

**TRANSMISSION SECTION**

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

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

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

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

<b>CONTROL SYSTEMS</b>	<b>CS</b>
<b>AUTOMATIC TRANSMISSION</b>	<b>AT</b>
<b>AUTOMATIC TRANSMISSION (DIAGNOSTICS)</b>	<b>AT</b>
<b>MANUAL TRANSMISSION AND DIFFERENTIAL</b>	<b>MT</b>
<b>CLUTCH SYSTEM</b>	<b>CL</b>



# AUTOMATIC TRANSMISSION

# AT

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	<b>Page</b>
1. General Description .....	2
2. Automatic Transmission Fluid .....	30
3. Differential Gear Oil.....	31
4. Road Test.....	32
5. Stall Test .....	33
6. Time Lag Test .....	35
7. Line Pressure Test.....	36
8. Transfer Clutch Pressure Test .....	38
9. Automatic Transmission Assembly .....	39
10. Transmission Mounting System .....	46
11. Extension Case Oil Seal .....	48
12. Inhibitor Switch.....	49
13. Front Vehicle Speed Sensor .....	54
14. Rear Vehicle Speed Sensor.....	58
15. Torque Converter Turbine Speed Sensor .....	59
16. Control Valve Body .....	60
17. Shift Solenoids, Duty Solenoids and ATF Temperature Sensor .....	67
18. Transfer Duty Solenoid and Valve Body .....	70
19. ATF Filter .....	73
20. Transmission Control Module (TCM) .....	76
21. ATF Cooler Pipe and Hose .....	78
22. Air Breather Hose.....	83
23. Oil Charger Pipe.....	84
24. Torque Converter Clutch Assembly .....	85
25. Extension Case .....	86
26. Transfer Clutch.....	90
27. Multi-plate Clutch .....	97
28. Rear Drive Shaft.....	99
29. Reduction Driven Gear.....	101
30. Reduction Drive Gear.....	104
31. Center Differential Carrier .....	106
32. Parking Pawl .....	108
33. Torque Converter Clutch Case .....	109
34. Oil Pump .....	112
35. Drive Pinion Shaft .....	118
36. Front Differential.....	124
37. High Clutch and Reverse Clutch .....	130
38. Planetary Gear and Low Clutch .....	136
39. 2-4 Brake.....	145
40. One-way Clutch.....	150
41. Low and Reverse Brake.....	155
42. Transmission Control Device .....	158

# CENTER DIFFERENTIAL CARRIER

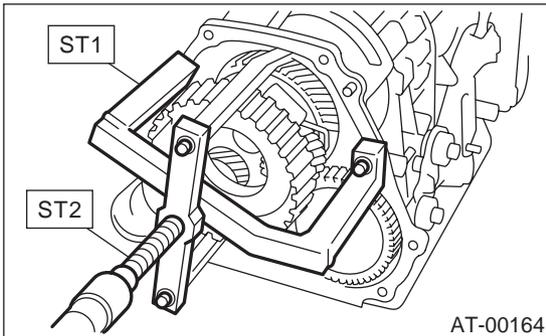
AUTOMATIC TRANSMISSION

## 31.Center Differential Carrier

### A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear wheel speed sensor, and separate the extension case from the transmission case. <Ref. to AT-86, REMOVAL, Extension Case.>
- 3) Pull out the rear driveshaft. <Ref. to AT-99, REMOVAL, Rear Drive Shaft.>
- 4) Using the special tools, pull out the center differential carrier assembly.

ST1 499737100 PULLER  
ST2 899524100 PULLER SET



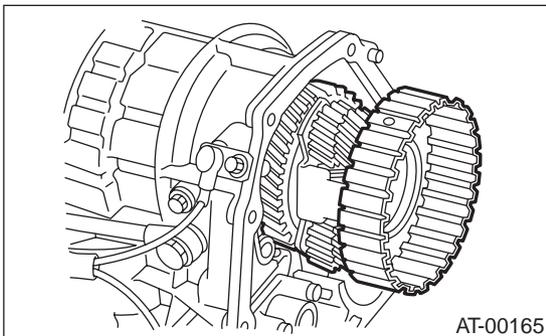
- 5) Pull out the shim(s) from transmission case.

### B: INSTALLATION

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

#### NOTE:

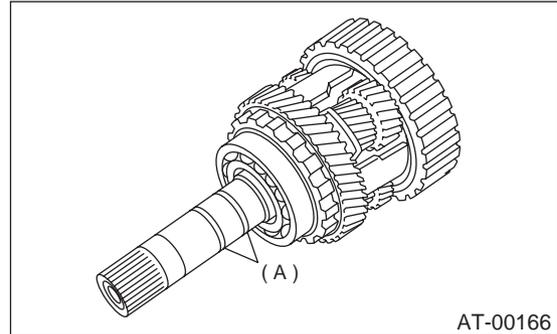
Insert the center differential assembly and shim(s) completely into the bearing shoulder bottom.



- 2) Insert the rear driveshaft. <Ref. to AT-99, INSTALLATION, Rear Drive Shaft.>
- 3) Connect the transmission case and extension case, and install the rear wheel speed sensor. <Ref. to AT-86, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly onto vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

### C: DISASSEMBLY

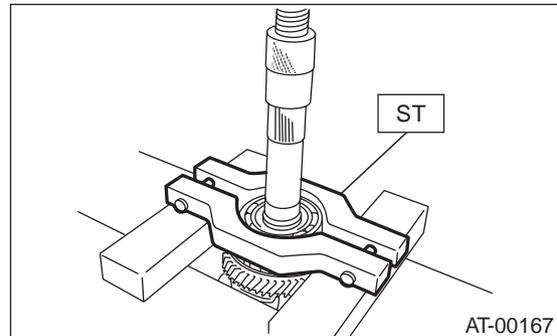
- 1) Remove the seal rings.



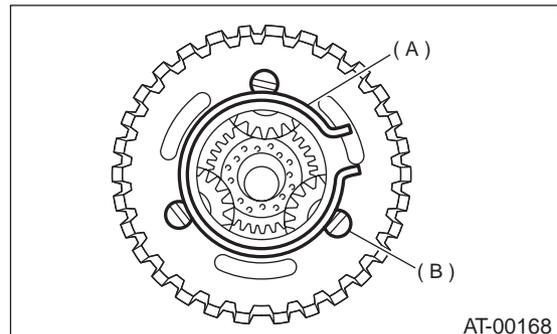
(A) Seal ring

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

ST 498077600 REMOVER



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

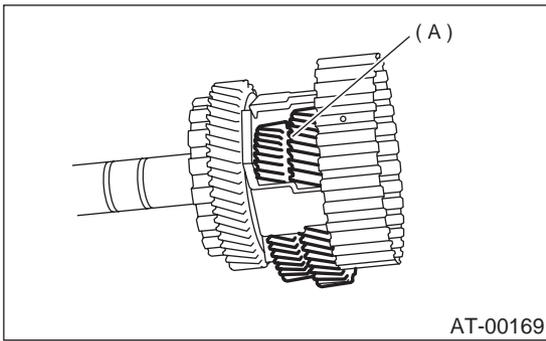


(A) Snap ring  
(B) Shaft

# CENTER DIFFERENTIAL CARRIER

AUTOMATIC TRANSMISSION

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



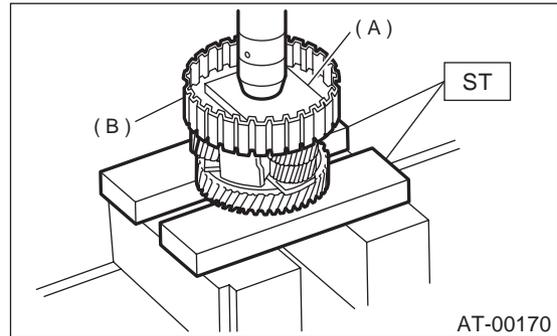
(A) Pinion gear

5) Pull out the intermediate shaft and thrust bearing.

## D: ASSEMBLY

- 1) Install the thrust washer onto the intermediate shaft.
- 2) Install thrust bearing onto the intermediate shaft.
- 3) Install the pinion gears and washers.
- 4) Insert the shaft into the center differential assembly.
- 5) Install the snap ring.
- 6) Using a press, install a new ball bearing into the center differential assembly.

ST 498077000 REMOVER



(A) Plate

(B) Center differential carrier

7) Apply Vaseline onto the seal ring outer surface and shaft grooves.

8) Install new seal rings.

## E: INSPECTION

- Check all parts for hole, score, or dirt.
- Check the play of the extension end, and if necessary, adjust it. <Ref. to AT-95, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

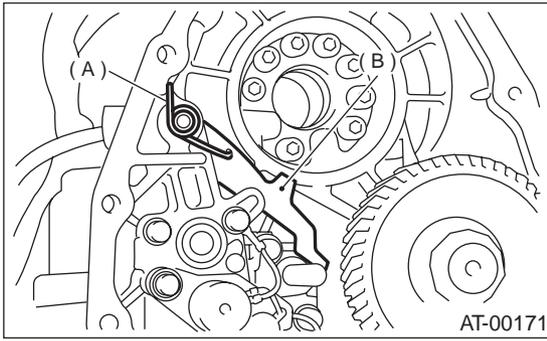
# PARKING PAWL

AUTOMATIC TRANSMISSION

## 32. Parking Pawl

### A: REMOVAL

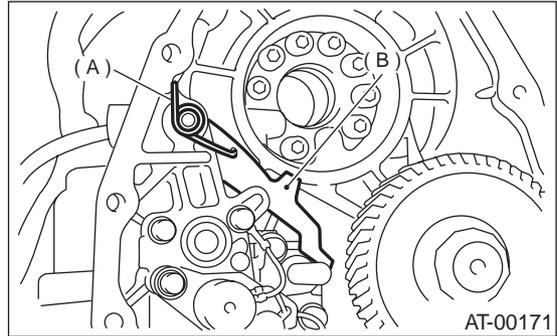
- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove rear vehicle speed sensor and separate transmission case and extension case sections. <Ref. to AT-86, REMOVAL, Extension Case.>
- 3) Remove the reduction drive gear. (MPT model) <Ref. to AT-104, REMOVAL, Reduction Drive Gear.>
- 4) Remove the center differential carrier. (VTD model) <Ref. to AT-106, REMOVAL, Center Differential Carrier.>
- 5) Remove the parking pawl, return spring and shaft.



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

### B: INSTALLATION

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



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

- 2) Install the reduction drive gear. <Ref. to AT-104, INSTALLATION, Reduction Drive Gear.>
- 3) Install the center differential carrier. (VTD model) <Ref. to AT-106, INSTALLATION, Center Differential Carrier.>
- 4) Install the rear vehicle speed sensor and extension case. <Ref. to AT-86, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

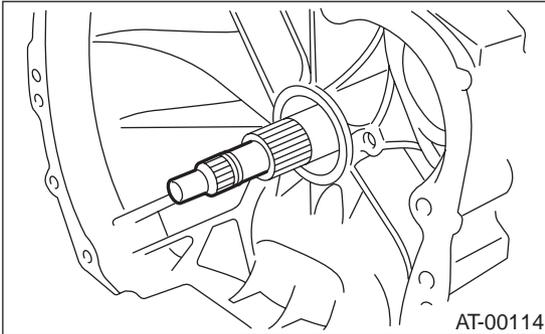
### C: INSPECTION

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

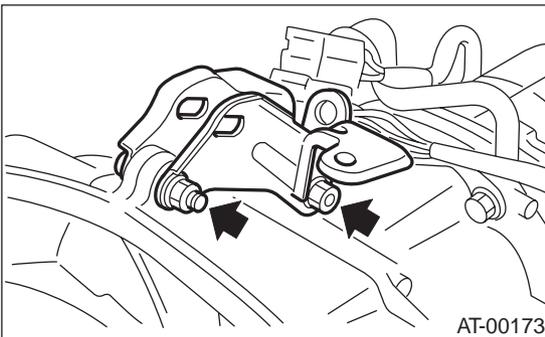
## 33. Torque Converter Clutch Case

### A: REMOVAL

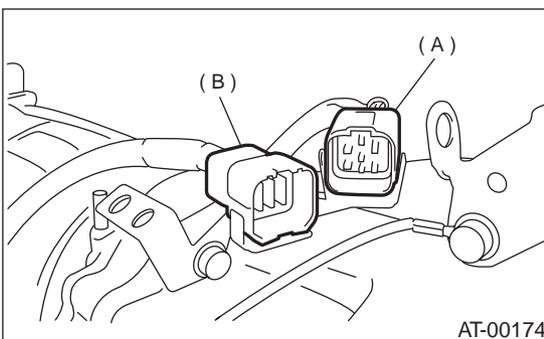
- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-85, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Remove air breather hose. <Ref. to AT-83, REMOVAL, Air Breather Hose.>
- 5) Remove pitching stopper bracket.



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



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

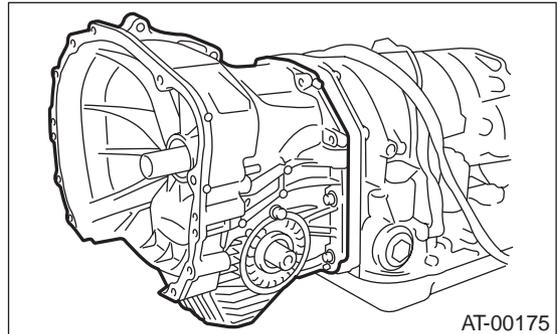
- 8) Remove the oil charger pipe. <Ref. to AT-84, REMOVAL, Oil Charger Pipe.>

- 9) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-78, REMOVAL, ATF Cooler Pipe and Hose.>

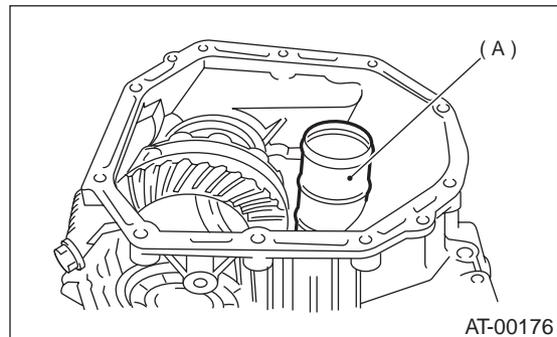
- 10) Lightly tapping the torque converter clutch case with plastic hammer, separate the transmission case and torque converter clutch case.

#### NOTE:

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



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



- (A) Seal pipe

- 12) Remove the differential assembly. <Ref. to AT-124, REMOVAL, Front Differential.>
- 13) Remove the oil seal from torque converter clutch case.

# TORQUE CONVERTER CLUTCH CASE

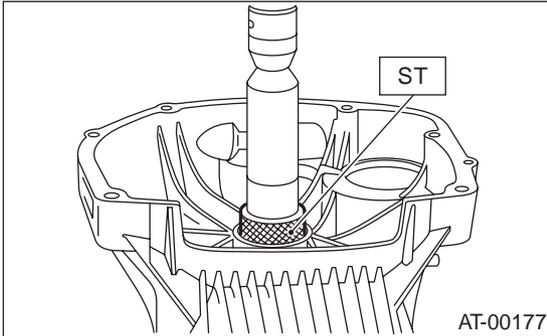
AUTOMATIC TRANSMISSION

## B: INSTALLATION

1) Check the appearance of each component and clean.

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

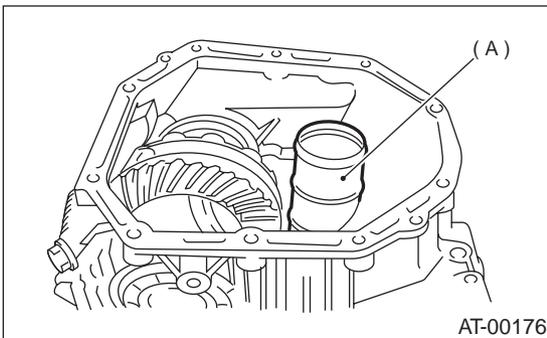
ST 398437700 DRIFT



3) Install the differential assembly to the case. <Ref. to AT-124, INSTALLATION, Front Differential.>

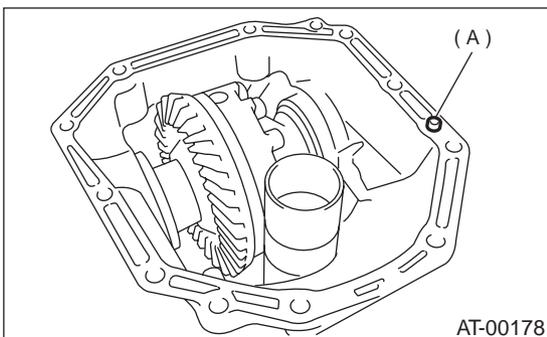
4) Install the left and right side retainers. <Ref. to AT-128, ADJUSTMENT, Front Differential.>

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



(A) Seal pipe

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

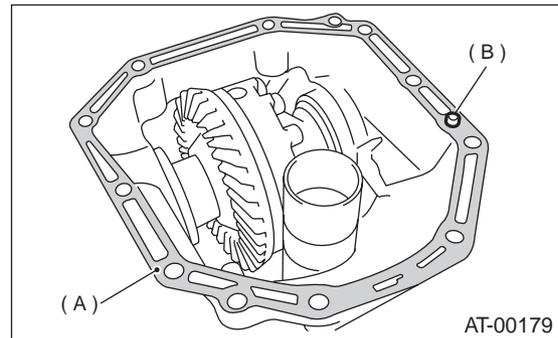


(A) Rubber seal

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

**Liquid gasket:**

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



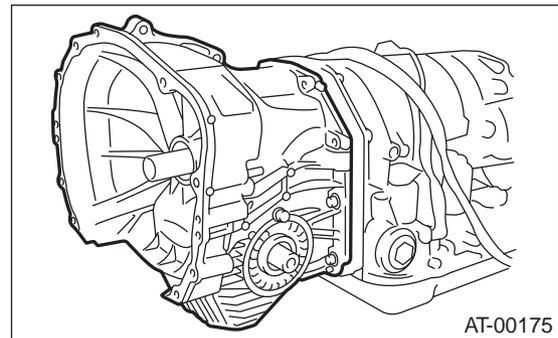
(A) THREE BOND 1215

(B) Rubber seal

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

**Tightening torque:**

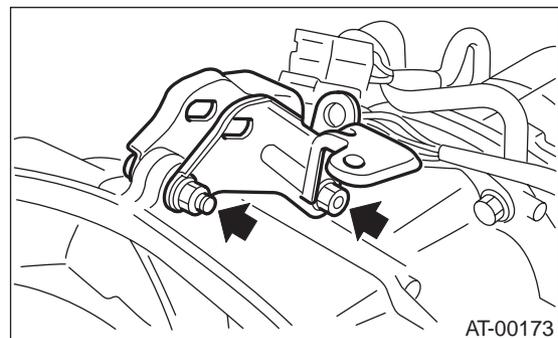
**41 N·m (4.2 kgf·m, 30.4 ft·lb)**



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

**Tightening torque:**

**41 N·m (4.2 kgf·m, 30.4 ft·lb)**



10) Insert inhibitor switch and transmission connector into stay.

11) Install air breather hose. <Ref. to AT-83, INSTALLATION, Air Breather Hose.>

12) Install the oil cooler pipes. <Ref. to AT-80, INSTALLATION, ATF Cooler Pipe and Hose.>

# TORQUE CONVERTER CLUTCH CASE

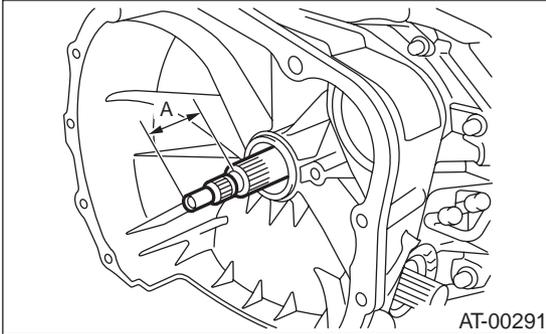
AUTOMATIC TRANSMISSION

13) Install the oil charger pipe with O-ring. <Ref. to AT-84, 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-85, INSTALLATION, Torque Converter Clutch Assembly.>

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

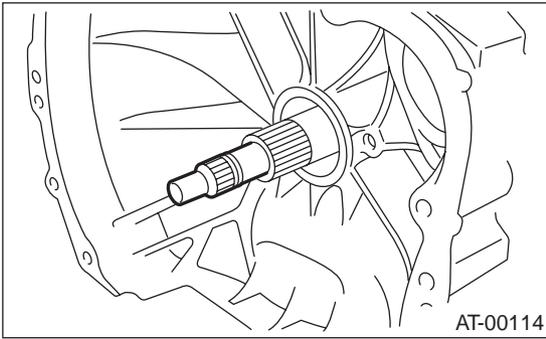
## C: INSPECTION

Measure the backlash and adjust to within specifications. <Ref. to AT-121, ADJUSTMENT, Drive Pinion Shaft.>

### 34. Oil Pump

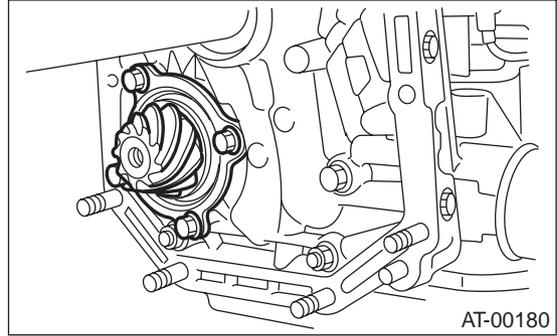
#### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-85, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose. <Ref. to AT-83, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charger pipe. <Ref. to AT-84, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-78, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case sections <Ref. to AT-109, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-86, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. (MPT model) <Ref. to AT-104, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to AT-106, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to AT-101, REMOVAL, REMOVAL, Reduction Driven Gear.>

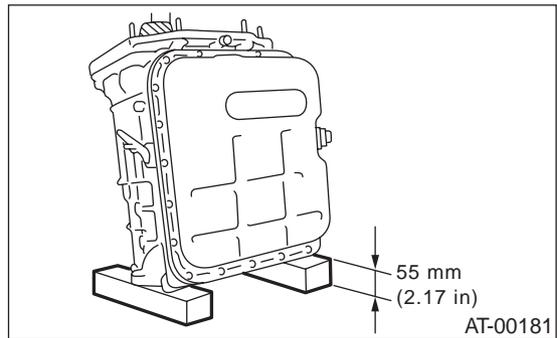
- 14) Loosen the taper roller bearing mounting bolts.



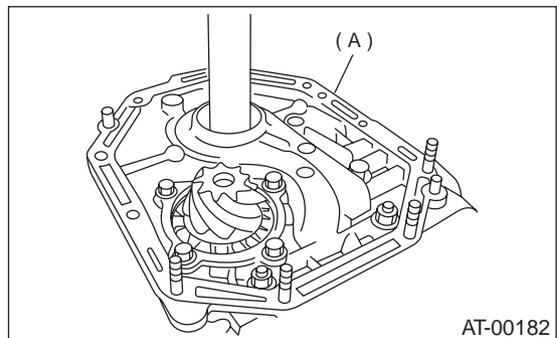
- 15) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

#### NOTE:

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

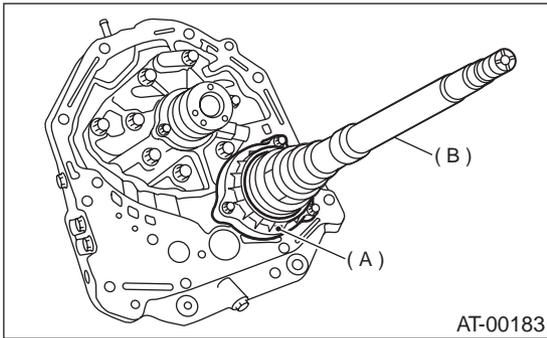


- 16) Remove the oil pump housing and adjusting thrust washer.



(A) Oil pump housing

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



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

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

## B: INSTALLATION

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

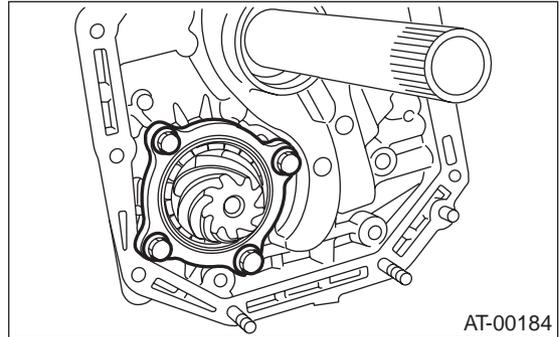
### NOTE:

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

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

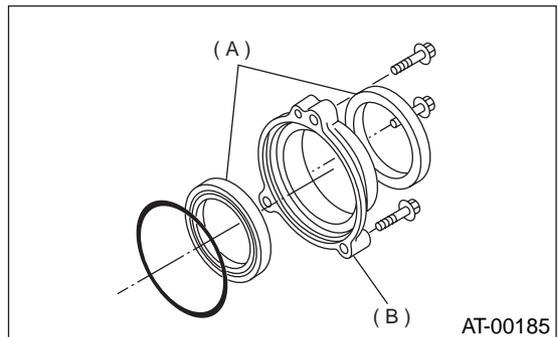
### Tightening torque:

**40 N·m (4.1 kgf-m, 30 ft-lb)**



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

ST 499247300 INSTALLER

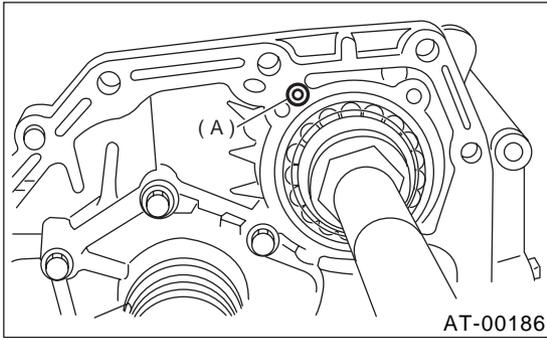


- (A) Oil seal  
(B) Oil seal retainer

# OIL PUMP

## AUTOMATIC TRANSMISSION

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

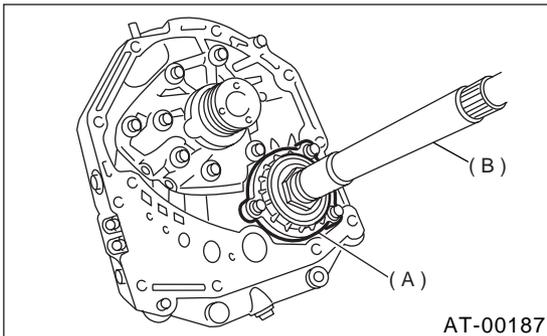


(A) O-ring

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

**Tightening torque:**

**7 N·m (0.7 kgf·m, 5.1 ft·lb)**



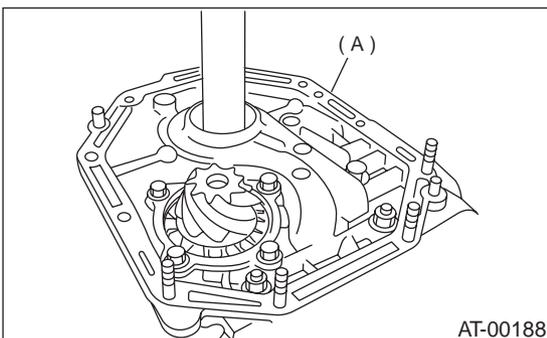
(A) Oil seal retainer  
(B) Drive pinion shaft

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

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

**Tightening torque:**

**42 N·m (4.3 kgf·m, 31 ft·lb)**



(A) Oil pump housing

8) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-85, INSTALLATION, Torque Converter Clutch Assembly.>

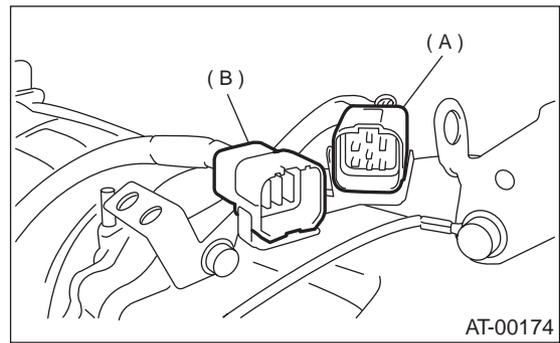
9) Install reduction driven gear. <Ref. to AT-102, INSTALLATION, Reduction Driven Gear.>

10) Install the reduction drive gear. (MPT model) <Ref. to AT-104, INSTALLATION, Reduction Drive Gear.>

11) Install the center differential carrier. (VTD model) <Ref. to AT-106, INSTALLATION, Center Differential Carrier.>

12) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to AT-86, INSTALLATION, Extension Case.>

13) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness  
(B) Inhibitor switch harness

14) Install air breather hose. <Ref. to AT-83, INSTALLATION, Air Breather Hose.>

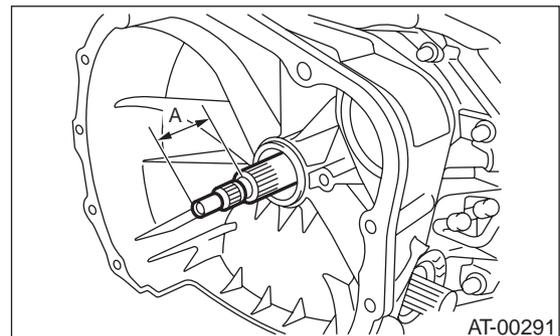
15) Install the oil cooler pipe. <Ref. to AT-80, INSTALLATION, ATF Cooler Pipe and Hose.>

16) Install the oil charger pipe with O-ring. <Ref. to AT-84, INSTALLATION, Oil Charger Pipe.>

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

**Normal protrusion A:**

**50 — 55 mm (1.97 — 2.17 in)**

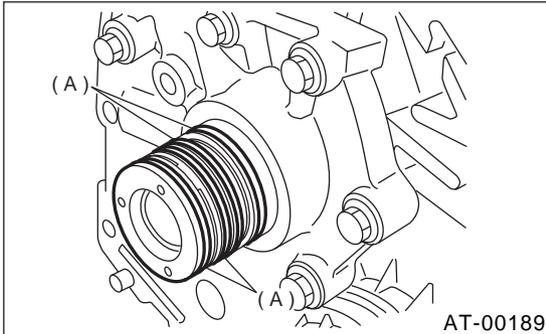


18) Install the torque converter clutch assembly. <Ref. to AT-85, INSTALLATION, Torque Converter Clutch Assembly.>

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

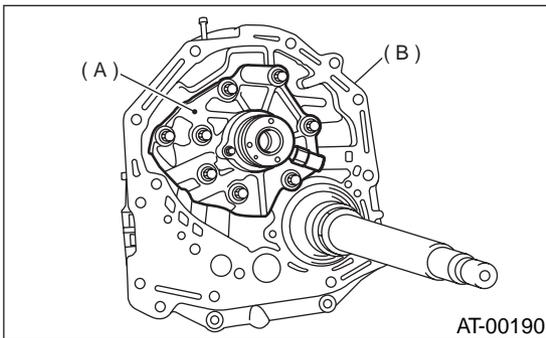
### C: DISASSEMBLY

1) Remove four seal rings.



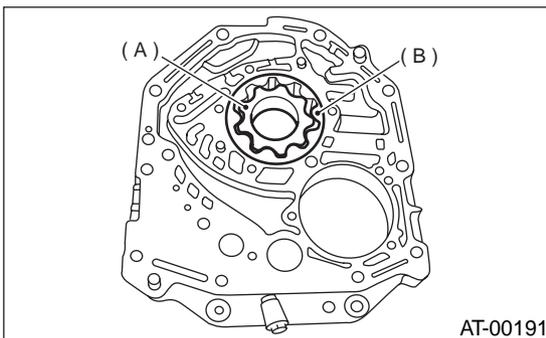
(A) Seal rings

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



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

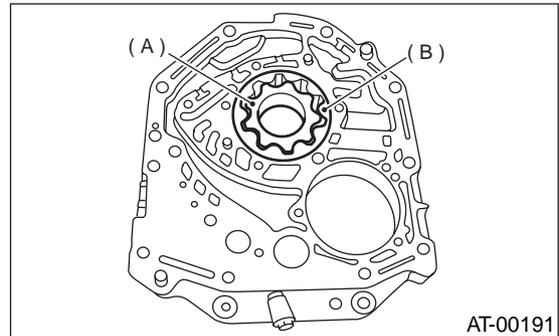
3) Remove the inner and outer rotor.



(A) Inner rotor  
(B) Outer rotor

### D: ASSEMBLY

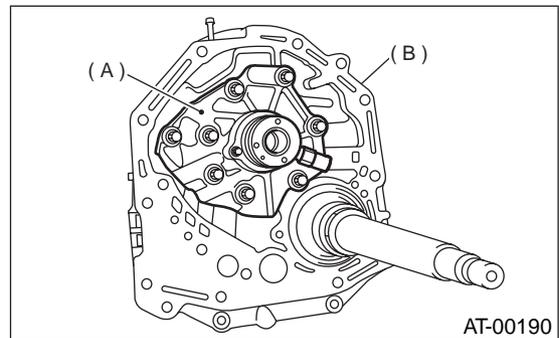
1) Install oil pump rotor assembly to oil pump housing.



(A) Inner rotor  
(B) Outer rotor

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

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



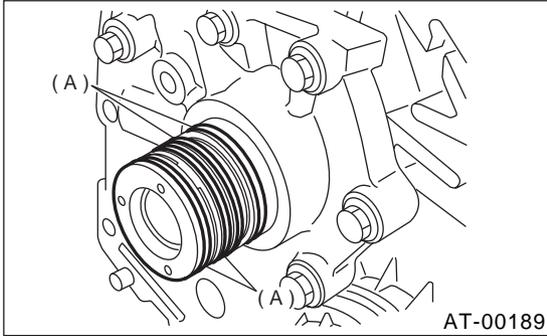
(A) Oil pump cover  
(B) Oil pump housing

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

# OIL PUMP

## AUTOMATIC TRANSMISSION

4) Install the oil seal retainer and new seal rings. After adjusting the drive pinion backlash and tooth contact. <Ref. to AT-117, ADJUSTMENT, Oil Pump.>



(A) Seal rings

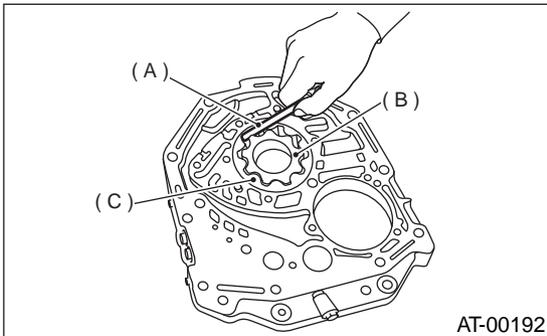
### E: INSPECTION

- 1) Check seal ring and O-ring oil seal for breaks or damage.
- 2) Check other parts for dents or abnormalities.
- 3) Selection of oil pump rotor assembly
  - (1) Tip clearance
 

Install inner rotor and outer rotor to oil pump. With rotor gears facing each other, measure crest-to-crest clearance.

#### Tip clearance:

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



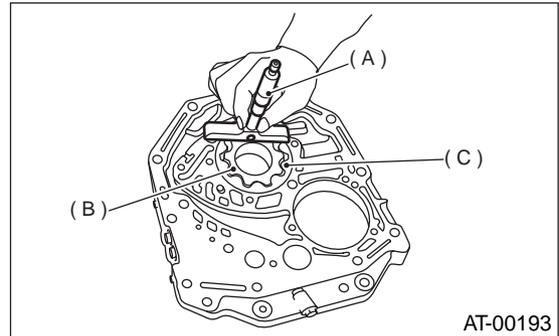
(A) Thickness gauge  
(B) Inner rotor  
(C) Outer rotor

#### (2) Side clearance

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

#### Side clearance:

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



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

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

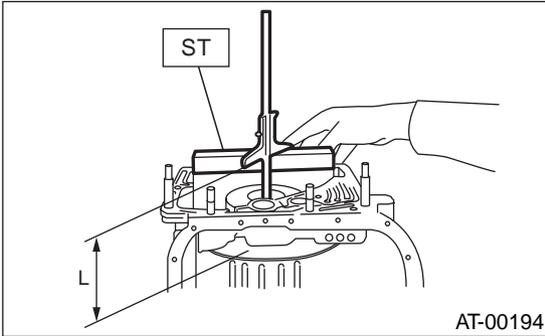
Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

- Measure the total end play and adjust to within specifications. <Ref. to AT-117, ADJUSTMENT, Oil Pump.>

### F: ADJUSTMENT

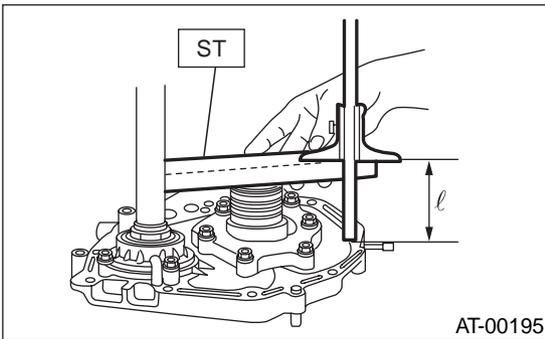
1) Using ST, measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum "L".

ST 398643600 GAUGE



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

ST 398643600 GAUGE

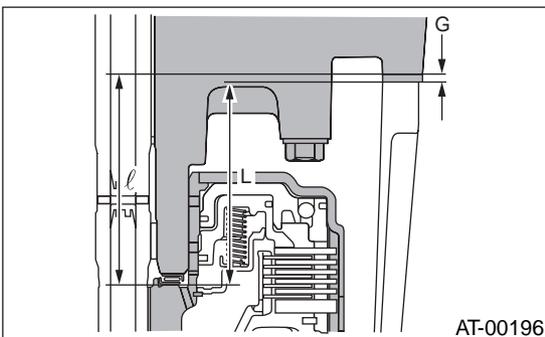


3) Calculation of total end play

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

$$C = (L + G) - l$$

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



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

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

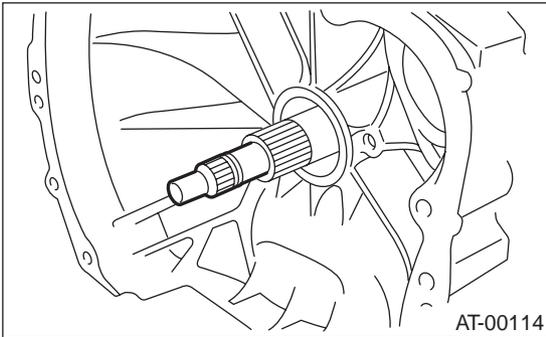
5) After correctly installing the new gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of the case.

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

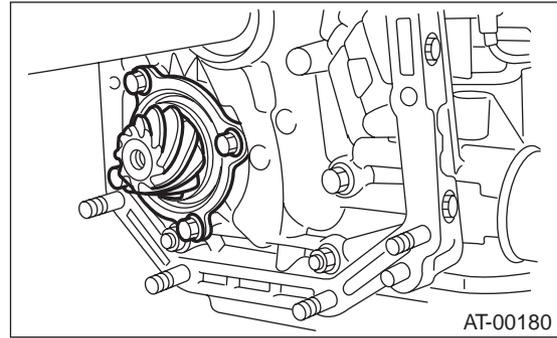
### 35. Drive Pinion Shaft

#### A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-85, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 14) Separation of drive pinion shaft and oil pump housing. <Ref. to AT-112, REMOVAL, Oil Pump.>



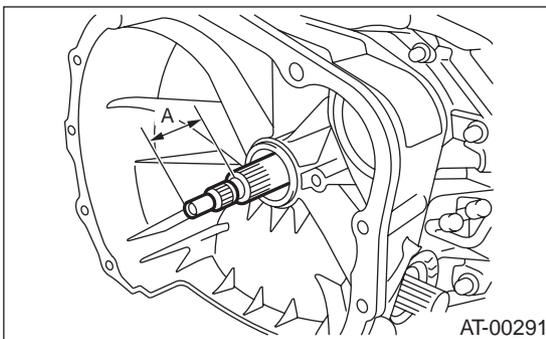
- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose. <Ref. to AT-83, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charger pipe. <Ref. to AT-84, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-78, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case sections <Ref. to AT-109, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-86, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. (MPT model) <Ref. to AT-104, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to AT-106, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to AT-101, REMOVAL, Reduction Driven Gear.>

## B: INSTALLATION

- 1) Assemble the drive pinion assembly to the oil pump housing. <Ref. to AT-113, INSTALLATION, Oil Pump.>
- 2) Install oil pump housing to transmission case. <Ref. to AT-113, INSTALLATION, Oil Pump.>
- 3) Combine the torque converter case with the transmission case. <Ref. to AT-110, INSTALLATION, Torque Converter Clutch Case.>
- 4) Install the reduction driven gear. <Ref. to AT-102, INSTALLATION, Reduction Driven Gear.>
- 5) Install the reduction drive gear. (MPT model) <Ref. to AT-104, INSTALLATION, Reduction Drive Gear.>
- 6) Install the center differential carrier. (VTD model) <Ref. to AT-106, INSTALLATION, Center Differential Carrier.>
- 7) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to AT-86, INSTALLATION, Extension Case.>
- 8) Insert inhibitor switch and transmission connector into stay.
- 9) Install air breather hose. <Ref. to AT-83, INSTALLATION, Air Breather Hose.>
- 10) Install the oil cooler inlet and outlet pipes. <Ref. to AT-80, INSTALLATION, ATF Cooler Pipe and Hose.>
- 11) Install the oil charger pipe with O-ring.
- 12) Insert the input shaft while turning lightly by hand. At this time, not to damage the bushing.

### Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)

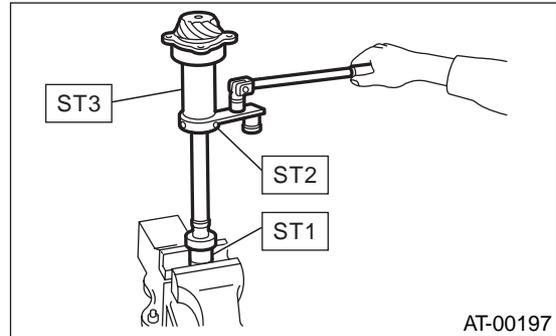


- 13) Install the torque converter clutch assembly. <Ref. to AT-85, INSTALLATION, Torque Converter Clutch Assembly.>
- 14) Install the transmission assembly to vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

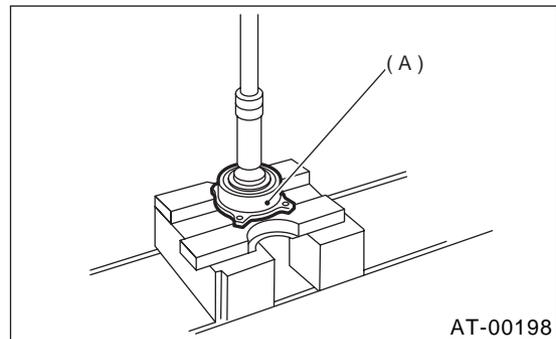
## C: DISASSEMBLY

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

ST1 498937110 HOLDER  
 ST2 499787700 WRENCH  
 ST3 499787500 ADAPTER



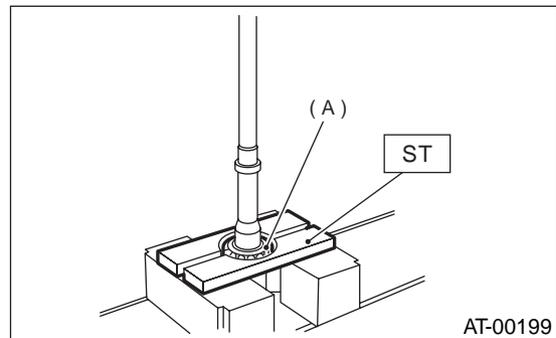
- 2) Remove the O-ring.
- 3) Using a press, separate the rear roller bearing and outer race from the shaft.



(A) Outer race

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

ST 498517000 REPLACER



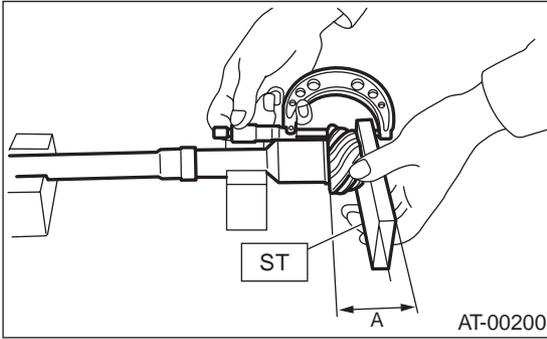
(A) Front roller bearing

# DRIVE PINION SHAFT

## AUTOMATIC TRANSMISSION

### D: ASSEMBLY

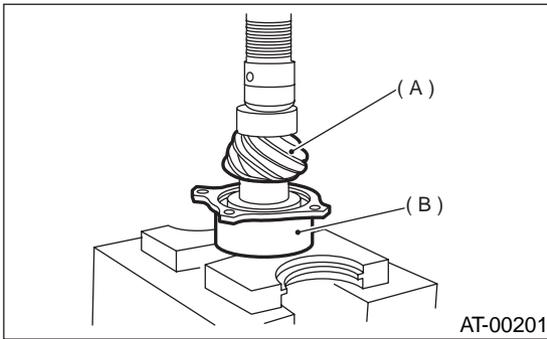
- 1) Measure dimension "A" of the drive pinion shaft.  
ST 398643600 GAUGE



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

#### NOTE:

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



- (A) Drive pinion shaft  
(B) Roller bearing

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

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

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

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

T1: 116 N·m (11.8 kgf·m, 85.3 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST2 length 0.072 m (2.83 in)

L2: Torque wrench length

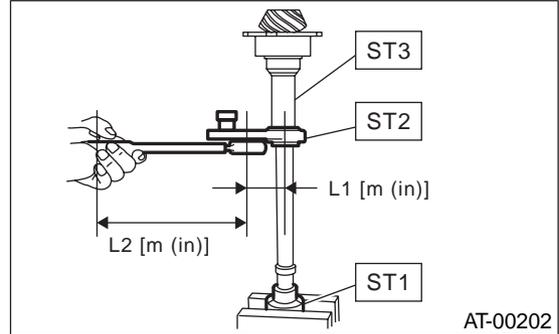
Example:

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

- ST1 498937110 HOLDER  
ST2 499787700 WRENCH  
ST3 499787500 ADAPTER

#### NOTE:

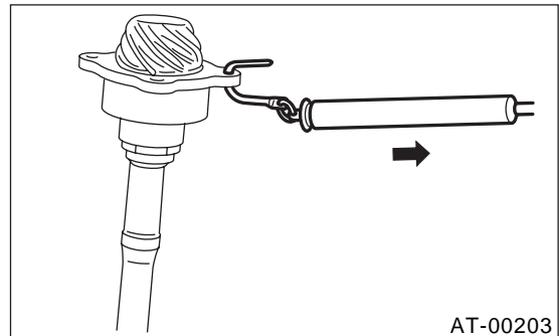
Install ST2 to torque wrench as straight as possible.



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

#### Starting torque:

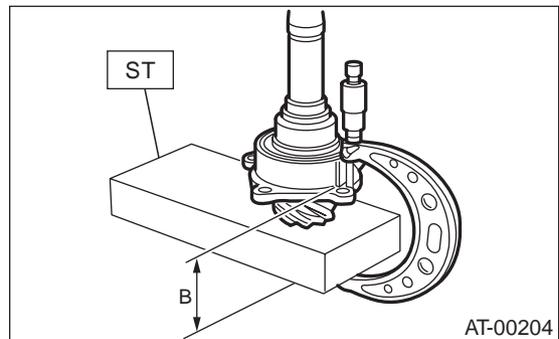
7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 8.6 lb)



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

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

- ST 398643600 GAUGE



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

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

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

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-121, ADJUSTMENT, Drive Pinion Shaft.>

## F: ADJUSTMENT

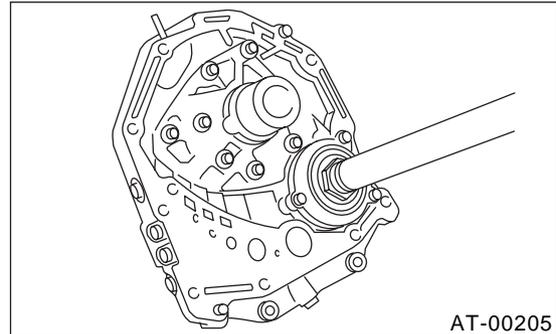
- 1) Thoroughly remove the liquid gasket from the case mating surface beforehand.
- 2) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening four bolts.

### NOTE:

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

### Tightening torque:

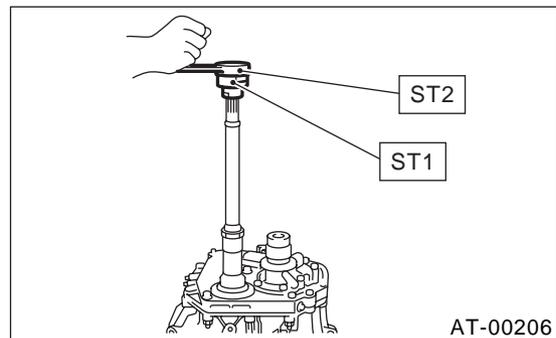
**41 N·m (4.2 kgf-m, 30.4 ft-lb)**



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

ST1 498937110 HOLDER

ST2 499787700 WRENCH



- 4) Adjust the backlash between drive pinion and crown gear. <Ref. to AT-128, ADJUSTMENT, Front Differential.>

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

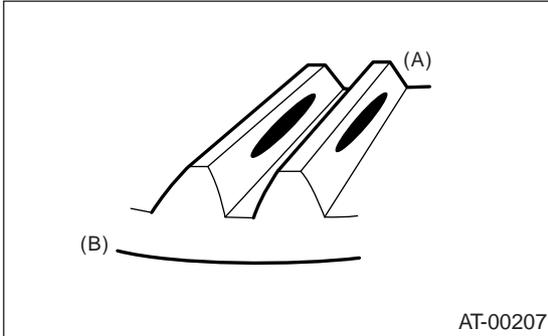
If tooth contact is improper, readjust the backlash or shim thickness. <Ref. to AT-128, ADJUSTMENT, Front Differential.>

# DRIVE PINION SHAFT

## AUTOMATIC TRANSMISSION

- Tooth contact

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

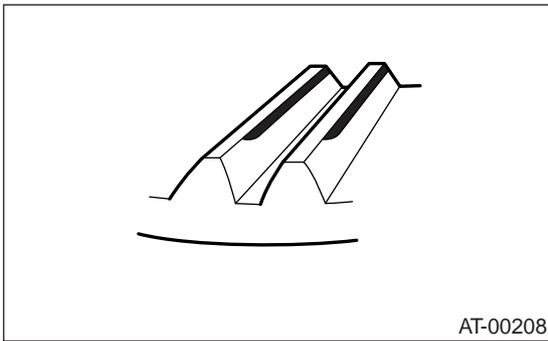


- (A) Toe side
- (B) Heel side

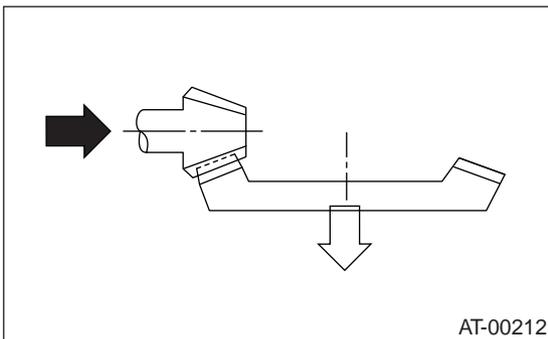
- Face contact

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

Contact pattern



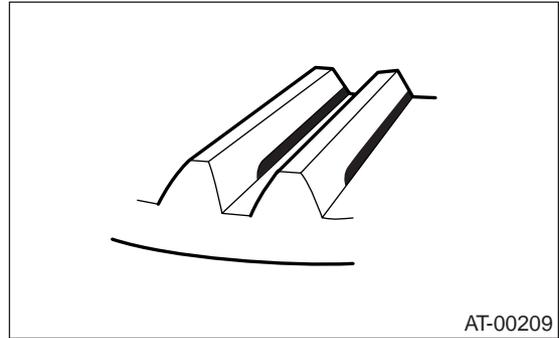
Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to crown gear.



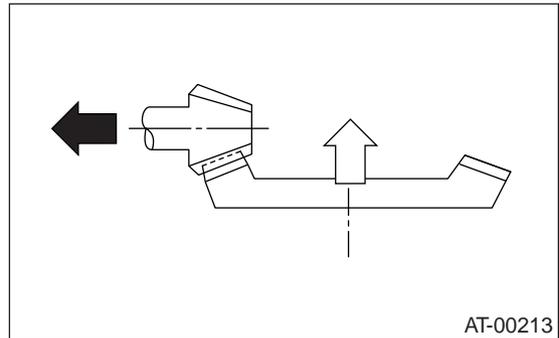
- Flank contact

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

Contact pattern



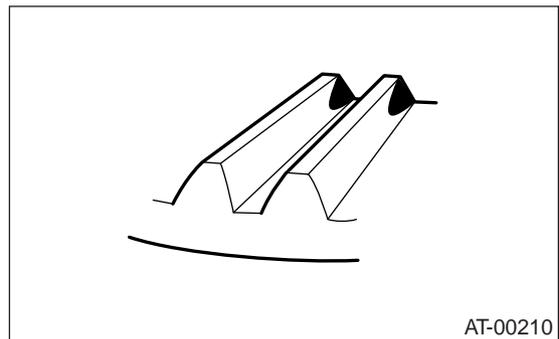
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.



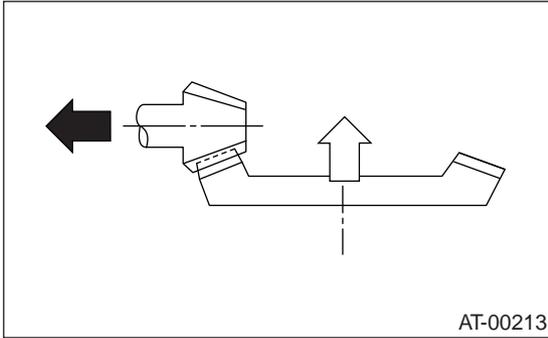
- Toe contact (Inside end contact)

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

Contact pattern

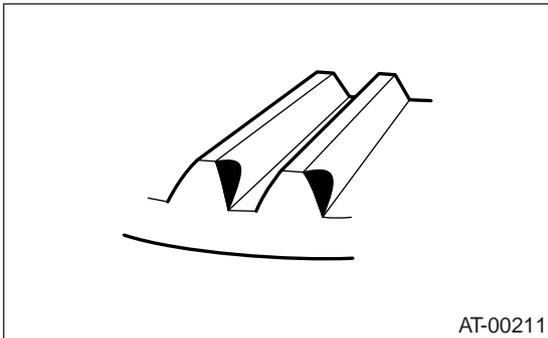


Corrective action: Decrease thickness of drive pinion height adjusting shim in order to move drive pinion away from crown gear.

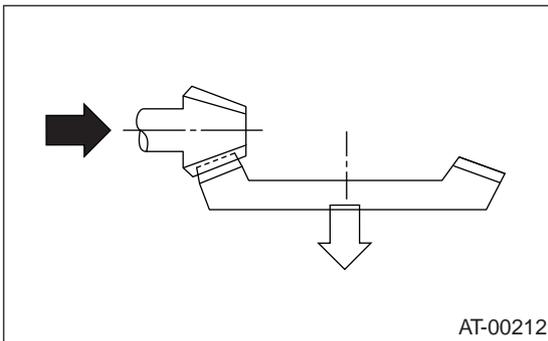


- Heel contact (Outside end contact)

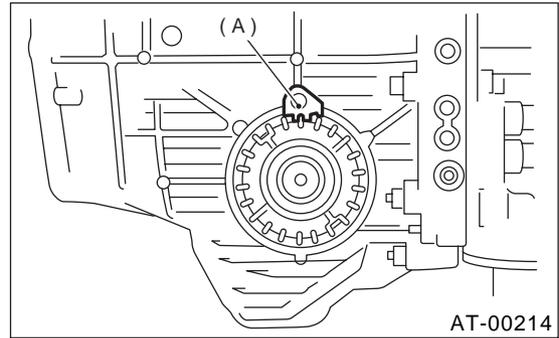
**Checking item: Contact areas is small.**  
Contact pattern



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



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



(A) Lock plate

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

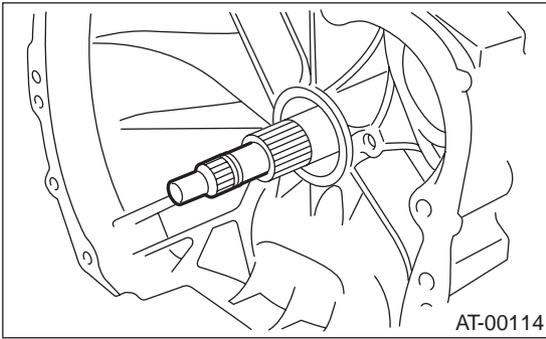
# FRONT DIFFERENTIAL

## AUTOMATIC TRANSMISSION

### 36. Front Differential

#### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-85, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Disconnect the air breather hose. <Ref. to AT-83, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-84, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-78, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case. <Ref. to AT-109, REMOVAL, Torque Converter Clutch Case.>
- 10) Remove the seal pipe if it is attached.
- 11) Remove the differential side retainer with ST.

#### NOTE:

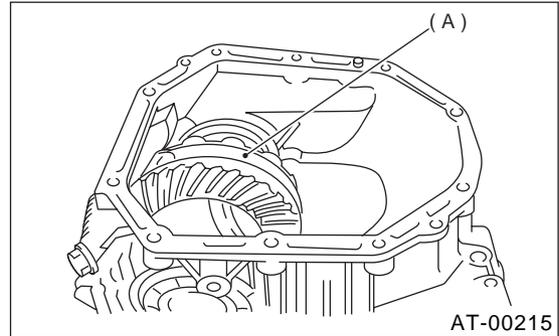
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the torque converter clutch case.

ST 499787000 WRENCH ASSY

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

#### B: INSTALLATION

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

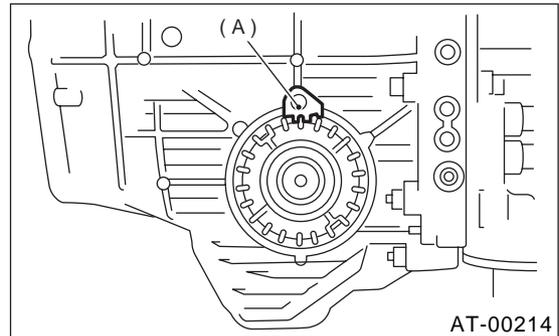


(A) Differential assembly

- 2) Remove the O-rings from left and right side retainer.
- 3) Using ST, install the side retainers. <Ref. to AT-124, REMOVAL, Front Differential.>  
ST 499787000 WRENCH ASSY
- 4) Install the lock plate.

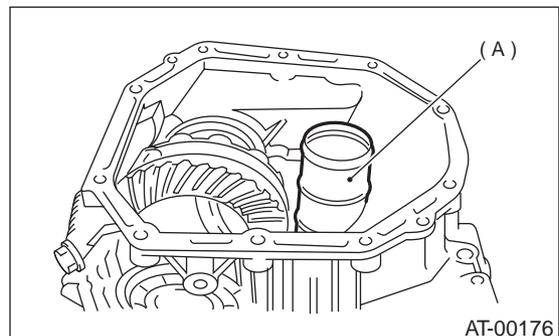
#### Tightening torque:

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



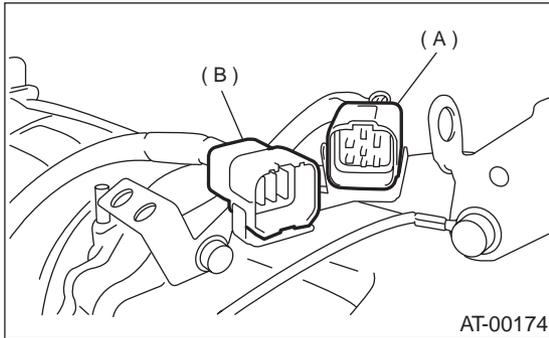
(A) Lock plate

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



(A) Seal pipe

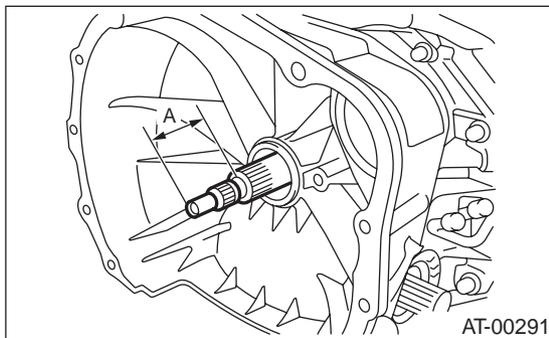
- 6) Install the torque converter clutch case to transmission case. <Ref. to AT-110, INSTALLATION, Torque Converter Clutch Case.>
- 7) Install air breather hose.
- 8) Insert inhibitor switch and transmission connector into stay.



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

- 9) Install oil cooler pipes. <Ref. to AT-80, INSTALLATION, ATF Cooler Pipe and Hose.>
- 10) Install the oil charger pipe with O-ring <Ref. to AT-84, 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)**



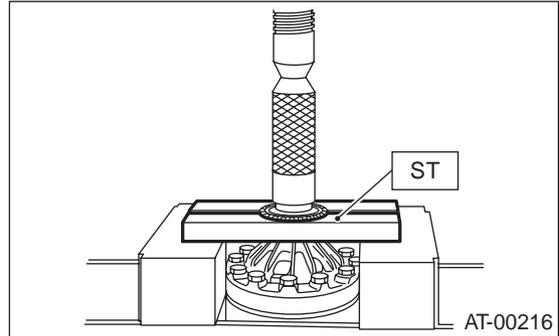
- 12) Install the torque converter clutch assembly. <Ref. to AT-85, INSTALLATION, Torque Converter Clutch Assembly.>
- 13) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

## C: DISASSEMBLY

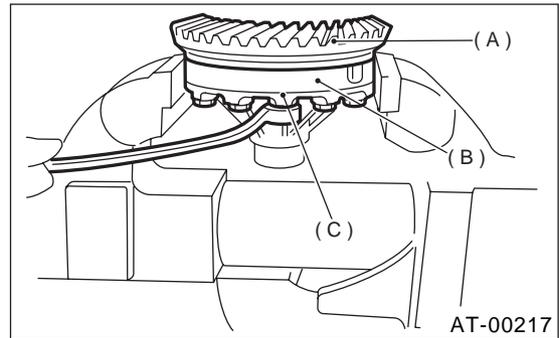
### 1. DIFFERENTIAL CASE ASSEMBLY

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

ST 498077000 REMOVER

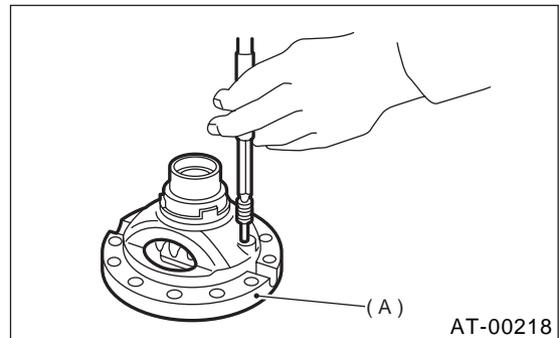


- 2) Secure the case in a vise and remove the crown gear tightening bolts, then separate the crown gear, case (RH) and case (LH).



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

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



- (A) Differential case (RH)

# FRONT DIFFERENTIAL

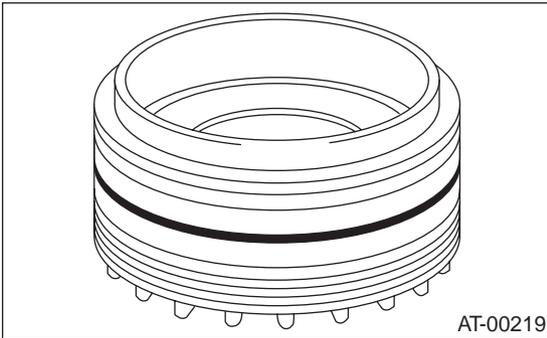
AUTOMATIC TRANSMISSION

## 2. SIDE RETAINER

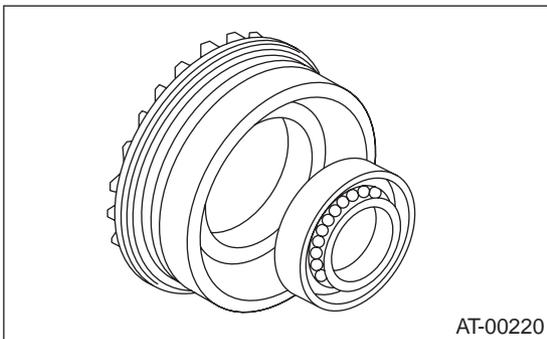
### NOTE:

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

1) Remove O-ring.

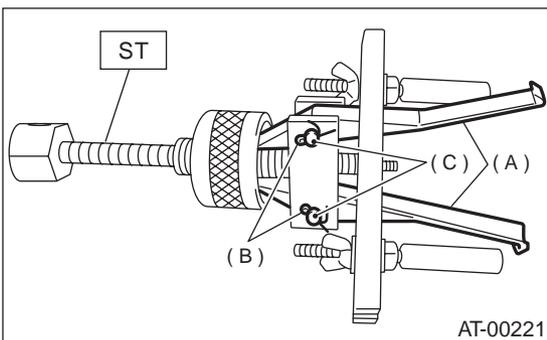


2) Remove oil seal.



3) Take out either split pin, remove claw.

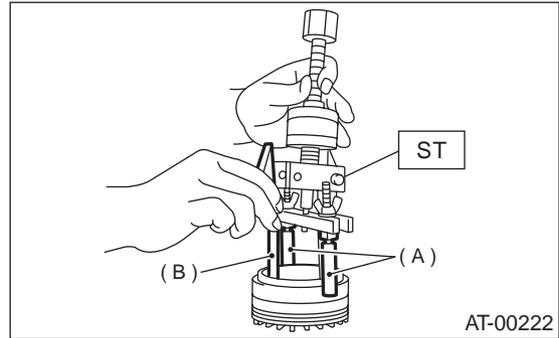
ST 398527700 PULLER ASSY



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

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

ST 398527700 PULLER ASSY



- (A) Shaft
- (B) Claw

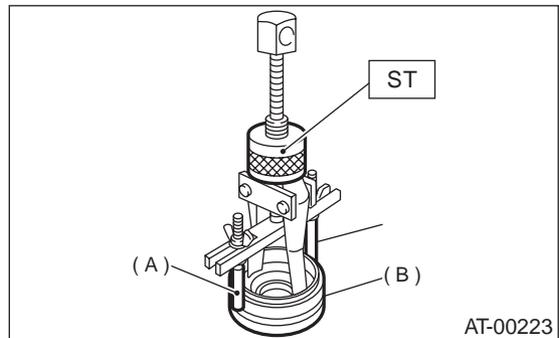
5) Return removed claw to the original position, and install pin and split pin.

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

ST 398527700 PULLER ASSY

### NOTE:

Replace bearing inner and outer races as a single unit.

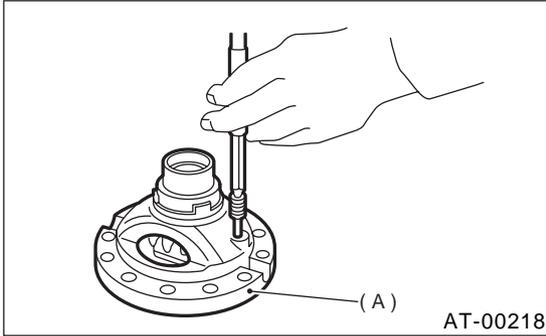


- (A) Shaft
- (B) Side retainer

## D: ASSEMBLY

### 1. DIFFERENTIAL CASE ASSEMBLY

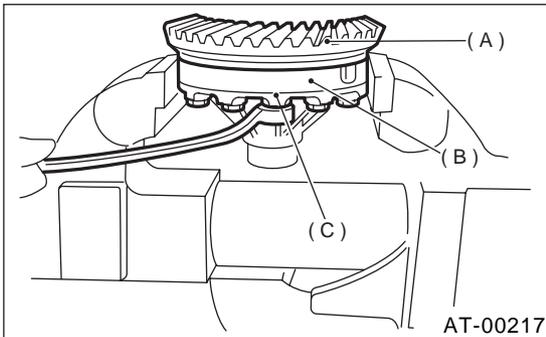
- 1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft.
- 2) Install straight pin from reverse direction.



(A) Differential case (RH)

- 3) Install the washer and differential bevel gear to the differential case (LH). Then put the case over the differential case (RH), and connect both cases.
- 4) Install the crown gear and secure by tightening the bolt.

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



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

- 5) Measurement of backlash (Selection of washer)
  - (1) Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of the case.

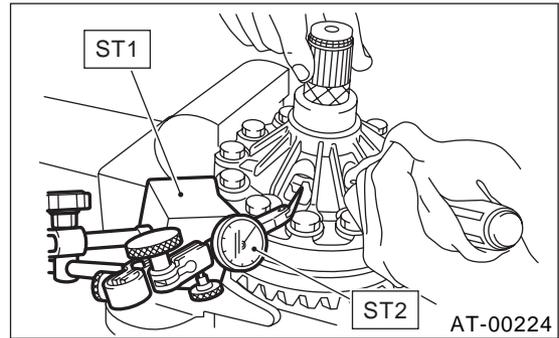
ST1 498247001 MAGNET BASE  
 ST2 498247100 DIAL GAUGE

**NOTE:**

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

**Standard value:**

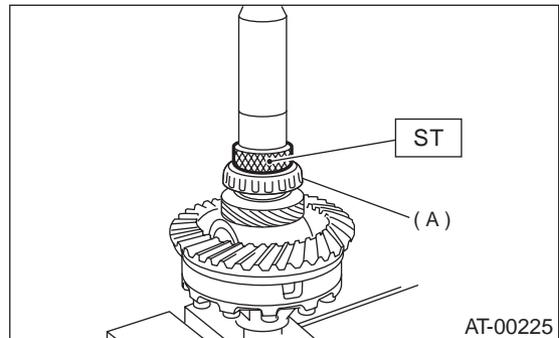
**0.13 — 0.18 mm (0.0051 — 0.0071 in)**



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

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

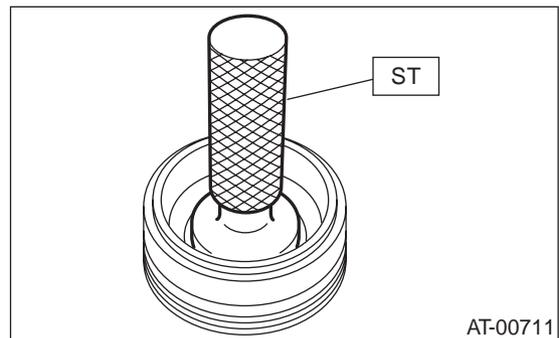
- 6) Using ST, install taper roller bearing.  
 ST 398437700 DRIFT



(A) Taper roller bearing

### 2. SIDE RETAINER

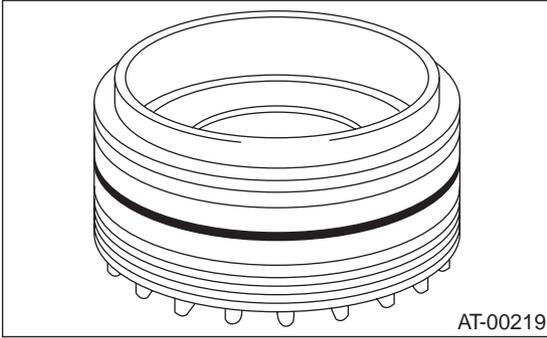
- 1) Install bearing outer race to side retainer.
- 2) Install a new oil seal using the ST and hammer.  
 ST 499797000 INSTALLER



# FRONT DIFFERENTIAL

## AUTOMATIC TRANSMISSION

3) Install new O-ring.



### E: INSPECTION

- Check each component for harmful cuts, damage and other faults.
- Measure the backlash and adjust to within specifications.

<Ref. to AT-128, ADJUSTMENT, Front Differential.>

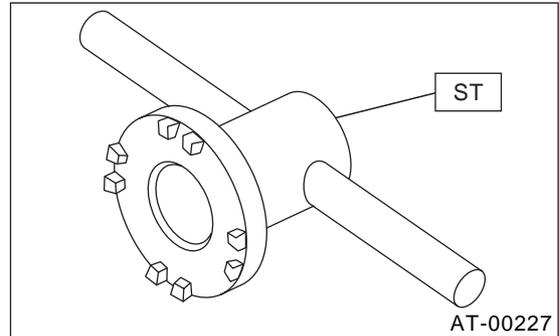
### F: ADJUSTMENT

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

#### NOTE:

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

ST 499787000 WRENCH ASSY



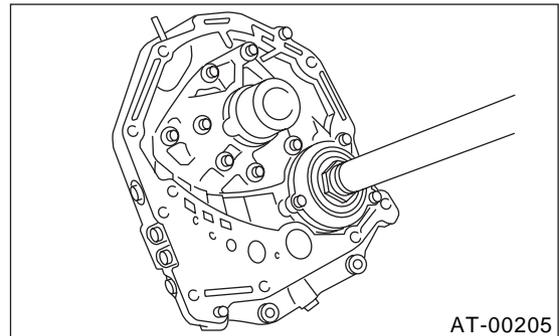
- 2) Remove the oil pump housing.
- 3) Thoroughly remove the liquid gasket from the case mating surface beforehand.
- 4) Install the oil pump housing assembly to the torque converter clutch case, and secure evenly by tightening four bolts.

#### NOTE:

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

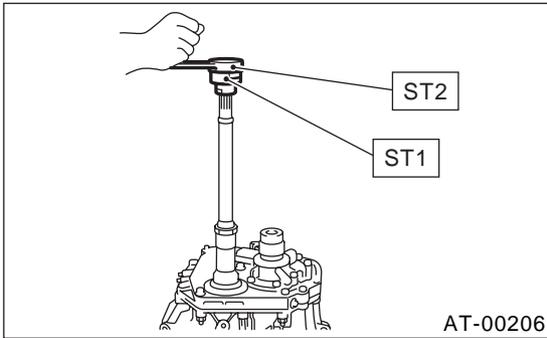
#### **Tightening torque:**

**41 N·m (4.2 kgf-m, 30.4 ft-lb)**

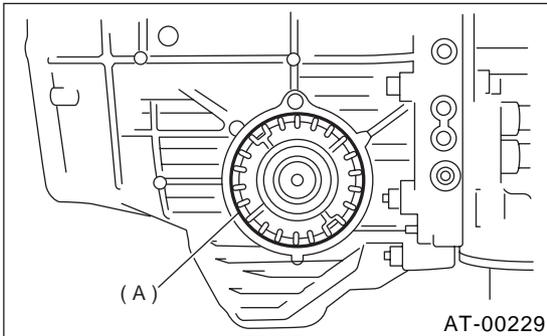


5) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937110 HOLDER  
ST2 499787700 WRENCH

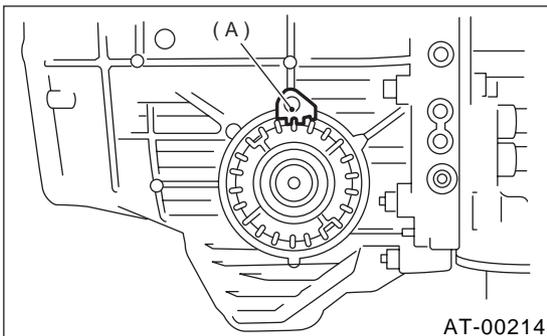


6) Tighten the LH retainer until contact is felt while rotating the shaft. Then loosen the RH retainer. Keep tightening the LH retainer and loosening the RH retainer until the pinion shaft can no longer be turned. This is the "zero" state.



(A) Retainer

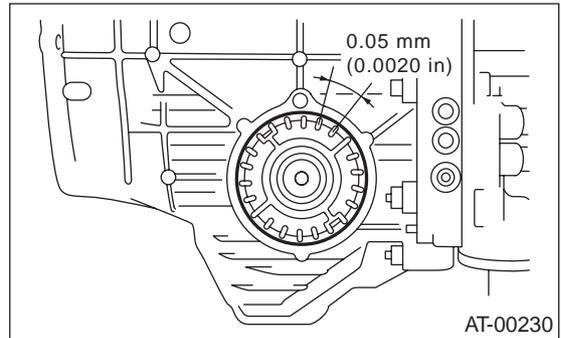
7) After the "zero" state is established, back off the LH retainer 3 notches and secure it with the lock plate. Then back off the RH retainer and retighten until it stops. Rotate drive pinion a few times. Tighten the RH retainer 1-3/4 notches further. This sets the preload. Finally, secure the retainer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



(A) Lock plate

**NOTE:**

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

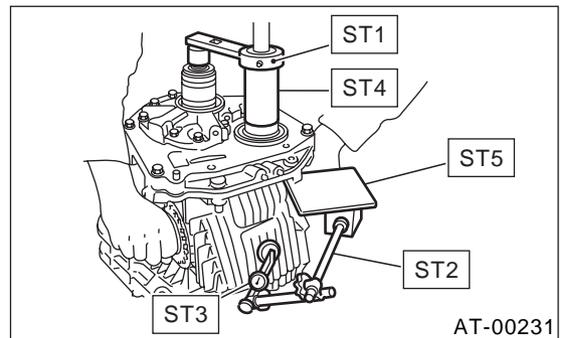


8) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3, ST4 and ST5.

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

**Backlash:**

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



9) Adjust the tooth contact between front differential and drive shaft. <Ref. to AT-121, ADJUSTMENT, Drive Pinion Shaft.>

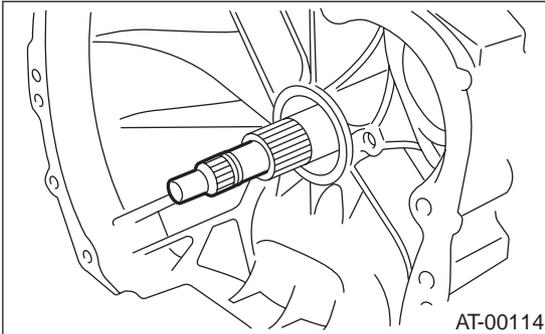
# HIGH CLUTCH AND REVERSE CLUTCH

## AUTOMATIC TRANSMISSION

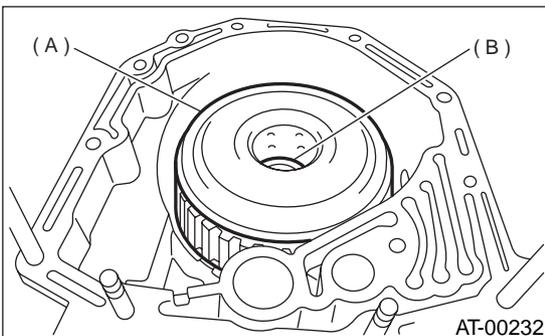
### 37.High Clutch and Reverse Clutch

#### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-85, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.

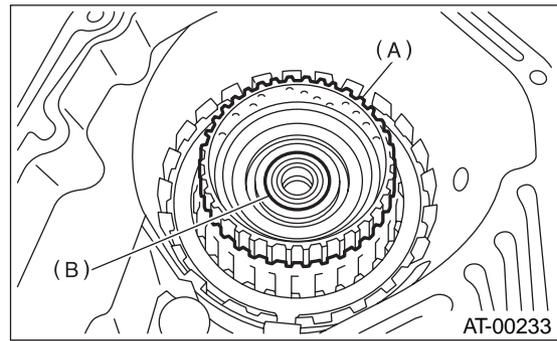


- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect inhibitor switch connector from stay.
- 6) Disconnect the air breather hose.
- 7) Remove the oil charger pipe. <Ref. to AT-84, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-78, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case.<Ref. to AT-109, REMOVAL, Torque Converter Clutch Case.>
- 10) Remove the oil pump housing. <Ref. to AT-112, REMOVAL, Oil Pump.>
- 11) Take out the high clutch, thrust needle bearing and reverse clutch assembly.



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

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



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

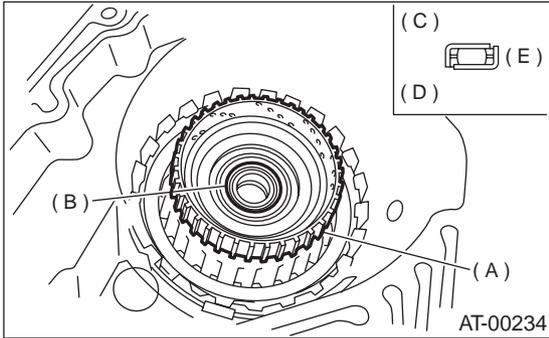
# HIGH CLUTCH AND REVERSE CLUTCH

AUTOMATIC TRANSMISSION

## B: INSTALLATION

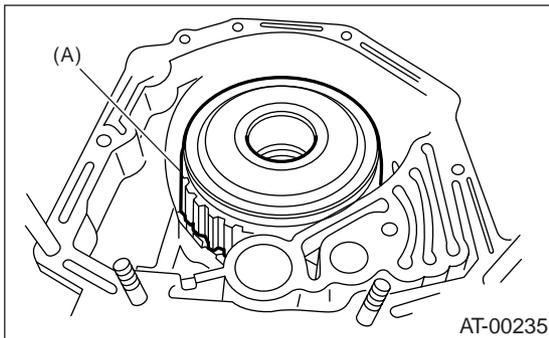
- 1) Apply vaseline to thrust needle bearing.
- 2) Install the high clutch hub and thrust needle bearing.

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



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

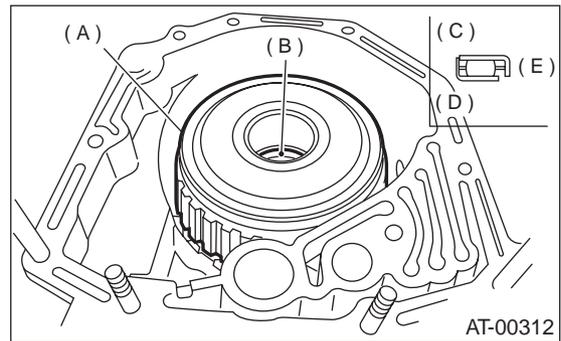
- 3) Install the high clutch assembly.



- (A) High clutch and reverse clutch assembly

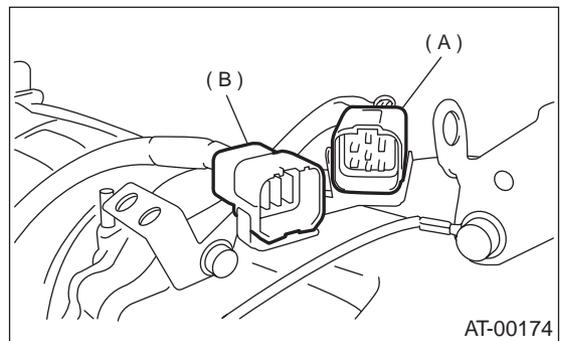
- 4) Adjust total end play. <Ref. to AT-117, ADJUSTMENT, Oil Pump.>

- 5) Install the thrust needle bearing in proper direction.



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

- 6) Install the oil pump housing assembly.
- 7) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-110, INSTALLATION, Torque Converter Clutch Case.>
- 8) Insert inhibitor switch and transmission connector into stay.
- 9) Install air breather hose. <Ref. to AT-83, INSTALLATION, Air Breather Hose.>



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

- 10) Install oil cooler pipes. <Ref. to AT-80, INSTALLATION, ATF Cooler Pipe and Hose.>
- 11) Install the oil charger pipe with O-ring. <Ref. to AT-84, INSTALLATION, Oil Charger Pipe.>

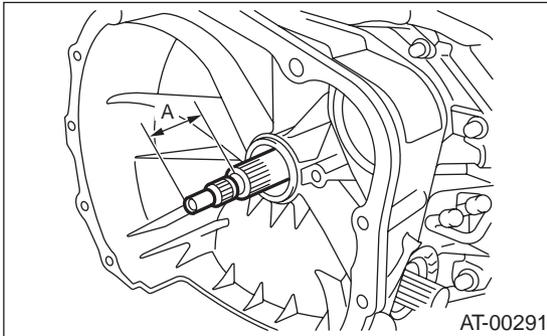
# HIGH CLUTCH AND REVERSE CLUTCH

## AUTOMATIC TRANSMISSION

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

**Normal protrusion A:**

**50 — 55 mm (1.97 — 2.17 in)**

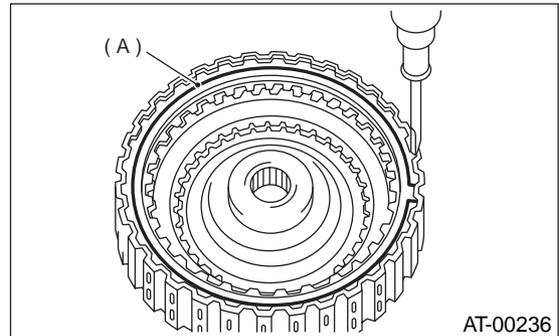


13) Install the torque converter clutch assembly. <Ref. to AT-85, INSTALLATION, Torque Converter Clutch Assembly.>

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

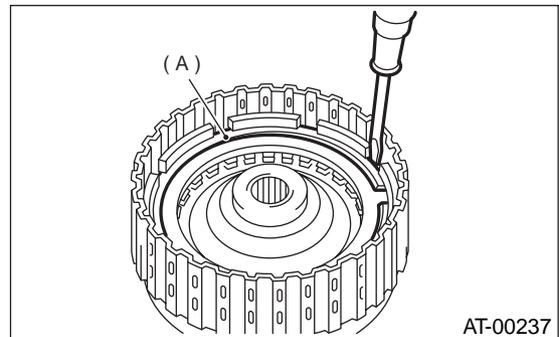
## C: DISASSEMBLY

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



(A) Snap ring

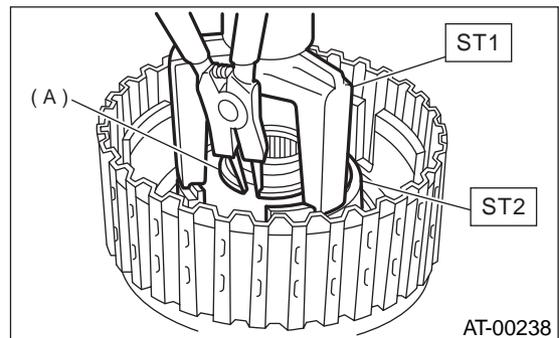
2) Remove snap ring, and take out the retaining plate, drive plates and driven plates.



(A) Snap ring

3) Using ST1 and ST2, remove snap ring.

ST1 398673600 COMPRESSOR  
ST2 498627100 SEAT

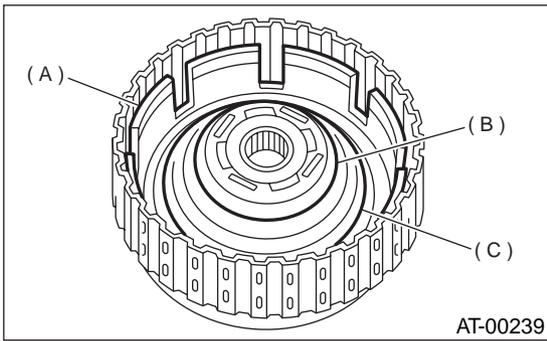


(A) Snap ring

# HIGH CLUTCH AND REVERSE CLUTCH

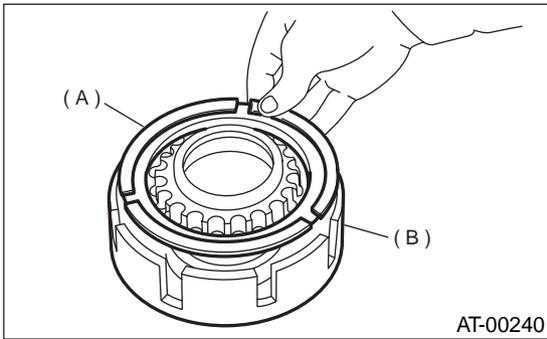
AUTOMATIC TRANSMISSION

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



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

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

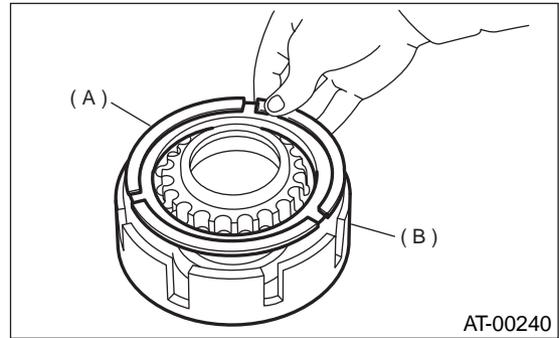


- (A) High clutch piston
- (B) Reverse clutch piston

## D: ASSEMBLY

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

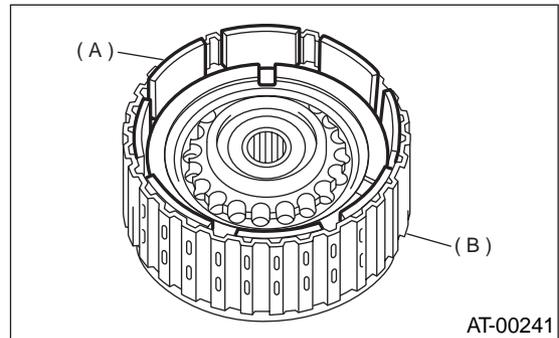
2) Install high clutch piston to reverse clutch piston.



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

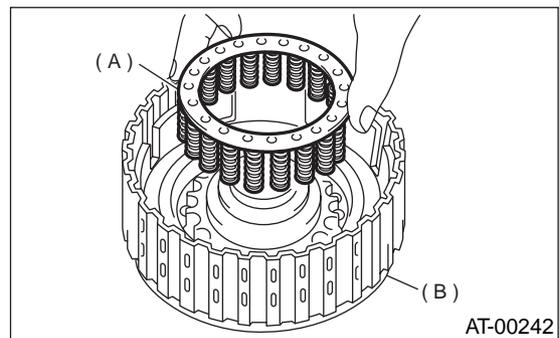
3) Install reverse clutch to high clutch drum.

Align the groove on the reverse clutch piston with the groove on the high clutch drum during installation.



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

4) Install spring retainer to high clutch piston.

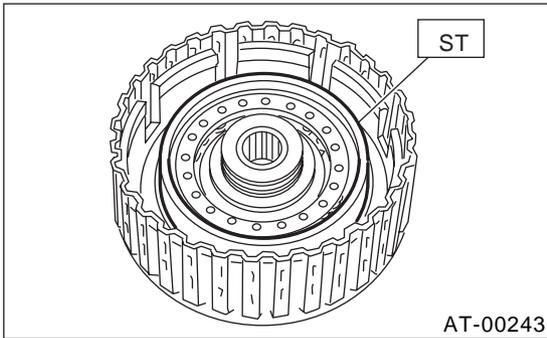


- (A) Return spring
- (B) High clutch drum

# HIGH CLUTCH AND REVERSE CLUTCH

## AUTOMATIC TRANSMISSION

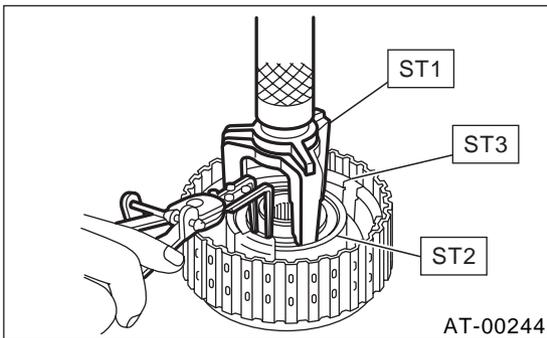
- 5) Install ST to high clutch piston.  
ST 498437000 HIGH CLUTCH PISTON GAUGE



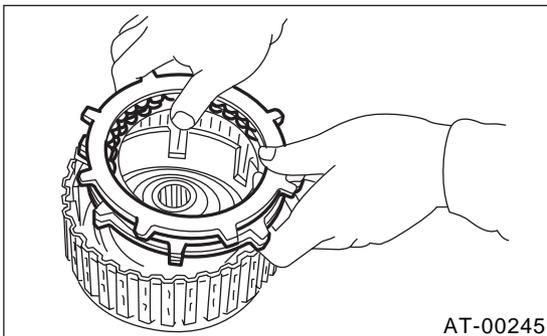
- 6) Avoid folding the high clutch piston seal, when installing the cover to high clutch piston.

- 7) Using ST1 and ST2, install snap ring.

- ST1 398673600 COMPRESSOR  
ST2 498627100 SEAT  
ST3 498437000 HIGH CLUTCH PISTON GAUGE

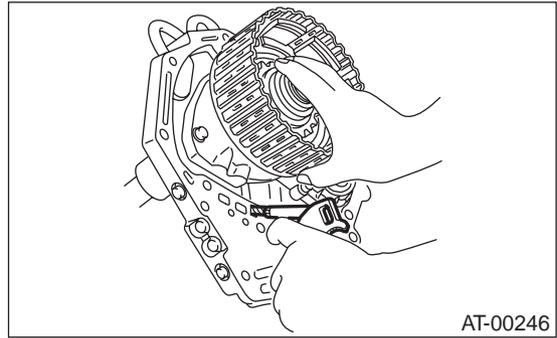


- 8) Install the thickest driven plate to piston side, and then install the driven plate, drive plate, retaining plate to high clutch drum.



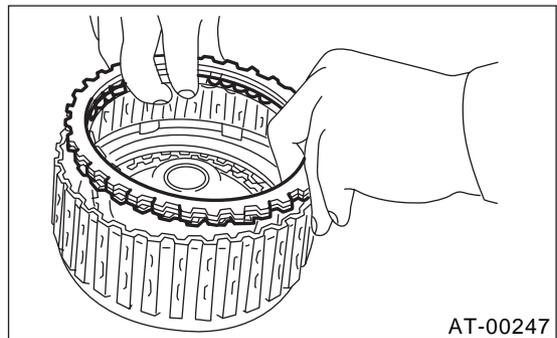
- 9) Install snap ring to high clutch drum.

- 10) Apply compressed air intermittently to check for operation.

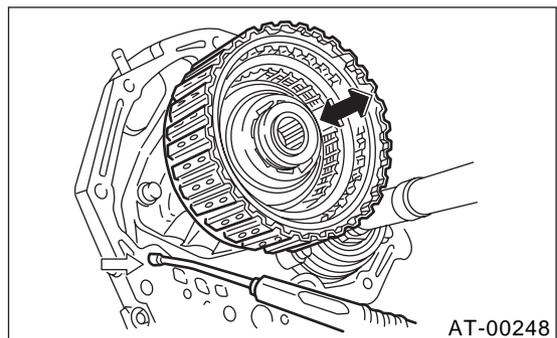


- 11) Measure the clearance between the retaining plate and snap ring.<Ref. to AT-135, INSPECTION, High Clutch and Reverse Clutch.>

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



- 13) Apply compressed air intermittently to check for operation.



- 14) Measure the clearance between the retaining plate and snap ring.<Ref. to AT-135, INSPECTION, High Clutch and Reverse Clutch.>

# HIGH CLUTCH AND REVERSE CLUTCH

AUTOMATIC TRANSMISSION

## E: INSPECTION

1) Inspect the following items.

- Drive plate facing for wear and damage
- Snap ring for wear, return spring for setting and breakage, and snap ring retainer for deformation
- Lip seal and D-ring for damage
- Piston and drum check ball for operation
- Adjust total end play. <Ref. to AT-117, ADJUSTMENT, Oil Pump.>

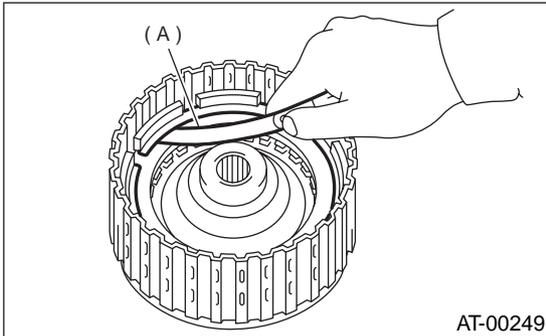
2) Inspect clearance between the retaining plate and snap ring. (High clutch) At this time, do not press down retaining plate.

**Standard value:**

**0.8 — 1.1 mm (0.031 — 0.043 in)**

**Allowable limit:**

**1.5 mm (0.059 in)**



(A) Thickness gauge

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

High clutch retaining plate	
Part No.	Thickness mm (in)
31567AA710	4.7 (0.185)
31567AA720	4.8 (0.189)
31567AA730	4.9 (0.193)
31567AA740	5.0 (0.197)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)

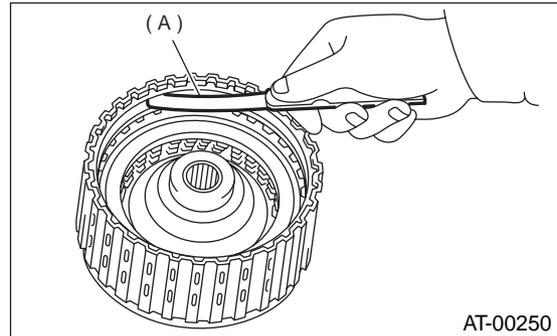
4) Inspect clearance between retaining plate and snap ring. (Reverse clutch) At this time, do not press down retaining plate.

**Standard value:**

**0.5 — 0.8 mm (0.020 — 0.031 in)**

**Allowable limit:**

**1.2 mm (0.047 in)**



(A) Thickness gauge

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

Reverse clutch retaining plates	
Part No.	Thickness mm (in)
31567AA910	4.0 (0.157)
31567AA920	4.2 (0.165)
31567AA930	4.4 (0.173)
31567AA940	4.6 (0.181)
31567AA950	4.8 (0.189)
31567AA960	5.0 (0.197)
31567AA970	5.2 (0.205)
31567AA980	5.4 (0.213)

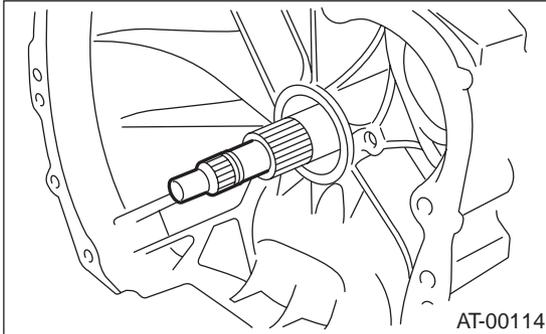
# PLANETARY GEAR AND LOW CLUTCH

## AUTOMATIC TRANSMISSION

### 38. Planetary Gear and Low Clutch

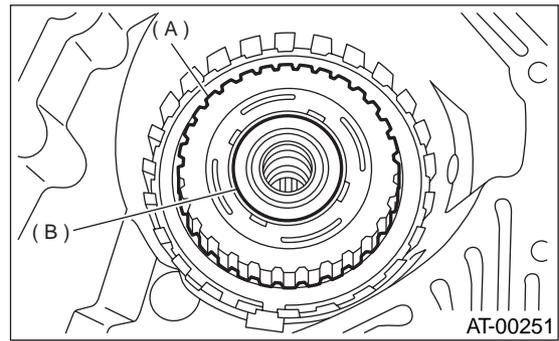
#### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-85, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Disconnect the air breather hose. <Ref. to AT-83, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe, and remove the O-ring from the flange face. Attach the O-ring to the pipe. <Ref. to AT-84, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-78, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to AT-86, REMOVAL, Extension Case.>
- 10) Remove reduction driven gear. <Ref. to AT-101, REMOVAL, Reduction Driven Gear.>
- 11) Separation of torque converter clutch case and transmission case. <Ref. to AT-109, REMOVAL, Torque Converter Clutch Case.>
- 12) Remove the oil pump housing. <Ref. to AT-112, REMOVAL, Oil Pump.>
- 13) Take out the high clutch and reverse clutch assembly. <Ref. to AT-130, REMOVAL, High Clutch and Reverse Clutch.>

- 14) Take out the front sun gear and the thrust bearing.

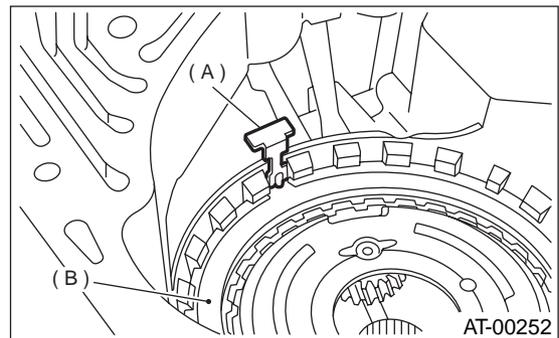


- (A) Front sun gear
- (B) Thrust needle bearing

- 15) Pull out leaf spring without folding.

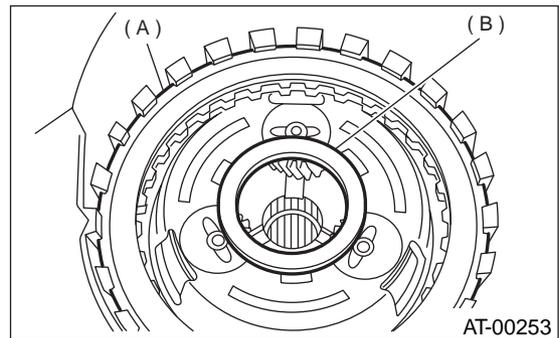
#### NOTE:

Remove it while pressing down on lower leaf spring.



- (A) Leaf spring
- (B) Retaining plate

- 16) Remove snap ring and thrust needle bearing.

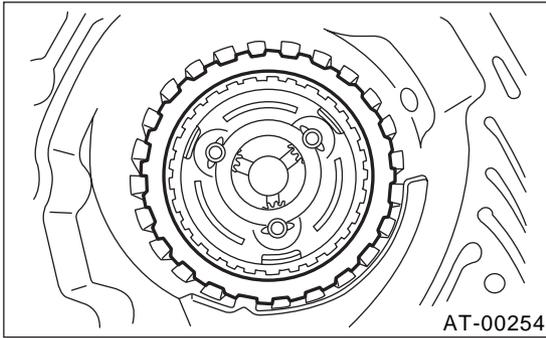


- (A) Snap ring
- (B) Thrust needle bearing

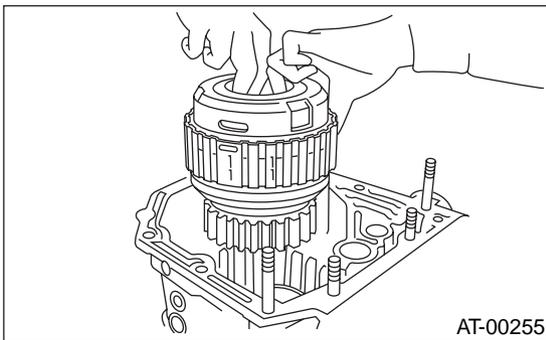
# PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

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



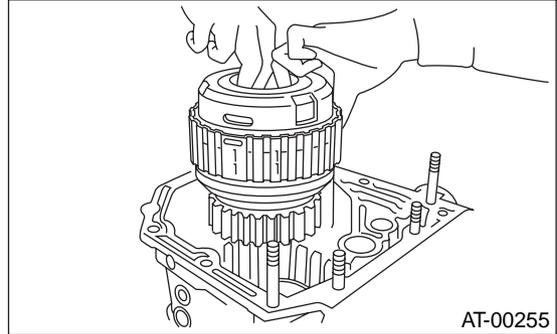
18) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly.



## B: INSTALLATION

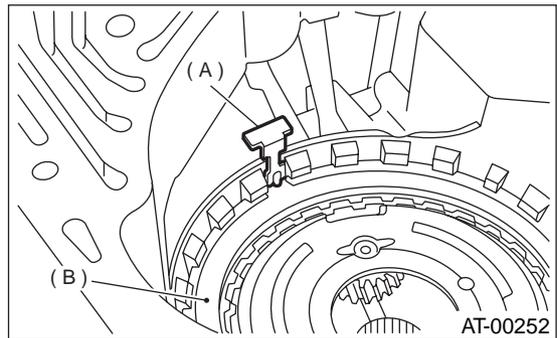
1) Install planetary gear and low clutch assembly to transmission case.

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



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

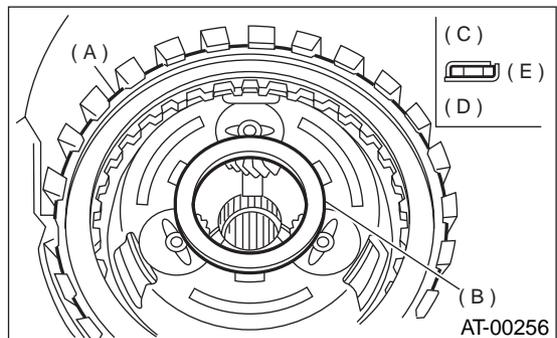
3) Be careful not to mistake the location of the leaf spring to be inserted.



(A) Leaf spring

(B) Retaining plate

4) Install thrust needle bearing in the correct direction.



(A) Snap ring

(B) Thrust needle bearing

(C) Upside

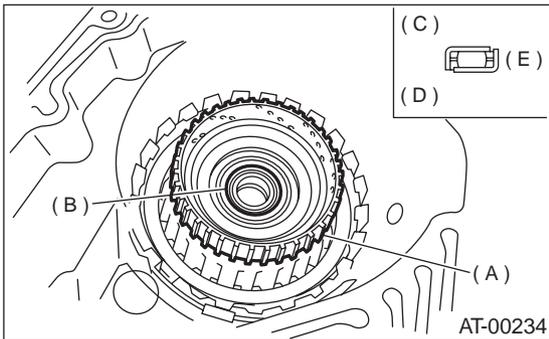
(D) Downside

(E) Outside

# PLANETARY GEAR AND LOW CLUTCH

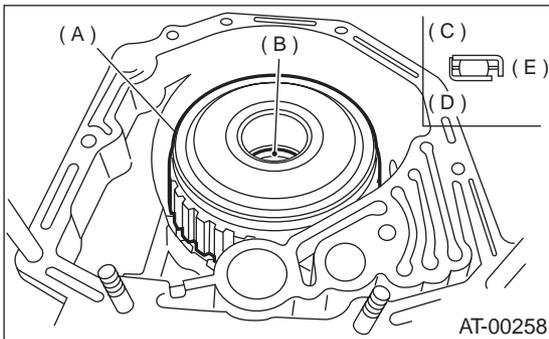
## AUTOMATIC TRANSMISSION

- 5) Install front sun gear and thrust needle bearing.
- 6) Install the high clutch hub.  
Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.
- 7) Install the thrust needle bearing in proper direction.



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

- 8) Install the high clutch assembly.
- 9) Install the thrust needle bearing in proper direction.

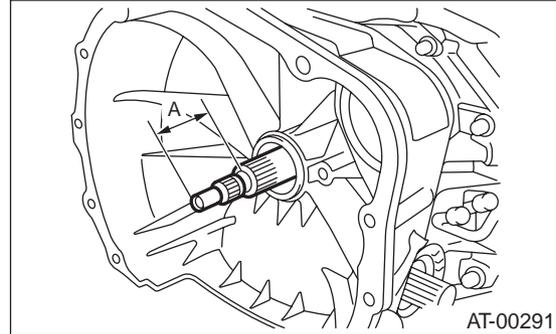


- (A) High clutch and reverse clutch assembly
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

- 10) Install oil pump housing assembly with new gasket.
- 11) Install torque converter clutch case. <Ref. to AT-110, INSTALLATION, Torque Converter Clutch Case.>
- 12) Insert inhibitor switch and transmission connector into stay.
- 13) Install air breather hose. <Ref. to AT-83, INSTALLATION, Air Breather Hose.>
- 14) Install oil cooler pipes. <Ref. to AT-80, INSTALLATION, ATF Cooler Pipe and Hose.>

- 15) Install the oil charger pipe with O-ring. <Ref. to AT-84, INSTALLATION, Oil Charger Pipe.>
- 16) Insert the input shaft while turning lightly by hand.

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



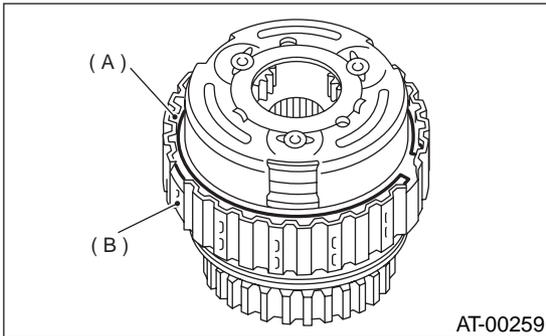
- 17) Install the torque converter clutch assembly. <Ref. to AT-85, INSTALLATION, Torque Converter Clutch Assembly.>
- 18) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

# PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

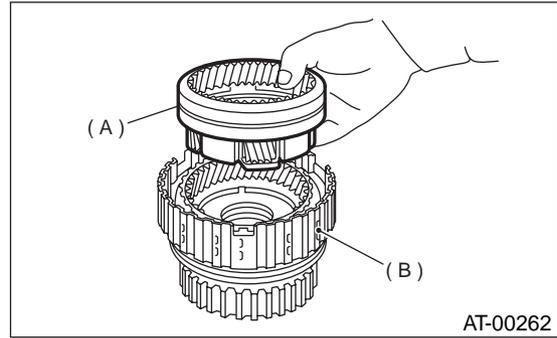
## C: DISASSEMBLY

1) Remove snap ring from the low clutch drum.



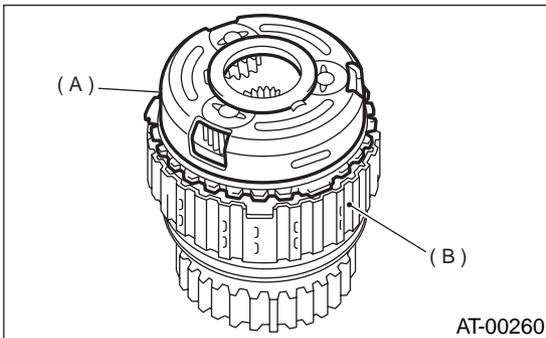
- (A) Snap ring
- (B) Low clutch drum

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



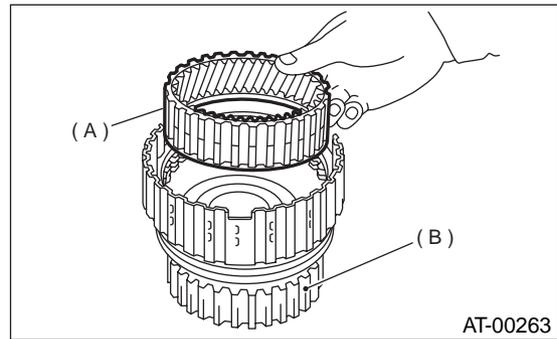
- (A) Rear planetary carrier
- (B) Low clutch drum

2) Take out front planetary carrier.



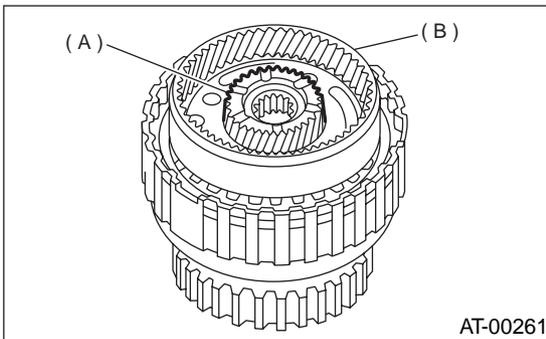
- (A) Front planetary carrier
- (B) Low clutch drum

5) Take out rear internal gear.



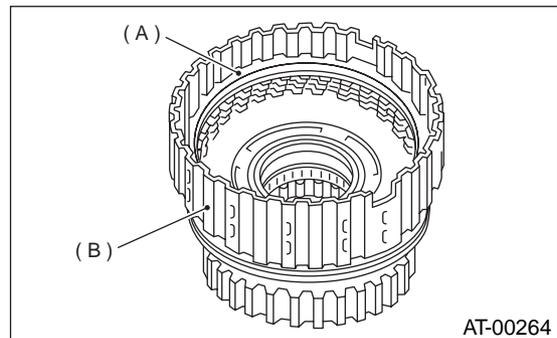
- (A) Rear internal gear
- (B) Low clutch drum

3) Take out rear sun gear.



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

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



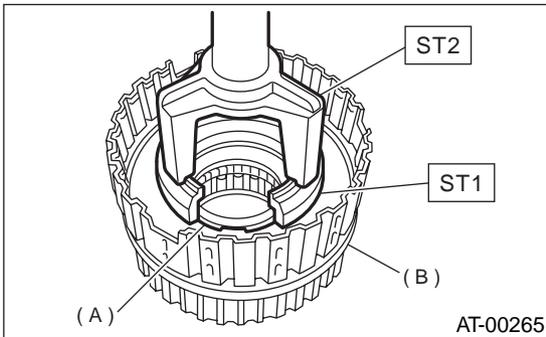
- (A) Snap ring
- (B) Low clutch drum

# PLANETARY GEAR AND LOW CLUTCH

## AUTOMATIC TRANSMISSION

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

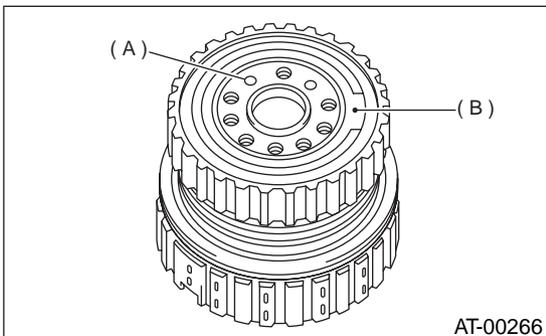
ST1 498627100 SEAT  
ST2 398673600 COMPRESSOR



- (A) Snap ring
- (B) Low clutch drum

8) Remove one-way clutch. <Ref. to AT-150, REMOVAL, One-way Clutch.>

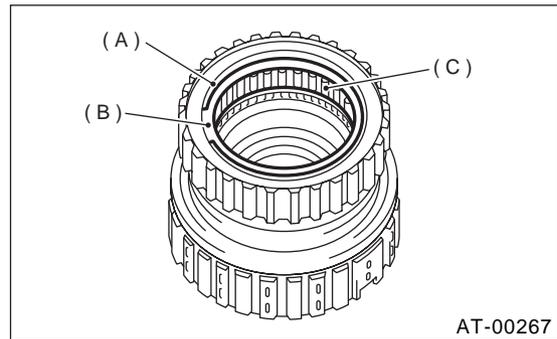
9) Install the one-way clutch inner race to the low clutch drum, and apply compressed air to remove the low clutch piston.



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

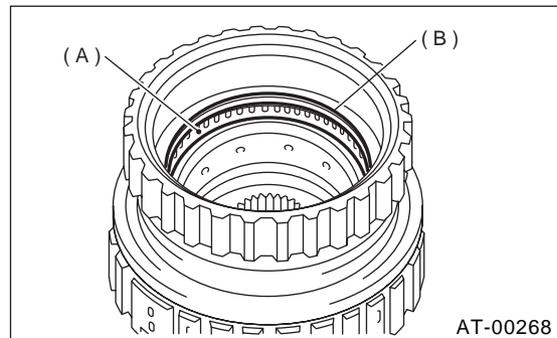
10) Remove the one-way clutch inner race.

11) Remove the one-way clutch after taking out the snap ring.



- (A) Snap ring
- (B) Plate
- (C) One-way clutch

12) Remove the needle bearing after taking out the snap ring.



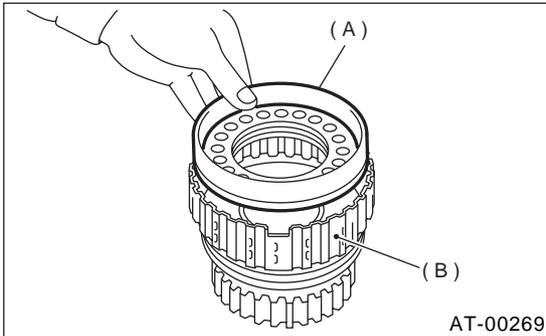
- (A) Needle bearing
- (B) Snap ring

# PLANETARY GEAR AND LOW CLUTCH

AUTOMATIC TRANSMISSION

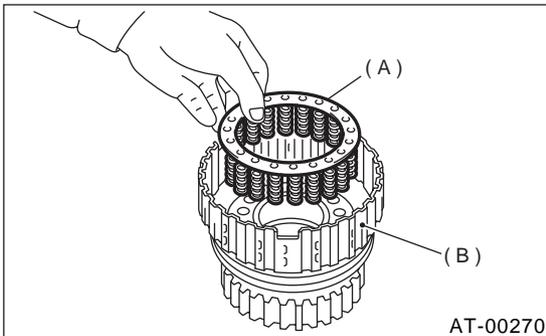
## D: ASSEMBLY

- 1) Install D-ring to low clutch piston.
- 2) Fit the low clutch piston to the low clutch drum.



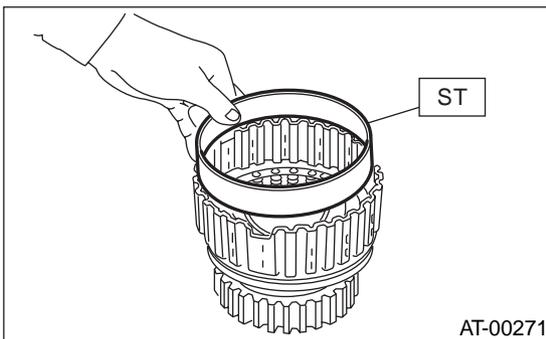
- (A) Low clutch piston
- (B) Low clutch drum

- 3) Install spring retainer to low clutch piston.



- (A) Spring retainer
- (B) Low clutch drum

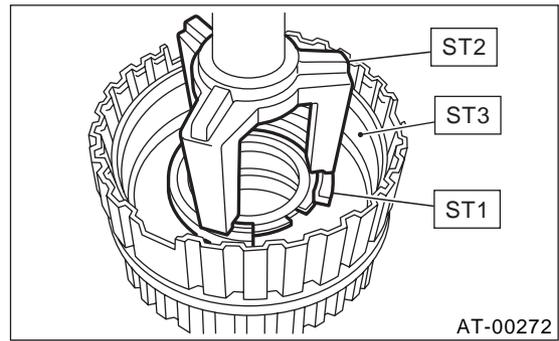
- 4) Install ST to low clutch drum.
- ST 498437100 LOW CLUTCH PISTON GUIDE



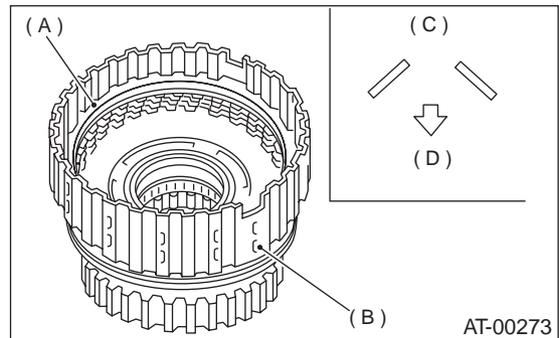
- 5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring. At this time, be careful not to fold cover seal during installation.

ST1 498627100 SEAT  
ST2 398673600 COMPRESSOR

- ST3 498437100 LOW CLUTCH PISTON GUIDE

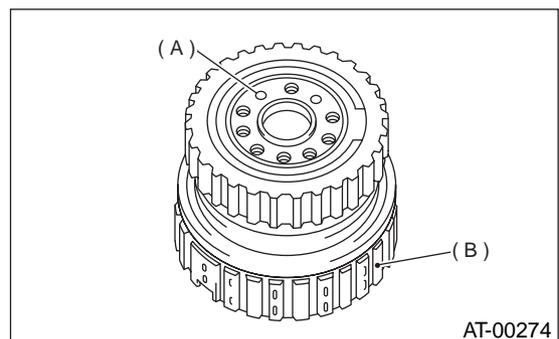


- 6) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring.



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

- 7) Check the low clutch for operation.
  - (1) Remove one-way clutch. <Ref. to AT-150, REMOVAL, One-way Clutch.>
  - (2) Set the one-way clutch inner race, and apply compressed air for checking.



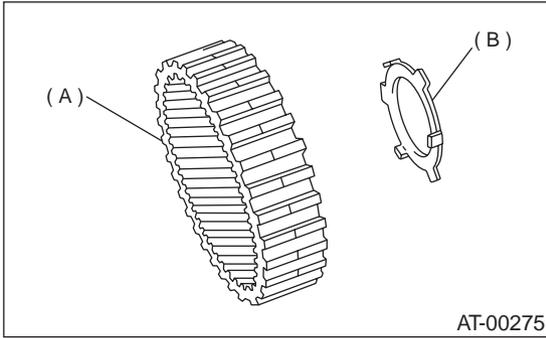
- (A) Apply compressed air
- (B) Low clutch drum

- 8) Checking low clutch clearance. <Ref. to AT-144, INSPECTION, Planetary Gear and Low Clutch.>

# PLANETARY GEAR AND LOW CLUTCH

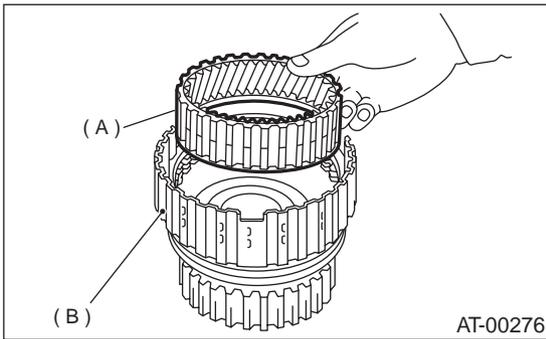
## AUTOMATIC TRANSMISSION

9) Install washer to rear internal gear.



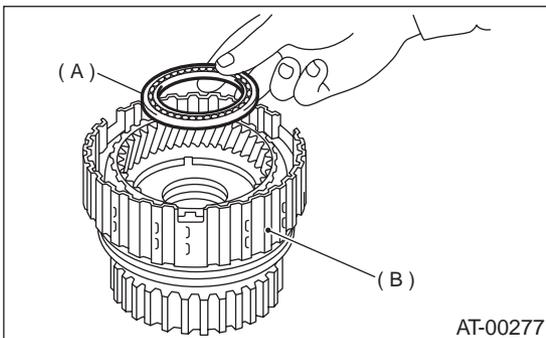
- (A) Rear internal gear
- (B) Washer

10) Install rear internal gear.



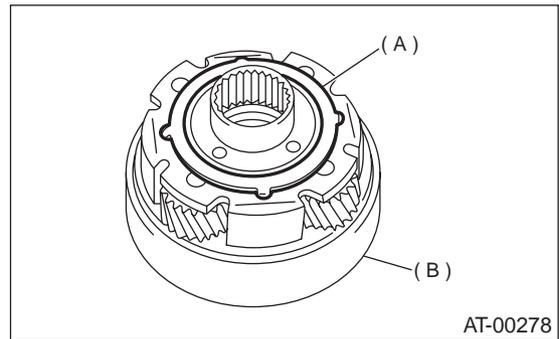
- (A) Rear internal gear
- (B) Low clutch drum

11) Install thrust needle bearing in the correct direction.



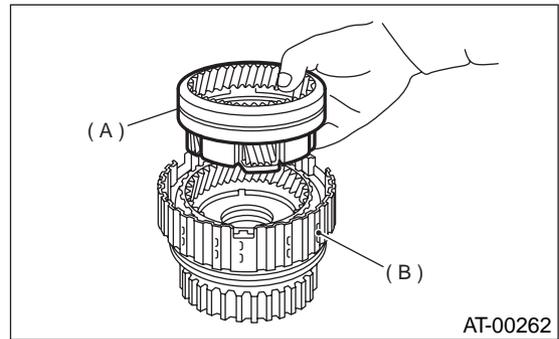
- (A) Thrust needle bearing
- (B) Low clutch drum

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



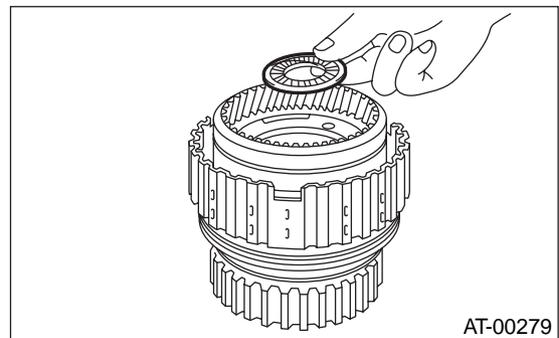
- (A) Washer
- (B) Rear planetary carrier

13) Install rear planetary carrier to low clutch drum.



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

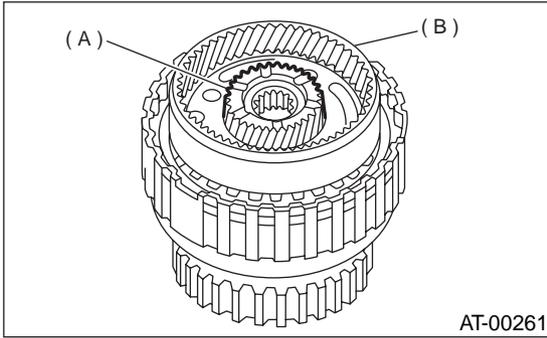
14) Install thrust needle bearing in the correct direction.



# PLANETARY GEAR AND LOW CLUTCH

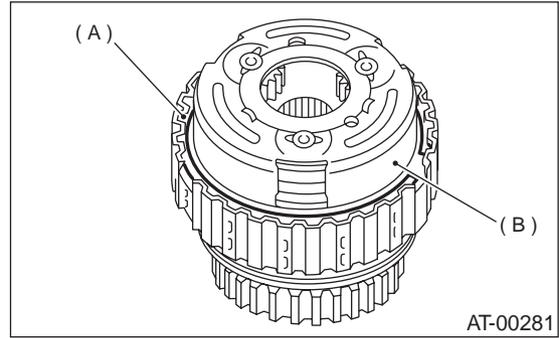
AUTOMATIC TRANSMISSION

15) Install the rear sun gear in proper direction.



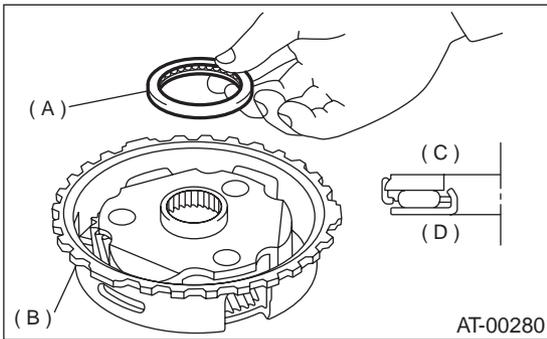
- (A) Rear sun gear
- (B) Rear planetary carrier

18) Install snap ring to low clutch drum.



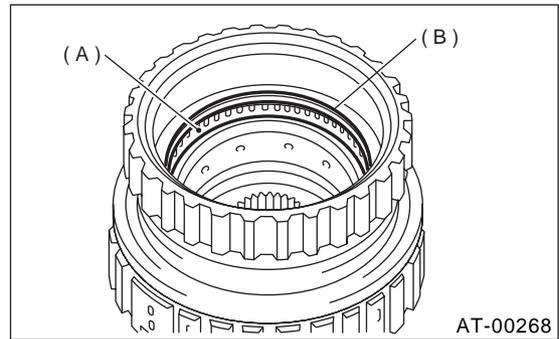
- (A) Snap ring
- (B) Front planetary carrier

16) Install the thrust needle bearing in proper direction.



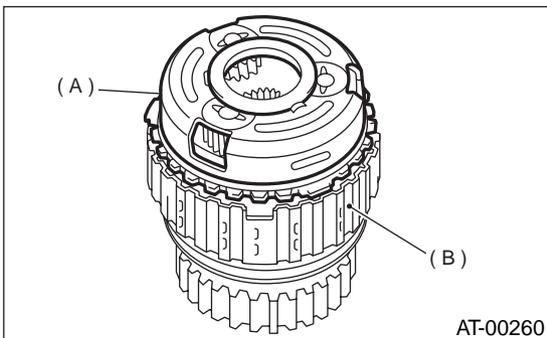
- (A) Thrust needle bearing
- (B) Front planetary carrier
- (C) Rear sun gear side
- (D) Front planetary carrier side

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



- (A) Needle bearing
- (B) Snap ring

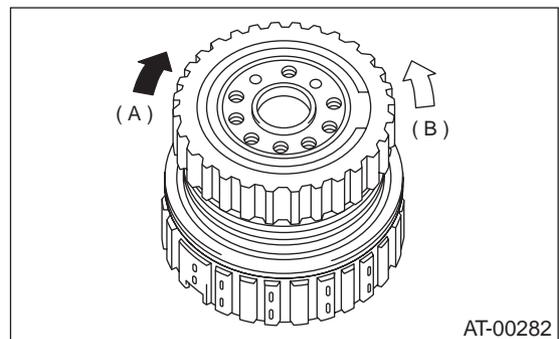
17) Install front planetary carrier to low clutch drum.



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

20) Install the one-way clutch, one-way clutch inner race and plate, and secure with the snap ring.

21) Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



- (A) Locked
- (B) Free

# PLANETARY GEAR AND LOW CLUTCH

## AUTOMATIC TRANSMISSION

### E: INSPECTION

1) Inspect the following items.

- Drive plate facing for wear and damage
- Snap ring for wear, return spring for breakage or setting, and spring retainer for deformation
- Lip seal and D-ring for damage
- Piston check ball for operation
- Measure the total end play and adjust to within specifications.

<Ref. to AT-117, ADJUSTMENT, Oil Pump.>

2) Place the same thickness of shim on both sides to prevent retaining plate from tilting.

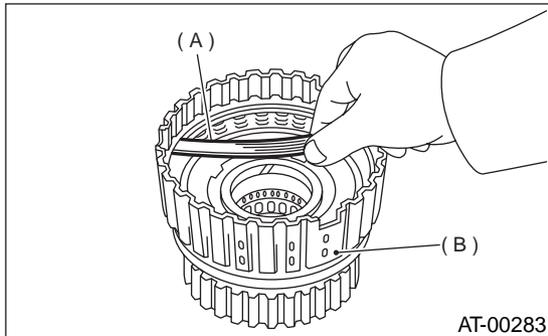
3) Inspect clearance between retaining plate and operation of the low clutch.

**Standard value:**

**0.7 — 1.1 mm (0.028 — 0.043 in)**

**Allowable limit:**

**1.6 mm (0.063 in)**



(A) Thickness gauge

(B) Low clutch drum

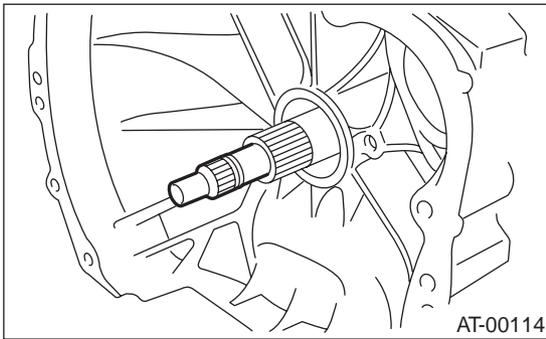
4) If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.

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

### 39.2-4 Brake

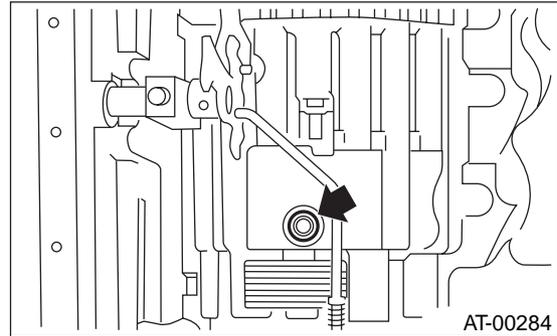
#### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-85, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.

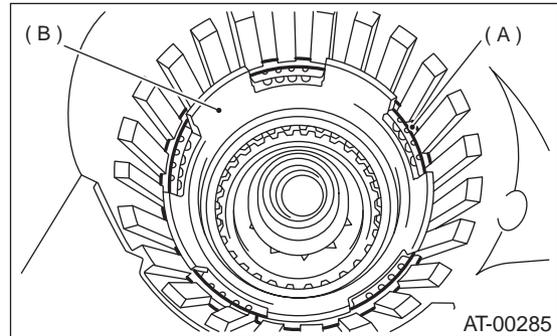


- 4) Disconnect the air breather hose. <Ref. to AT-83, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-84, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes with washers. <Ref. to AT-78, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to AT-86, REMOVAL, Extension Case.>
- 10) Remove the reduction drive gear. (MPT model) <Ref. to AT-104, REMOVAL, Reduction Drive Gear.>
- 11) Remove the center differential carrier. (VTD model) <Ref. to AT-106, REMOVAL, Center Differential Carrier.>
- 12) Remove reduction driven gear. <Ref. to AT-101, REMOVAL, Reduction Driven Gear.>
- 13) Separation of torque converter clutch case and transmission case. <Ref. to AT-109, REMOVAL, Torque Converter Clutch Case.>
- 14) Remove the oil pan and control valve body. <Ref. to AT-60, REMOVAL, Control Valve Body.>
- 15) Remove the oil pump housing. <Ref. to AT-112, REMOVAL, Oil Pump.>

- 16) Remove 2-4 brake seal.

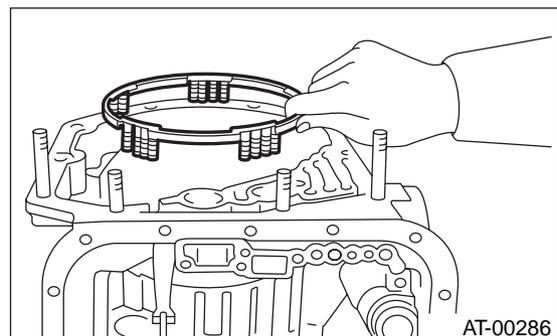


- 17) Take out the high clutch and reverse clutch assembly. <Ref. to AT-130, REMOVAL, High Clutch and Reverse Clutch.>
- 18) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly. <Ref. to AT-136, REMOVAL, Planetary Gear and Low Clutch.>
- 19) Remove snap ring.



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

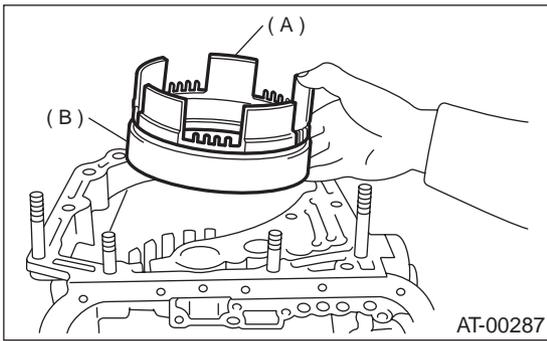
- 20) Take out 2-4 brake return spring.



## 2-4 BRAKE

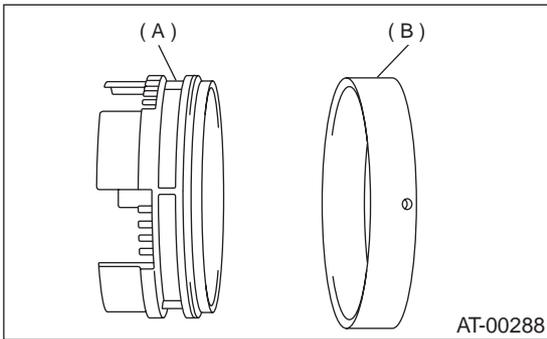
### AUTOMATIC TRANSMISSION

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



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

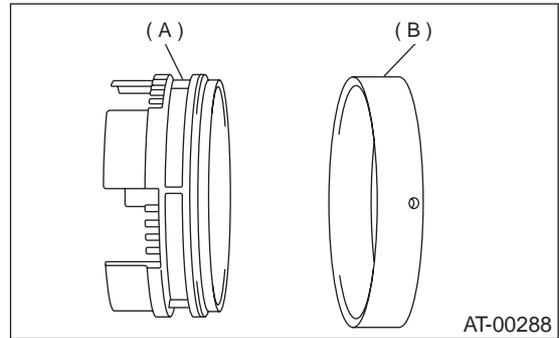
22) Separate 2-4 brake piston and piston retainer.



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

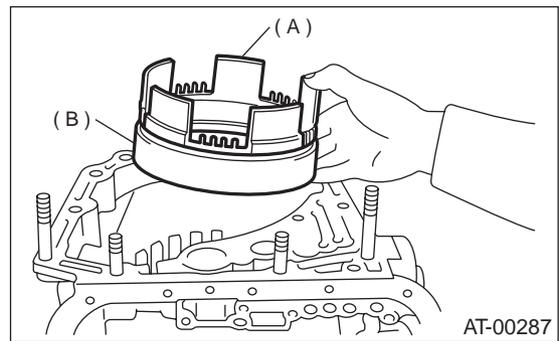
## B: INSTALLATION

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



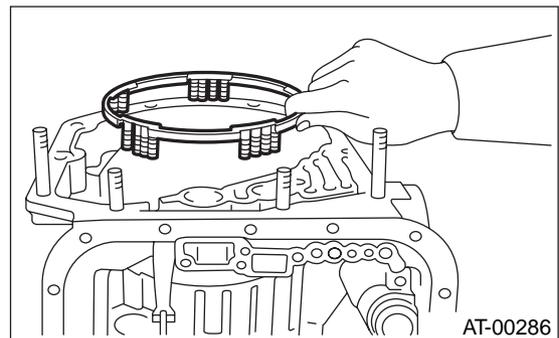
- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

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



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

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

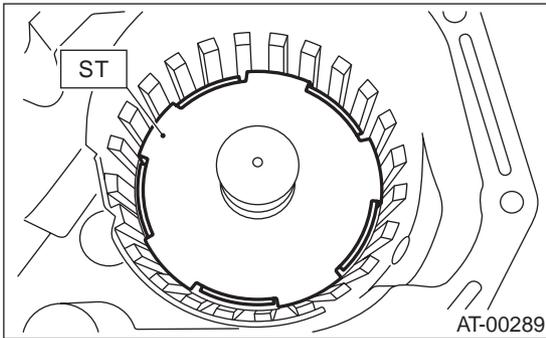


## 2-4 BRAKE

AUTOMATIC TRANSMISSION

4) Position snap ring in transmission. Using ST, press the snap ring into place.

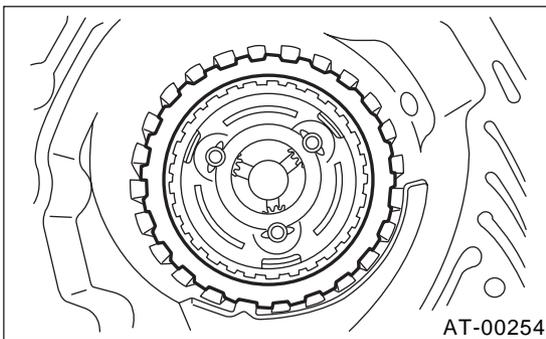
ST 498677100 COMPRESSOR



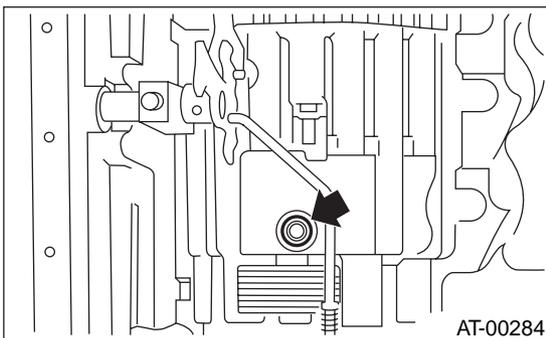
5) Install planetary gear and low clutch assembly to transmission case.

Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring. <Ref. to AT-137, INSTALLATION, Planetary Gear and Low Clutch.>

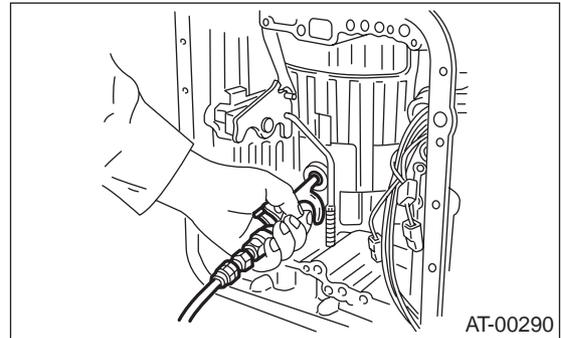
6) Install pressure plate, drive plate, driven plate, retaining plate and snap ring.



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

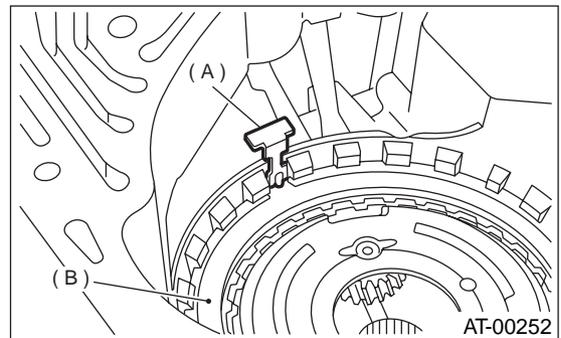


8) After all 2-4 brake component parts have been installed, blow in air intermittently and confirm the operation of the brake.



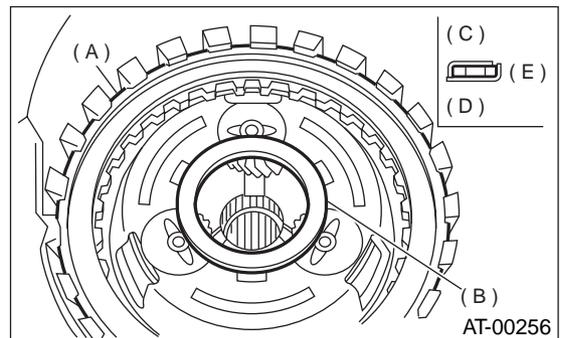
9) Check the clearance between the retaining plate and the snap ring. <Ref. to AT-149, INSPECTION, 2-4 Brake.>

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



- (A) Leaf spring
- (B) Retaining plate

11) Install thrust needle bearing in the correct direction.



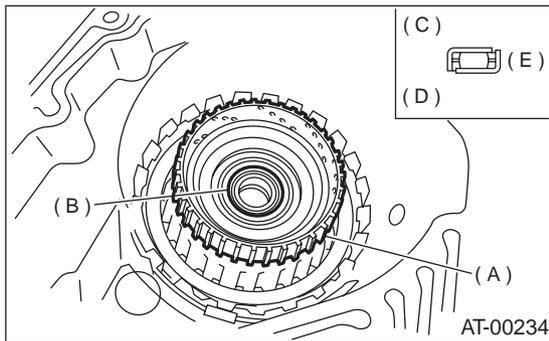
- (A) Snap ring
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Retaining plate

12) Install front sun gear.

## 2-4 BRAKE

### AUTOMATIC TRANSMISSION

13) Install thrust needle bearing in the correct direction.



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

14) Install the high clutch assembly. <Ref. to AT-131, INSTALLATION, High Clutch and Reverse Clutch.>

15) Install oil pump housing to transmission case. <Ref. to AT-113, INSTALLATION, Oil Pump.>

16) Install the control valve body and oil pan. <Ref. to AT-61, INSTALLATION, Control Valve Body.>

17) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-110, INSTALLATION, Torque Converter Clutch Case.>

18) Install the reduction driven gear. <Ref. to AT-102, INSTALLATION, Reduction Driven Gear.>

19) Install the reduction drive gear. (MPT model) <Ref. to AT-104, INSTALLATION, Reduction Drive Gear.>

20) Install the center differential carrier. (VTD model) <Ref. to AT-106, INSTALLATION, Center Differential Carrier.>

21) Insert inhibitor switch and transmission connector into stay.

22) Install air breather hose. <Ref. to AT-83, INSTALLATION, Air Breather Hose.>

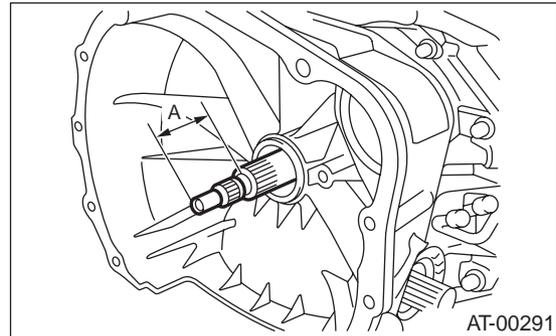
23) Install the oil cooler pipes. <Ref. to AT-80, INSTALLATION, ATF Cooler Pipe and Hose.>

24) Install the oil charger pipe with O-ring. <Ref. to AT-84, INSTALLATION, Oil Charger Pipe.>

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

**Normal protrusion A:**

**50 — 55 mm (1.97 — 2.17 in)**



26) Install the torque converter clutch assembly. <Ref. to AT-85, INSTALLATION, Torque Converter Clutch Assembly.>

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

**C: INSPECTION**

- Drive plate facing for wear and damage
- Snap ring for wear and spring retainer for deformation
- Lip seal and D-ring for damage
- Measure the total end play and adjust to within specifications.<Ref. to AT-117, ADJUSTMENT, Oil Pump.>

1) Inspect the clearance between the retaining plate and the snap ring.

**NOTE:**

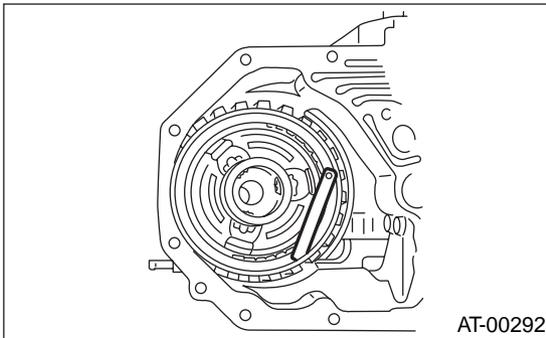
Select a retaining plate with a suitable value from the following table, so that the clearance becomes the standard value.

**Standard value:**

**0.8 — 1.2 mm (0.031 — 0.047 in)**

**Allowable limit:**

**1.5 mm (0.059 in)**



Available retaining plates	
Part No.	Thickness mm (in)
31567AA612	5.6 (0.220)
31567AA622	5.8 (0.228)
31567AA632	6.0 (0.236)
31567AA642	6.2 (0.244)
31567AA652	6.4 (0.252)
31567AA662	6.6 (0.260)

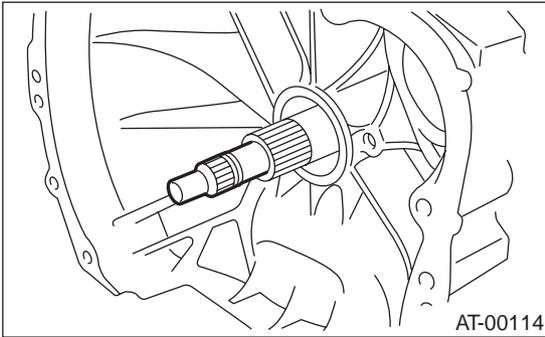
# ONE-WAY CLUTCH

## AUTOMATIC TRANSMISSION

### 40. One-way Clutch

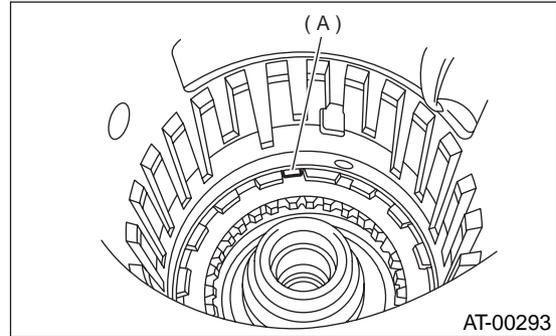
#### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-85, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



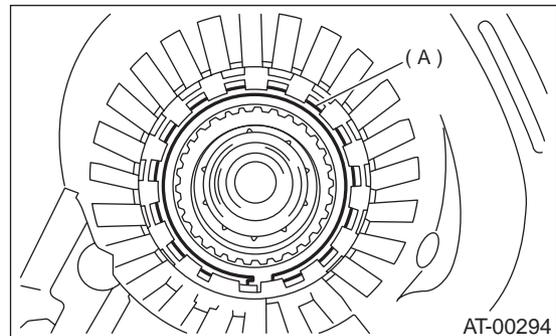
- 4) Disconnect the air breather hose. <Ref. to AT-83, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-84, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-78, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case. <Ref. to AT-109, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-86, REMOVAL, Extension Case.>
- 11) Remove the reduction driven gear. <Ref. to AT-101, REMOVAL, Reduction Driven Gear.>
- 12) Remove the reduction drive gear. (MPT model) <Ref. to AT-101, REMOVAL, Reduction Driven Gear.>
- 13) Remove the center differential carrier. (VTD model) <Ref. to AT-106, REMOVAL, Center Differential Carrier.>
- 14) Remove control valve assembly. <Ref. to AT-60, REMOVAL, Control Valve Body.>
- 15) Remove the oil pump housing. <Ref. to AT-112, REMOVAL, Oil Pump.>
- 16) Take out the high clutch and reverse clutch assembly. <Ref. to AT-130, REMOVAL, High Clutch and Reverse Clutch.>
- 17) Take out the thrust needle bearing, planetary gear assembly. <Ref. to AT-136, REMOVAL, Planetary Gear and Low Clutch.>

- 18) Take out 2-4 brake return spring, piston and piston retainer. <Ref. to AT-145, REMOVAL, 2-4 Brake.>
- 19) Pull out the leaf spring without folding.



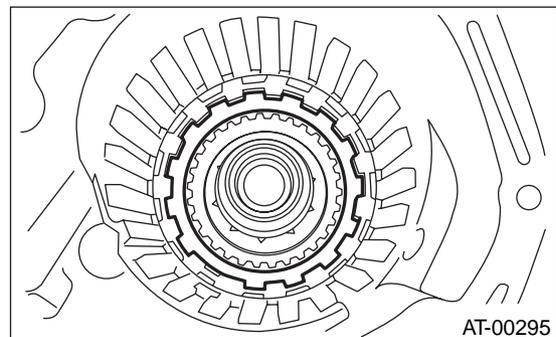
(A) Leaf spring

- 20) Remove snap ring.

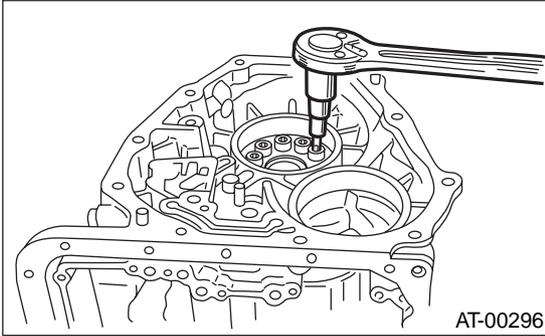


(A) Snap ring

- 21) Take out retaining plate, drive plate, driven plate and dish plate.



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

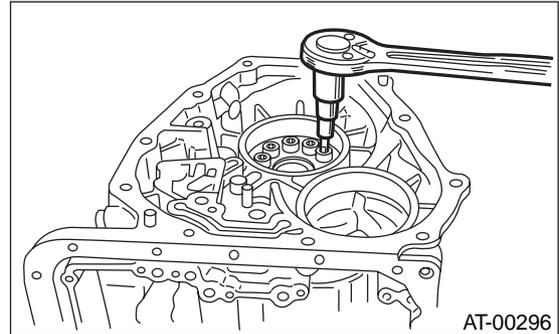


## B: INSTALLATION

- 1) Install the one-way clutch inner race, spring retainer and return spring.
- 2) Tighten socket head bolts evenly from the rear side of the transmission case.

### **Tightening torque:**

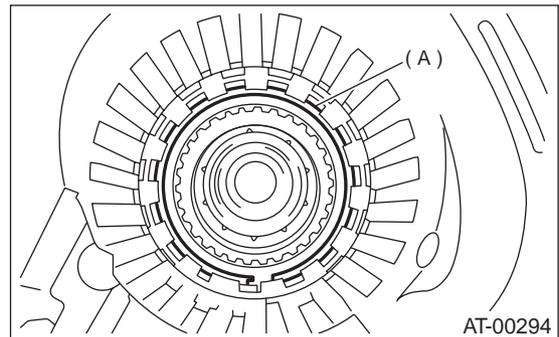
**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



- 3) Place transmission case with the front facing up.
- 4) Install thrust needle bearing.
- 5) Installation of the low & reverse brake: Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

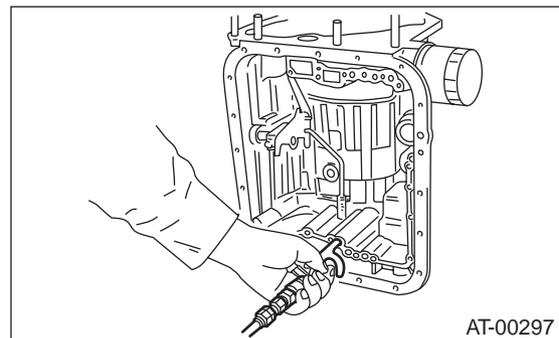
### **NOTE:**

Pay attention to the orientation of the dish plate.



(A) Snap ring

- 6) Apply compressed air intermittently to check for operation.



- 7) Check the clearance and select retaining plate. <Ref. to AT-157, INSPECTION, Low and Reverse Brake.>

# ONE-WAY CLUTCH

## AUTOMATIC TRANSMISSION

8) Install 2-4 brake. <Ref. to AT-146, INSTALLATION, 2-4 Brake.>

9) Install planetary gear and low clutch assembly to transmission case.

Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring. <Ref. to AT-137, INSTALLATION, Planetary Gear and Low Clutch.>

10) Install the high clutch assembly. <Ref. to AT-131, INSTALLATION, High Clutch and Reverse Clutch.>

11) Install the oil pump housing assembly. <Ref. to AT-113, INSTALLATION, Oil Pump.>

12) Install control valve assembly and oil pan. <Ref. to AT-61, INSTALLATION, Control Valve Body.>

13) Install the torque converter clutch case assembly. <Ref. to AT-110, INSTALLATION, Torque Converter Clutch Case.>

14) Install reduction driven gear. <Ref. to AT-102, INSTALLATION, Reduction Driven Gear.>

15) Install reduction drive gear. (MPT model)

16) Install the center differential carrier. (VTD model) <Ref. to AT-106, INSTALLATION, Center Differential Carrier.>

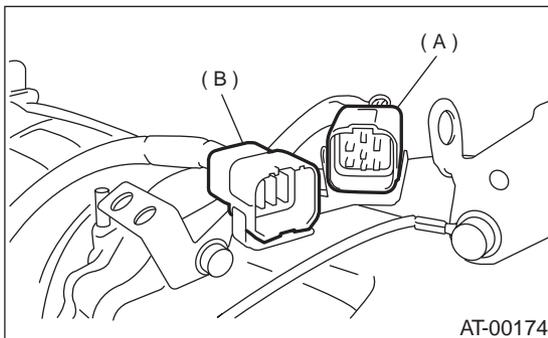
17) Install the extension case to the transmission case. <Ref. to AT-86, INSTALLATION, Extension Case.>

18) Install the rear vehicle speed sensor.

### **Tightening torque:**

**7 N·m (0.7 kgf-m, 5.1 ft-lb)**

19) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness

(B) Inhibitor switch harness

20) Install air breather hose. <Ref. to AT-83, INSTALLATION, Air Breather Hose.>

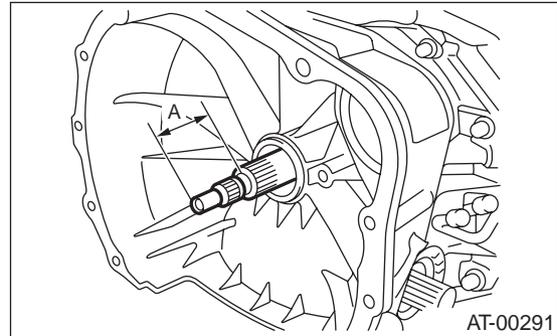
21) Install the oil cooler pipes. <Ref. to AT-80, INSTALLATION, ATF Cooler Pipe and Hose.>

22) Install the oil charger pipe with O-ring. <Ref. to AT-84, INSTALLATION, Oil Charger Pipe.>

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

### **Normal protrusion A:**

**50 — 55 mm (1.97 — 2.17 in)**



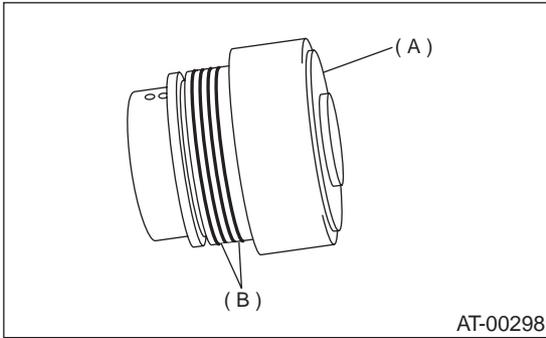
24) Install the torque converter clutch assembly. <Ref. to AT-85, INSTALLATION, Torque Converter Clutch Assembly.>

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

## C: DISASSEMBLY

### 1. ONE-WAY CLUTCH INNER RACE

1) Remove seal rings.

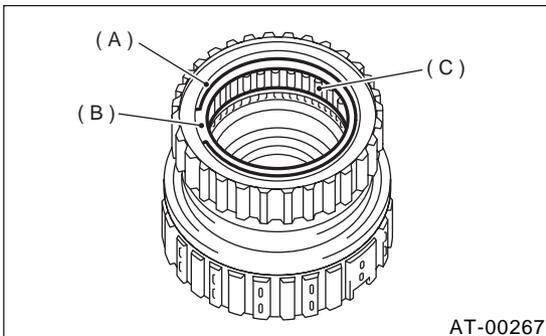


- (A) One way clutch inner race
- (B) Seal rings

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

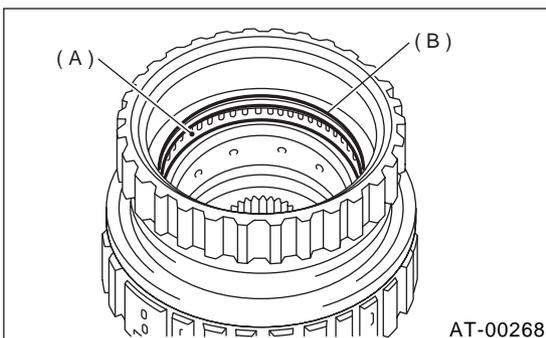
### 2. ONE-WAY CLUTCH OUTER RACE

1) Remove the one-way clutch after taking out the snap ring.



- (A) Snap ring
- (B) Plate
- (C) One-way clutch

2) Remove the needle bearing after taking out the snap ring.



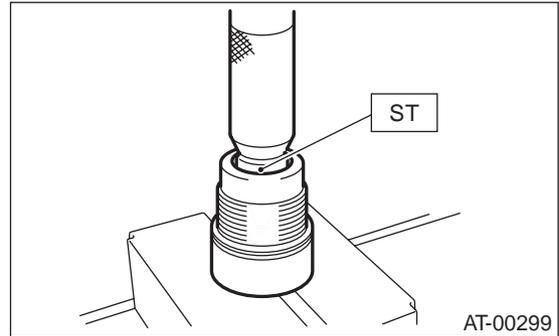
- (A) Needle bearing
- (B) Snap ring

## D: ASSEMBLY

### 1. ONE-WAY CLUTCH INNER RACE

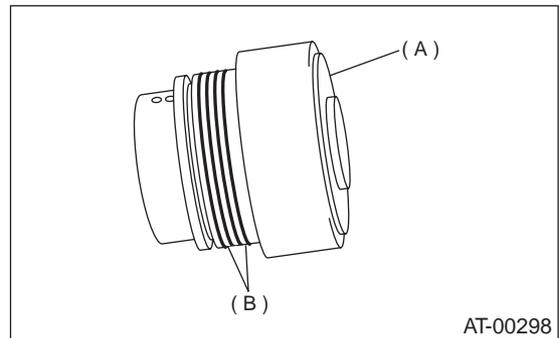
1) Using a press and ST, install the needle bearing to the inner race.

ST 398497701 ADAPTER



2) Apply vaseline to the groove of the inner race and to the seal ring.

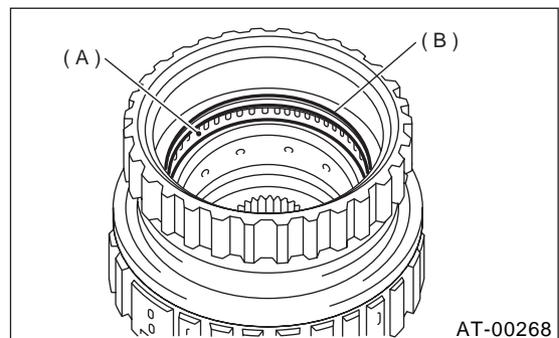
3) Install two seal rings to one-way clutch inner race.



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

### 2. ONE-WAY CLUTCH OUTER RACE

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



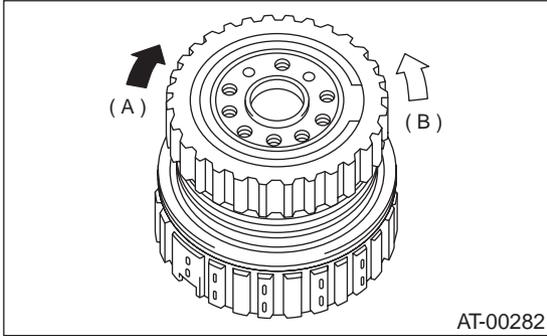
- (A) Needle bearing
- (B) Snap ring

2) Install the one-way clutch, one-way clutch inner race and plate, and secure with the snap ring.

# ONE-WAY CLUTCH

## AUTOMATIC TRANSMISSION

3) Set the inner race. Make sure that the forward clutch is free in the clockwise direction and locked in the counterclockwise direction, as viewed from the front of the vehicle.



- (A) Locked
- (B) Free

### E: INSPECTION

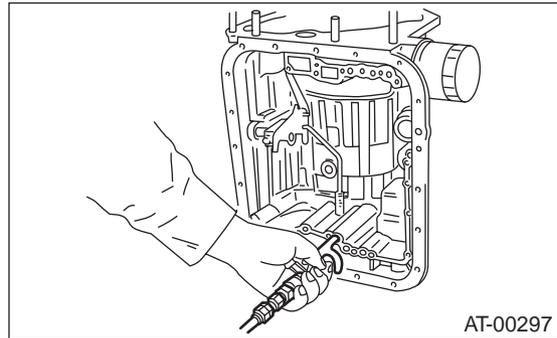
- Make sure the snap ring is not worn and the seal rings are not damaged.
- Measure the total end play and adjust to within specifications. <Ref. to AT-117, ADJUSTMENT, Oil Pump.>

### 41.Low and Reverse Brake

#### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-85, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.
- 4) Disconnect the air breather hose. <Ref. to AT-83, REMOVAL, Air Breather Hose.>
- 5) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 6) Disconnect inhibitor switch connector from stay.
- 7) Remove the oil charger pipe. <Ref. to AT-84, REMOVAL, Oil Charger Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to AT-78, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separation of torque converter clutch case and transmission case.<Ref. to AT-109, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate transmission case and extension case sections. <Ref. to AT-86, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. <Ref. to AT-104, REMOVAL, Reduction Drive Gear.>
- 12) Remove the center differential carrier. (VTD model) <Ref. to AT-106, REMOVAL, Center Differential Carrier.>
- 13) Remove the reduction driven gear. <Ref. to AT-101, REMOVAL, Reduction Driven Gear.>
- 14) Remove the oil pump housing. <Ref. to AT-112, REMOVAL, Oil Pump.>
- 15) Remove control valve assembly. <Ref. to AT-60, REMOVAL, Control Valve Body.>
- 16) Take out the high clutch and reverse clutch assembly. <Ref. to AT-130, REMOVAL, High Clutch and Reverse Clutch.>
- 17) Take out the thrust needle bearing, planetary gear assembly. <Ref. to AT-136, REMOVAL, Planetary Gear and Low Clutch.>
- 18) Take out 2-4 brake return spring, piston and piston retainer. <Ref. to AT-145, REMOVAL, 2-4 Brake.>
- 19) Remove one-way clutch inner race. <Ref. to AT-150, REMOVAL, One-way Clutch.>

- 20) Take out the low & reverse piston by applying compressed air.



- 21) Take out the spring retainer, return spring and low & reverse piston.

# LOW AND REVERSE BRAKE

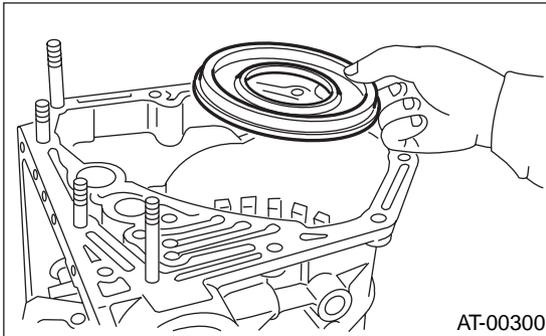
## AUTOMATIC TRANSMISSION

### B: INSTALLATION

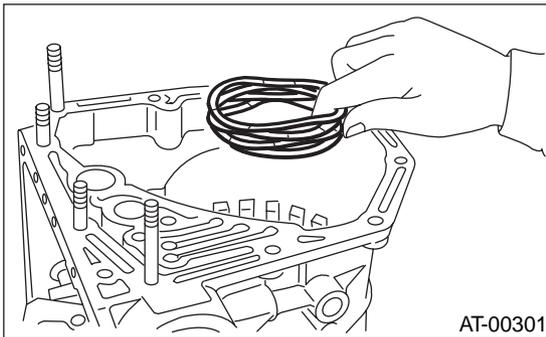
1) Install the low and reverse piston without tilting.

#### NOTE:

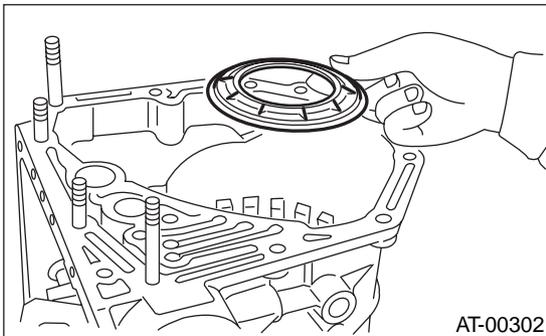
Be careful not to damage the lip seal.



2) Install return spring.



3) Install spring retainer.



4) Install the one-way clutch inner race. <Ref. to AT-151, INSTALLATION, One-way Clutch.>

5) Install thrust needle bearing.

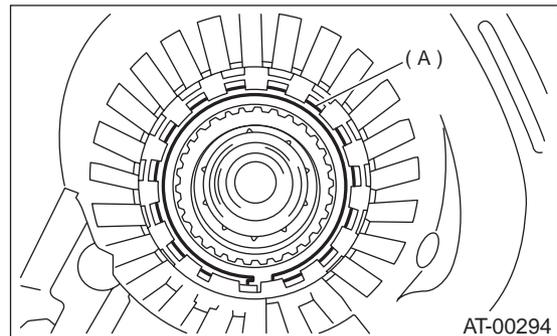
#### NOTE:

Place transmission case with the front facing up.

6) Installation of the low & reverse brake:  
Install dish plate, driven plates, drive plates, and a retaining plate, and secure with a snap ring.

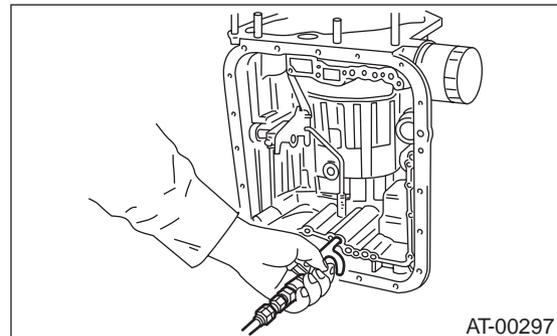
#### NOTE:

Pay attention to the orientation of the dish plate.



(A) Snap ring

7) Apply compressed air intermittently to check for operation.



8) Check the clearance and select retaining plate. <Ref. to AT-157, INSPECTION, Low and Reverse Brake.>

9) Install 2-4 brake piston, retainer and return spring to transmission case. <Ref. to AT-146, INSTALLATION, 2-4 Brake.>

10) Install planetary gear and low clutch assembly to transmission case.

Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring. <Ref. to AT-137, INSTALLATION, Planetary Gear and Low Clutch.>

11) Install the high clutch assembly. <Ref. to AT-131, INSTALLATION, High Clutch and Reverse Clutch.>

12) Install the oil pump housing assembly. <Ref. to AT-113, INSTALLATION, Oil Pump.>

13) Install the control assembly and oil pan. <Ref. to AT-61, INSTALLATION, Control Valve Body.>

14) Install the torque converter clutch case assembly to the transmission case assembly. <Ref. to AT-110, INSTALLATION, Torque Converter Clutch Case.>

15) Install reduction driven gear.

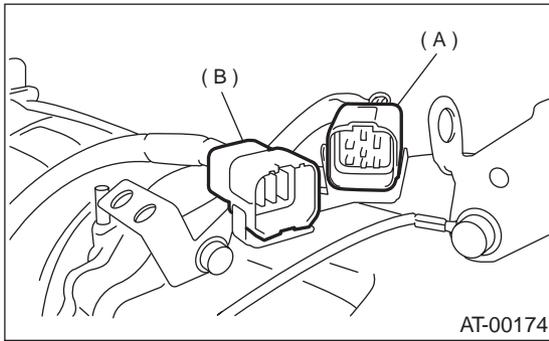
<Ref. to AT-102, INSTALLATION, Reduction Driven Gear.>

16) Install reduction drive gear. <Ref. to AT-104, INSTALLATION, Reduction Drive Gear.>

17) Install the center differential carrier. (VTD model) <Ref. to AT-106, INSTALLATION, Center Differential Carrier.>

18) Install the extension case and rear vehicle speed sensor to the transmission case. <Ref. to AT-86, INSTALLATION, Extension Case.>

19) Insert inhibitor switch and transmission connector into stay.



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

20) Install air breather hose. <Ref. to AT-83, INSTALLATION, Air Breather Hose.>

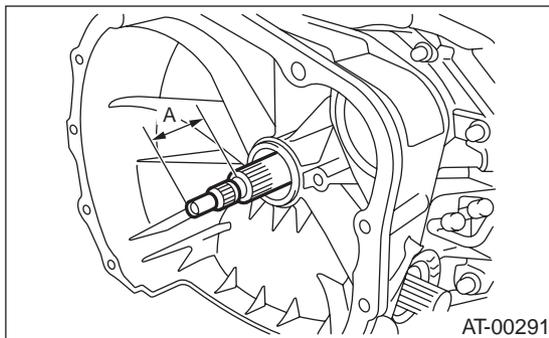
21) Install the oil cooler pipes. <Ref. to AT-80, INSTALLATION, ATF Cooler Pipe and Hose.>

22) Install the oil charger pipe with O-ring. <Ref. to AT-84, INSTALLATION, Oil Charger Pipe.>

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

**Normal protrusion A:**

**50 — 55 mm (1.97 — 2.17 in)**



24) Install the torque converter clutch assembly. <Ref. to AT-85, INSTALLATION, Torque Converter Clutch Assembly.>

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

### C: INSPECTION

Check for the following.

- Drive plate facing for wear or damage
- Snap ring for wear and spring retainer for deformation

1) Place the same thickness of shim on both sides to prevent retaining plate from tilting.

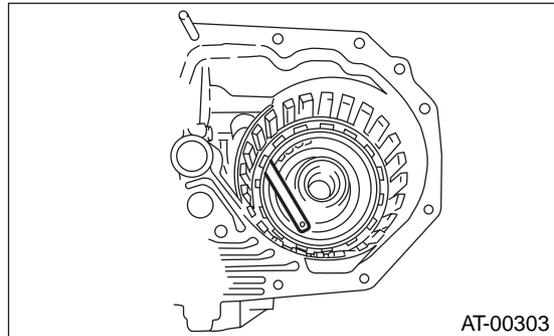
2) Inspect clearance and select retaining plate.

**Standard value:**

**0.7 — 1.2 mm (0.028 — 0.047 in)**

**Allowable limit:**

**2.2 mm (0.087 in)**



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

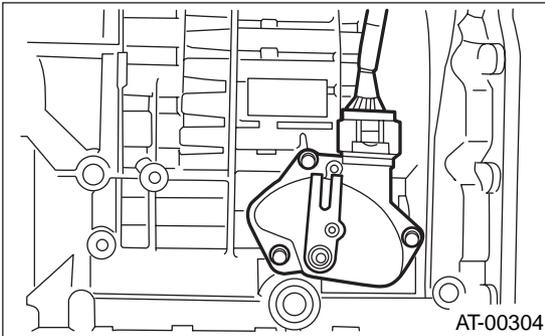
# TRANSMISSION CONTROL DEVICE

## AUTOMATIC TRANSMISSION

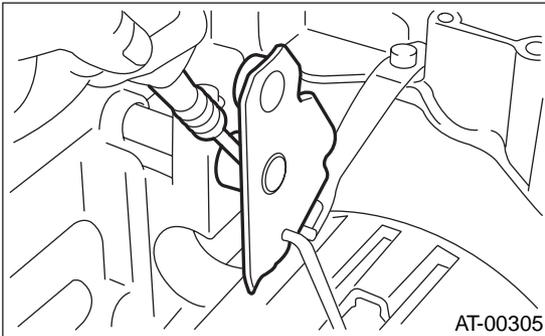
### 42. Transmission Control Device

#### A: REMOVAL

- 1) Remove the transmission assembly from the vehicle. <Ref. to AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Extract the torque converter clutch assembly. <Ref. to AT-85, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.
- 4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
- 5) Disconnect the air breather hoses. <Ref. to AT-83, REMOVAL, Air Breather Hose.>
- 6) Disconnect inhibitor switch connector from stay.
- 7) Wrap vinyl tape around the nipple attached to the air breather hose.
- 8) Remove pitching stopper bracket.
- 9) Remove the inhibitor switch.



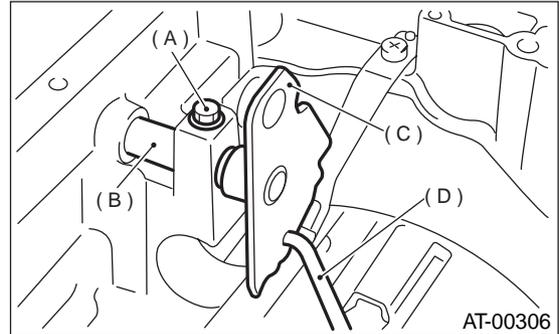
- 10) Remove control valve body assembly. <Ref. to AT-60, REMOVAL, Control Valve Body.>
- 11) Pull off the straight pin of manual plate.



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

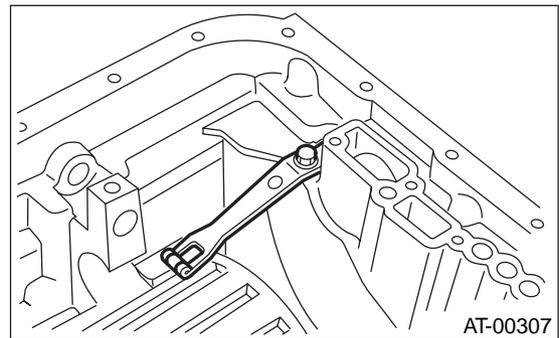
#### NOTE:

Be careful not to damage the lips of the press-fitted oil seal in the case.



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

- 13) Remove the detention spring.

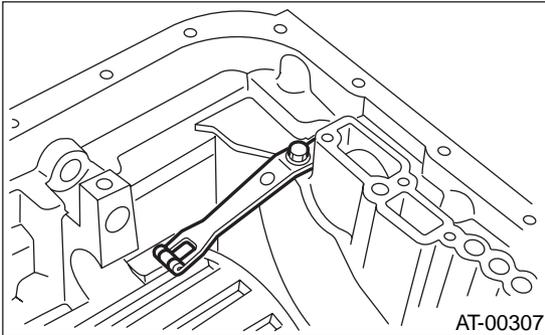


## B: INSTALLATION

1) Install detention spring to transmission case.

**Tightening torque:**

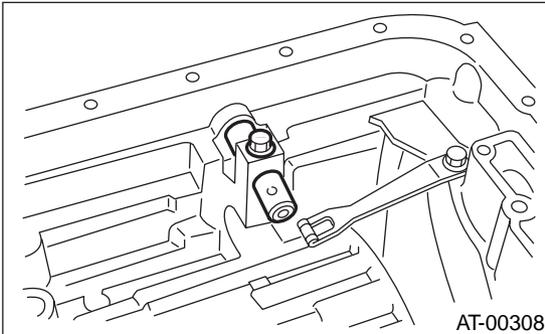
**6 N·m (0.6 kgf-m, 4.3 ft-lb)**



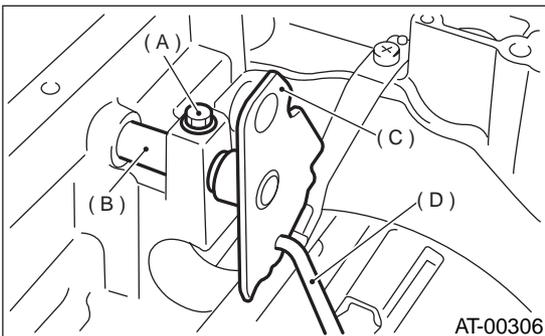
2) Insert range select lever, and tighten bolt.

**Tightening torque:**

**6 N·m (0.6 kgf-m, 4.3 ft-lb)**

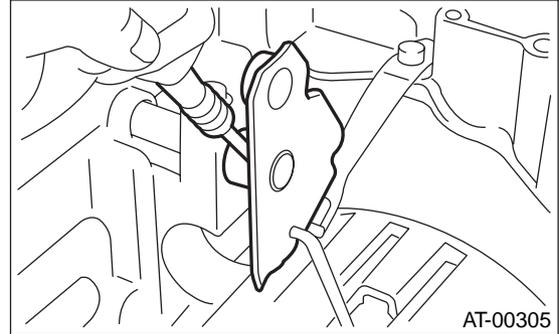


3) Insert manual plate and parking rod.



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

4) Insert spring pin to manual plate.



5) Install control valve assembly and oil pan. <Ref. to AT-61, INSTALLATION, Control Valve Body.>

6) Turn over the transmission case to its original position.

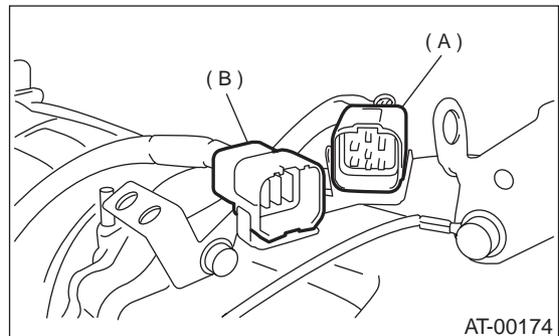
7) Install pitching stopper bracket.

**Tightening torque:**

**41 N·m (4.2 kgf-m, 30.4 ft-lb)**

8) Install inhibitor switch and adjust the inhibitor switch. <Ref. to AT-49, Inhibitor Switch.>

9) Insert inhibitor switch and transmission connector into stay.



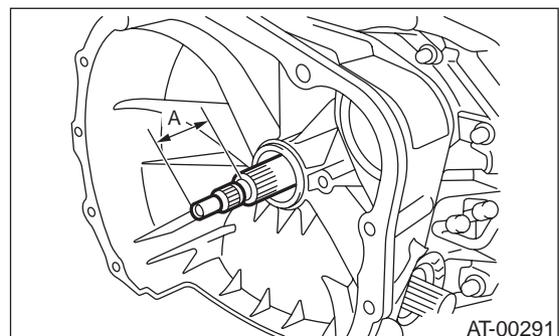
- (A) Transmission harness
- (B) Inhibitor switch harness

10) Install air breather hose. <Ref. to AT-83, INSTALLATION, Air Breather Hose.>

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

**Normal protrusion A:**

**50 — 55 mm (1.97 — 2.17 in)**



## TRANSMISSION CONTROL DEVICE

### AUTOMATIC TRANSMISSION

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- 12) Install the torque converter clutch assembly. <Ref. to AT-85, INSTALLATION, Torque Converter Clutch Assembly.>
- 13) Install the transmission assembly to the vehicle. <Ref. to AT-42, INSTALLATION, Automatic Transmission Assembly.>

### **C: INSPECTION**

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