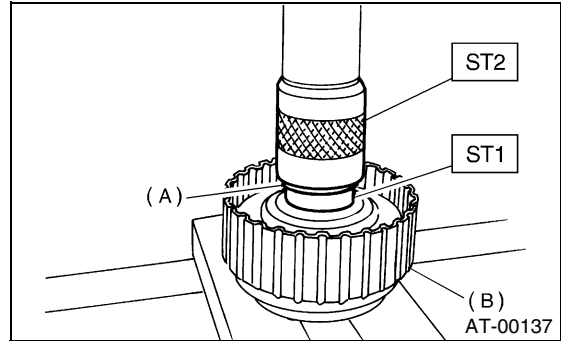
ST 499257300 SNAP RING OUTER GUIDE



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

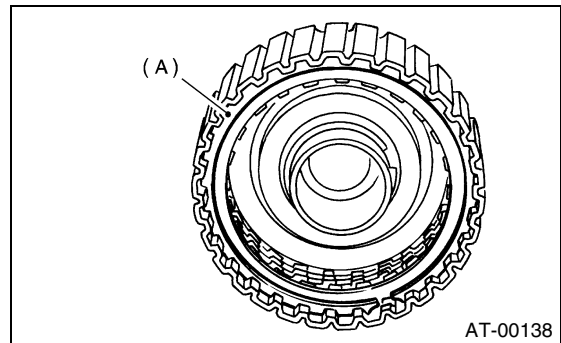
6) Using the ST1 and ST2, install the snap ring to rear drive shaft.

ST1 499257300 SNAP RING OUTER GUIDE  
ST2 499247400 INSTALLER



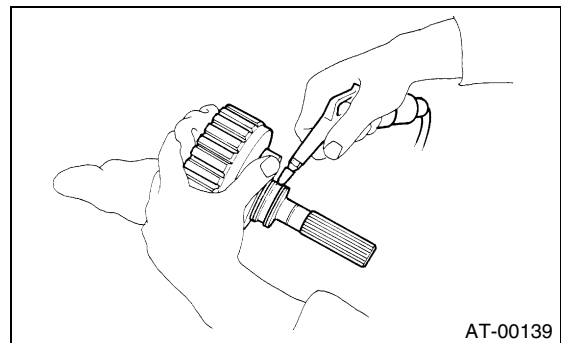
- (A) Snap ring
- (B) Transfer clutch

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



- (A) Snap ring

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

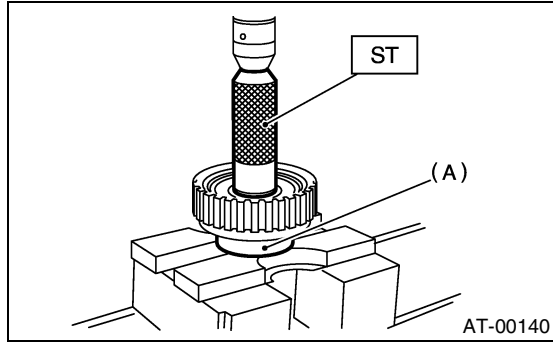


9) Check the clearance between snap ring and pressure plate. <Ref. to AT-82, INSPECTION, Transfer Clutch.>

# TRANSFER CLUTCH

## AUTOMATIC TRANSMISSION

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

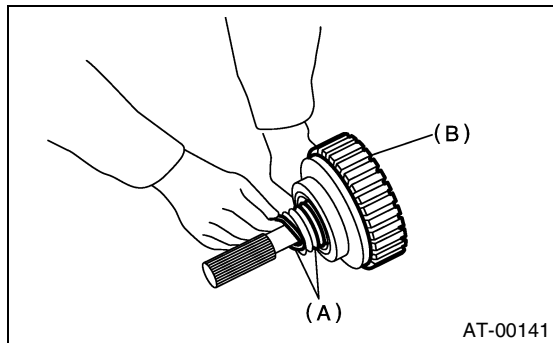


(A) Ball bearing

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

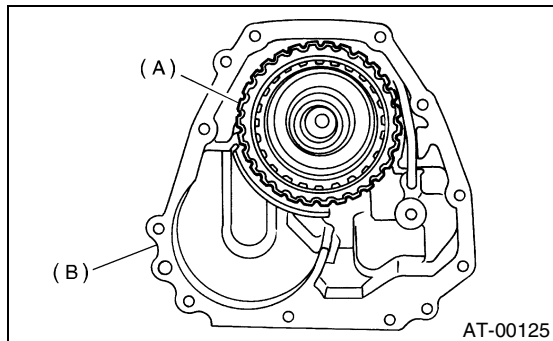
### NOTE:

Do not expand the seal ring excessively when installing.



(A) Snap ring  
(B) Transfer clutch

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



(A) Transfer clutch  
(B) Extension case

## E: INSPECTION

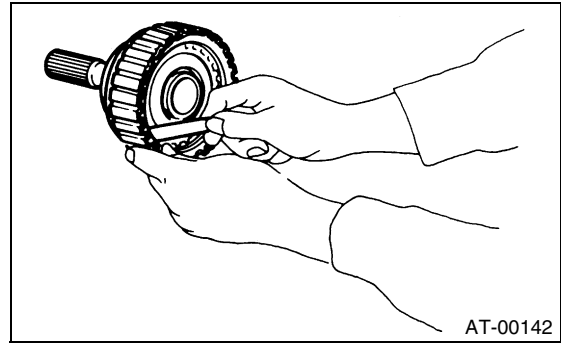
- Check the drive plate facing for wear and damage.
- Check the snap ring for wear, the return spring for permanent set, breakage and deformation.
- Check the lathe cut ring for damage.
- Measure the extension end play and adjust it within specifications. <Ref. to AT-83, ADJUSTMENT, Transfer Clutch.>
  - 1) Inspect the clearance between snap ring and pressure plate.
  - 2) Before measuring the clearance, place the same thickness of shim on both sides to prevent pressure plate from tilting.
  - 3) If the clearance is not within specification, adjust it by selecting a suitable pressure plate on the transfer clutch piston side.

### Standard value:

**0.7 — 1.1 mm (0.028 — 0.043 in)**

### Allowable limit:

**1.6 mm (0.063 in)**



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

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

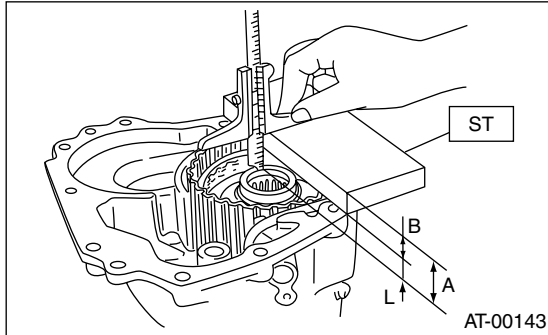
## F: ADJUSTMENT

1) Measure the distance “L” from end of extension case and rear drive shaft with ST.

ST 398643600 GAUGE

L = Measured value – 15 mm

(L = Measured value – 0.59 in)



A: Measured value

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

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

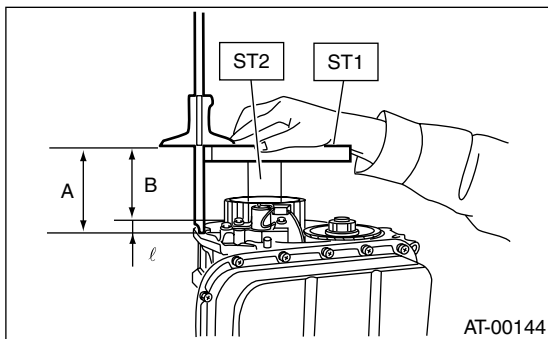
2) Measure the distance “ $\varnothing$ ” from the transmission case mating surface to the reduction drive gear end surface with ST1 and ST2.

$\varnothing$  = Measured value – 50 mm

( $\varnothing$  = Measured value – 1.97 in)

ST1 398643600 GAUGE

ST2 499577000 GAUGE



A: Measured value

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

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

3) Calculation equation:

NOTE:

Calculate “H”:

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

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

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

T: Thrust needle bearing thickness

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

0.45 mm (0.0177 in): Gasket thickness

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

H: Shim clearance

0.05 — 0.25 mm (0.0020 — 0.0098 in)

Example:

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

Calculation when the clearance is 0.05 mm (0.0020 in)

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

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

Calculation when the clearance is 0.25 mm (0.0098 in)

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

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

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

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

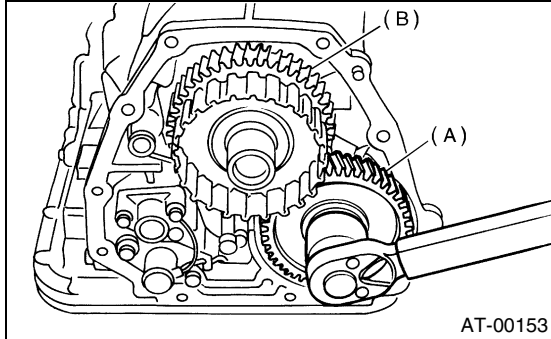
# REDUCTION DRIVEN GEAR

AUTOMATIC TRANSMISSION

## 28.Reduction Driven Gear

### A: REMOVAL

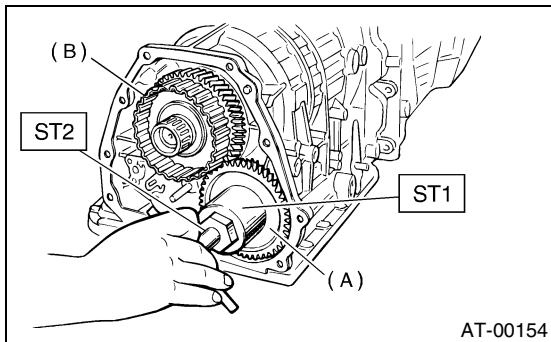
- 1) Remove the transmission assembly from vehicle. <Ref. to AT-38, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to AT-77, REMOVAL, Extension Case.>
- 3) Set the select lever to "P" range.
- 4) Straighten the staked portion, and remove the lock nut.



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

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

ST1 499737000 PULLER  
ST2 899524100 PULLER SET

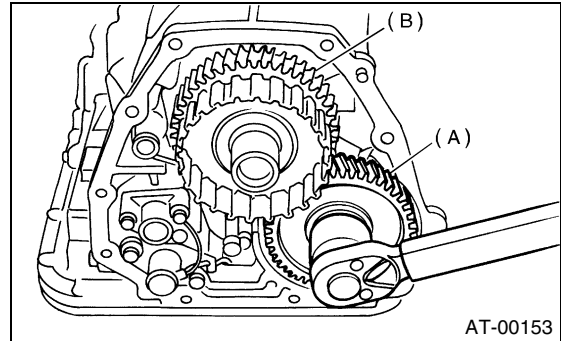


- (A) Reduction driven gear
- (B) Reduction drive gear

### B: INSTALLATION

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

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

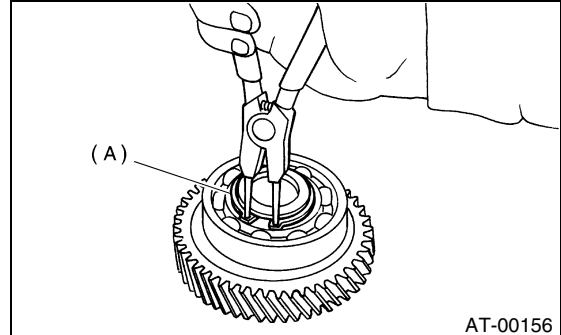


- (A) Reduction driven gear
- (B) Reduction drive gear

- 3) After tightening, stake the lock nut securely.
- 4) Combine the transmission case with extension case, and install the rear vehicle speed sensor. <Ref. to AT-77, Installation.>
- 5) Install the transmission assembly to vehicle. <Ref. to AT-40, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

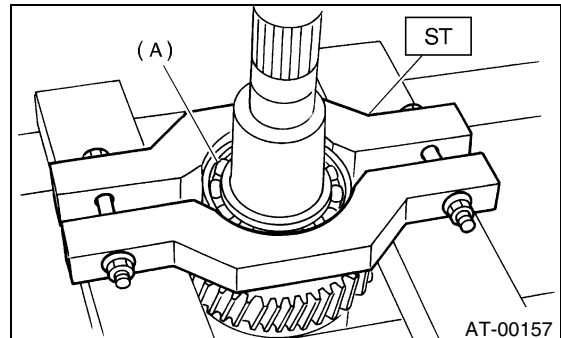
- 1) Remove the snap ring from reduction driven gear.



- (A) Snap ring

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

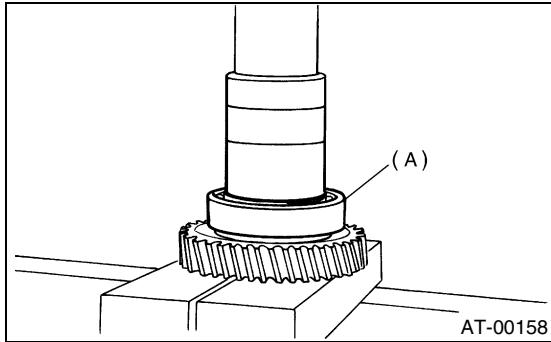
ST 498077600 REMOVER



- (A) Ball bearing

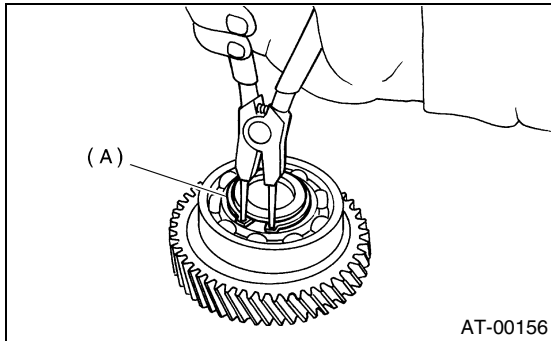
## D: ASSEMBLY

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



(A) Ball bearing

2) Install the snap ring to reduction driven gear.



(A) Snap ring

## E: INSPECTION

Check the ball bearing and gear for dents or damage.

# REDUCTION DRIVE GEAR

AUTOMATIC TRANSMISSION

## 29.Reduction Drive Gear

### A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to AT-38, REMOVAL, Automatic Transmission Assembly.>

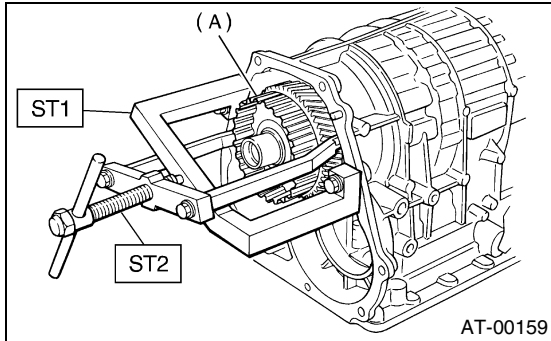
2) Remove the rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to AT-77, REMOVAL, Extension Case.>

3) Remove the reduction driven gear. <Ref. to AT-84, REMOVAL, Reduction Driven Gear.>

4) Using ST, extract the reduction drive gear.

ST1 499737100 PULLER

ST2 899524100 PULLER SET



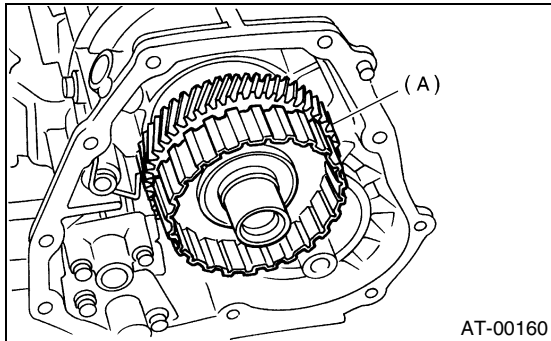
(A) Reduction drive gear

### B: INSTALLATION

1) Install the reduction drive gear assembly.

NOTE:

Insert it fully into position until the bearing shoulder bottoms.



(A) Reduction drive gear

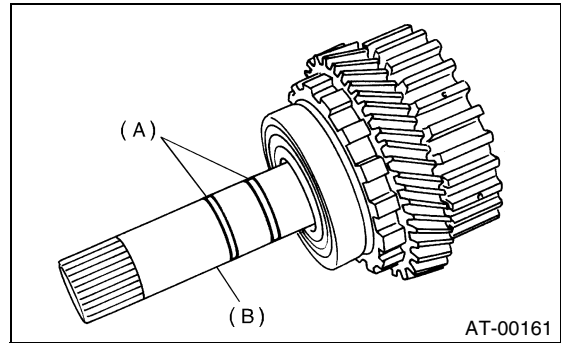
2) Install the reduction driven gear. <Ref. to AT-84, INSTALLATION, Reduction Driven Gear.>

3) Combine the transmission case with extension case, and install the rear vehicle speed sensor. <Ref. to AT-77, Installation.>

4) Install the transmission assembly to vehicle. <Ref. to AT-40, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

1) Take out the seal rings.

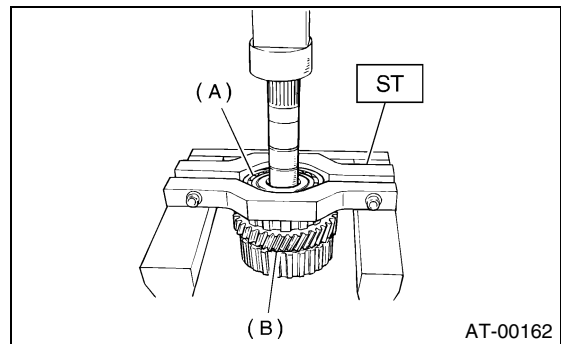


(A) Seal rings

(B) Reduction drive shaft

2) Using the ST, remove the ball bearing.

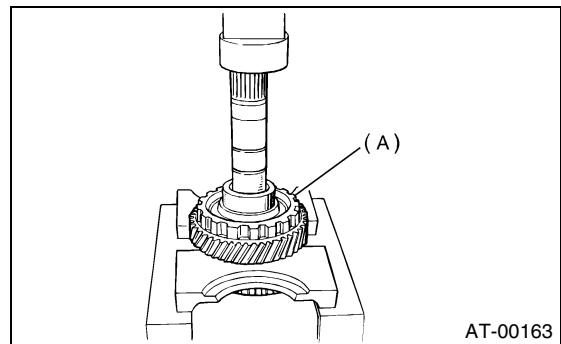
ST 498077600 REMOVER



(A) Ball bearing

(B) Reduction drive gear

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



(A) Reduction drive gear

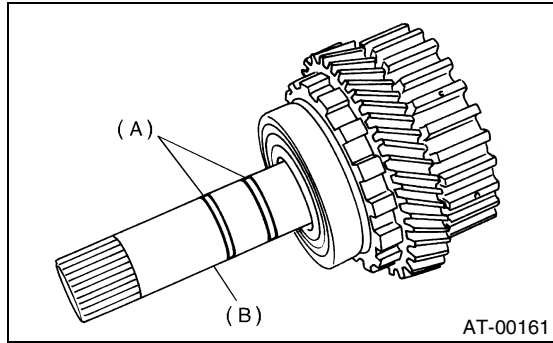
### D: ASSEMBLY

1) Press-fit the reduction drive gear to shaft.

2) Press-fit the a new ball bearing to reduction drive gear.

3) Apply vaseline to the outer surface of seal ring and shaft groove.

4) Attach new seal rings.



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

## E: INSPECTION

- Rotate the bearing by hand, make sure it rotates smoothly.
- Make sure that each component is free of harmful gouges, cuts, or dust.
- Measure the extension end play and adjust it to within specifications.<Ref. to AT-83, ADJUSTMENT, Transfer Clutch.>



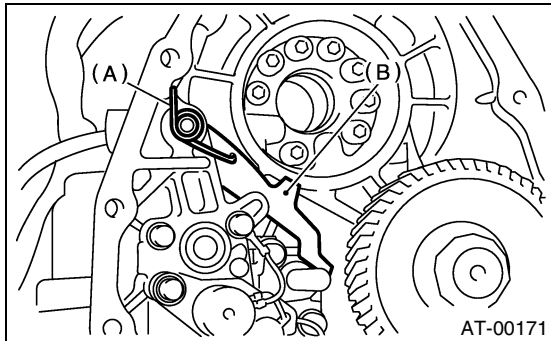
# PARKING PAWL

## AUTOMATIC TRANSMISSION

### 30. Parking Pawl

#### A: REMOVAL

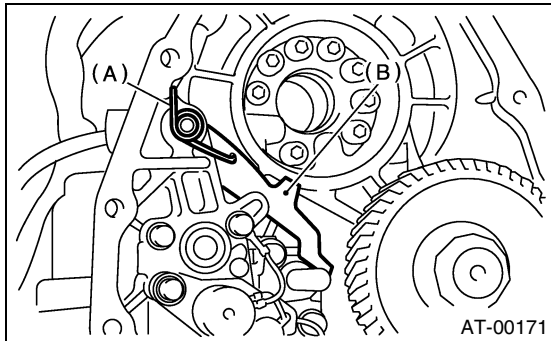
- 1) Remove the transmission assembly from vehicle. <Ref. to AT-38, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor and separate the transmission case and extension case sections. <Ref. to AT-77, REMOVAL, Extension Case.>
- 3) Remove the reduction drive gear. <Ref. to AT-86, REMOVAL, Reduction Drive Gear.>
- 4) Remove the parking pawl, return spring and shaft.



- (A) Return spring
- (B) Parking pawl

#### B: INSTALLATION

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



- (A) Return spring
- (B) Parking pawl

- 2) Install the reduction drive gear. <Ref. to AT-86, INSTALLATION, Reduction Drive Gear.>
- 3) Install the rear vehicle speed sensor and extension case. <Ref. to AT-77, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly to vehicle. <Ref. to AT-40, INSTALLATION, Automatic Transmission Assembly.>

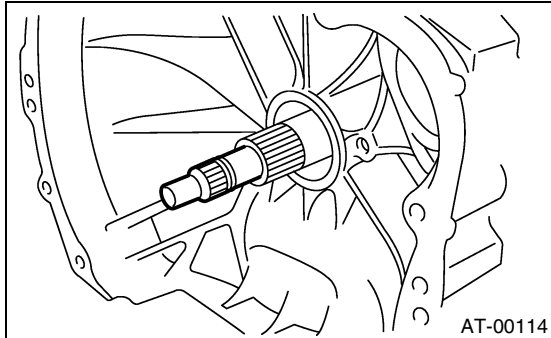
#### C: INSPECTION

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

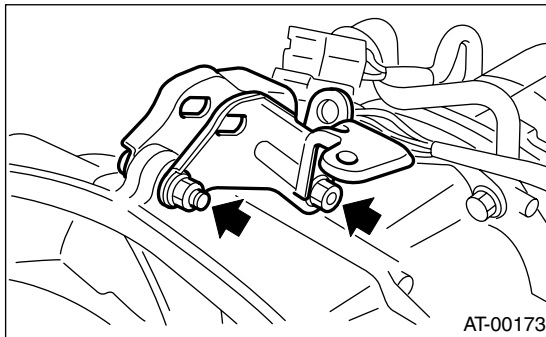
## 31. Torque Converter Clutch Case

### A: REMOVAL

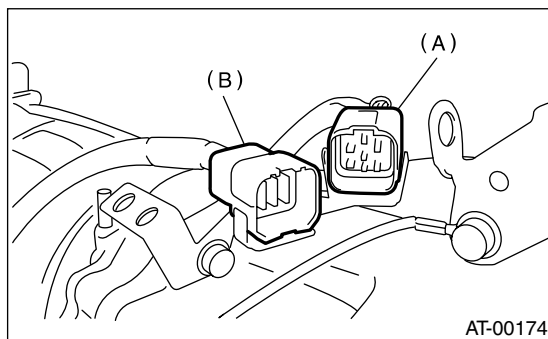
- 1) Remove the transmission assembly from vehicle. <Ref. to AT-38, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-76, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Remove the air breather hose. <Ref. to AT-74, REMOVAL, Air Breather Hose.>
- 5) Remove the pitching stopper bracket.



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

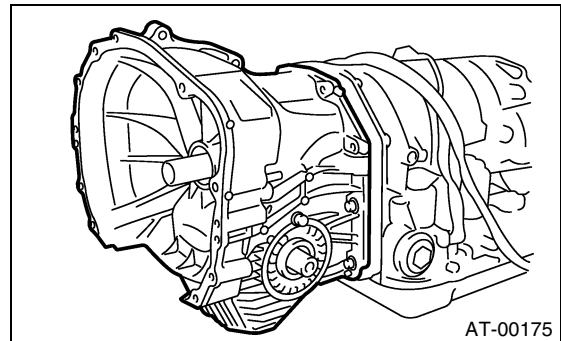


- (A) Transmission harness  
(B) Inhibitor switch harness

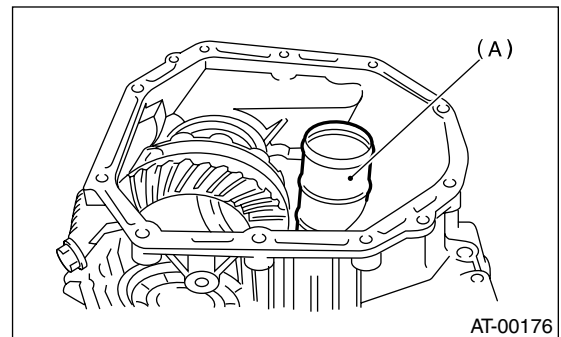
- 8) Remove the oil charger pipe. <Ref. to AT-75, REMOVAL, Oil Charger Pipe.>
- 9) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-71, REMOVAL, ATF Cooler Pipe and Hose.>
- 10) Lightly tapping the torque converter clutch case with plastic hammer, separate the transmission case and torque converter clutch case.

### NOTE:

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



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



- (A) Seal pipe

- 12) Remove the differential assembly. <Ref. to AT-103, REMOVAL, Front Differential.>
- 13) Remove the oil seal from torque converter clutch case.

### B: INSTALLATION

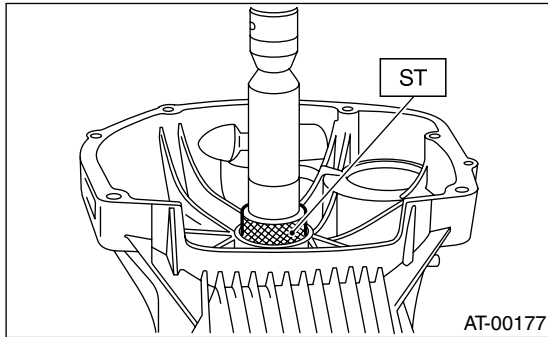
- 1) Check the appearance of each component and clean it.

# TORQUE CONVERTER CLUTCH CASE

## AUTOMATIC TRANSMISSION

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

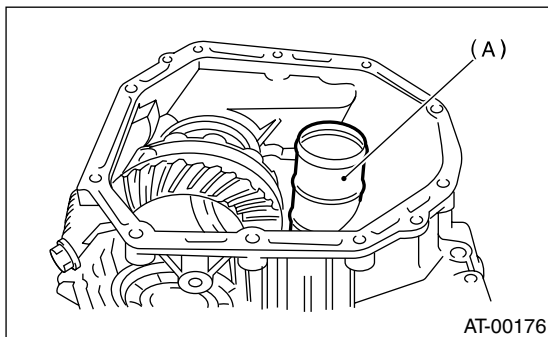
ST 398437700 DRIFT



3) Install the differential assembly to torque converter clutch case. <Ref. to AT-103, INSTALLATION, Front Differential.>

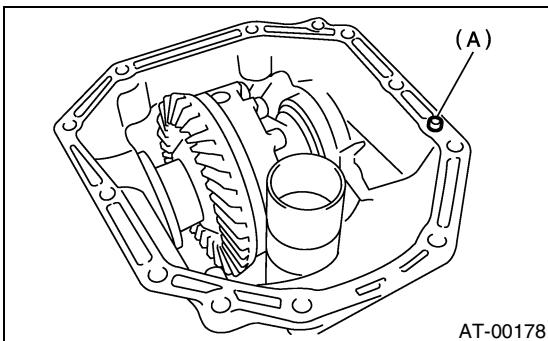
4) Install the left and right side retainers. <Ref. to AT-107, ADJUSTMENT, Front Differential.>

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



(A) Seal pipe

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

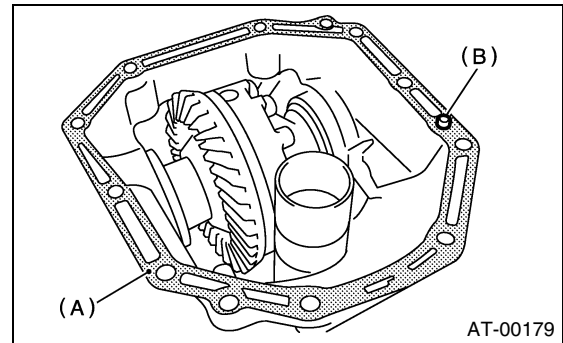


(A) Rubber seal

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

**Liquid gasket:**

**THREE BOND 1215 (Part No. 004403007)**



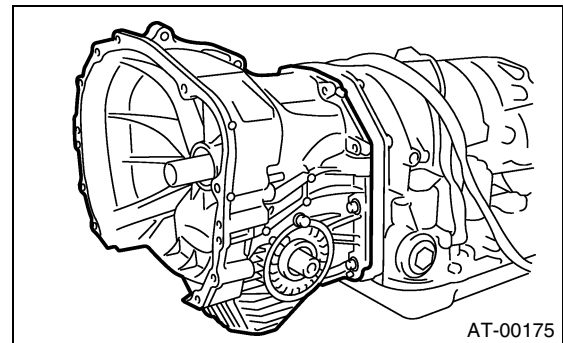
(A) THREE BOND 1215

(B) Rubber seal

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

**Tightening torque:**

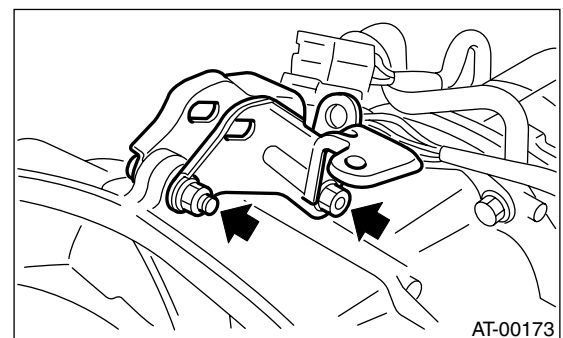
**41 N·m (4.2 kgf-m, 30.4 ft-lb)**



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

**Tightening torque:**

**41 N·m (4.2 kgf-m, 30.4 ft-lb)**



10) Insert the inhibitor switch and transmission connector into stay.

11) Install the air breather hose. <Ref. to AT-74, INSTALLATION, Air Breather Hose.>

12) Install the the oil cooler pipes. <Ref. to AT-72, INSTALLATION, ATF Cooler Pipe and Hose.>

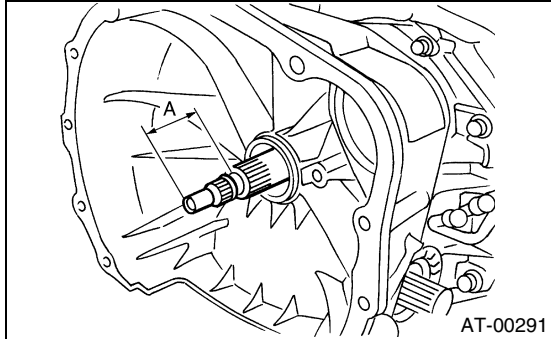
## TORQUE CONVERTER CLUTCH CASE

AUTOMATIC TRANSMISSION

- 13) Install the oil charger pipe with O-ring. <Ref. to AT-75, INSTALLATION, Oil Charger Pipe.>
- 14) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

### **Normal protrusion A:**

**50 — 55 mm (1.97 — 2.17 in)**



- 15) Install the torque converter clutch assembly. <Ref. to AT-76, INSTALLATION, Torque Converter Clutch Assembly.>
- 16) Install the transmission assembly to vehicle. <Ref. to AT-40, INSTALLATION, Automatic Transmission Assembly.>

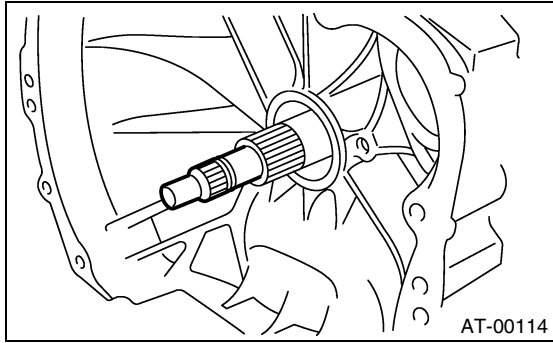
### **C: INSPECTION**

Measure the backlash and adjust within specifications. <Ref. to AT-100, ADJUSTMENT, Drive Pinion Shaft.>

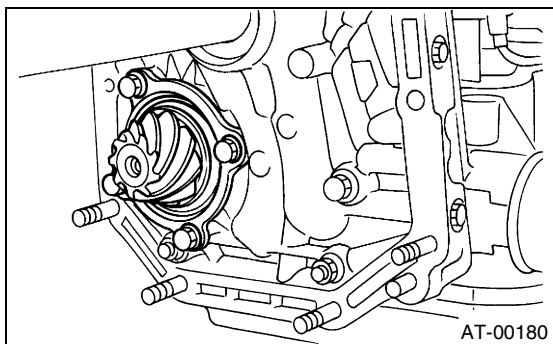
## 32. Oil Pump

### A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to AT-38, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-76, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



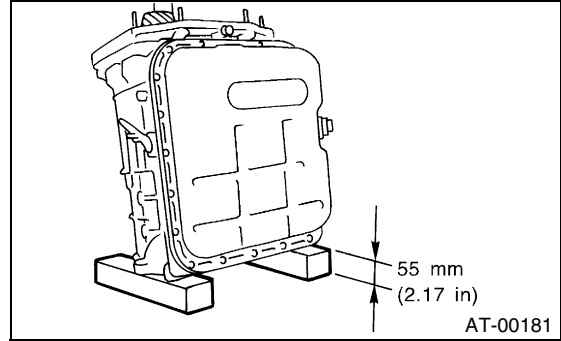
- 4) Lift-up the lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect the inhibitor switch connector from stay.
- 6) Disconnect the air breather hose. <Ref. to AT-74, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charger pipe. <Ref. to AT-75, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-71, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate the torque converter clutch case and transmission case sections <Ref. to AT-89, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate the transmission case and extension case sections. <Ref. to AT-77, REMOVAL, Extension Case.>
- 11) Remove the reduction driven gear. <Ref. to AT-84, REMOVAL, REMOVAL, Reduction Driven Gear.>
- 12) Loosen the taper roller bearing mounting bolts.



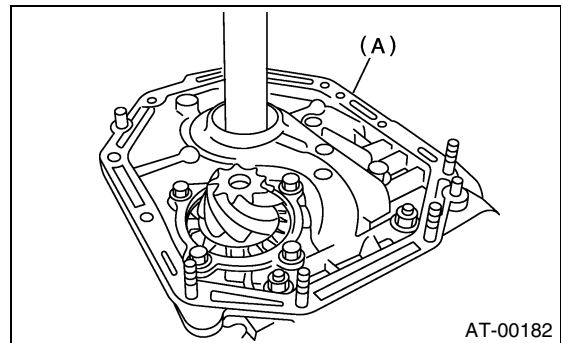
- 13) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

#### NOTE:

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

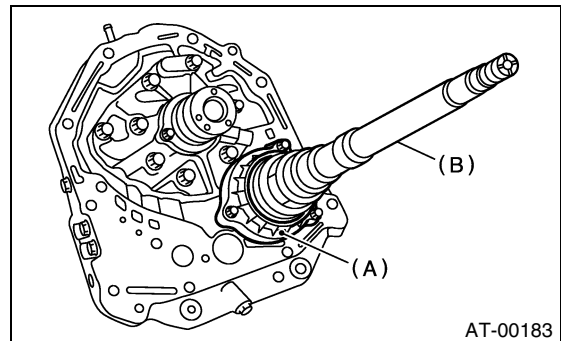


- 14) Remove the oil pump housing and adjusting thrust washer.



(A) Oil pump housing

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



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

- 16) Remove the O-rings from oil pump housing.
- 17) Remove the drive pinion assembly.

## B: INSTALLATION

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

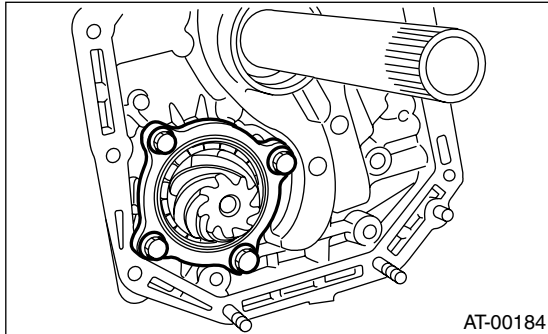
**NOTE:**

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

2) Tighten the four bolts to secure roller bearing.

**Tightening torque:**

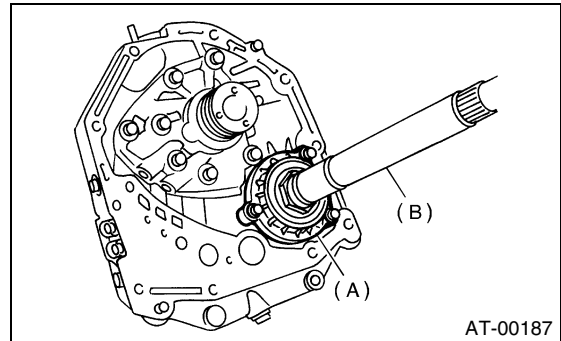
**40 N-m (4.1 kgf-m, 30 ft-lb)**



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

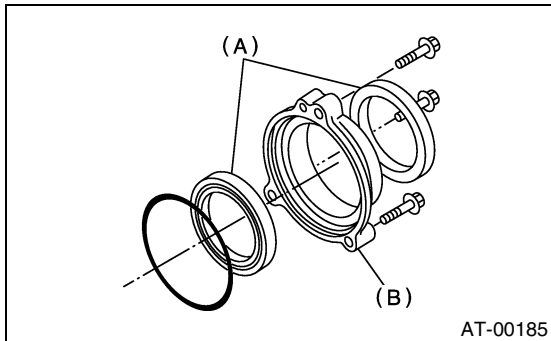
**Tightening torque:**

**7 N-m (0.7 kgf-m, 5.1 ft-lb)**



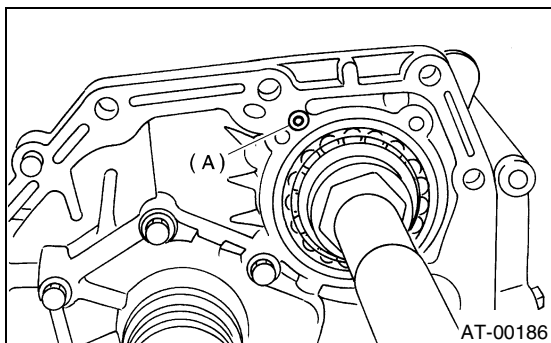
- (A) Oil seal retainer
- (B) Drive pinion shaft

3) Paying attention to the orientation of oil seals, install two new oil seals to oil seal retainer using ST. ST 499247300 INSTALLER



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

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



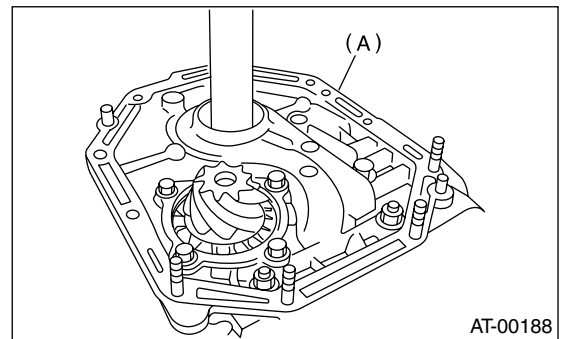
- (A) O-ring

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

7) Secure the housing with two nuts and bolt.

**Tightening torque:**

**42 N-m (4.3 kgf-m, 31 ft-lb)**



- (A) Oil pump housing

8) Install the torque converter clutch case assembly to transmission case assembly. <Ref. to AT-76, INSTALLATION, Torque Converter Clutch Assembly.>

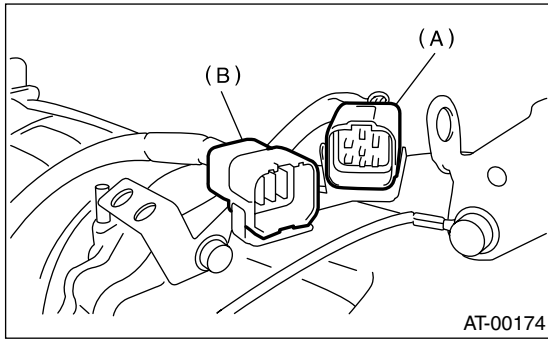
9) Install the reduction driven gear. <Ref. to AT-84, INSTALLATION, Reduction Driven Gear.>

10) Combine the extension case with transmission case, and install the vehicle speed sensor 1 (rear). <Ref. to AT-77, INSTALLATION, Extension Case.>

# OIL PUMP

## AUTOMATIC TRANSMISSION

11) Insert inhibitor switch and transmission connector into stay.



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

12) Install the air breather hose. <Ref. to AT-74, INSTALLATION, Air Breather Hose.>

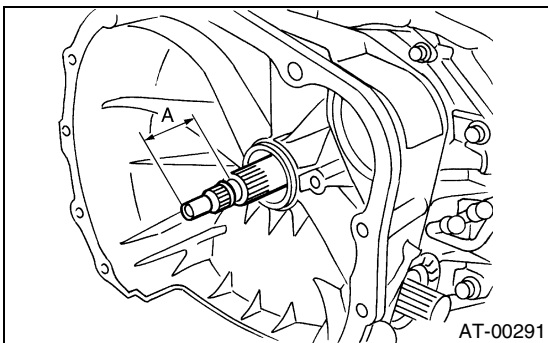
13) Install the oil cooler pipe. <Ref. to AT-72, INSTALLATION, ATF Cooler Pipe and Hose.>

14) Install the oil charger pipe with O-ring. <Ref. to AT-75, INSTALLATION, Oil Charger Pipe.>

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

### Normal protrusion A:

**50 — 55 mm (1.97 — 2.17 in)**

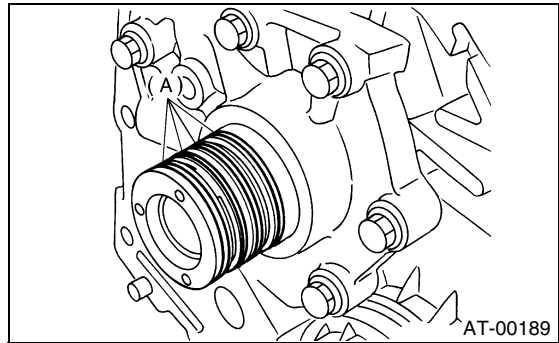


16) Install the torque converter clutch assembly. <Ref. to AT-76, INSTALLATION, Torque Converter Clutch Assembly.>

17) Install the transmission assembly to vehicle. <Ref. to AT-40, INSTALLATION, Automatic Transmission Assembly.>

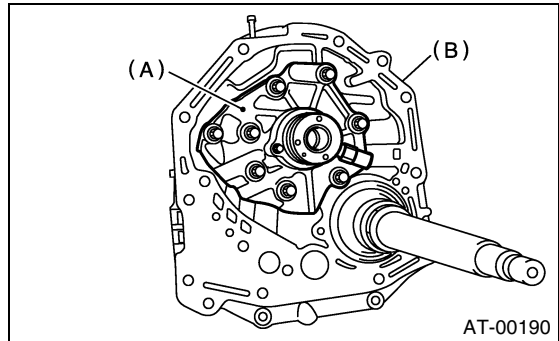
## C: DISASSEMBLY

1) Remove the four seal rings.



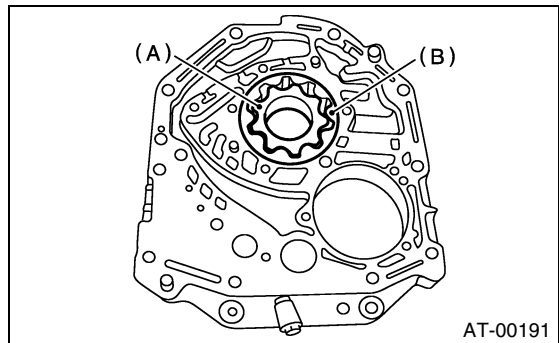
- (A) Seal rings

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



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

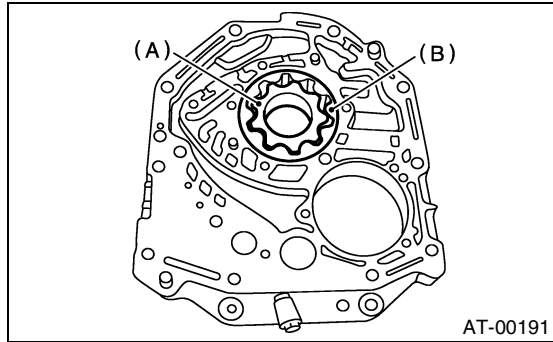
3) Remove the inner and outer rotor.



- (A) Inner rotor
- (B) Outer rotor

## D: ASSEMBLY

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

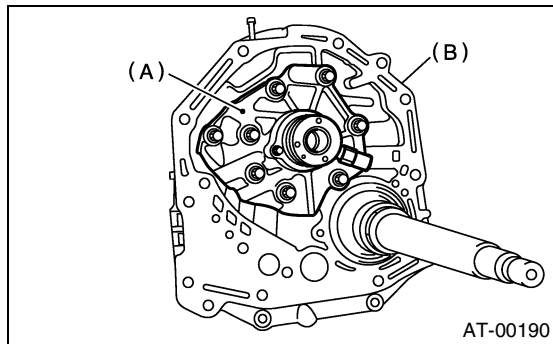


- (A) Inner rotor
- (B) Outer rotor

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

**Tightening torque:**

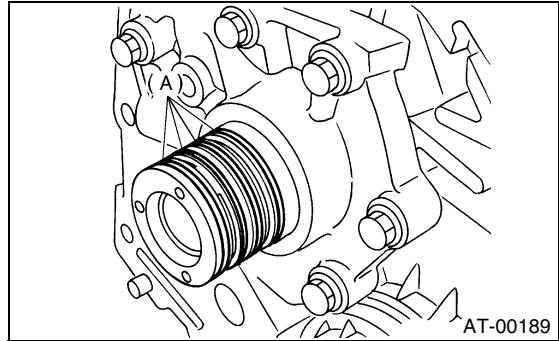
**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



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

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

4) Install the oil seal retainer and new seal rings. After adjusting the drive pinion backlash and tooth contact. <Ref. to AT-96, ADJUSTMENT, Oil Pump.>



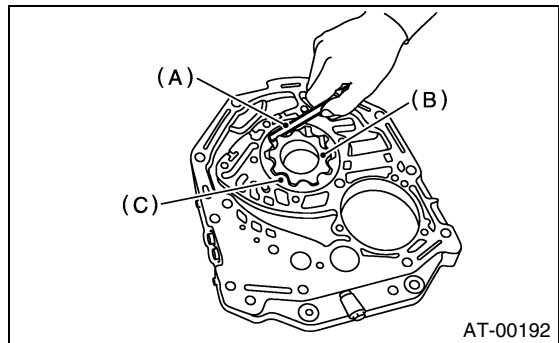
- (A) Seal rings

## E: INSPECTION

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

**Tip clearance:**

**0.02 — 0.15 mm (0.0008 — 0.0059 in)**



- (A) Thickness gauge
- (B) Inner rotor
- (C) Outer rotor



# OIL PUMP

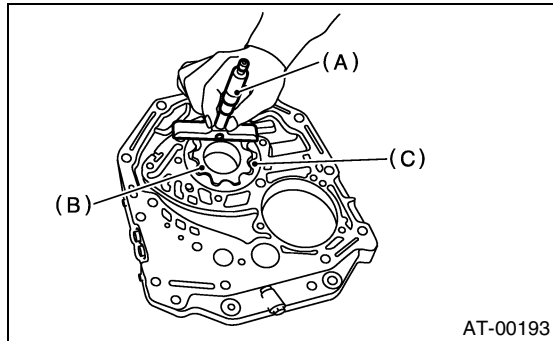
## AUTOMATIC TRANSMISSION

### (2) Side clearance

Set a depth gauge to oil pump housing, then measure oil pump housing-to-rotor clearances.

#### Side clearance:

**0.02 — 0.04 mm (0.0008 — 0.0016 in)**



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

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

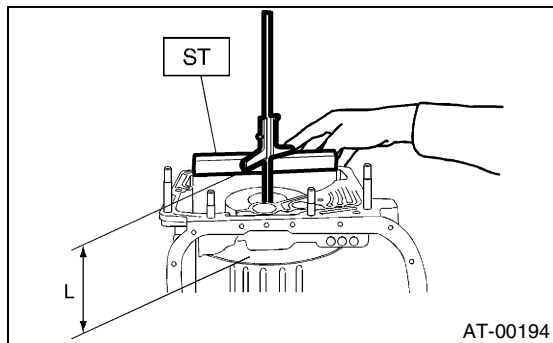
Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

• Measure the total end play and adjust within specifications. <Ref. to AT-96, ADJUSTMENT, Oil Pump.>

## F: ADJUSTMENT

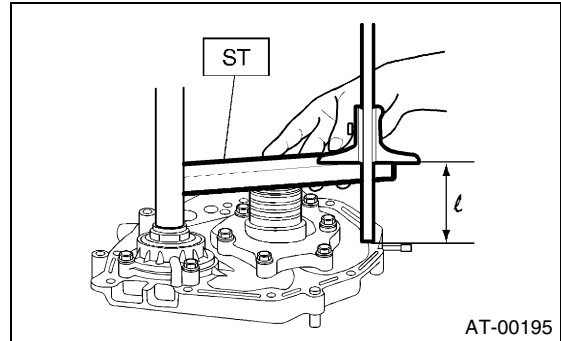
1) Using the ST, measure the distance from transmission case mating surface to recessed portion of high clutch drum "L".

ST 398643600 GAUGE



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

ST 398643600 GAUGE

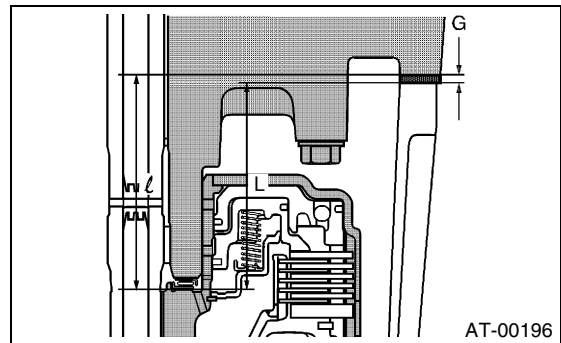


### 3) Calculation of total end play

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

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

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



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

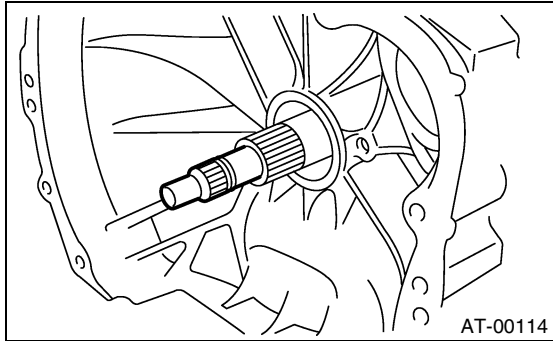
4) After completing end play adjustment, insert the bearing race in recess of high clutch. Attach the thrust needle bearing to oil pump cover with vaseline.

- 5) After correctly installing the new gasket to case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against inside of case.
- 6) Install both parts with dowel pins aligned. Make sure no clearance exists at mating surface.

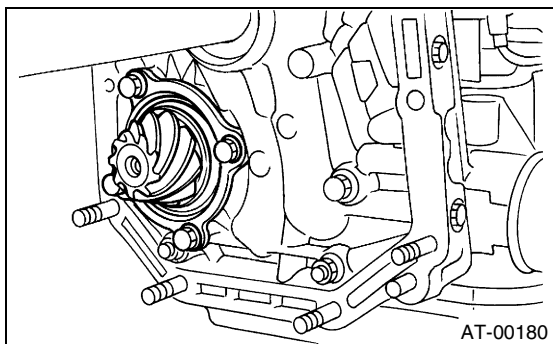
## 33. Drive Pinion Shaft

### A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to AT-38, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-76, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Lift-up the lever behind transmission harness connector and disconnect it from stay.
- 5) Disconnect the inhibitor switch connector from stay.
- 6) Disconnect the air breather hose. <Ref. to AT-74, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charger pipe. <Ref. to AT-75, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-71, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate the torque converter clutch case and transmission case sections <Ref. to AT-89, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate the transmission case and extension case sections. <Ref. to AT-77, REMOVAL, Extension Case.>
- 11) Remove the reduction driven gear. <Ref. to AT-84, REMOVAL, Reduction Driven Gear.>
- 12) Separate the drive pinion shaft and oil pump housing <Ref. to AT-92, REMOVAL, Oil Pump.>

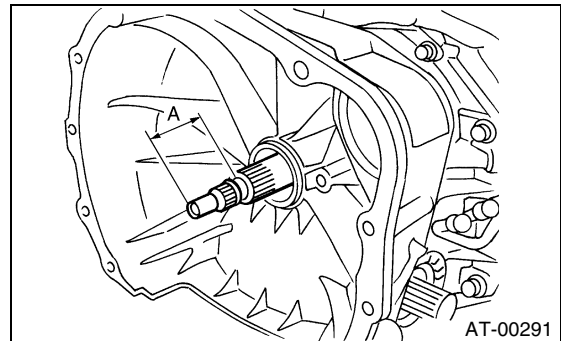


### B: INSTALLATION

- 1) Assemble the drive pinion assembly to oil pump housing. <Ref. to AT-93, INSTALLATION, Oil Pump.>
- 2) Install the oil pump housing to transmission case. <Ref. to AT-93, INSTALLATION, Oil Pump.>
- 3) Combine the torque converter case with transmission case. <Ref. to AT-89, INSTALLATION, Torque Converter Clutch Case.>
- 4) Install the reduction driven gear. <Ref. to AT-84, INSTALLATION, Reduction Driven Gear.>
- 5) Combine the extension case with transmission case, and install the vehicle speed sensor 1 (rear). <Ref. to AT-77, INSTALLATION, Extension Case.>
- 6) Insert the inhibitor switch and transmission connector into stay.
- 7) Install the air breather hose. <Ref. to AT-74, INSTALLATION, Air Breather Hose.>
- 8) Install the oil cooler inlet and outlet pipes. <Ref. to AT-72, INSTALLATION, ATF Cooler Pipe and Hose.>
- 9) Install the oil charger pipe with O-ring. <Ref. to AT-75, INSTALLATION, Oil Charger Pipe.>
- 10) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

#### Normal protrusion A:

**50 — 55 mm (1.97 — 2.17 in)**



- 11) Install the torque converter clutch assembly. <Ref. to AT-76, INSTALLATION, Torque Converter Clutch Assembly.>
- 12) Install the transmission assembly to vehicle. <Ref. to AT-40, INSTALLATION, Automatic Transmission Assembly.>

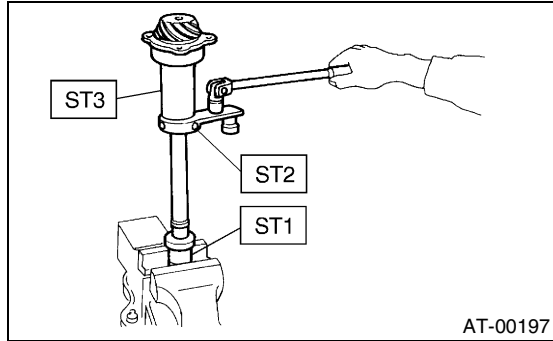
# DRIVE PINION SHAFT

AUTOMATIC TRANSMISSION

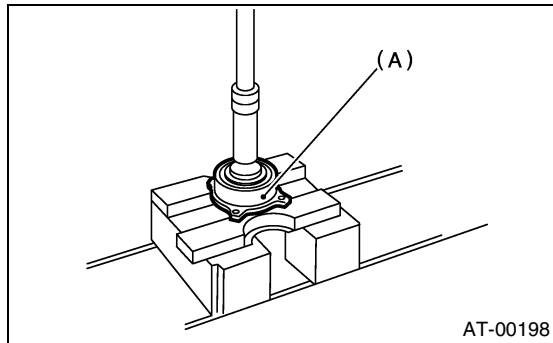
## C: DISASSEMBLY

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

ST1 498937110 HOLDER  
 ST2 499787700 WRENCH  
 ST3 499787500 ADAPTER



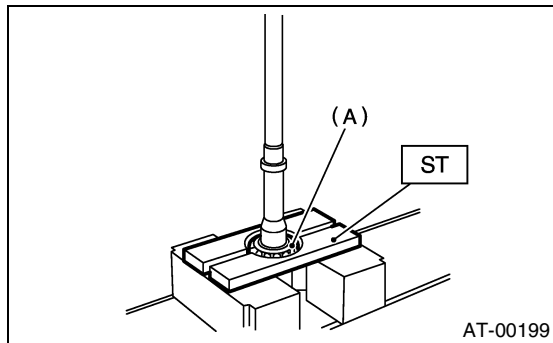
- 2) Remove the O-ring.
- 3) Using a press, separate the rear roller bearing and outer race from shaft.



(A) Outer race

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

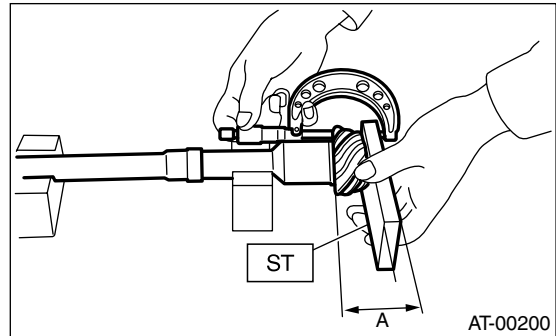
ST 498517000 REPLACER



(A) Front roller bearing

## D: ASSEMBLY

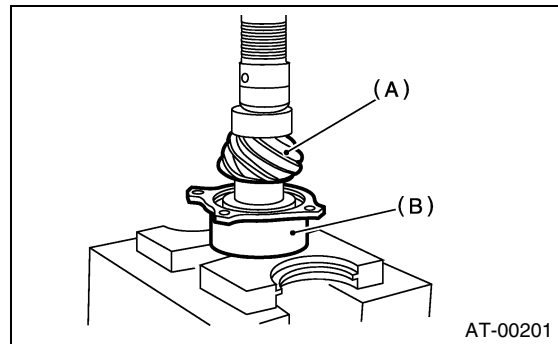
- 1) Measure the dimension "A" of drive pinion shaft.  
 ST 398643600 GAUGE



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

### NOTE:

If too much pressure is applied, the roller bearing will not turn easily.



(A) Drive pinion shaft  
 (B) Roller bearing

- 3) After fitting a new O-ring to shaft, attach the drive pinion collar to shaft.

- 4) Install the lock washer to drive pinion shaft in proper direction.

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

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

T1: 116 N·m (11.8 kgf·m, 85.3 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST2 length 0.072 m (2.83 in)

L2: Torque wrench length

Example:

Torque wrench length m (in)	Tightening torque N·m (kgf·m, ft·lb)
0.4 (15.75)	98 (10.0, 72)
0.45 (17.72)	100 (10.2, 73.8)
0.5 (19.69)	101 (10.3, 74.5)
0.55 (21.65)	102 (10.4, 75)

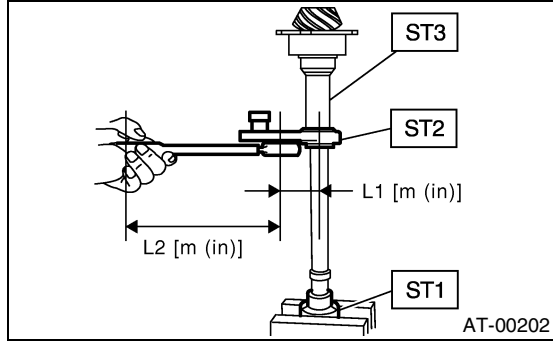
# DRIVE PINION SHAFT

## AUTOMATIC TRANSMISSION

ST1 498937110 HOLDER  
 ST2 499787700 WRENCH  
 ST3 499787500 ADAPTER

### NOTE:

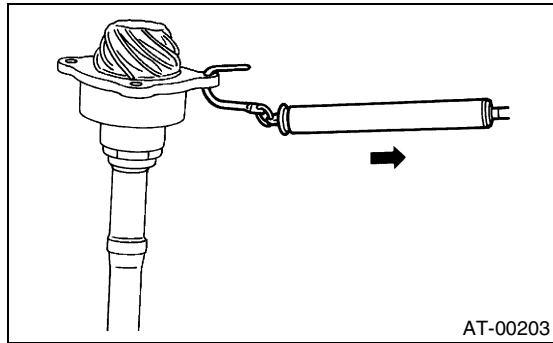
Install the ST2 to torque wrench as straight as possible.



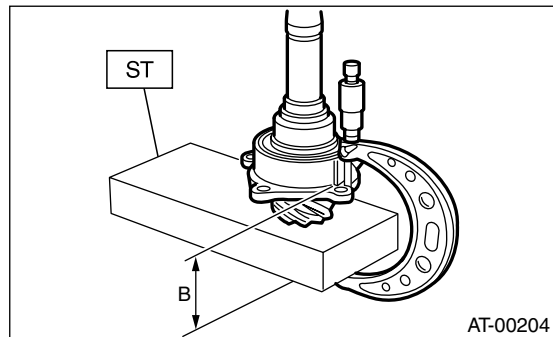
6) Measure the starting torque of bearing. Make sure the starting torque is within specified range. If out of allowable range, replace the roller bearing.

### Starting torque:

**7.6 — 38.1 N (0.776 — 3.88 kgf, 5.6 — 28.1 lb)**



7) Stake the lock nut securely at two places.  
 8) Measure the dimension "B" of drive pinion shaft.  
 ST 398643600 GAUGE



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

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

10) Select three or less shims from following table.

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

## E: INSPECTION

- Make sure that all component parts are free of harmful cuts, gouges and other faults.
- Adjust the teeth alignment. <Ref. to AT-100, ADJUSTMENT, Drive Pinion Shaft.>

## F: ADJUSTMENT

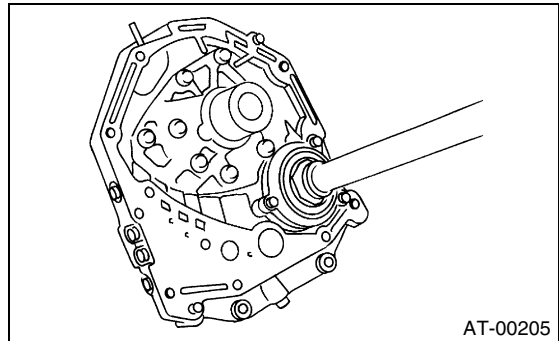
- 1) Thoroughly remove the liquid gasket from case mating surface beforehand.
- 2) Install the oil pump housing assembly to torque converter clutch case, and secure it evenly by tightening four bolts.

### NOTE:

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

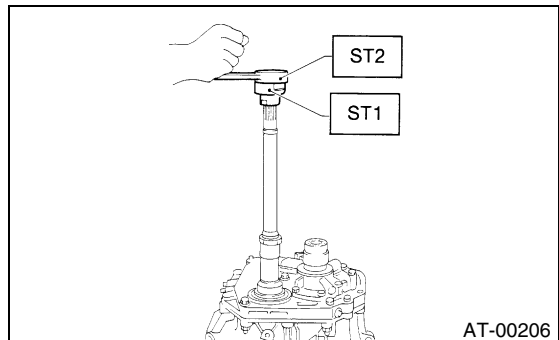
### Tightening torque:

**41 N·m (4.2 kgf·m, 30.4 ft·lb)**



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

ST1 498937110 HOLDER  
 ST2 499787700 WRENCH



4) Adjust the backlash between drive pinion and crown gear. <Ref. to AT-107, ADJUSTMENT, Front Differential.>

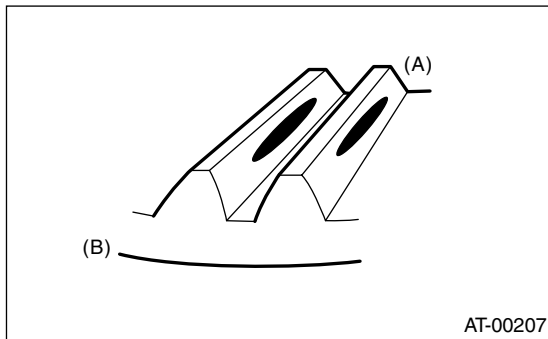
5) Apply red lead evenly to the surfaces of three or four teeth of crown gear. Rotate the drive pinion in forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern.

If tooth contact is improper, readjust the backlash or shim thickness.<Ref. to AT-107, ADJUSTMENT, Front Differential.>

- Tooth contact

**Checking item: Tooth contact pattern is slightly shifted toward toe side under no-load rotation.**

**[When loaded, contact pattern moves toward heel.]**

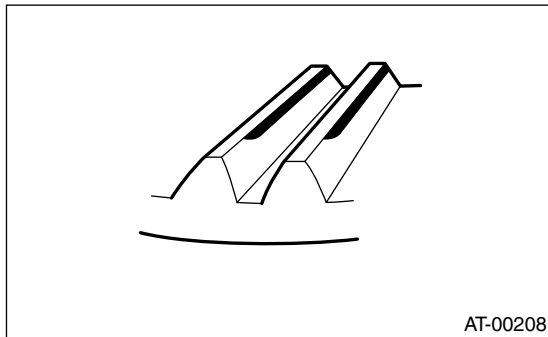


- (A) Toe side
- (B) Heel side

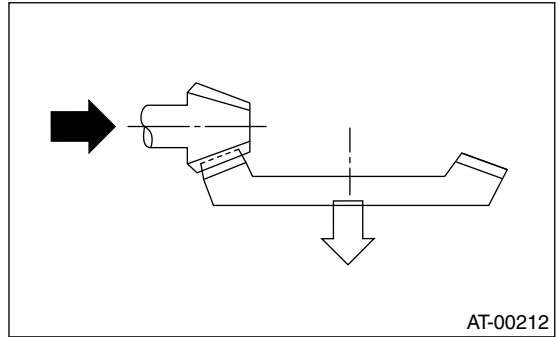
- Face contact

**Checking item: Backlash is too large.**

Contact pattern



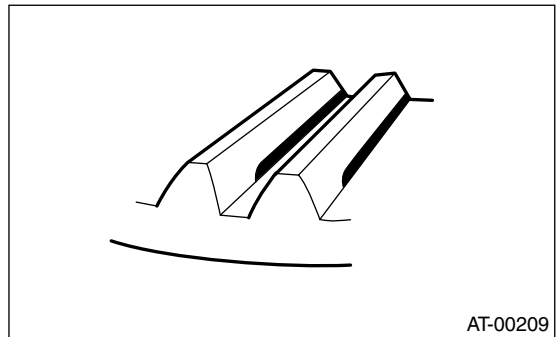
Corrective action: Increase the thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



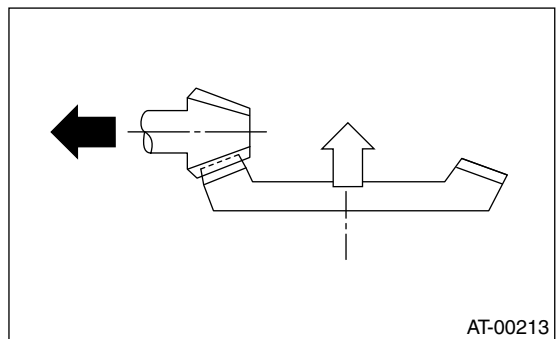
- Flank contact

**Checking item: Backlash is too small.**

Contact pattern



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



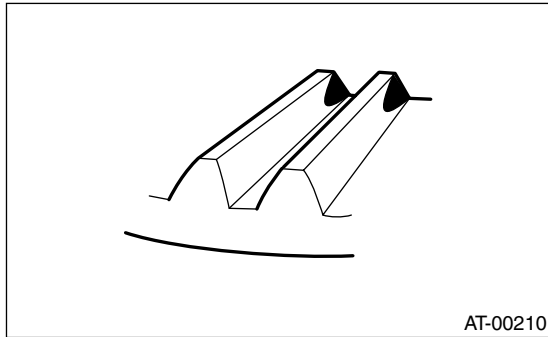
# DRIVE PINION SHAFT

## AUTOMATIC TRANSMISSION

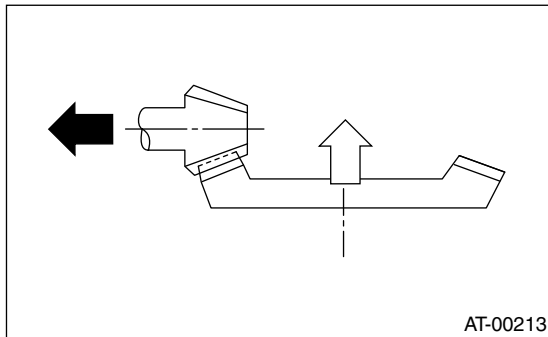
- Toe contact (Inside end contact)

**Checking item: Contact areas is small.**

Contact pattern



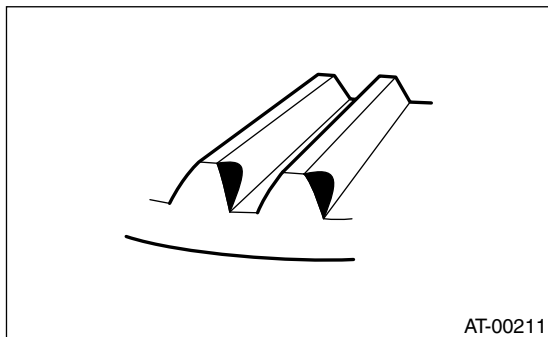
Corrective action: Increase the thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



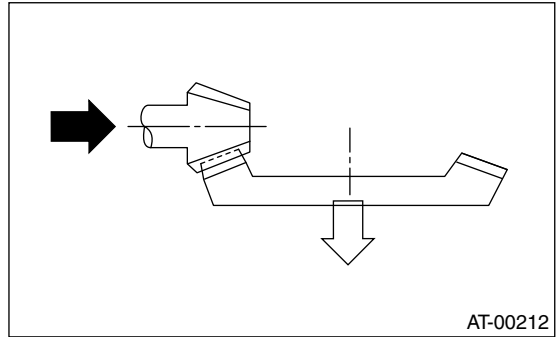
- Heel contact (Outside end contact)

**Checking item: Contact areas is small.**

Contact pattern



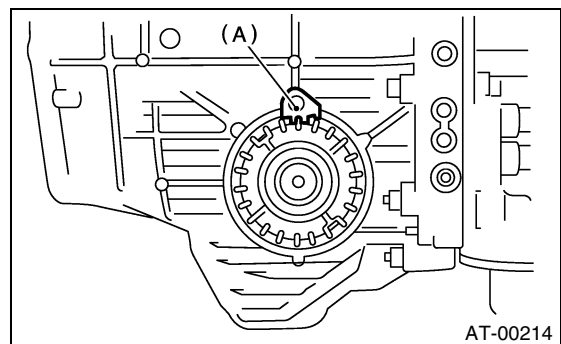
Corrective action: Reduce the thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



6) If tooth contact is correct, mark the retainer position and loosen it. After fitting a new O-ring, screw in the retainer to marked position. Then tighten the lock plate to specified torque.

**Tightening torque:**

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**

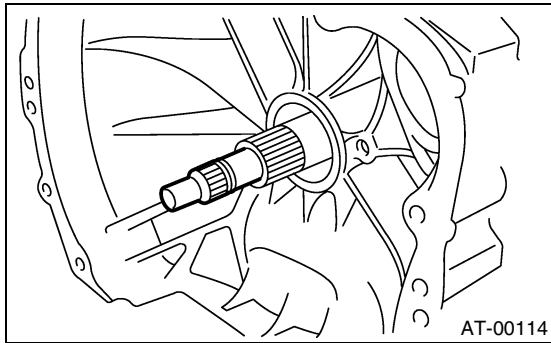


(A) Lock plate

## 34. Front Differential

### A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to AT-38, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-76, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Disconnect the air breather hose. <Ref. to AT-74, REMOVAL, Air Breather Hose.>
- 5) Lift-up the lever behind transmission harness connector and disconnect it from stay.
- 6) Disconnect the inhibitor switch from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-74, REMOVAL, Air Breather Hose.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-71, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate the torque converter clutch case and transmission case. <Ref. to AT-89, REMOVAL, Torque Converter Clutch Case.>
- 10) Remove the seal pipe if it is attached.
- 11) Remove the differential side retainer with ST.

**NOTE:**

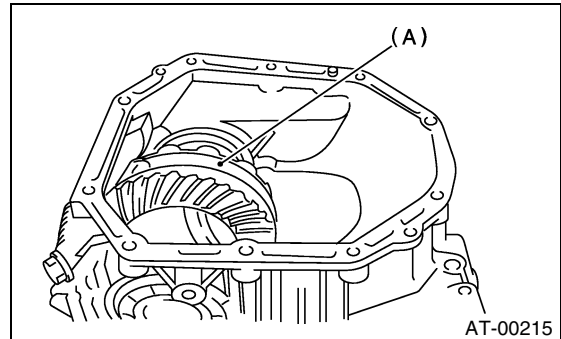
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of torque converter clutch case.

ST 499787000 WRENCH ASSY

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

### B: INSTALLATION

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

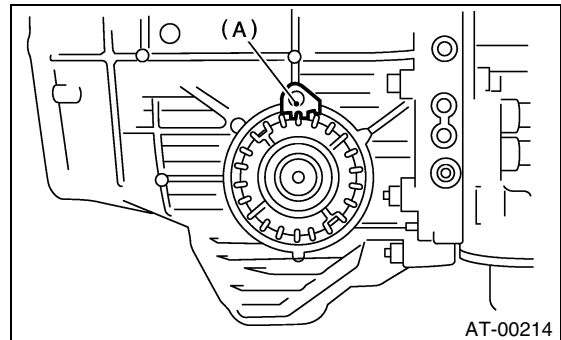


(A) Differential assembly

- 2) Remove the O-rings from left and right side retainer.
- 3) Using the ST, install the side retainers. <Ref. to AT-103, REMOVAL, Front Differential.>  
ST 499787000 WRENCH ASSY
- 4) Install the lock plate.

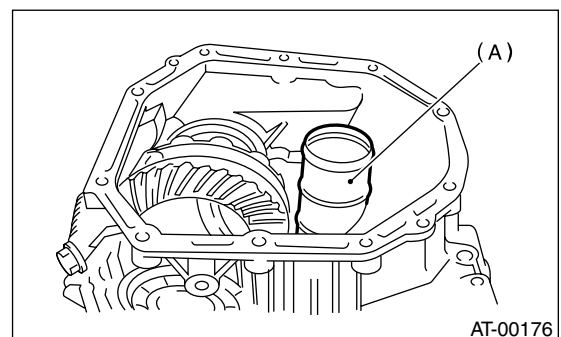
**Tightening torque:**

**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



(A) Lock plate

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



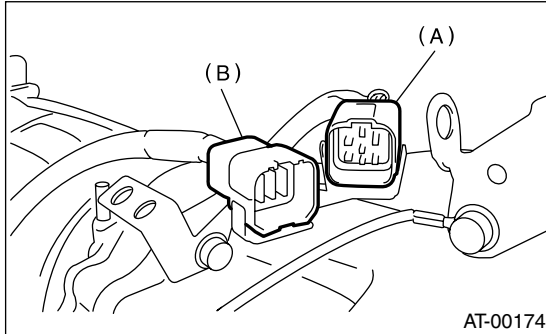
(A) Seal pipe



# FRONT DIFFERENTIAL

## AUTOMATIC TRANSMISSION

- 6) Install the torque converter clutch case to transmission case. <Ref. to AT-89, INSTALLATION, Torque Converter Clutch Case.>
- 7) Install the air breather hose.
- 8) Insert the inhibitor switch and transmission connector into stay.

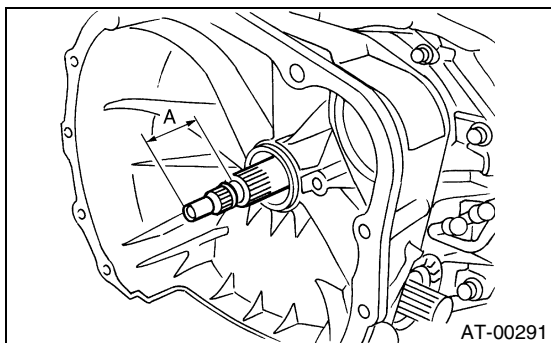


- (A) Transmission harness
- (B) Inhibitor switch harness

- 9) Install the oil cooler pipes. <Ref. to AT-72, INSTALLATION, ATF Cooler Pipe and Hose.>
- 10) Install the oil charger pipe with O-ring <Ref. to AT-75, INSTALLATION, Oil Charger Pipe.>
- 11) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

### Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



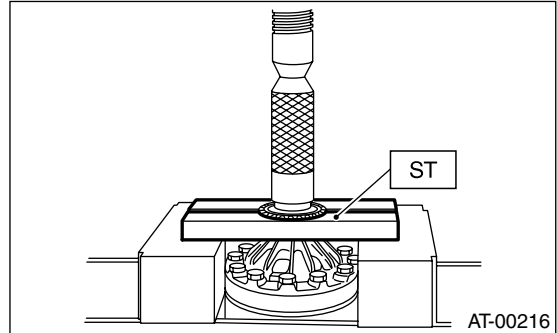
- 12) Install the torque converter clutch assembly. <Ref. to AT-76, INSTALLATION, Torque Converter Clutch Assembly.>
- 13) Install the transmission assembly to vehicle. <Ref. to AT-40, INSTALLATION, Automatic Transmission Assembly.>

## C: DISASSEMBLY

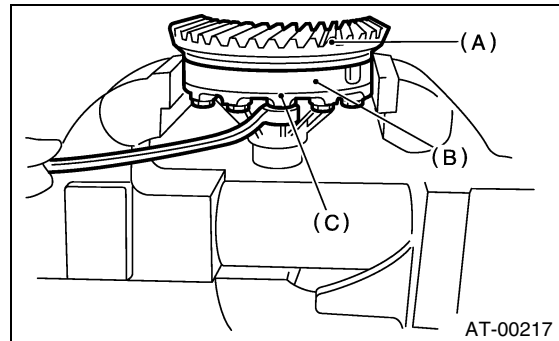
### 1. DIFFERENTIAL CASE ASSEMBLY

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

ST 498077000 REMOVER

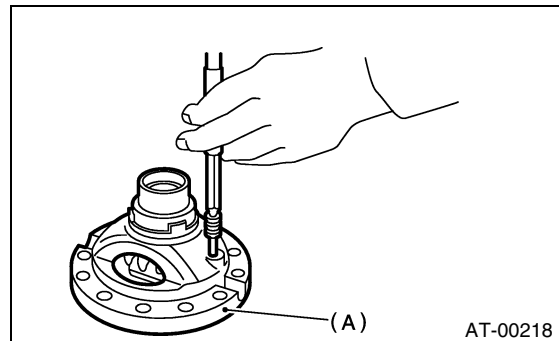


- 2) Secure the case in a vise and remove the crown gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



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

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



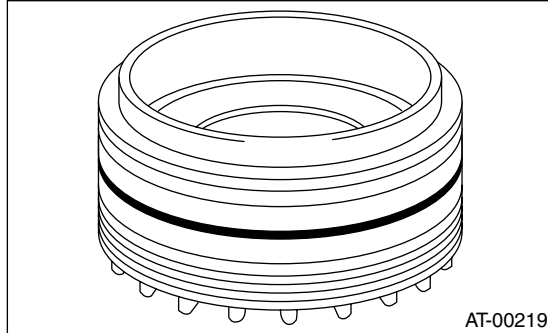
- (A) Differential case (RH)

## 2. SIDE RETAINER

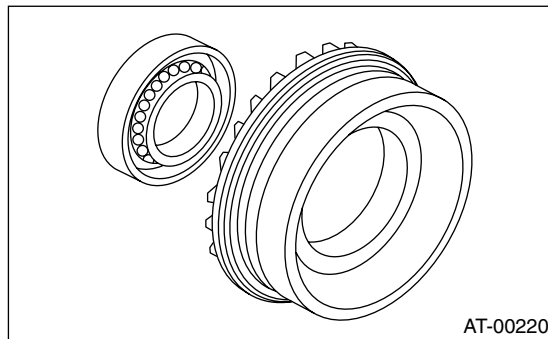
**NOTE:**

Remove and install the oil seal and O-ring after adjusting drive pinion backlash and tooth contact.

1) Remove the O-ring.

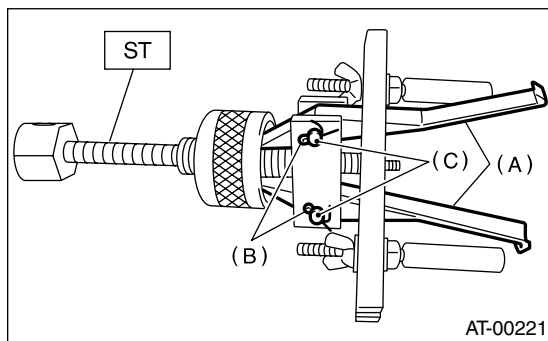


2) Remove the oil seal.



3) Take out either split pin, remove the claw.

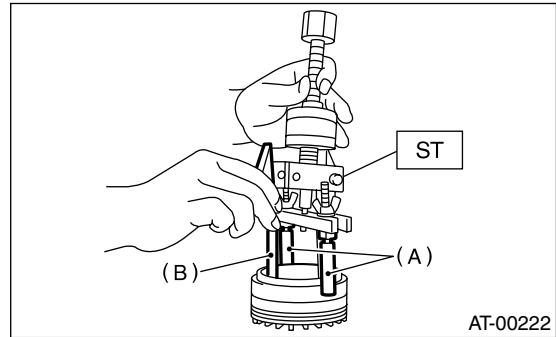
ST 398527700 PULLER ASSY



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

4) Securely attach the two claws to outer race, set ST to side retainer.

ST 398527700 PULLER ASSY



- (A) Shaft
- (B) Claw

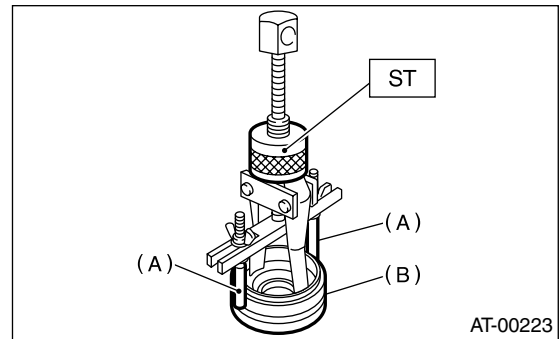
5) Return the removed claw to original position, and install the pin and split pin.

6) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.

ST 398527700 PULLER ASSY

**NOTE:**

Replace the bearing inner and outer races as a single unit.



- (A) Shaft
- (B) Side retainer

## D: ASSEMBLY

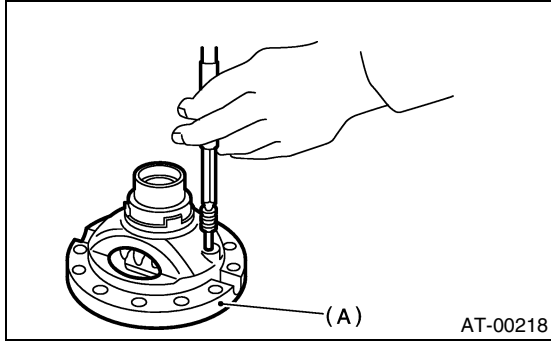
### 1. DIFFERENTIAL CASE ASSEMBLY

1) Install the washer, differential bevel gear and differential bevel pinion in differential case (RH). Insert pinion shaft.

# FRONT DIFFERENTIAL

## AUTOMATIC TRANSMISSION

2) Install the straight pin from reverse direction.

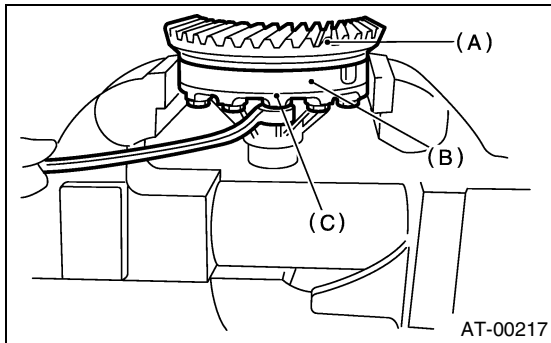


(A) Differential case (RH)

3) Install the washer and differential bevel gear to differential case (LH). Then put the case over differential case (RH), and connect both cases.

4) Install the crown gear and secure it by tightening the bolt.

**Standard tightening torque:**  
**62 N·m (6.3 kgf·m, 45.6 ft·lb)**



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

5) Measurement of backlash (Selection of washer)

(1) Install the axle shaft (Subaru genuine part) to differential case.

Part No. 38415AA070 AXLE SHAFT

(2) Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of case.

ST1 498247001 MAGNET BASE

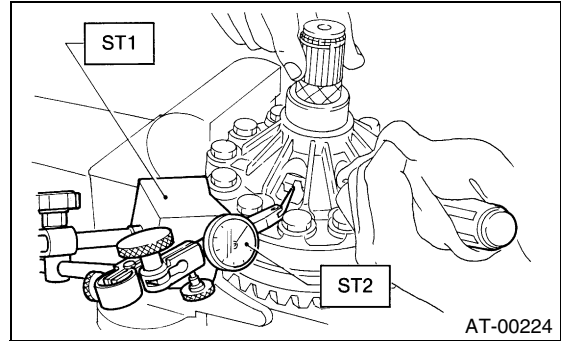
ST2 498247100 DIAL GAUGE

**NOTE:**

- Measure the backlash by applying a pinion tooth between two bevel gear teeth.
- Fix the bevel pinion gear in place with a screwdriver or similar tool when measuring.

**Standard value:**

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**

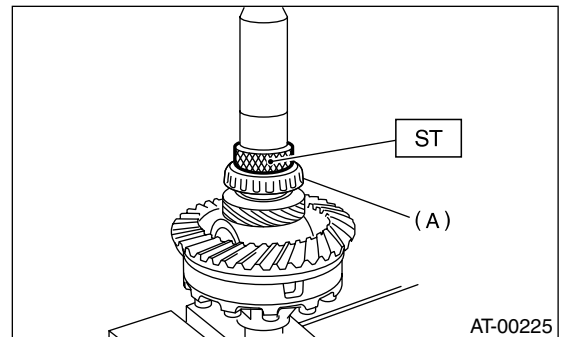


(3) If backlash is not as specified, select a washer from table below.

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

6) Using the ST, install the taper roller bearing.

ST 398437700 DRIFT

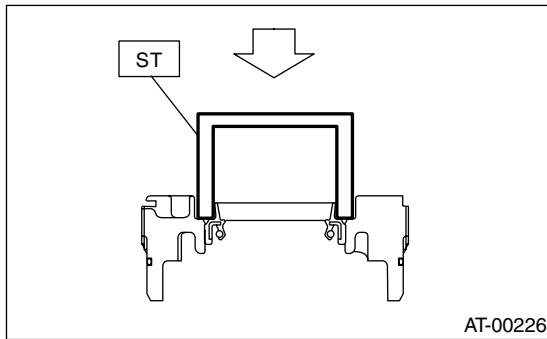


(A) Taper roller bearing

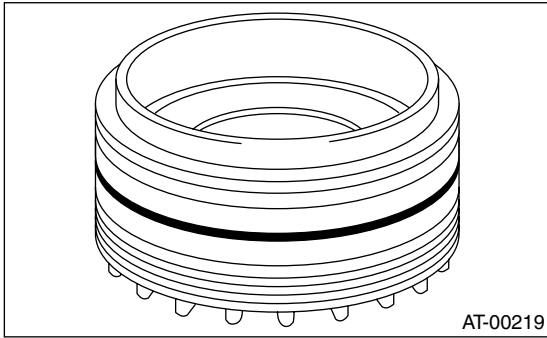
### 2. SIDE RETAINER

- 1) Install the bearing outer race to side retainer.
- 2) Using the ST and hammer, install a new oil seal.

ST 18675AA000 INSTALLER



- 3) Install a new O-ring.



### E: INSPECTION

- Check each component for harmful cuts, damage and other faults.
- Measure the backlash and adjust within specifications. <Ref. to AT-107, ADJUSTMENT, Front Differential.>

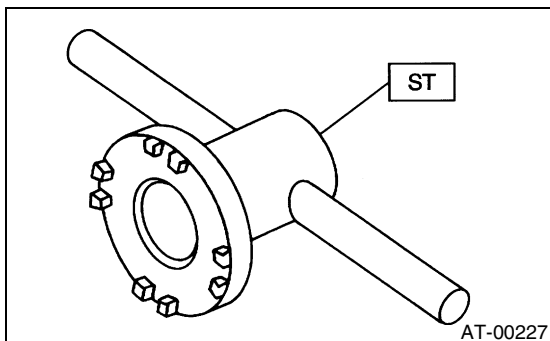
### F: ADJUSTMENT

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

NOTE:

Screw in the RH side slightly deeper than the LH side.

ST 499787000 WRENCH ASSY



- 2) Remove the oil pump housing.

- 3) Thoroughly remove the liquid gasket from case mating surface beforehand.

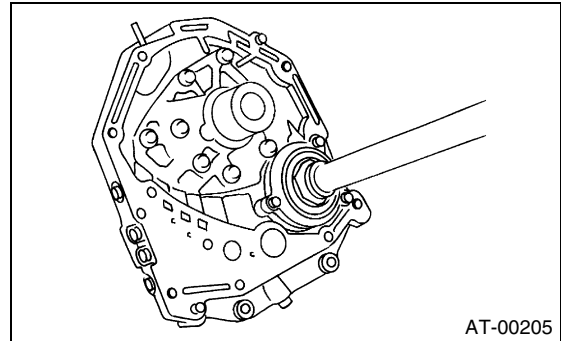
- 4) Install the oil pump housing assembly to torque converter clutch case, and secure it evenly by tightening four bolts.

NOTE:

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

**Tightening torque:**

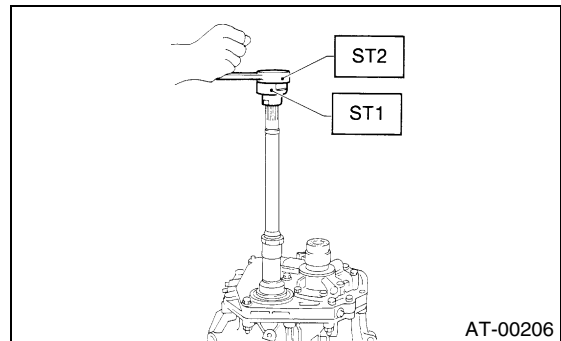
**41 N·m (4.2 kgf·m, 30.4 ft·lb)**



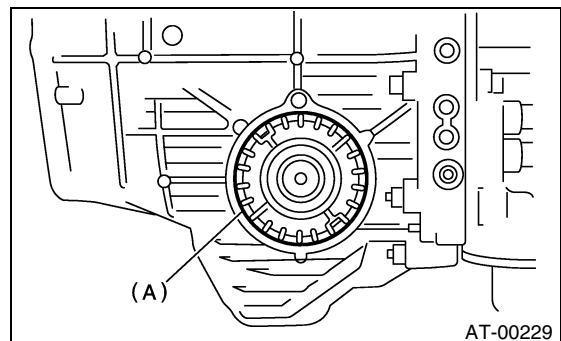
- 5) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937110 HOLDER

ST2 499787700 WRENCH



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

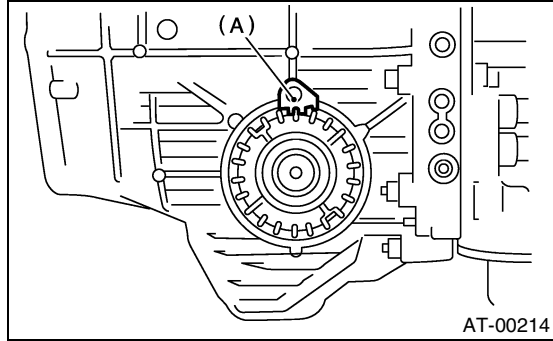


(A) Retainer

# FRONT DIFFERENTIAL

## AUTOMATIC TRANSMISSION

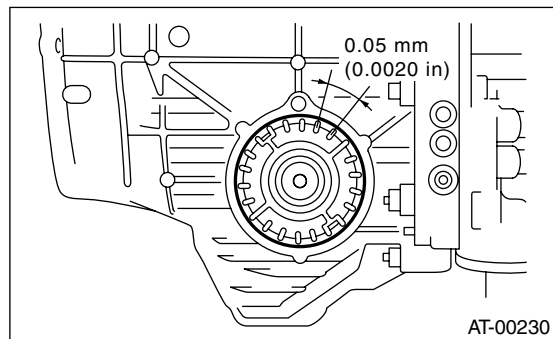
7) After the "zero" state is established, back off the LH retainer 3 notches and secure it with the lock plate. Then back off the RH retainer and retighten until it stops. Rotate the drive pinion a few times. Tighten the RH retainer 1-3/4 notches further. This sets the preload. Finally, secure the retainer with its lock plate.



(A) Lock plate

### NOTE:

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



8) Insert the axle shaft (Subaru genuine part) to both holes of side retainer.

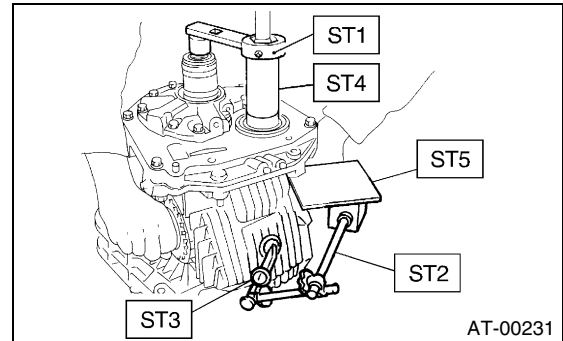
Part No. 38415AA070 AXLE SHAFT

9) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3, ST4 and ST5.

ST1	499787700	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499787500	ADAPTER
ST5	498255400	PLATE

### Backlash:

**0.13 — 0.18 mm (0.0051 — 0.0071 in)**



10) Adjust the tooth contact between front differential and drive shaft. <Ref. to AT-100, ADJUSTMENT, Drive Pinion Shaft.>