

TRANSMISSION SECTION

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

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

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

AUTOMATIC TRANSMISSION

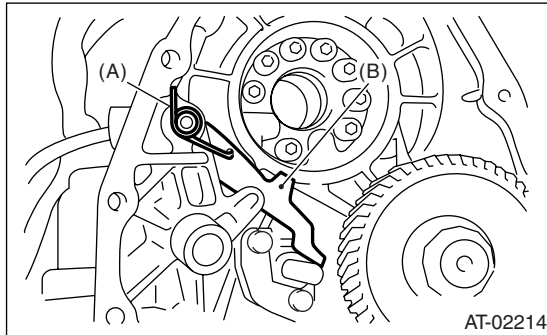
4AT

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35. Parking Pawl

A: REMOVAL

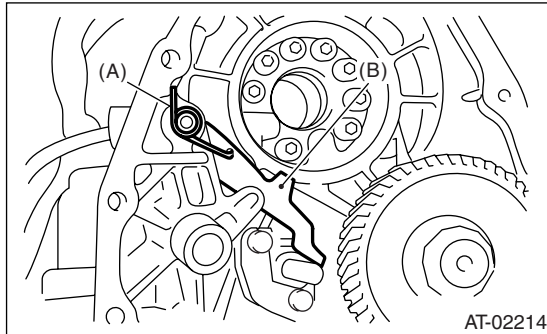
- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor, and then separate the extension case from transmission case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 3) Remove the reduction drive gear. <Ref. to 4AT-96, REMOVAL, Reduction Drive Gear.>
- 4) Remove the parking pawl, return spring and shaft.



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

B: INSTALLATION

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



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

- 2) Install the reduction drive gear. <Ref. to 4AT-96, INSTALLATION, Reduction Drive Gear.>
- 3) Install the extension case and rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 4) Install the transmission assembly into the vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

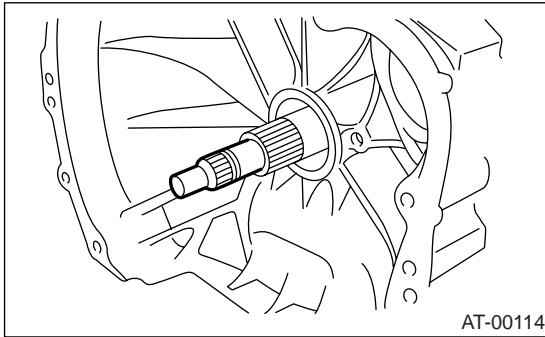
C: INSPECTION

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

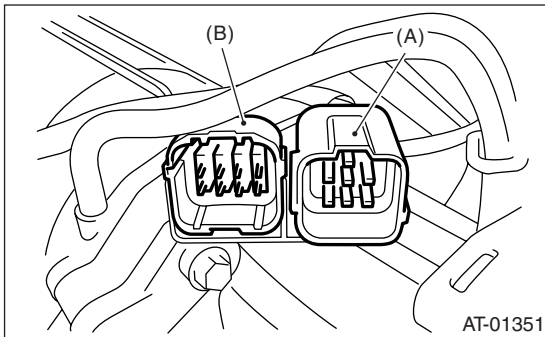
36. Converter Case

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Lift-up the lever on the rear side of connector, and then disconnect it from the stay.
- 5) Disconnect the inhibitor switch connector from the stay.



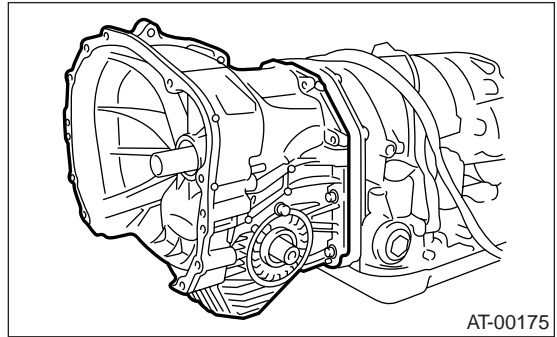
- (A) Transmission connector
- (B) Inhibitor switch connector

- 6) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
- 7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-67, REMOVAL, ATF Cooler Pipe and Hose.>
- 8) Remove the converter case aligning bolt, and then separate the transmission case and converter case by lightly tapping with plastic hammer.

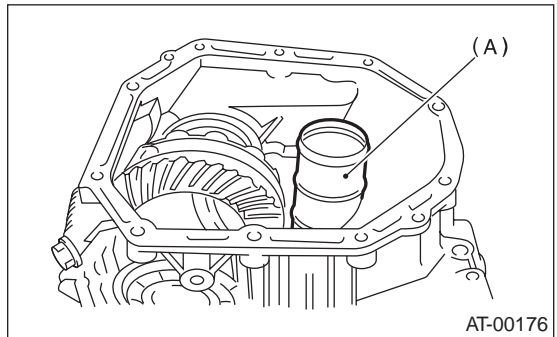
NOTE:

- Be careful not to damage the oil seal and bush inside the converter case by the oil pump cover.

- Be careful not to loosen the rubber seal.



- 9) Remove the seal pipe.

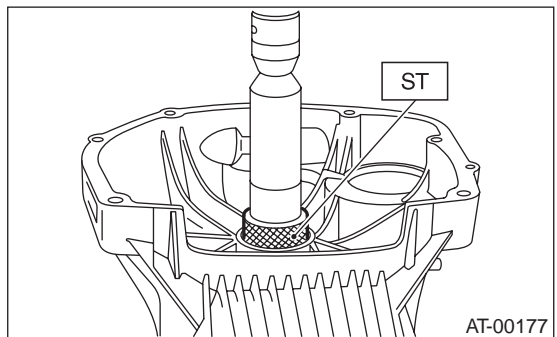


- (A) Seal pipe

- 10) Remove the differential assembly. <Ref. to 4AT-113, REMOVAL, Front Differential Assembly.>
- 11) Remove the oil seal from converter case.

B: INSTALLATION

- 1) Check the appearance of each component and clean them.
- 2) Press-fit the oil seal to converter case using ST. ST 398437700 DRIFT

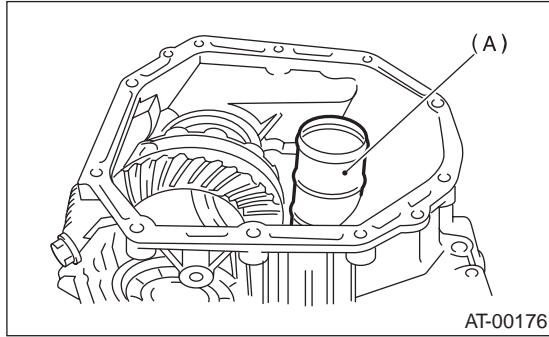


- 3) Install the differential assembly to case. <Ref. to 4AT-113, INSTALLATION, Front Differential Assembly.>
- 4) Install the left and right side retainers. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>

Converter Case

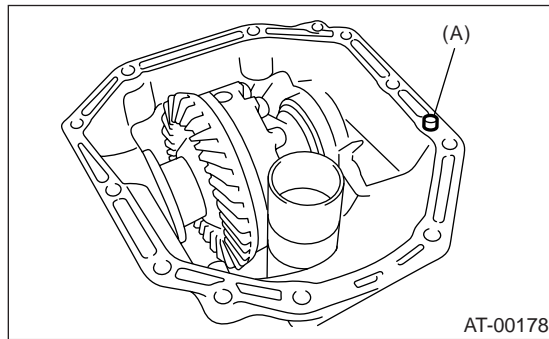
AUTOMATIC TRANSMISSION

5) Install the new seal pipe to converter case.



(A) Seal pipe

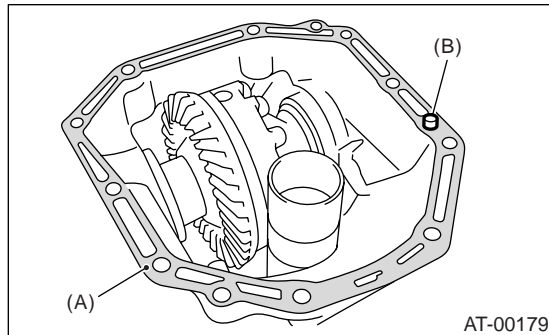
6) Install the rubber seal to converter case.



(A) Rubber seal

7) Apply proper amount of liquid gasket to the entire matching surface of converter case.

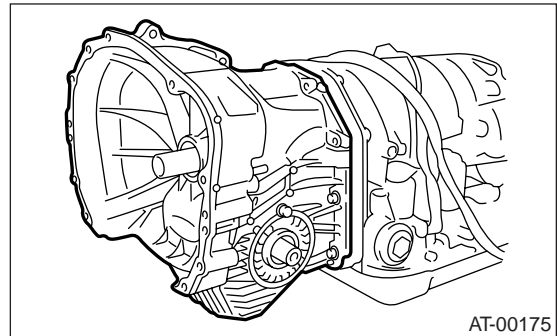
Liquid gasket:
THREE BOND 1215 (Part No. 004403007)



(A) THREE BOND 1215
(B) Rubber seal

8) Install the converter case assembly without damaging bushing and oil seal.

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



9) Insert the inhibitor switch and transmission connector to the stay.

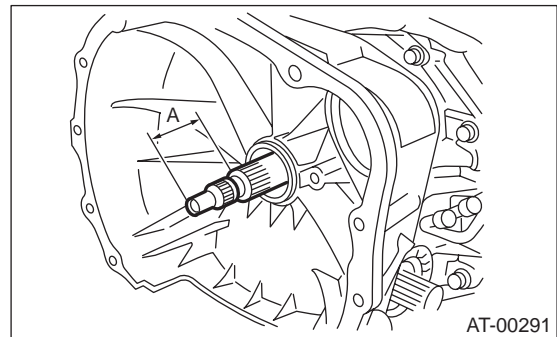
10) Install the air breather hose. <Ref. to 4AT-78, INSTALLATION, Air Breather Hose.>

11) Install the oil cooler pipe. <Ref. to 4AT-69, INSTALLATION, ATF Cooler Pipe and Hose.>

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

13) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

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



14) Install the torque converter clutch assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>

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

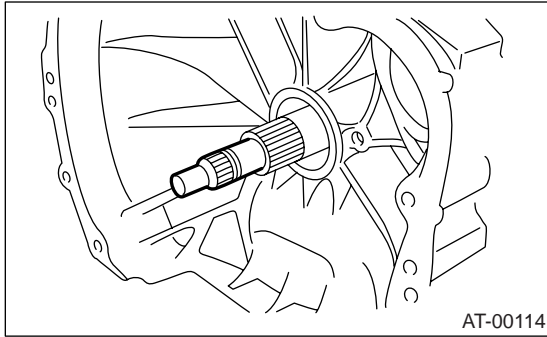
C: INSPECTION

Measure the backlash, and then adjust it within specification. <Ref. to 4AT-110, ADJUSTMENT, Drive Pinion Shaft Assembly.>

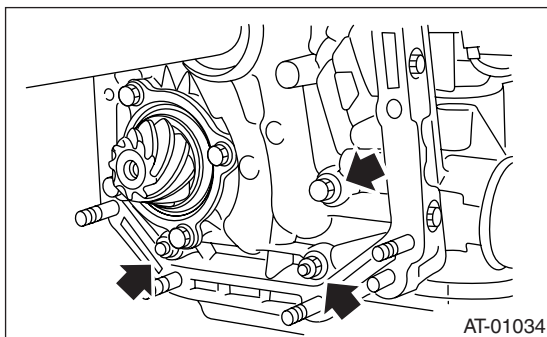
37.Oil Pump Housing

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



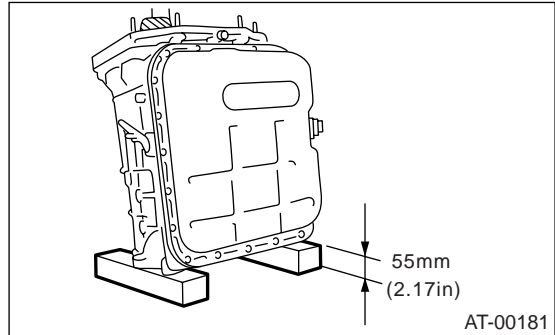
- 4) Lift-up the lever on the rear side of transmission harness connector, and then remove it from stay.
- 5) Remove the inhibitor switch connector from stay.
- 6) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
- 7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-67, REMOVAL, ATF Cooler Pipe and Hose.>
- 8) Separate the converter case and transmission case part. <Ref. to 4AT-101, REMOVAL, Converter Case.>
- 9) Separate the transmission case and extension case part. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 10) Remove the reduction drive gear. <Ref. to 4AT-96, REMOVAL, Reduction Drive Gear.>
- 11) Remove the reduction driven gear. <Ref. to 4AT-94, REMOVAL, Reduction Driven Gear.>
- 12) Loosen the oil pump housing mounting bolts.



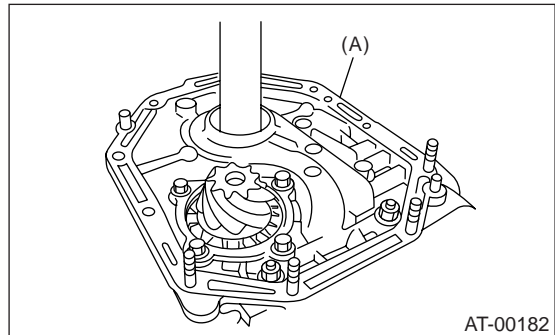
- 13) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

NOTE:

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



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



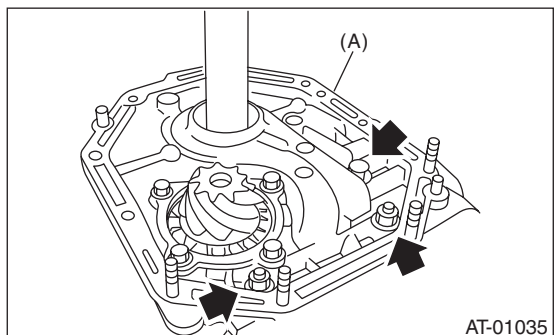
(A) Oil pump housing

B: INSTALLATION

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

Tightening torque:

42 N·m (4.3 kgf·m, 31 ft·lb)

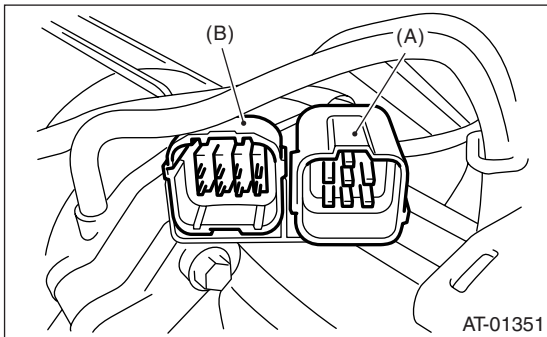


(A) Oil pump housing

Oil Pump Housing

AUTOMATIC TRANSMISSION

- 2) Install the converter case assembly into transmission case assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>
- 3) Install the reduction driven gear. <Ref. to 4AT-94, INSTALLATION, Reduction Driven Gear.>
- 4) Install the reduction drive gear. <Ref. to 4AT-96, INSTALLATION, Reduction Drive Gear.>
- 5) Combine the transmission case with extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 6) Insert the inhibitor switch and transmission connector to the stay.

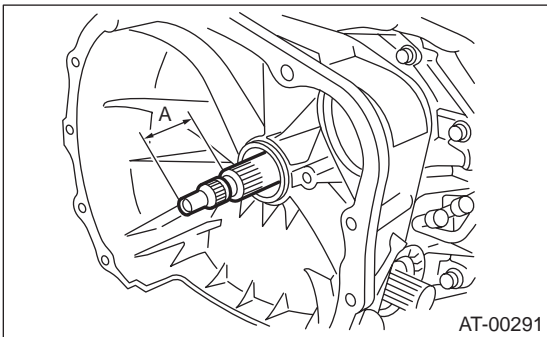


- (A) Transmission connector
- (B) Inhibitor switch connector

- 7) Install the oil cooler pipe. <Ref. to 4AT-69, INSTALLATION, ATF Cooler Pipe and Hose.>
- 8) Install the oil charge pipe with a O-ring. <Ref. to 4AT-79, INSTALLATION, Oil Charge Pipe.>
- 9) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)

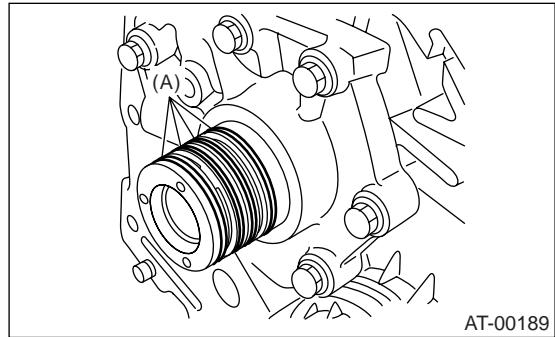


- 10) Install the torque converter clutch assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>
- 11) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

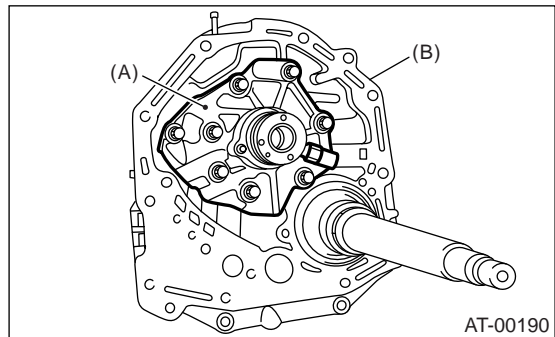
1. OIL PUMP COVER

- 1) Remove four seal rings.



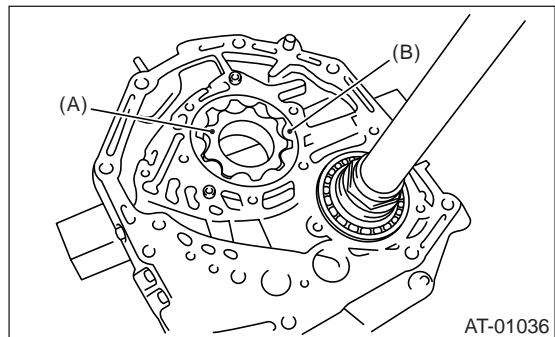
- (A) Seal ring

- 2) Remove the cover by lightly tapping the end of stator shaft.



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

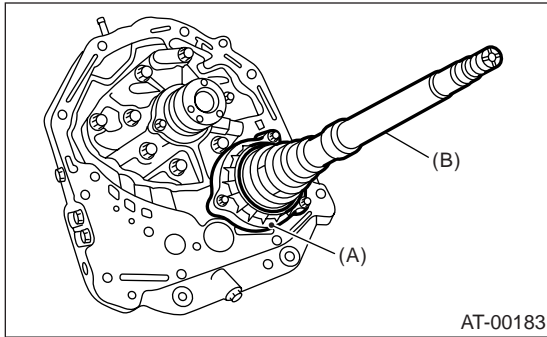
- 3) Remove the inner and outer rotor.



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

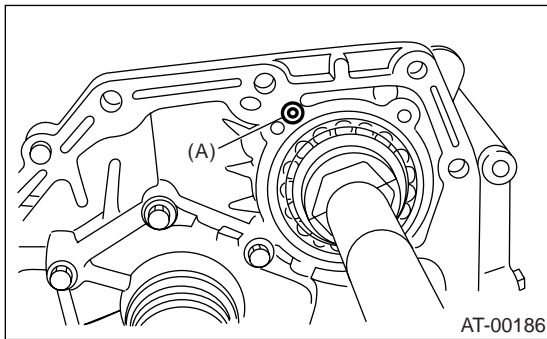
2. OIL SEAL RETAINER

1) Remove the oil seal retainer.



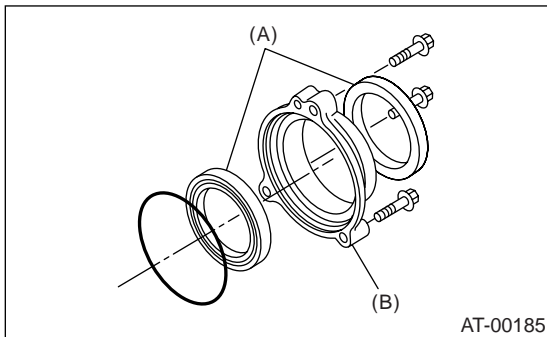
- (A) Oil seal retainer
- (B) Drive pinion shaft

2) Remove the O-ring.



- (A) O-ring

3) Remove the oil seal from oil seal retainer.

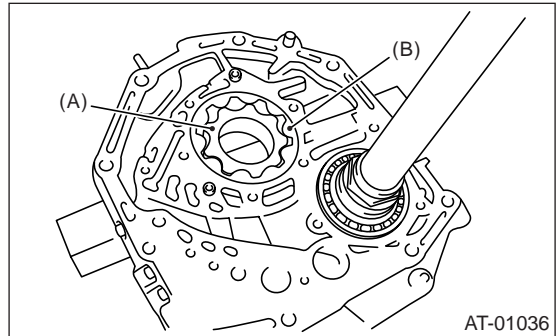


- (A) Oil seal
- (B) Oil seal retainer

D: ASSEMBLY

1. OIL PUMP COVER

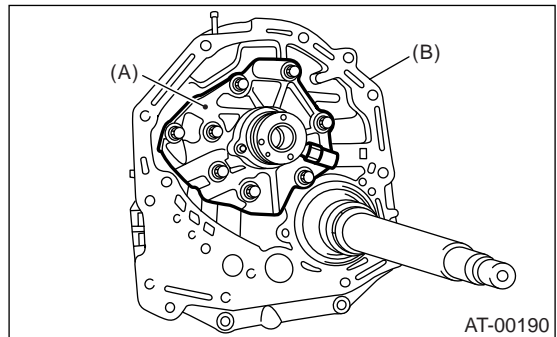
1) Install the oil pump rotor assembly to oil pump housing.



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

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

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



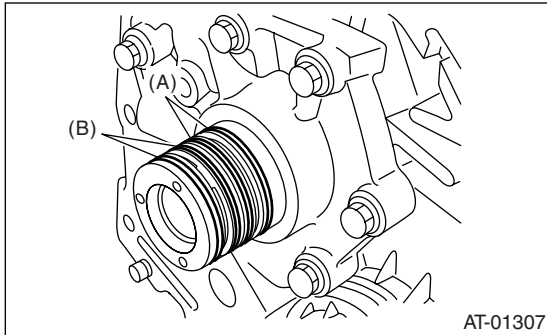
- (A) Oil pump cover
- (B) Oil pump housing

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

Oil Pump Housing

AUTOMATIC TRANSMISSION

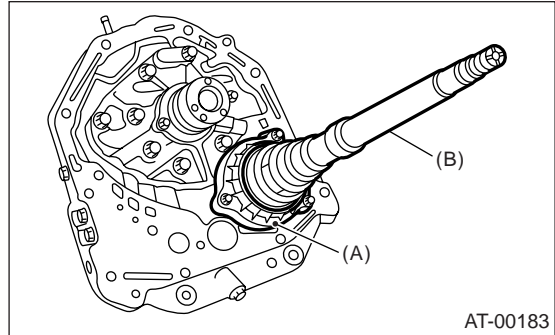
4) Apply vaseline to the oil seal retainer and new seal rings, and install them. After installing, adjust the tooth contact and backlash of drive pinion. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>



- (A) Seal ring (Black)
- (B) Seal ring (Brown)

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

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

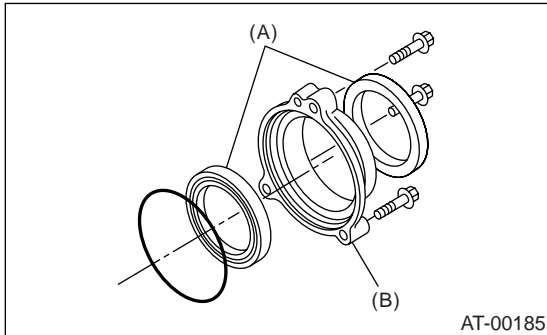


- (A) Oil seal retainer
- (B) Drive pinion shaft

2. OIL SEAL RETAINER

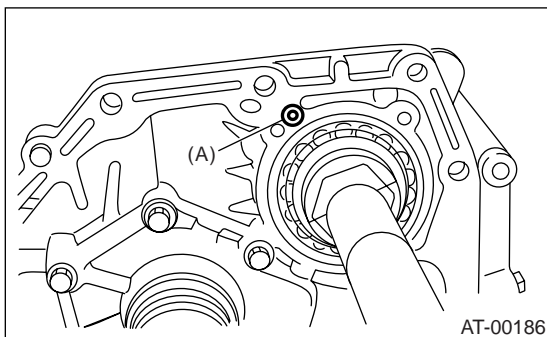
1) Apply ATF to new oil seals (two), and install them to the oil seal retainer in proper direction using ST.

ST 499247300 INSTALLER



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

2) Apply ATF to a new O-ring and install it to the oil seal retainer. Install the seal to oil pump housing bore.



- (A) O-ring

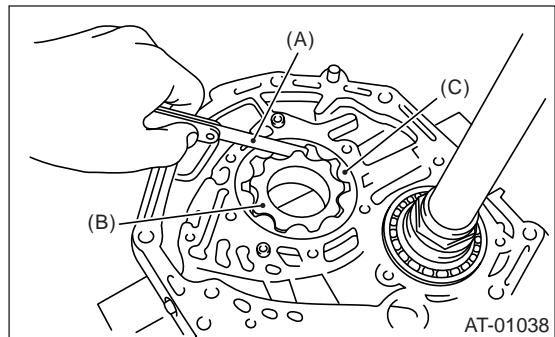
E: INSPECTION

- 1) Check the seal ring and oil seal for breaks and damages.
- 2) Check other parts for dents or abnormalities.
- 3) Selection of oil pump rotor assembly

(1) Tip clearance

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

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



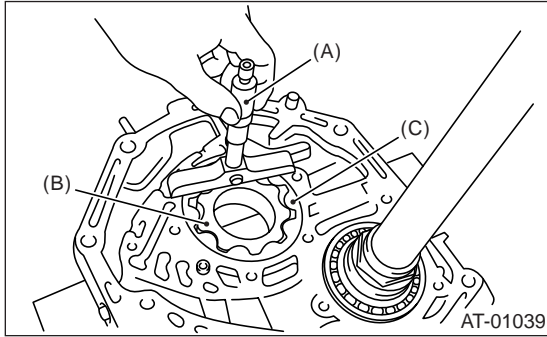
- (A) Thickness gauge
- (B) Inner rotor
- (C) Outer rotor

(2) Side clearance

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

Side clearance:

0.02 — 0.04 mm (0.0008 — 0.0016 in)



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

(3) If the depth and/or side clearance are not within the specifications, replace the rotor assembly.

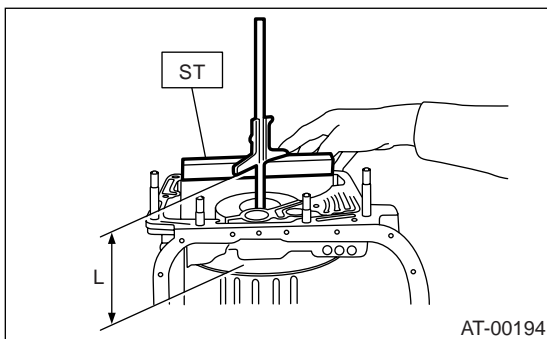
Oil pump rotor ASSY	
Part number	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

Measure the total end play and adjust it within specifications. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

F: ADJUSTMENT

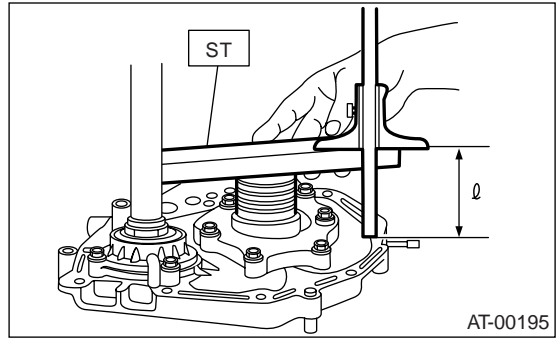
1) Using the ST, measure the length “L”, which is from the mating surface of transmission to the recessed portion of high clutch drum.

ST 398643600 GAUGE



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

ST 398643600 GAUGE

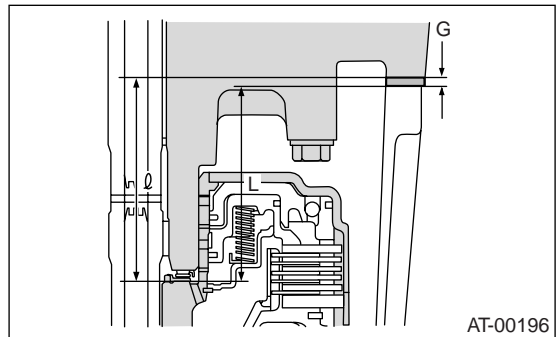


3) Calculation of total end play

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

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

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)]
phi	Height from housing mating surface to upper surface of clutch drum support



Thrust needle bearing	
Part number	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 the end play adjustment, insert the bearing race in recess of the high clutch. Install the thrust needle bearing to oil pump cover using vaseline.

5) After correctly install 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 case.

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

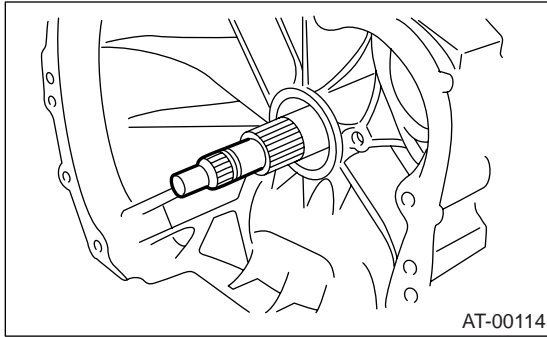
Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

38. Drive Pinion Shaft Assembly

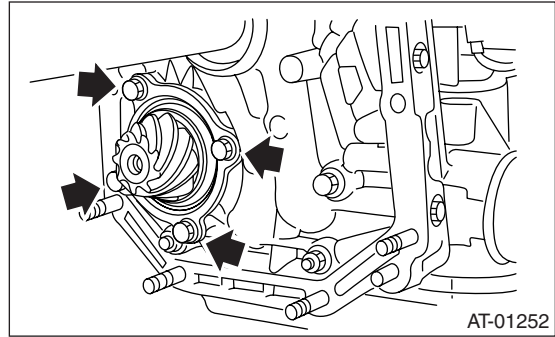
A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Lift-up the lever on rear side of transmission harness connector, and then disconnect it from the stay.
- 5) Disconnect the inhibitor switch connector from the stay.
- 6) Disconnect the air breather hose. <Ref. to 4AT-78, REMOVAL, Air Breather Hose.>
- 7) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-67, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate the converter case and transmission case part. <Ref. to 4AT-101, REMOVAL, Converter Case.>
- 10) Separate the transmission case and extension case part. <Ref. to 4AT-82, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. <Ref. to 4AT-96, REMOVAL, Reduction Drive Gear.>
- 12) Remove the reduction driven gear. <Ref. to 4AT-94, REMOVAL, Reduction Driven Gear.>

- 13) Remove the drive pinion shaft mounting bolt and remove the drive shaft assembly from oil pump housing.



B: INSTALLATION

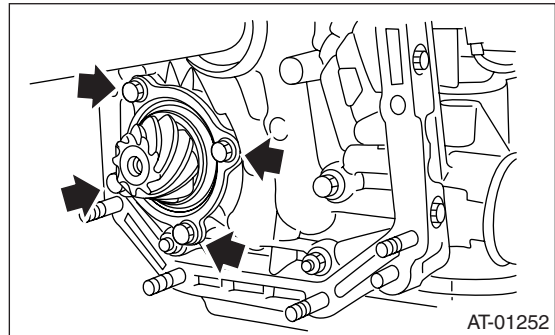
- 1) Assemble the drive pinion assembly to oil pump housing.

NOTE:

- Be careful not to bend the shim.
- Be careful not to press-fit the pinion into housing bore.

Tightening torque:

40 N·m (4.0 kgf-m, 30 ft-lb)



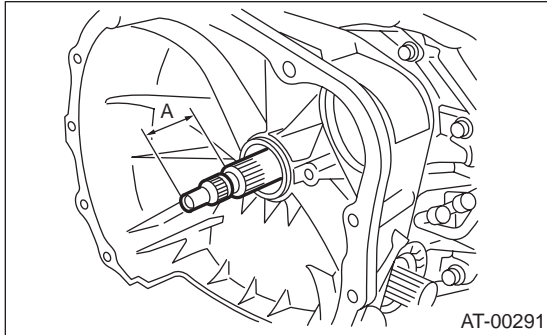
- 2) Combine the torque converter case with transmission case. <Ref. to 4AT-101, INSTALLATION, Converter Case.>
- 3) Install the reduction driven gear. <Ref. to 4AT-94, INSTALLATION, Reduction Driven Gear.>
- 4) Install the reduction drive gear. <Ref. to 4AT-96, INSTALLATION, Reduction Drive Gear.>
- 5) Combine the transmission case with the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
- 6) Insert the inhibitor switch and transmission connector to the stay.
- 7) Install the oil cooler inlet and outlet pipes. <Ref. to 4AT-69, INSTALLATION, ATF Cooler Pipe and Hose.>
- 8) Install the oil charge pipe with O-ring.
- 9) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



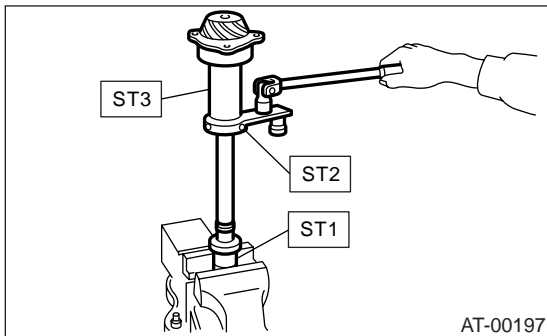
10) Install the torque converter clutch assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>

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

C: DISASSEMBLY

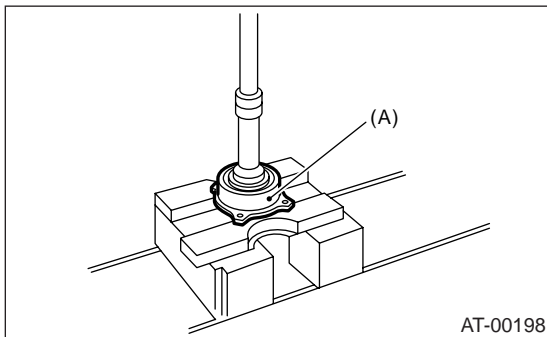
1) Remove the caulking part of lock nut, and then remove the lock nut with holding the rear spline part of shaft using ST1 and ST2. Pull out the drive pinion collar.

ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER



2) Remove the O-ring.

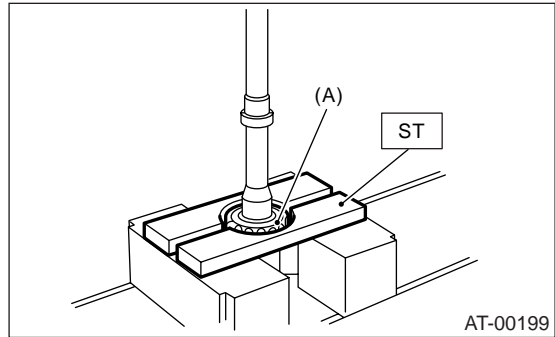
3) Separate the roller bearing and outer race from shaft using press.



(A) Outer race

4) Separate the front roller bearing from shaft using a press and ST.

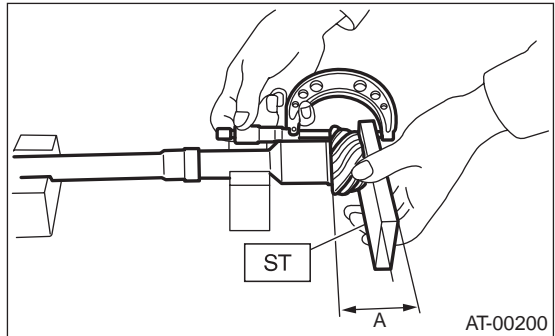
ST 498517000 REPLACER



(A) Front roller bearing

D: ASSEMBLY

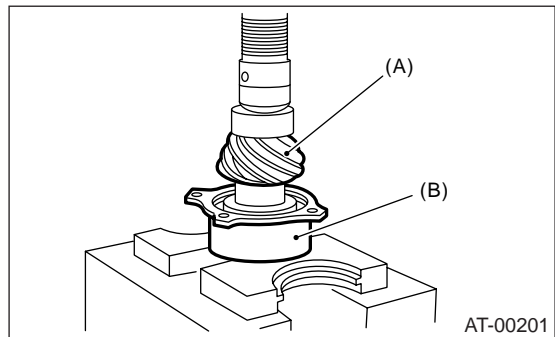
1) Measure the dimension "A" of drive pinion shaft
ST 398643600 GAUGE



2) Using a press, press-fit the new roller bearing into specified position.

NOTE:

If excessive force is applied to roller bearing, the roller bearing will not turn easily.



(A) Drive pinion shaft

(B) Roller bearing

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

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

Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

5) Tighten the new lock nuts using ST1, ST2 and ST3.

Calculate the lock washer and lock nut specifications using following formula.

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

T1: 116 N·m (11.8 kgf·m, 85.3 ft·lb)

[Required torque setting]

T2: Tightening torque

L1: ST2 length 0.072 m (2.83 in)

L2: Torque wrench length

Example:

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

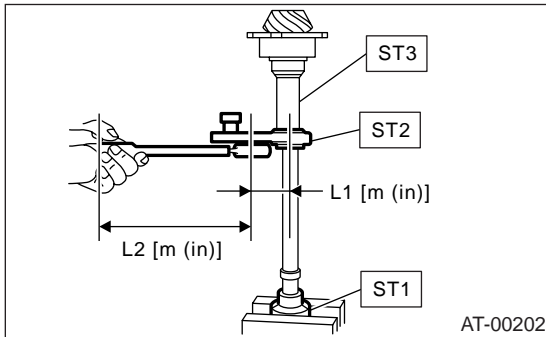
ST1 498937110 HOLDER

ST2 499787700 WRENCH

ST3 499787500 ADAPTER

NOTE:

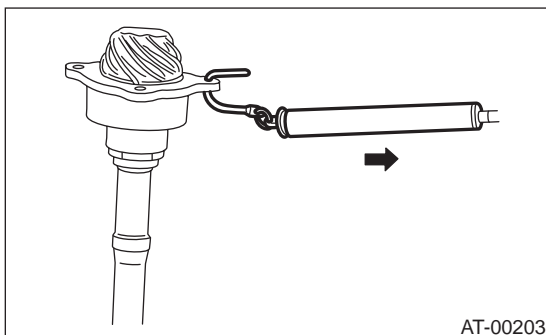
Install the ST2 to torque wrench as straight as possible.



6) Measure the starting torque of bearing. Make sure the starting torque is within the specified range. If the torque is not within specified range, replace the roller bearing.

Starting torque:

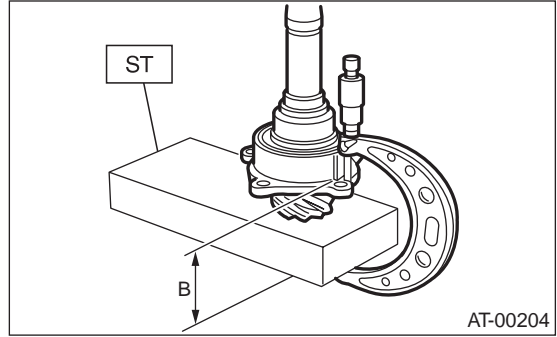
7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 8.6 lb)



7) Stake the lock nut at two points.

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

ST 398643600 GAUGE



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

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

10) Select three or less shims from following table.

Drive pinion shim	
Part number	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 cut, gouges, and other faults.
- Adjust the teeth alignment. <Ref. to 4AT-110, ADJUSTMENT, Drive Pinion Shaft Assembly.>

F: ADJUSTMENT

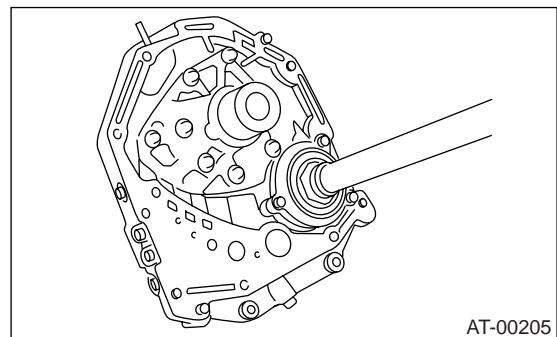
- 1) Remove the liquid gasket completely.
- 2) Install the oil pump housing assembly to converter case, and secure them with tightening four bolts evenly.

NOTE:

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

Tightening torque:

41 N·m (4.2 kgf·m, 30.4 ft·lb)

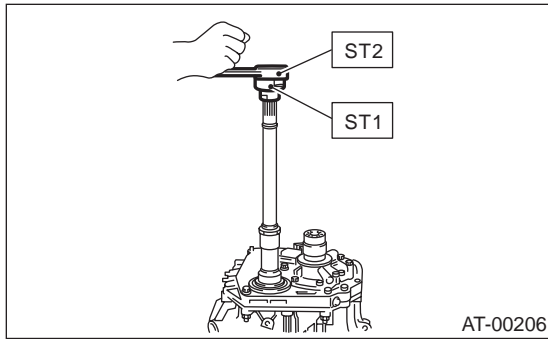


3) Rotate the drive pinion several times using ST1 and ST2.

Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

ST1 498937110 HOLDER
ST2 499787700 WRENCH



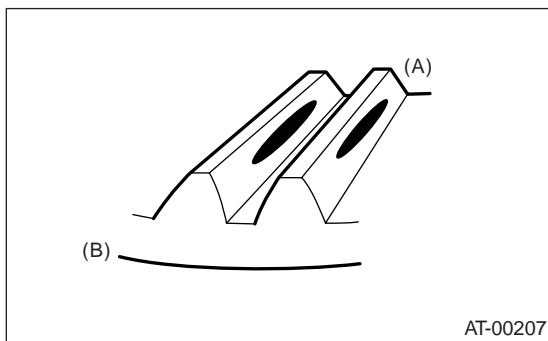
4) Adjust backlash between drive pinion and crown gear. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>

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

If the tooth contact is improper, readjust the backlash or shim thickness. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>

- Correct 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.]

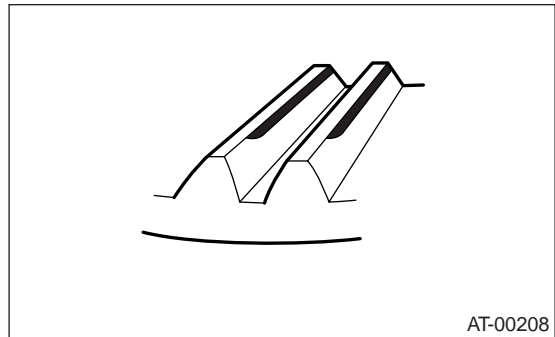


(A) Toe side
(B) Heel side

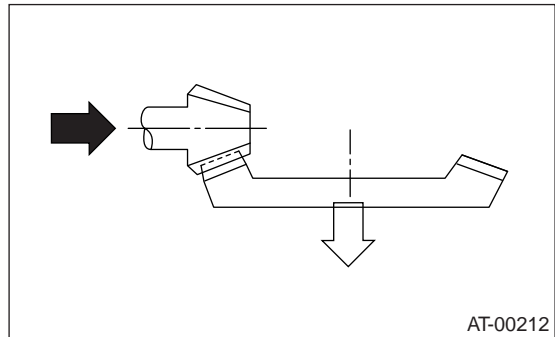
- Face contact

Checking item: Backlash is too large.

Contact pattern



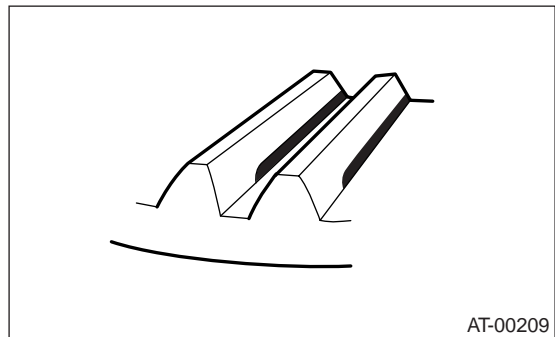
Corrective action: Increase thickness of pinion height adjusting washer in order to bring drive pinion close to driven gear.



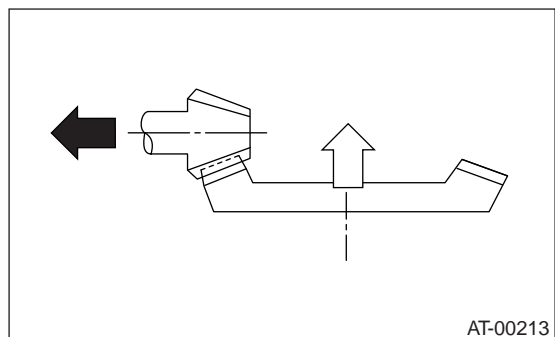
- Flank contact

Checking item: Backlash is too small.

Contact pattern



Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion away from driven gear.



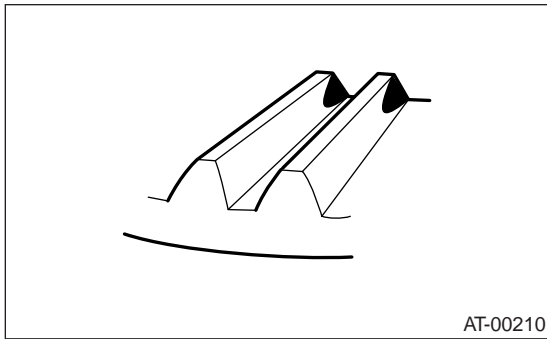
Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

- Toe contact (inside end contact)

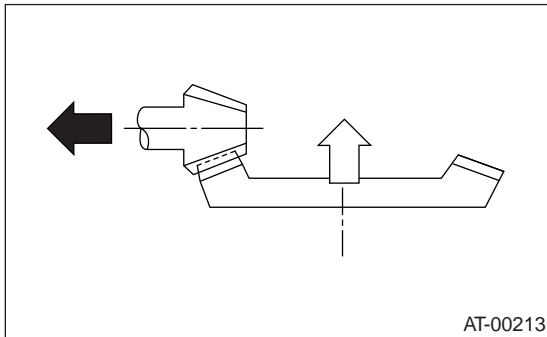
Checking item: Contact area is small.

Contact pattern



AT-00210

Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion away from driven gear.

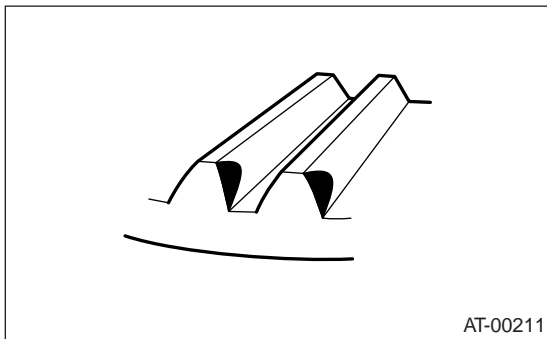


AT-00213

- Heel contact (outside end contact)

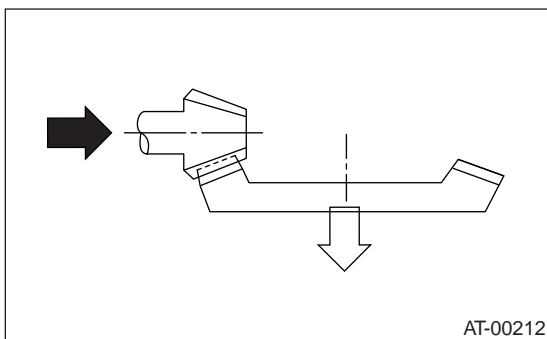
Checking item: Contact area is small.

Contact pattern



AT-00211

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

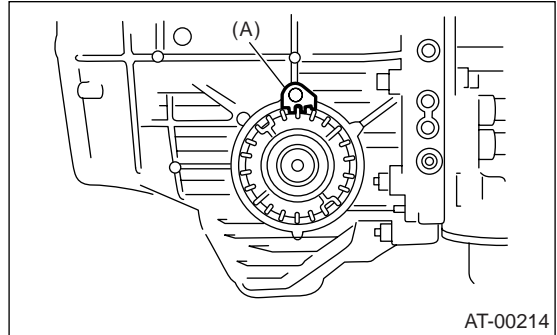


AT-00212

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. Tighten the lock plate with specified torque.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



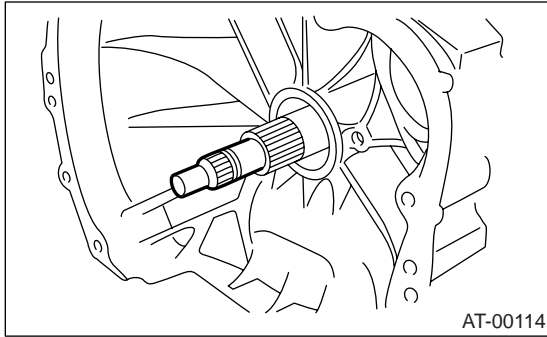
AT-00214

(A) Lock plate

39. Front Differential Assembly

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.



- 4) Lift-up the lever on rear side of transmission harness connector, and then remove it from the stay.
- 5) Remove the inhibitor switch from the stay.
- 6) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
- 7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-67, REMOVAL, ATF Cooler Pipe and Hose.>
- 8) Separate the converter case and transmission case. <Ref. to 4AT-101, REMOVAL, Converter Case.>
- 9) Remove the seal pipe.
- 10) Remove the differential side retainers using ST.

NOTE:

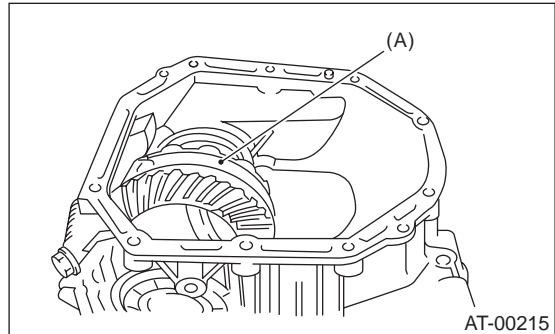
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of converter case.

ST 499787000 WRENCH ASSY

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

B: INSTALLATION

- 1) When installing the differential assembly to case, be careful not to damage the inside of case (particularly, the differential side retainer mating surface).

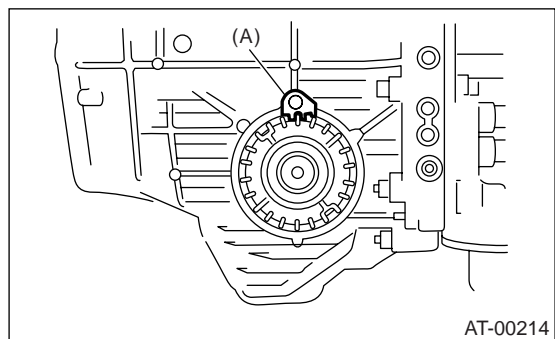


(A) Differential assembly

- 2) Install the O-ring to left and right side retainer.
- 3) Install the side retainers using ST. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>
ST 499787000 WRENCH ASSY
- 4) Adjust the front differential backlash. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>
- 5) Install the lock plate.

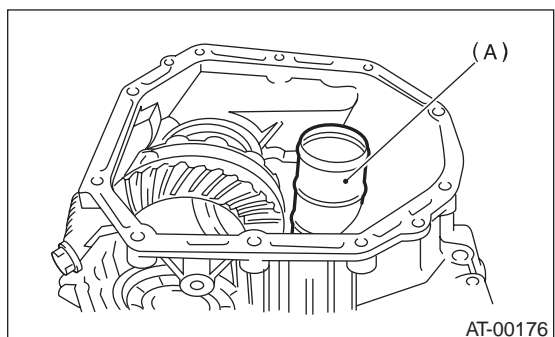
Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



(A) Lock plate

- 6) Install the new seal pipe to converter case.



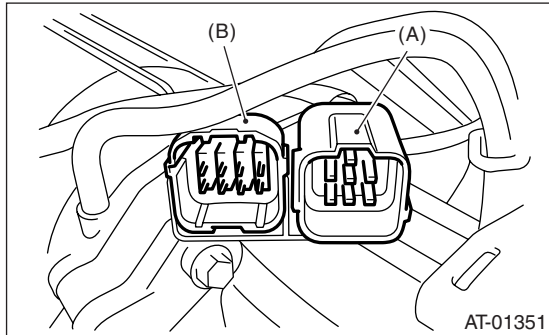
(A) Seal pipe

Front Differential Assembly

AUTOMATIC TRANSMISSION

7) Install the converter case to transmission case.
<Ref. to 4AT-101, INSTALLATION, Converter Case.>

8) Insert the inhibitor switch and transmission connector to the stay.



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

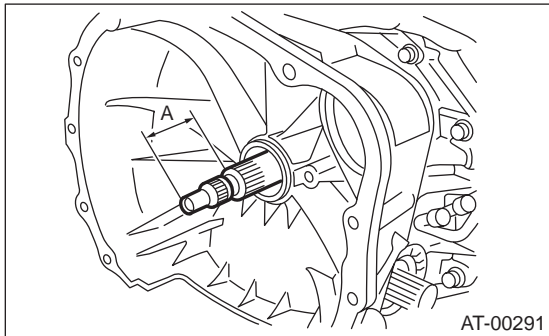
9) Install the oil cooler pipe. <Ref. to 4AT-69, INSTALLATION, ATF Cooler Pipe and Hose.>

10) Install the oil charge pipe with a O-ring. <Ref. to 4AT-79, INSTALLATION, Oil Charge Pipe.>

11) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



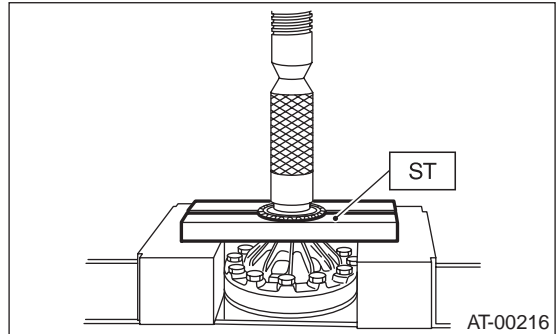
12) Install the torque converter clutch assembly.
<Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>

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

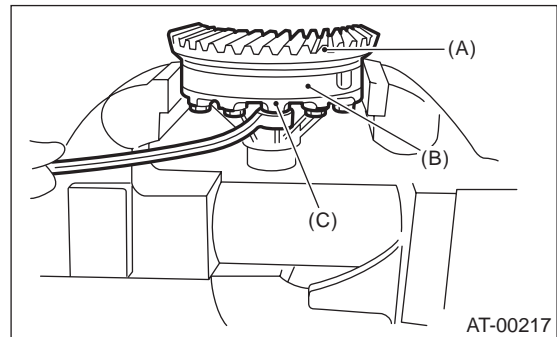
C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Remove taper roller bearing using ST and press.
ST 498077000 REMOVER

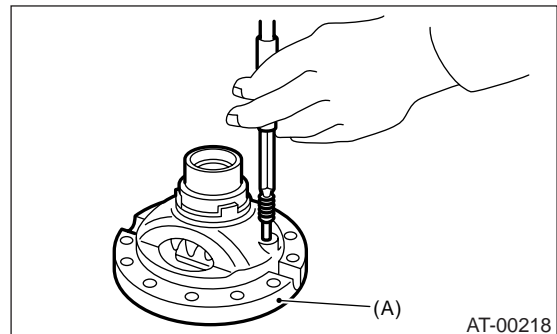


2) Secure the case in a vise and remove the hypoid driven gear tightening bolts, then separate the hypoid driven gear, case (RH) and case (LH).



- (A) Hypoid driven gear
- (B) Differential case (RH)
- (C) Differential case (LH)

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



- (A) Differential case (RH)

Front Differential Assembly

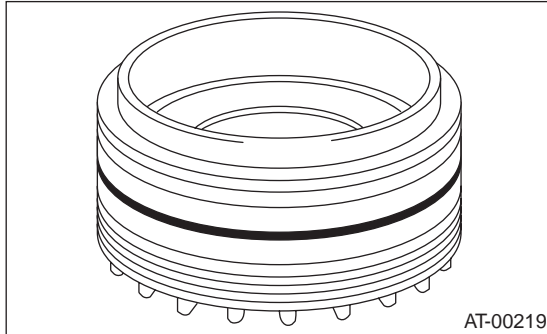
AUTOMATIC TRANSMISSION

2. SIDE RETAINER

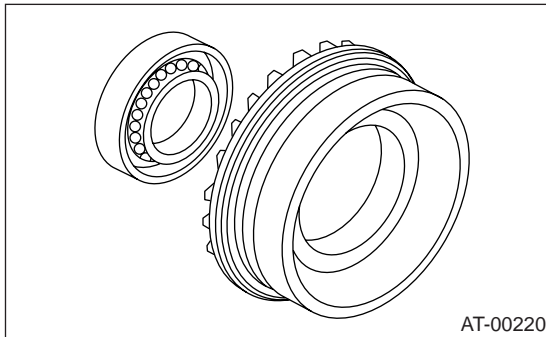
NOTE:

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

1) Remove the O-ring.

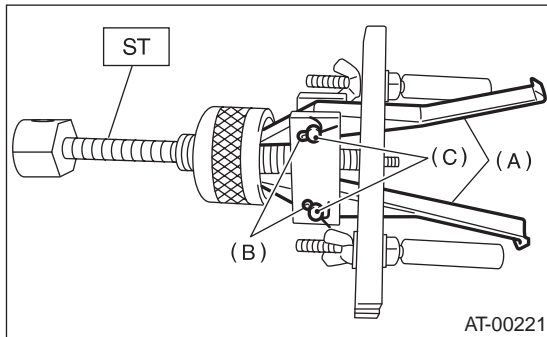


2) Remove the oil seal.



3) Remove the split pin, and then remove the claw.

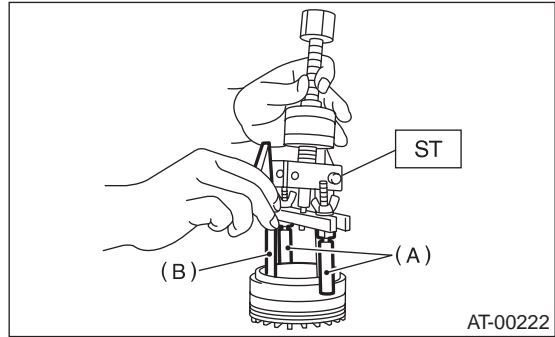
ST 398527700 PULLER ASSY



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

4) Attach two claws to the outer race, and set the ST to side retainer.

ST 398527700 PULLER ASSY



- (A) Shaft
- (B) Claw

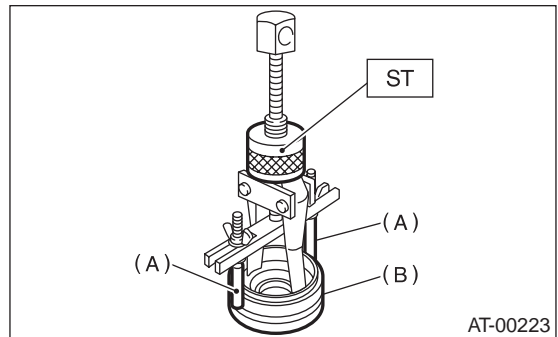
5) Restore the removed claws to original position, and install the pin and split pin.

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

ST 398527700 PULLER ASSY

NOTE:

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



- (A) Shaft
- (B) Side retainer

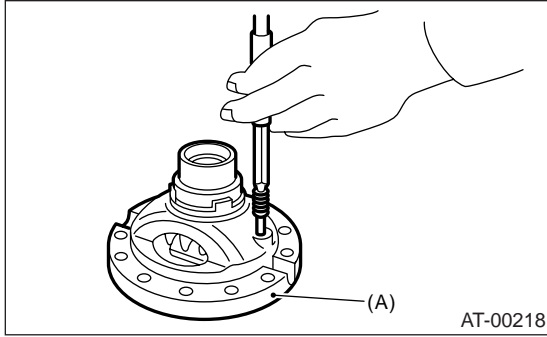
Front Differential Assembly

AUTOMATIC TRANSMISSION

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

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

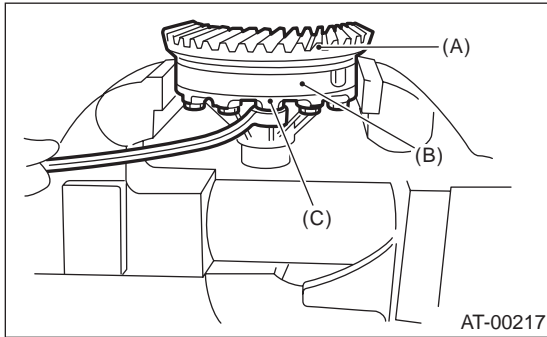


(A) Differential case (RH)

- 3) Install the washer and differential bevel gear to differential case (LH). Put the differential case (RH) on the case, and then combine the both cases.
- 4) Install the hypoid driven gear and secure by tightening the bolt.

Tightening torque:

62 N·m (6.3 kgf·m, 45.6 ft·lb)



- (A) Hypoid driven gear
- (B) Differential case (RH)
- (C) Differential case (LH)

- 5) Measurement of backlash (Selection of washer)
 - (1) Install the SUBARU genuine axle shaft to differential case.

Parts No. 38415AA070 AXLE SHAFT

- (2) Measure the gear backlash using ST1 and ST2, and then insert the ST2 from the access window of case.

ST1 498247001 MAGNET BASE

ST2 498247100 DIAL GAUGE

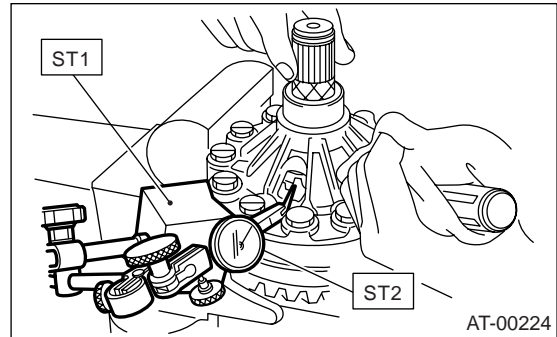
NOTE:

- Measure the backlash by applying a pinion tooth between two bevel gear teeth.

- Fix the bevel pinion gear in place with a screwdriver or similar tool when measuring.

Standard value:

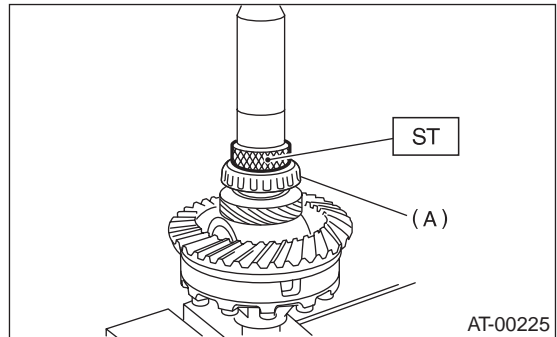
0.13 — 0.18 mm (0.0051 — 0.0071 in)



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

Washer	
Part number	Thickness mm (in)
803038021	0.95 (0.037)
803038022	1.00 (0.039)
803038023	1.05 (0.041)

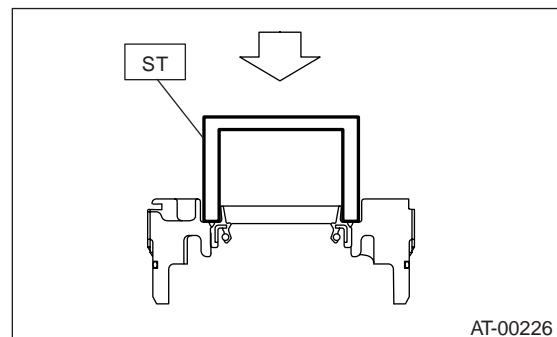
- 6) Using the ST, install the taper roller bearing.
ST 398487700 DRIFT



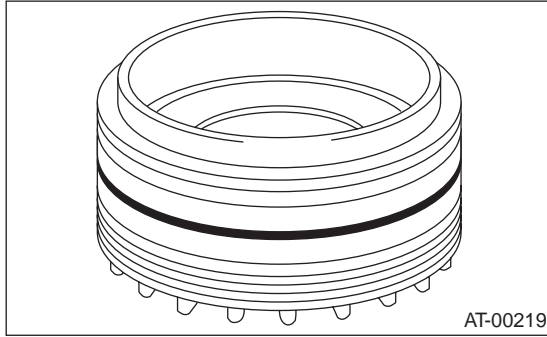
(A) Taper roller bearing

2. SIDE RETAINER

- 1) Install the bearing outer race to side retainer.
- 2) Install a new oil seal using ST and hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



3) Apply gear oil to a new O-ring and install it.



E: INSPECTION

- Check each component for scratches, damage and other faults.
 - Measure the backlash, and then adjust it within specification.
- <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>

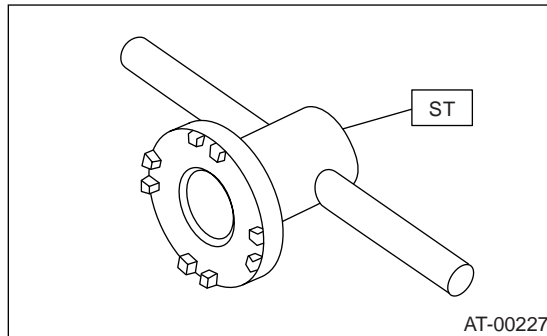
F: ADJUSTMENT

1) Using the 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



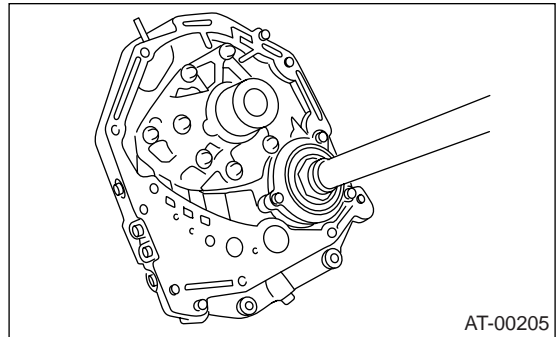
- 2) Remove the oil pump housing.
- 3) Remove the liquid gasket completely.
- 4) Install the oil pump housing assembly to converter case, and secure them with tightening four bolts evenly.

NOTE:

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

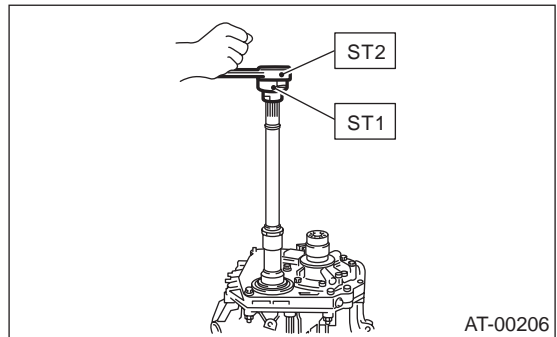
Tightening torque:

41 N·m (4.2 kgf·m, 30.4 ft·lb)



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

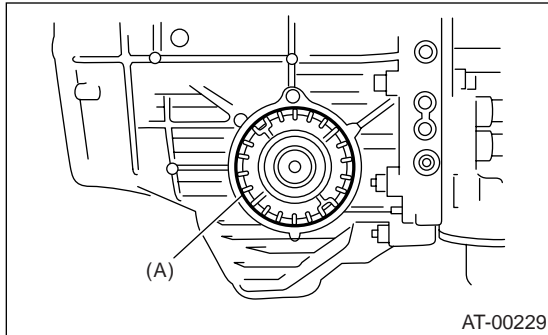
ST1 498937110 HOLDER
ST2 499787700 WRENCH



Front Differential Assembly

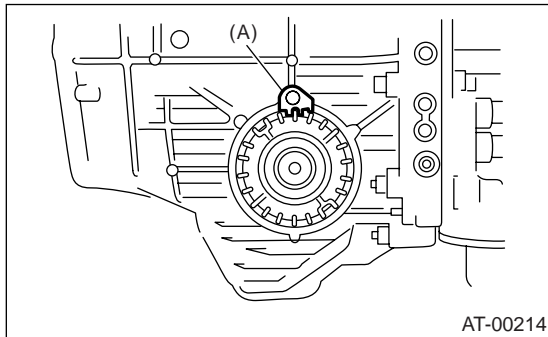
AUTOMATIC TRANSMISSION

6) Tighten the retainer LH until contact is felt while rotating the shaft. Then loosen the retainer RH. Keep tightening the retainer LH, and loosening the retainer RH until the pinion shaft cannot be turned. This is the "zero" state.



(A) Retainer

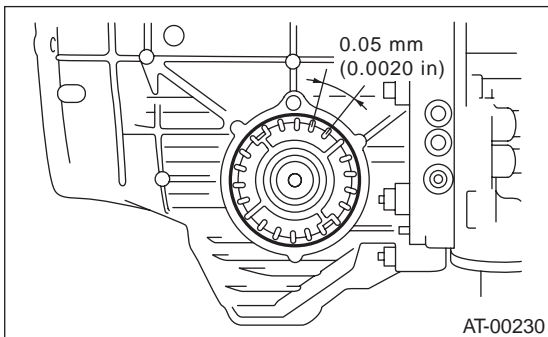
7) After the "zero" state is established, back off the retainer LH 3 notches and secure it with the lock plate. Then back off the retainer RH and retighten until it stops. Rotate the drive pinion few times. Tighten the retainer RH 1-3/4 notches further. This sets the preload. Finally, secure the retainer 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) Install the SUBARU genuine axle shaft to both side of front differential part.

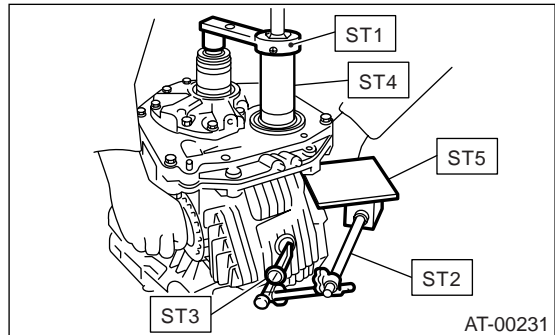
Parts No. 38415AA000 AXLE SHAFT

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

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

Backlash:

0.13 — 0.18 mm (0.0051 — 0.0071 in)

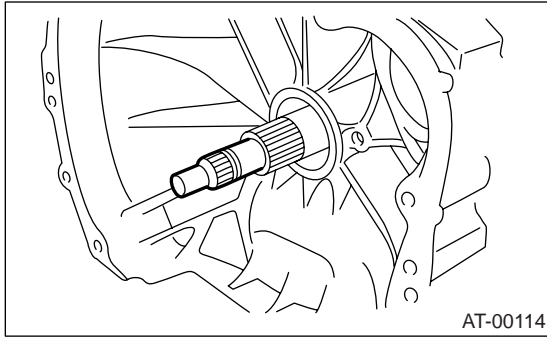


10) Adjust the tooth contact between front differential and drive shaft. <Ref. to 4AT-110, ADJUSTMENT, Drive Pinion Shaft Assembly.>

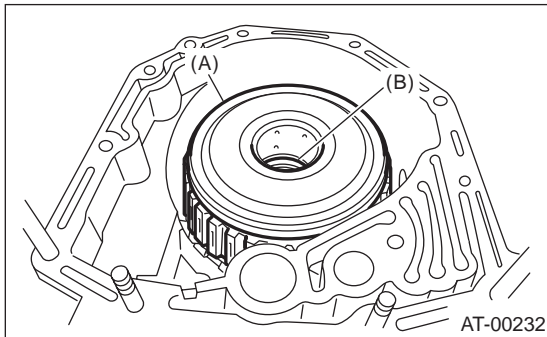
40.AT Main Case

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.

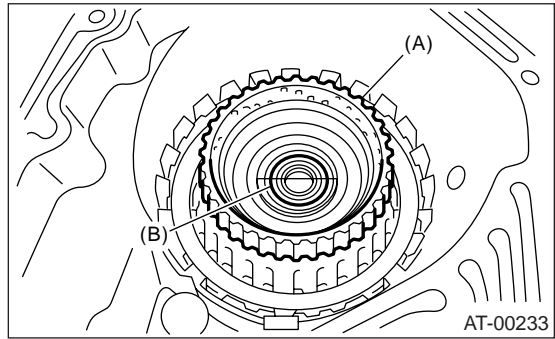


- 4) Lift-up the lever on the rear side of transmission harness connector, and then disconnect it from the stay.
- 5) Disconnect the inhibitor switch connector from the stay.
- 6) Disconnect the air breather hose.
- 7) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
- 8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-67, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate the converter case and transmission case. <Ref. to 4AT-101, REMOVAL, Converter Case.>
- 10) Remove the oil pump housing. <Ref. to 4AT-103, REMOVAL, Oil Pump Housing.>
- 11) Take out the high clutch, thrust needle bearing and reverse clutch assembly.



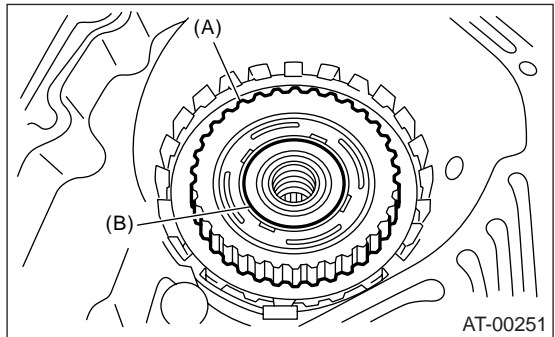
- (A) High clutch and reverse clutch ASSY
- (B) Thrust needle bearing

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



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

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

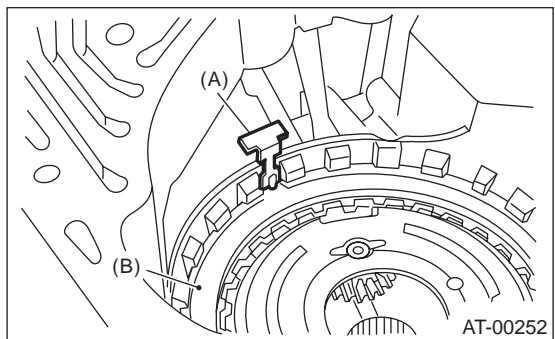


- (A) Front sun gear
- (B) Thrust needle bearing

- 14) Pull out the leaf spring without folding.

NOTE:

Remove it while pressing down on lower leaf spring.

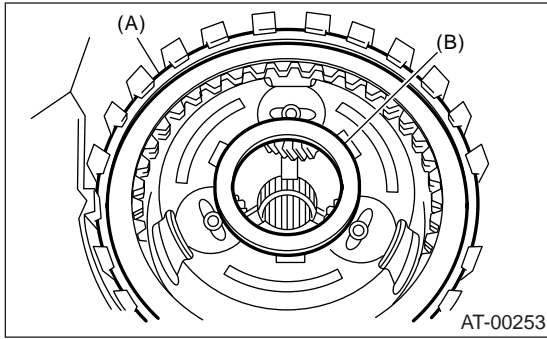


- (A) Leaf spring
- (B) Retaining plate

AT Main Case

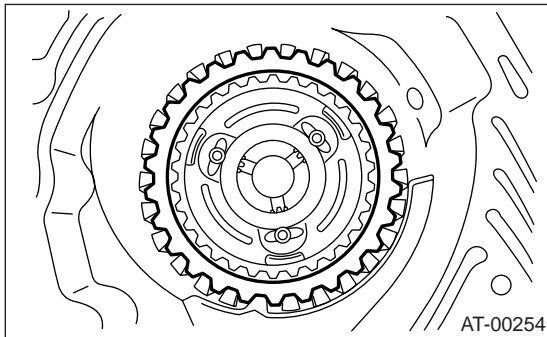
AUTOMATIC TRANSMISSION

15) Remove the snap ring and thrust needle bearing.

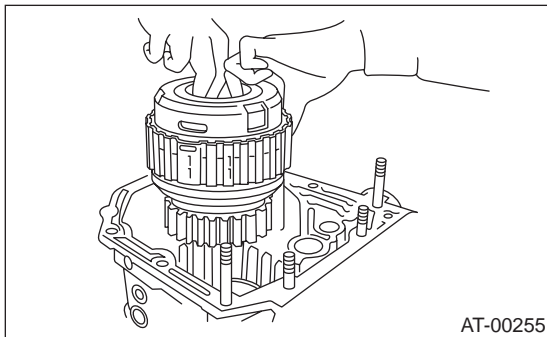


- (A) Snap ring
- (B) Thrust needle bearing

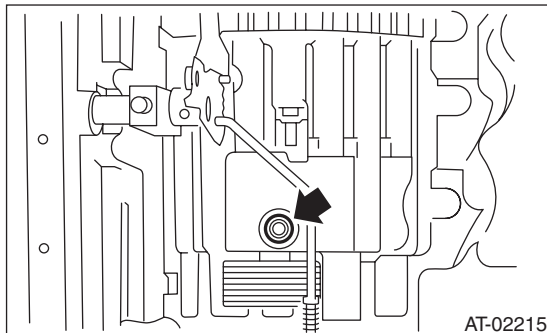
16) Take out the retaining plate, drive plate and driven plate of 2-4 brake.



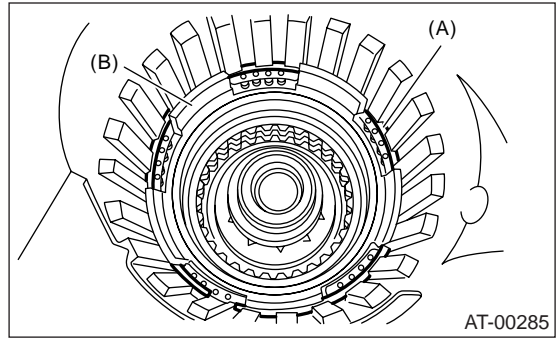
17) Take out the thrust needle bearing, planetary gear assembly and low clutch assembly.



18) Remove the 2-4 brake seal.

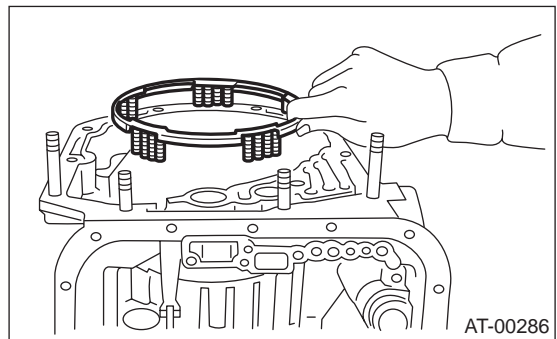


19) Remove the snap ring.

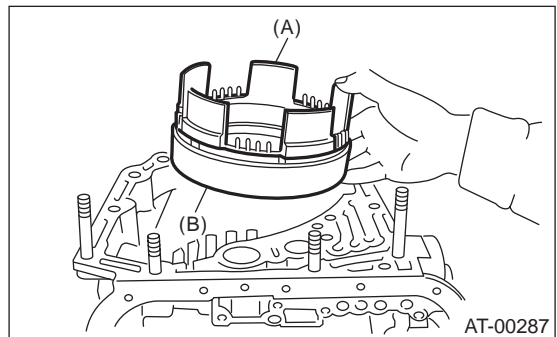


- (A) Snap ring
- (B) 2-4 brake piston

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

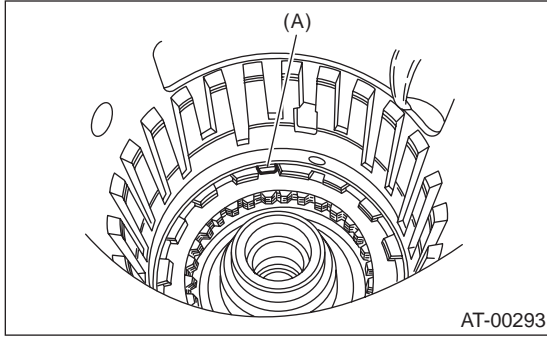


21) Remove the 2-4 brake piston and piston retainer without damaging.



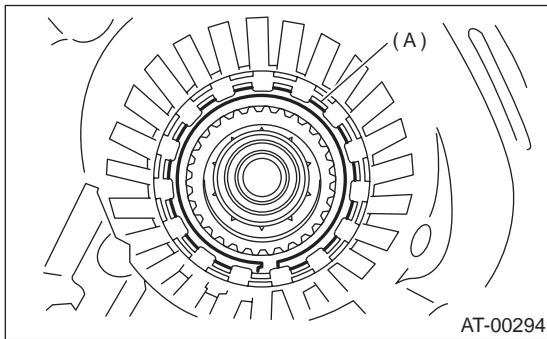
- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

22) Pull out the leaf spring without folding.



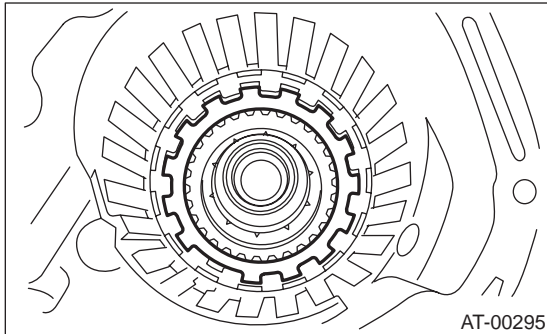
(A) Leaf spring

23) Remove the snap ring.

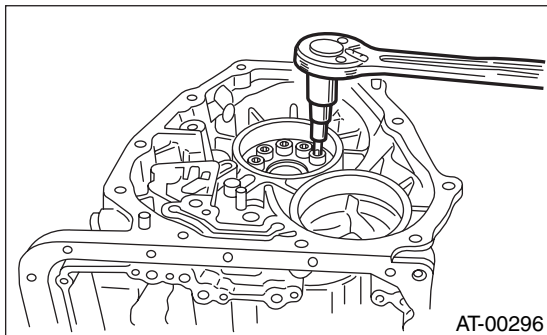


(A) Snap ring

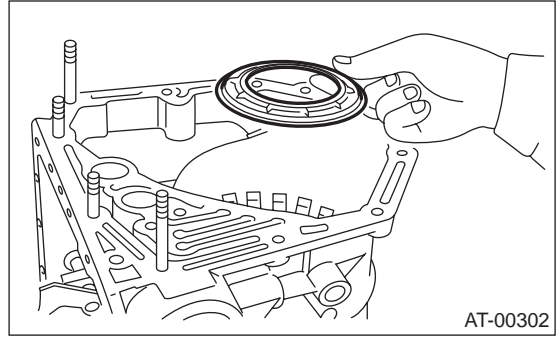
24) Take out the retaining plate, drive plate, driven plate and dish plate.



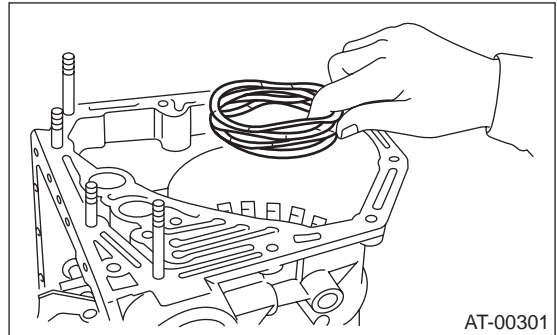
25) Turn the transmission case upside down, and then take out the socket bolts while holding the one-way clutch inner race with hand.



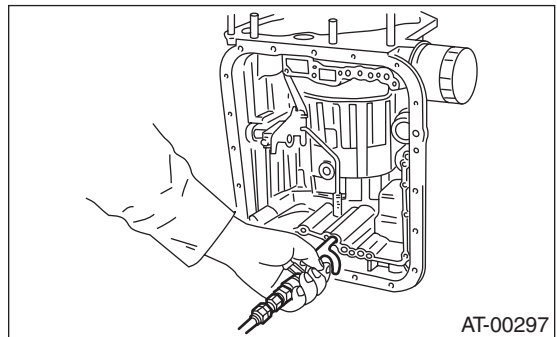
26) Remove the spring retainer.



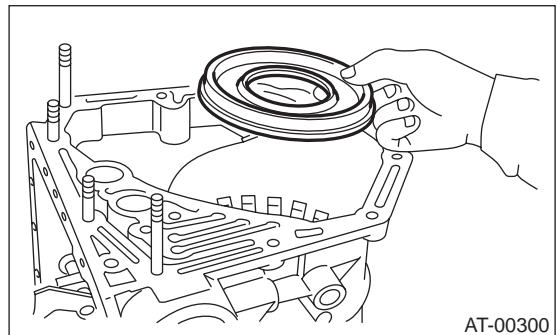
27) Take out the return spring.



28) Apply compressed air.



29) Take out the low & reverse piston.



AT Main Case

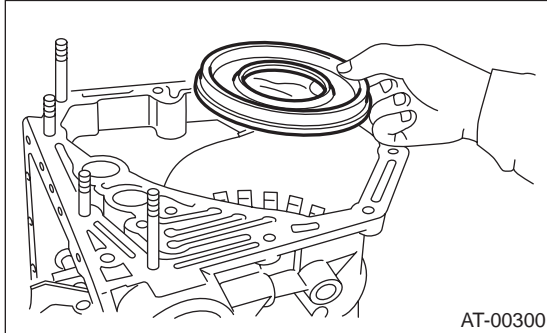
AUTOMATIC TRANSMISSION

B: INSTALLATION

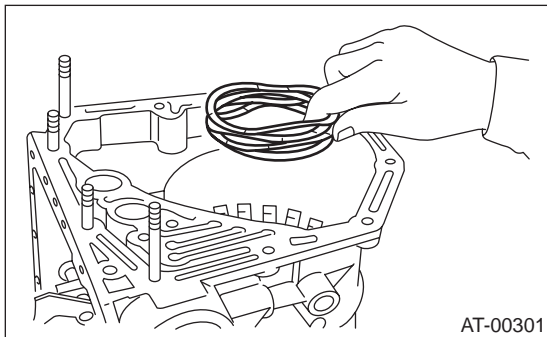
1) Install the low & reverse brake piston.

NOTE:

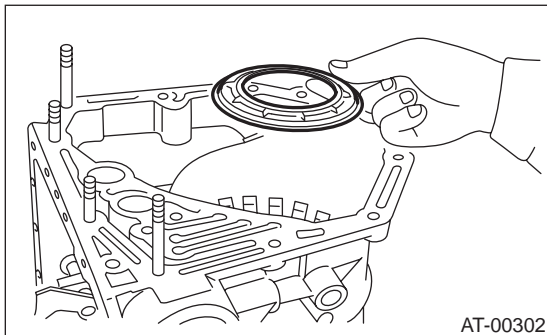
- Be careful not to damage the lip seal.
- Apply ATF to the lip.



2) Install the return spring.



3) Install the spring retainer.

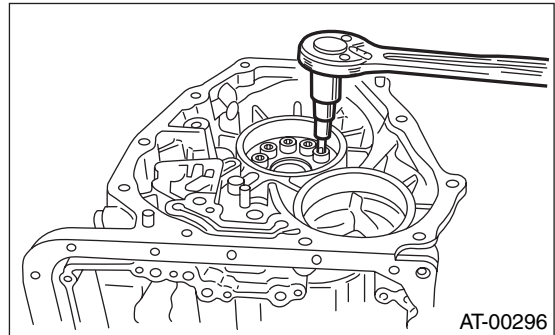


4) Install the one-way clutch inner race, spring retainer and return spring.

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

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)



6) Place the front side of transmission body up.

7) Install the thrust needle bearing.

8) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.

9) Set the micro gauge to clutch, and read its scale.

NOTE:

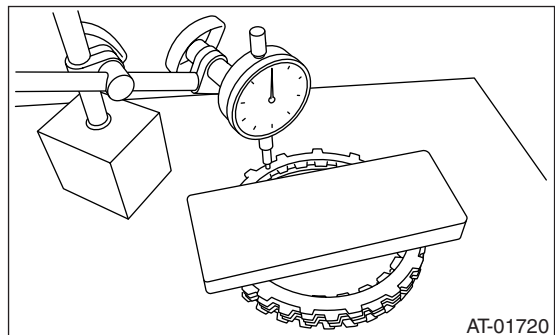
The value, which is read in the gauge at this time, is zero point.

10) Scale and record the weight "Z" of a flat board which will be put on plates.

NOTE:

- Use a stiff flat board which does not bend against load.
- Use a flat board of its weight less than 83 N (8.5 kgf, 18.7 lb).

11) Put the flat board on retaining plate.



12) Using the following formula, calculate "N" indicated on the push/pull gauge.

$$N = 83 \text{ N (8.5 kgf, 18.7 lb)} - Z$$

N: Value indicated on push/pull gauge

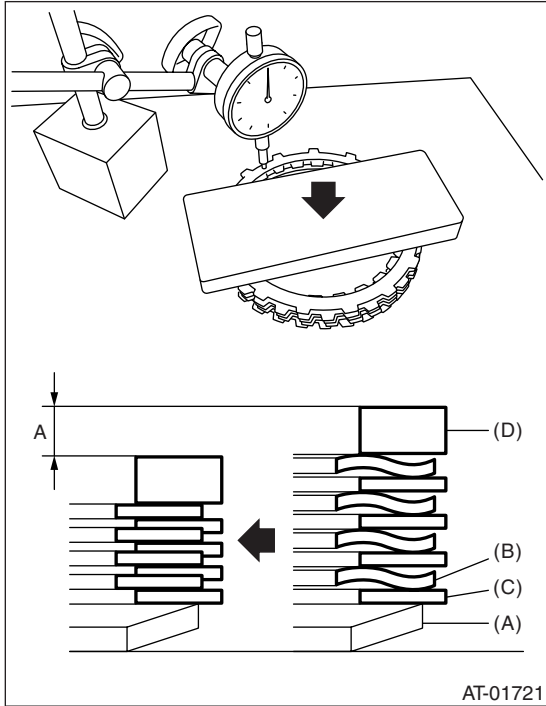
83 N (8.5 kgf, 18.7 lb): Load applied to clutch plate

Z: Flat board weight

13) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height A. Make more than three measurements at even distance and take the average value.

NOTE:

If three points, measure the height every 120°. If four points, measure the height every 90°.

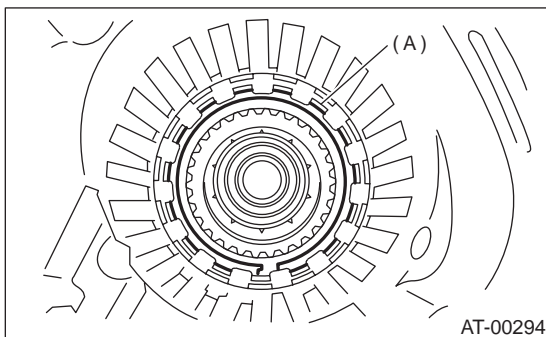


- (A) Dish plate
- (B) Driven plate
- (C) Drive plate
- (D) Retaining plate

14) Installation of the low & reverse brake:
Install the dish plate, driven plate and retaining plate, and then secure them with snap ring.

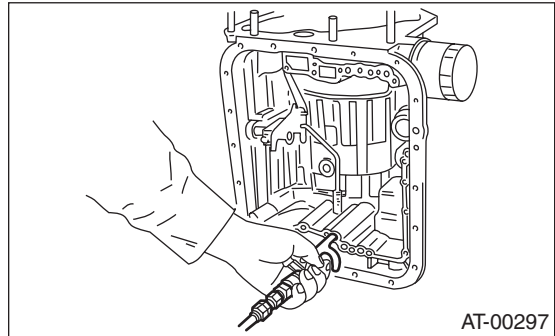
NOTE:

Pay attention to the orientation of dish plate.



- (A) Snap ring

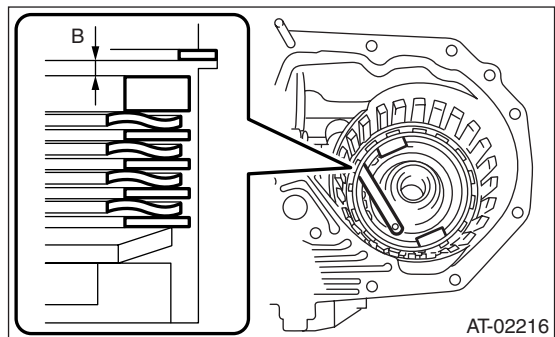
15) Apply compressed air intermittently to check for operation.



16) Place the same thickness of shim on both sides to prevent the plate from tilting, and then measure and record the clearance B.

NOTE:

Do not press the shim downward with excessive force, or else the waveform of drive plates will be broken down.



17) Piston stroke calculation

Select the retaining plate within the specification by calculating with A and B dimensions which have been recorded before. If the calculated value exceeds the service limit, replace the drive plate with a new one and adjust it within the specification.

$$T = A + B$$

T: Piston stroke

A: Collapse amount of drive plate

B: Clearance between retaining plate and snap ring

Initial standard:

2.15 — 2.65 mm (0.085 — 0.104 in)

Limit thickness:

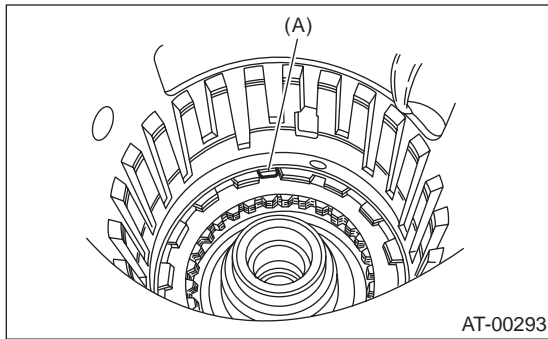
2.95 mm (0.116 in)

AT Main Case

AUTOMATIC TRANSMISSION

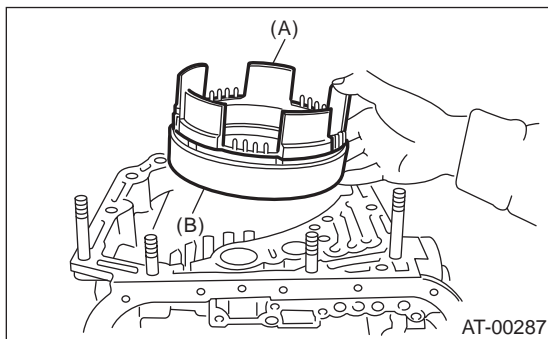
Retaining plate	
Part number	Thickness mm (in)
31667AA420	3.8 (0.150)
31667AA320	4.1 (0.161)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

18) Install the leaf spring of low & reverse brake.



(A) Leaf spring

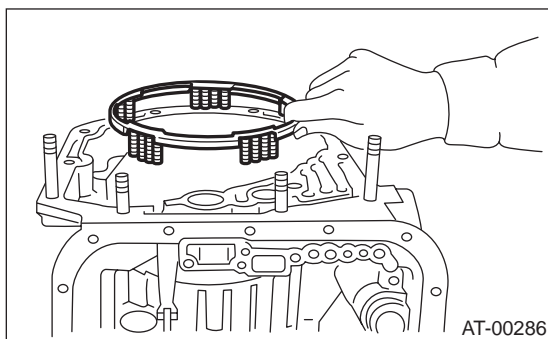
19) Install the 2-4 brake piston and 2-4 brake retainer by aligning the holes of 2-4 brake retainer and hole of transmission case.



(A) 2-4 brake piston

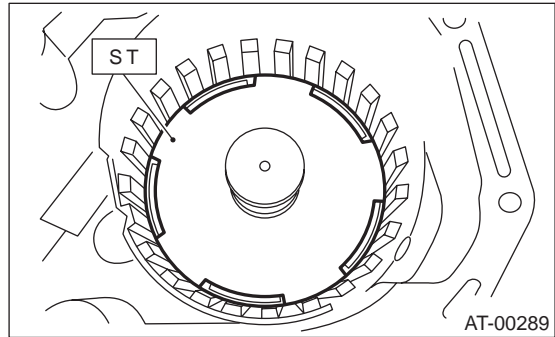
(B) 2-4 brake piston retainer

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



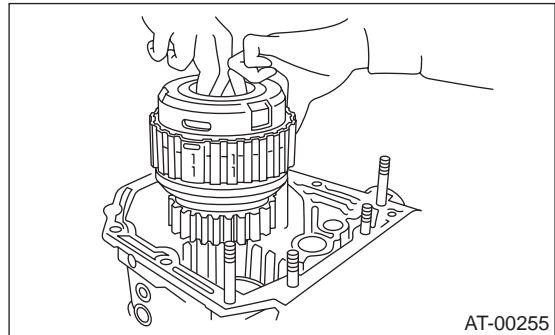
21) Position the snap ring in transmission. Using the ST, press the snap ring into specified place.

ST 498677100 COMPRESSOR



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

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



23) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.

24) Set the micro gauge to clutch, and read its scale.

NOTE:

The value, which is read in the gauge at this time, is zero point.

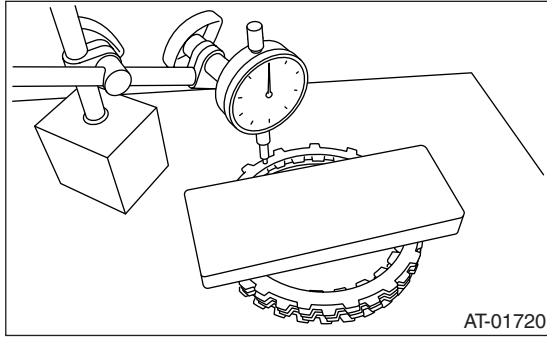
25) Scale and record the weight "Z" of a flat board which will be put on plates.

NOTE:

- Use a stiff flat board which does not bend against load.

- Use a flat board of its weight less than 100 N (10.2 kgf, 22.5 lb).

26) Put the flat board on retaining plate.



27) Using the following formula, calculate "N" indicated on the push/pull gauge.

$$N = 100 N (10.2 \text{ kgf}, 22.5 \text{ lb}) - Z$$

N: Value indicated on push/pull gauge

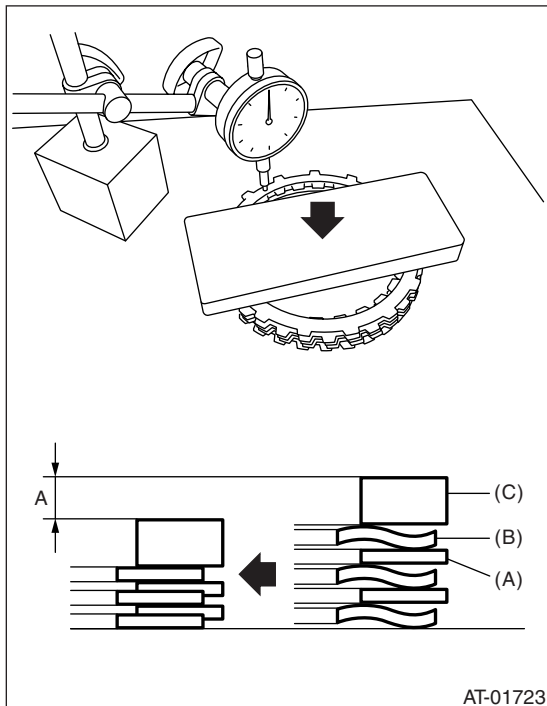
100 N (10.2 kgf, 22.5 lb): Load applied to clutch plate

Z: Flat board weight

28) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height A. Make more than three measurements at even distance and take the average value.

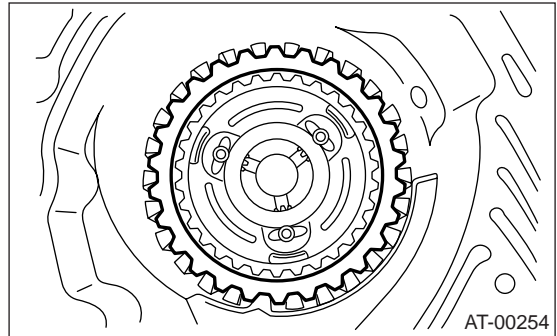
NOTE:

If three points, measure the height every 120°. If four points, measure the height every 90°.

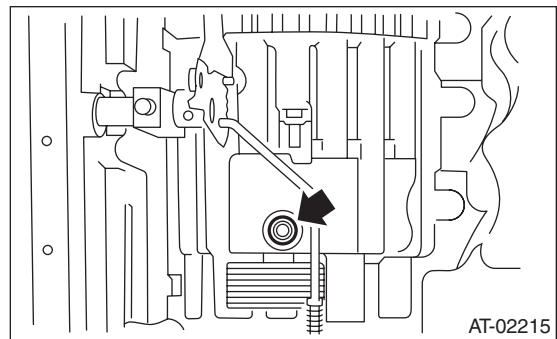


- (A) Driven plate
- (B) Drive plate
- (C) Retaining plate

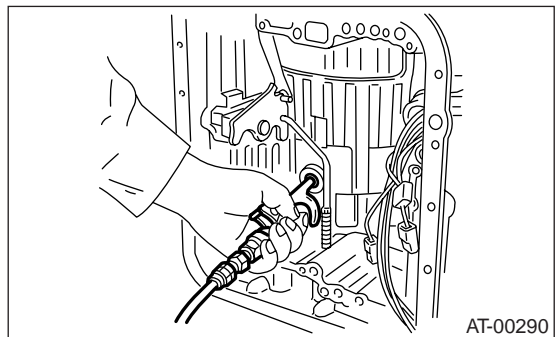
29) Install the pressure plate, drive plate, driven plate, retaining plate and snap ring.



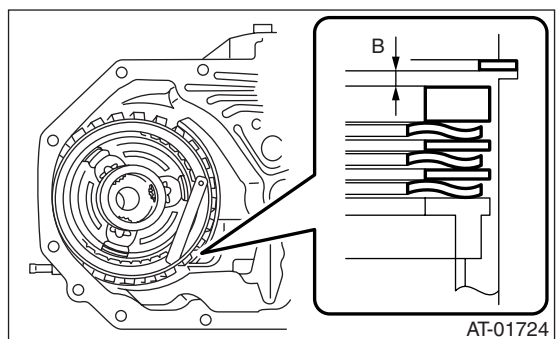
30) Install a new 2-4 brake oil seal to transmission case.



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



32) Measure and record the clearance B between the retaining plate and snap ring.



AT Main Case

AUTOMATIC TRANSMISSION

33) Piston stroke calculation

Select the retaining plate within the specification by calculating with A and B dimensions which have been recorded before. If the calculated value exceeds the usage limit, replace the drive plate with a new one and adjust it within the specification.

$$T = A + B$$

T: Piston stroke

A: Collapse amount of drive plate

B: Clearance between retaining plate and snap ring

2.0 L SOHC model:

Initial standard:

1.4 — 1.8 mm (0.055 — 0.071 in)

Limit thickness:

1.95 mm (0.077 in)

Except for 2.0 L SOHC model:

Initial standard:

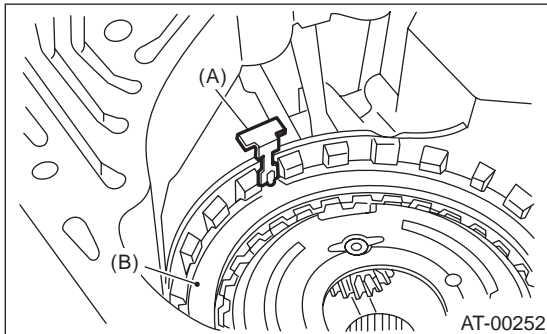
1.7 — 2.1 mm (0.067 — 0.083 in)

Limit thickness:

2.3 mm (0.091 in)

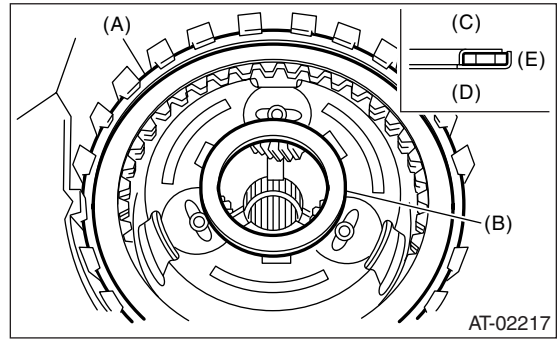
Retaining plate	
Part number	Thickness mm (in)
31567AA991	5.6 (0.220)
31567AB001	5.8 (0.228)
31567AB011	6.0 (0.236)
31567AB021	6.2 (0.244)
31567AB031	6.4 (0.252)
31567AB041	6.6 (0.260)

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



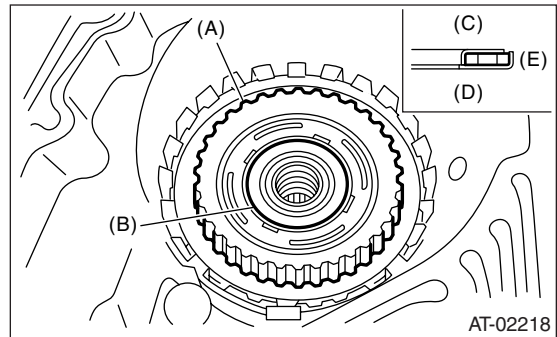
- (A) Leaf spring
- (B) Retaining plate

35) Install the thrust needle bearing in correct direction.



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

36) Install the front sun gear and thrust needle bearing.

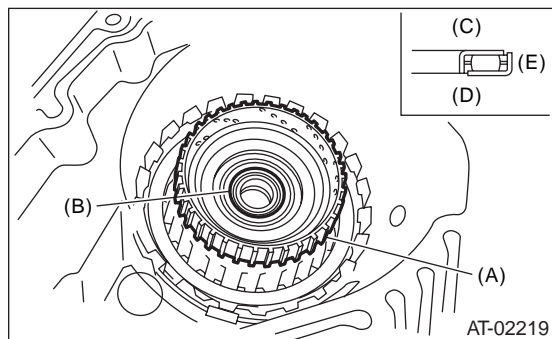


- (A) Front sun gear
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

37) Install the high clutch hub.

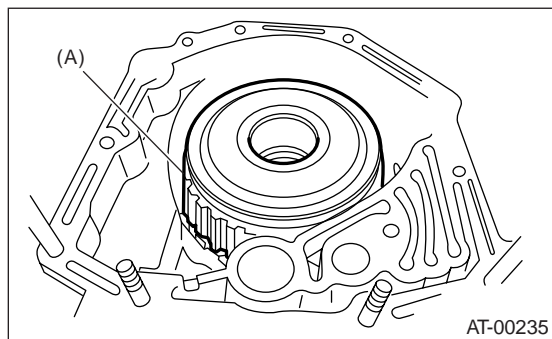
Attach the thrust needle bearing to hub using vaseline, and then install the hub by correctly engaging the splines of the front planetary carrier.

38) Install the thrust needle bearing in proper direction.



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

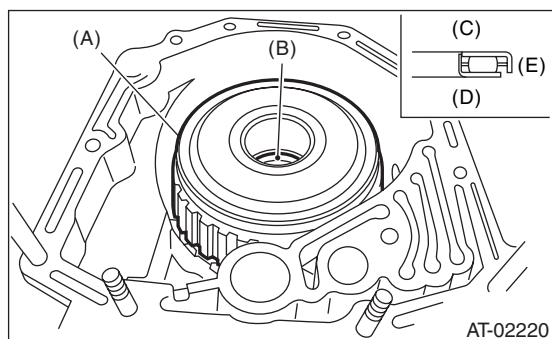
39) Install the high clutch assembly.



- (A) High clutch and reverse clutch ASSY

40) Adjust the total end play. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

41) Install the thrust needle bearing in proper direction.



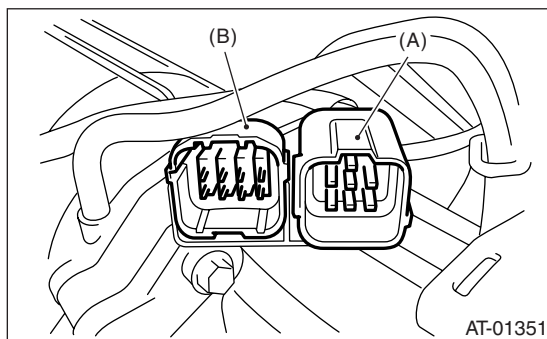
- (A) High clutch and reverse clutch ASSY
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

42) Install the oil pump housing assembly with a new gasket. <Ref. to 4AT-103, Oil Pump Housing.>

43) Install the converter case assembly into transmission case assembly. <Ref. to 4AT-101, INSTALLATION, Converter Case.>

44) Insert the inhibitor switch and transmission connector to the stay.

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



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

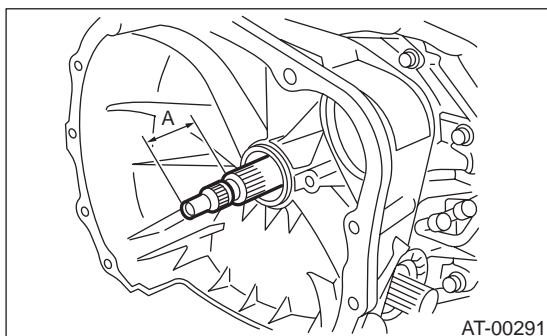
46) Install the oil cooler pipe. <Ref. to 4AT-69, INSTALLATION, ATF Cooler Pipe and Hose.>

47) Install the oil charge pipe with a O-ring. <Ref. to 4AT-79, INSTALLATION, Oil Charge Pipe.>

48) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



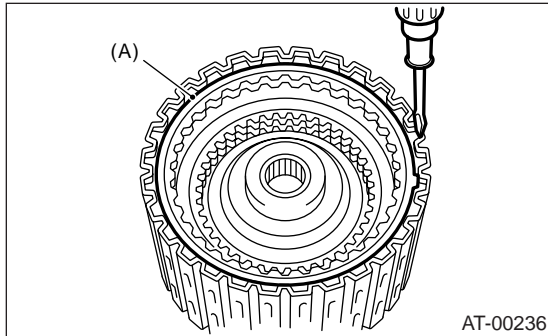
49) Install the torque converter clutch assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>

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

C: DISASSEMBLY

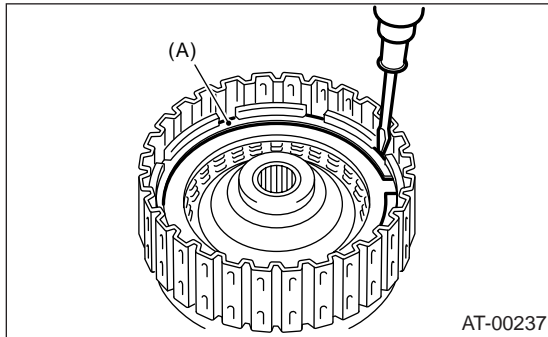
1. HIGH CLUTCH AND REVERSE CLUTCH

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



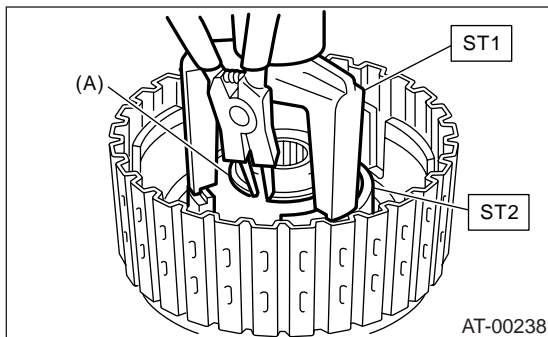
(A) Snap ring

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



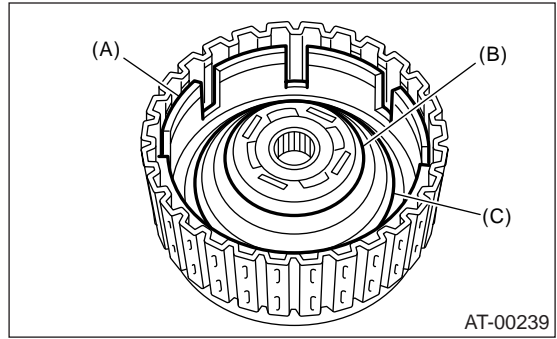
(A) Snap ring

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



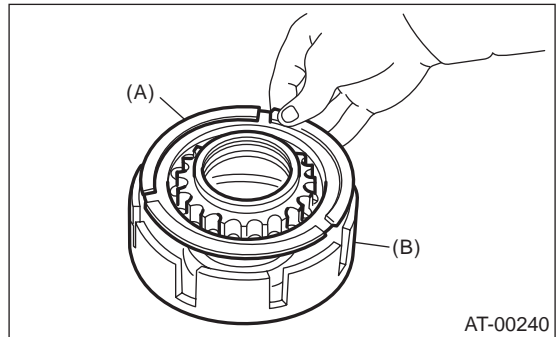
(A) Snap ring

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



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

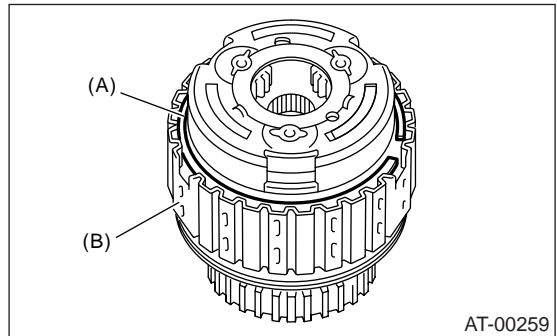
5) Remove the seal ring and lip seal from the high clutch piston and reverse clutch piston.



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

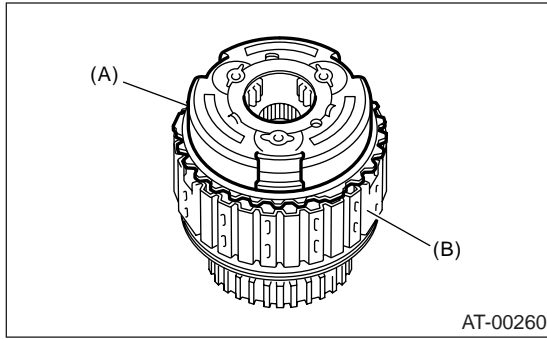
2. PLANETARY GEAR AND LOW CLUTCH

1) Remove the snap ring from low clutch drum.



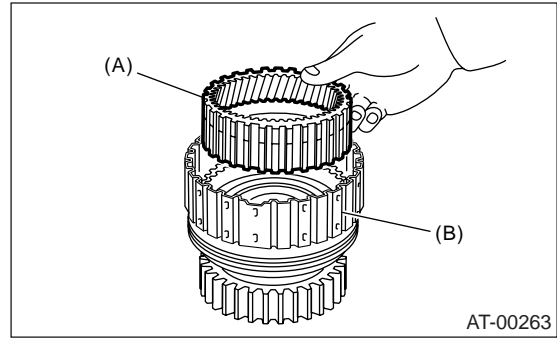
(A) Snap ring
 (B) Low clutch drum

2) Take out the front planetary carrier.



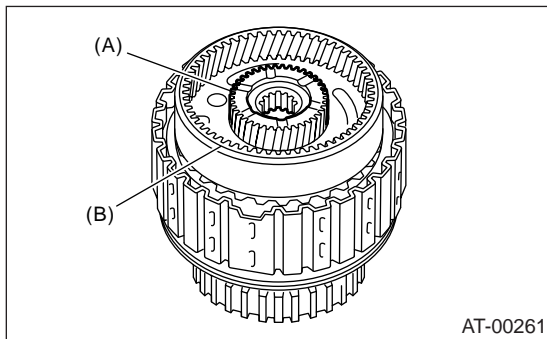
- (A) Front planetary carrier
- (B) Low clutch drum

5) Take out the rear internal gear.



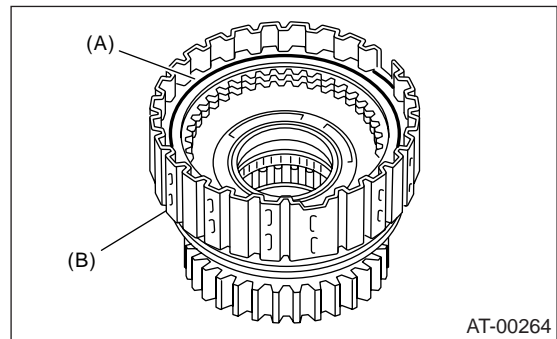
- (A) Rear internal gear
- (B) Low clutch drum

3) Take out the rear sun gear.



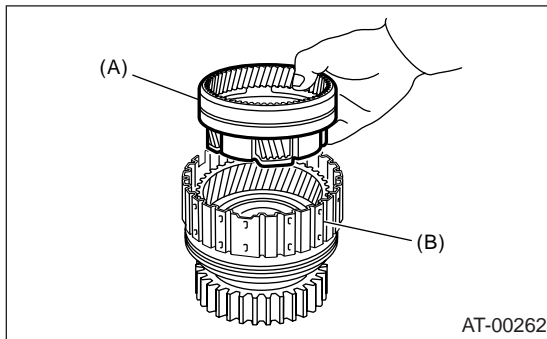
- (A) Rear sun gear
- (B) Rear planetary carrier

6) Remove the snap ring from low clutch drum.



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

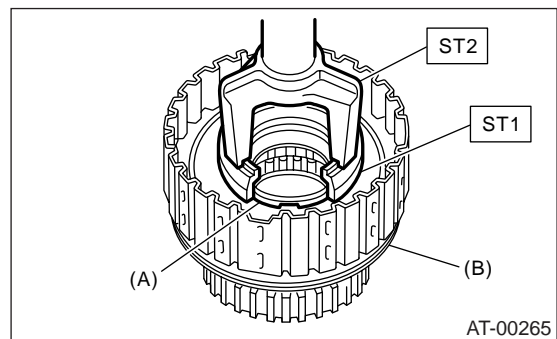
4) Take out the rear planetary carrier, washer and thrust needle bearing.



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

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

ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



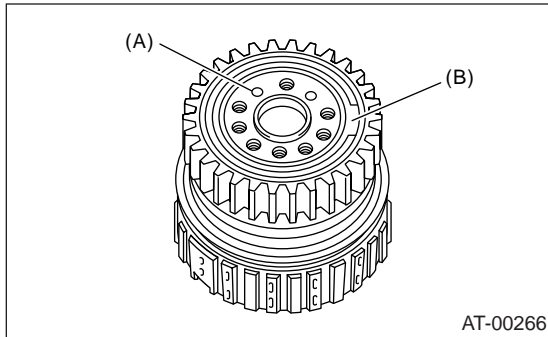
- (A) Snap ring
- (B) Low clutch drum

8) Remove the one-way clutch. <Ref. to 4AT-119, REMOVAL, AT Main Case.>

AT Main Case

AUTOMATIC TRANSMISSION

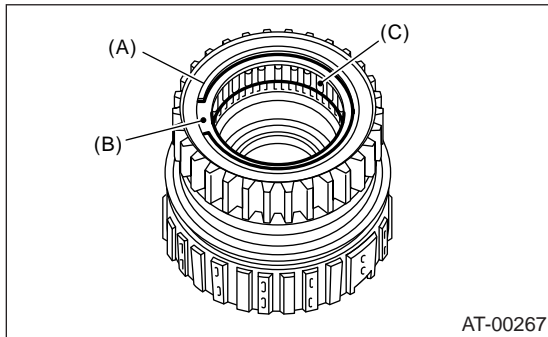
9) Install the one-way clutch inner race to low clutch drum, and then apply compressed air to remove the low clutch piston.



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

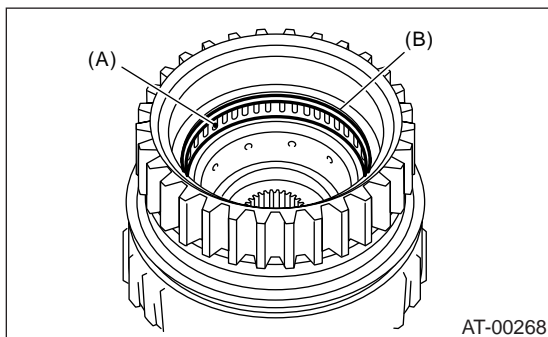
10) Remove the one-way clutch inner race.

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



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

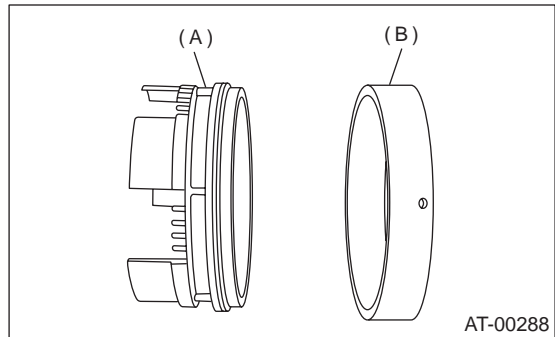
12) Remove the needle bearing after taking out the snap ring.



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

3. 2-4 BRAKE

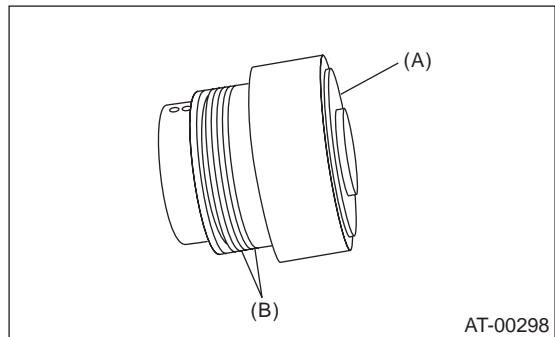
Separate the 2-4 brake piston and piston retainer.



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

4. ONE-WAY CLUTCH INNER RACE

1) Remove the seal ring.

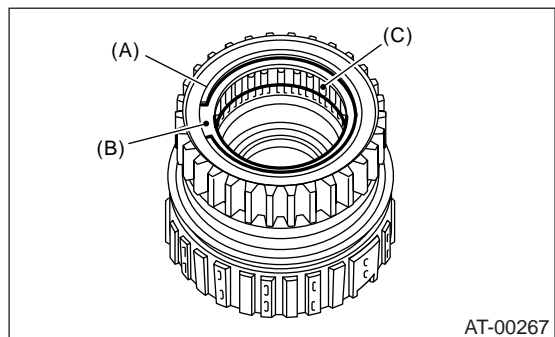


- (A) One-way clutch inner race
- (B) Seal ring

2) Remove the needle bearing using ST. ST 398527700 PULLER ASSY

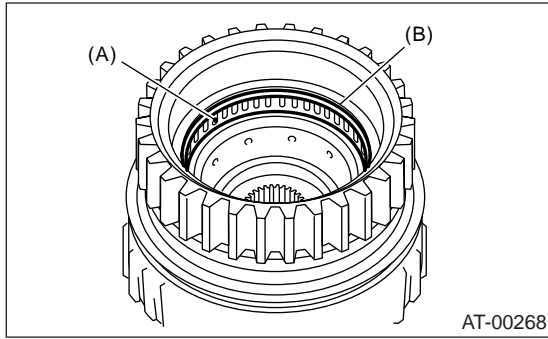
5. ONE-WAY CLUTCH OUTER RACE

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



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

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



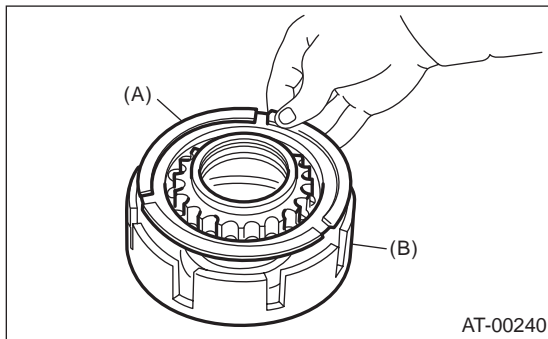
- (A) Needle bearing
- (B) Snap ring

D: ASSEMBLY

1. HIGH CLUTCH AND REVERSE CLUTCH

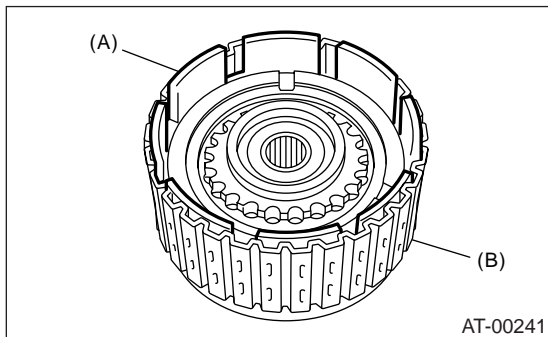
1) Install the seal ring and lip seal to the high clutch piston and reverse clutch piston.

2) Install the high clutch piston to reverse clutch piston.



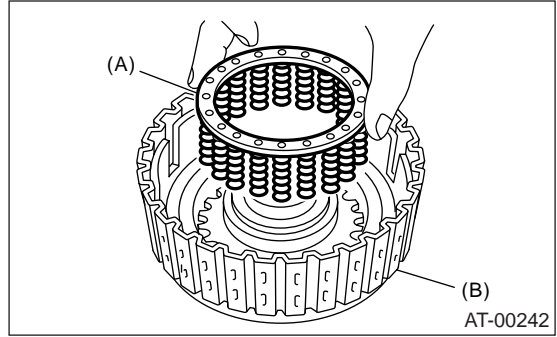
- (A) High clutch piston
- (B) Reverse clutch piston

3) Install the reverse clutch piston to high clutch drum. Align the groove on reverse clutch piston with the groove on high clutch drum during installation.



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

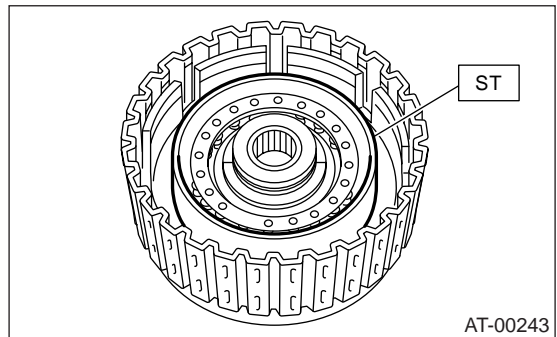
4) Install the spring retainer to high clutch piston.



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

5) Install the ST to high clutch piston.

ST 498437000 HIGH CLUTCH PISTON GUIDE



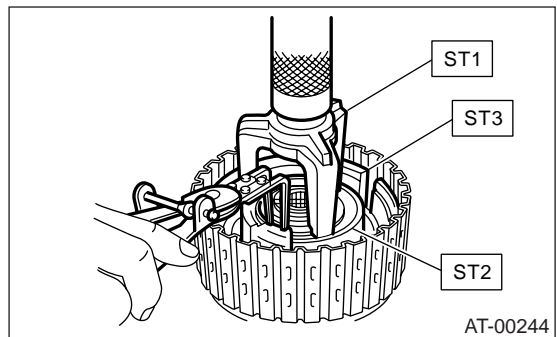
6) Install the cover to high clutch piston without folding the high clutch piston seal.

7) Install the snap ring using ST1 and ST2.

ST1 398673600 COMPRESSOR

ST2 498627100 SEAT

ST3 498437000 HIGH CLUTCH PISTON GUIDE



8) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
9) Set the micro gauge to clutch, and read its scale.

NOTE:

The value, which is read in the gauge at this time, is zero point.

10) Scale and record the weight "Z" of a flat board which will be put on plates.

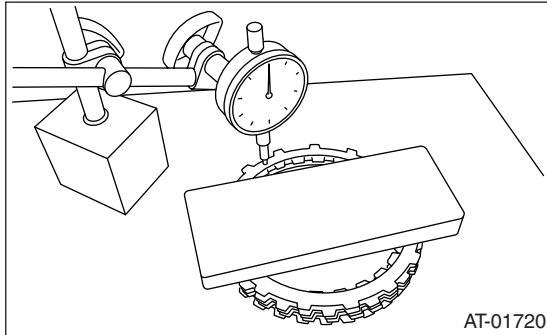
AT Main Case

AUTOMATIC TRANSMISSION

NOTE:

- Use a stiff flat board which does not bend against load.
- Use a flat board of its weight less than 250 N (25.5 kgf, 56.2 lb).

11) Put the flat board on retaining plate.



12) Using the following formula, calculate "N" indicated on the push/pull gauge.

$$N = 250 \text{ N (25.5 kgf, 56.2 lb)} - Z$$

N: Value indicated on push/pull gauge

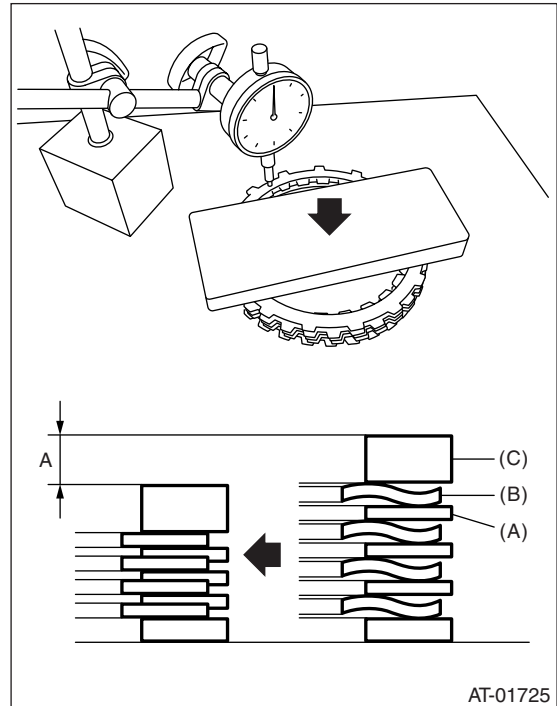
250 N (25.5 kgf, 56.2 lb): Load applied to clutch plate

Z: Flat board weight

13) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height A. Make more than three measurements at even distance and take the average value.

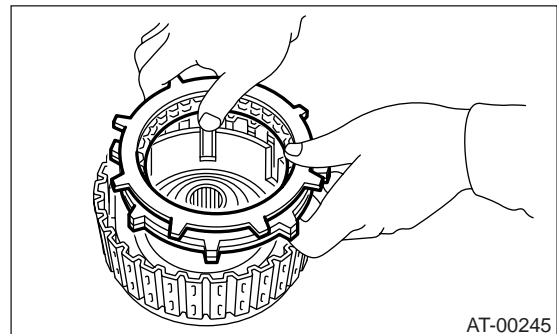
NOTE:

If three points, measure the height every 120°. If four points, measure the height every 90°.



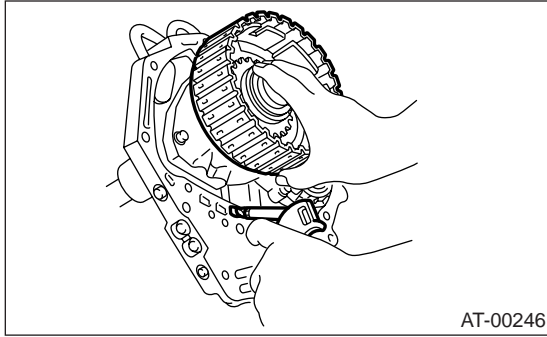
- (A) Driven plate
- (B) Drive plate
- (C) Retaining plate

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

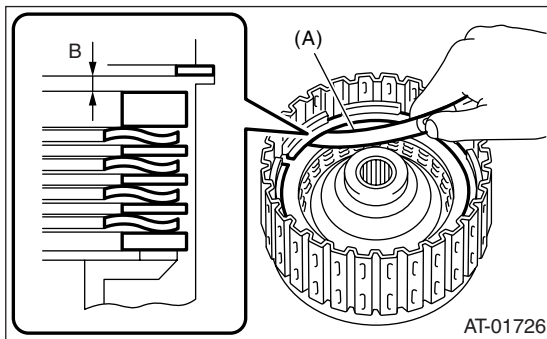


15) Install the snap ring to high clutch drum.

16) Apply compressed air intermittently to check for operation.



17) Measure and record the clearance B between the retaining plate and snap ring. (High clutch)
At this time, do not press down the retaining plate.



(A) Thickness gauge

18) Piston stroke calculation

Select the retaining plate within the specification by calculating with A and B dimensions which have been recorded before. If the calculated value exceeds the usage limit, replace the drive plate with a new one and adjust it within the specification.

$$T = A + B$$

T: Piston stroke

A: Collapse amount of drive plate

B: Clearance between retaining plate and snap ring

Initial standard:

2.0 — 2.3 mm (0.079 — 0.091 in)

Limit thickness:

2.6 mm (0.102 in)

High clutch retaining plate	
Part number	Thickness mm (in)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)
31567AA710	5.5 (0.217)
31567AA720	5.6 (0.220)
31567AA730	5.7 (0.224)
31567AA740	5.8 (0.228)

19) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.

20) Set the micro gauge to clutch, and read its scale.

NOTE:

The value, which is read in the gauge at this time, is zero point.

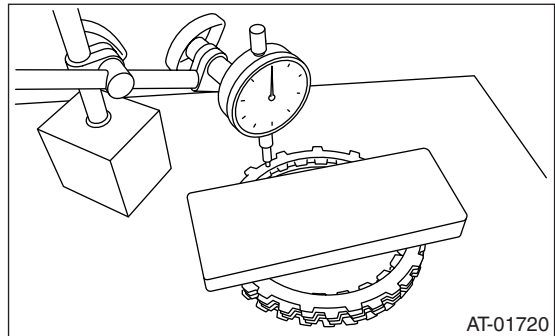
21) Scale and record the weight "Z" of a flat board which will be put on plates.

NOTE:

- Use a stiff flat board which does not bend against load.

- Use a flat board of its weight less than 150 N (15.3 kgf, 33.7 lb).

22) Put the flat board on retaining plate.



23) Using the following formula, calculate "N" indicated on the push/pull gauge.

$$N = 150 \text{ N (15.3 kgf, 33.7 lb)} - Z$$

N: Value indicated on push/pull gauge

150 N (15.3 kgf, 33.7 lb): Load applied to clutch plate

Z: Flat board weight

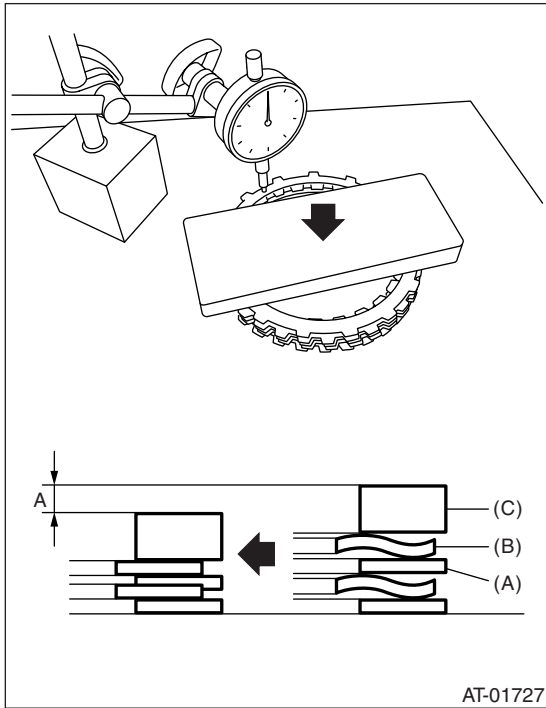
24) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height A. Make more than three measurements at even distance and take the average value.

AT Main Case

AUTOMATIC TRANSMISSION

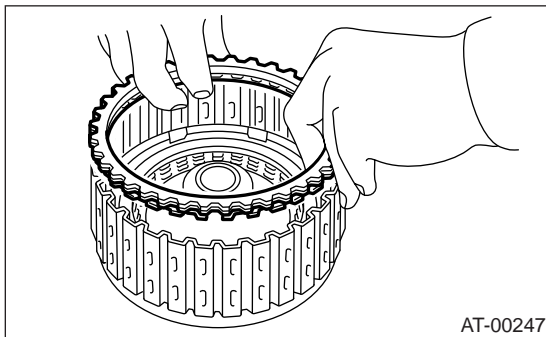
NOTE:

If three points, measure the height every 120°. If four points, measure the height every 90°.

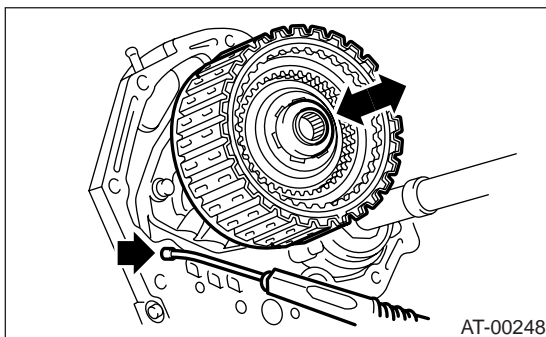


- (A) Driven plate
- (B) Drive plate
- (C) Retaining plate

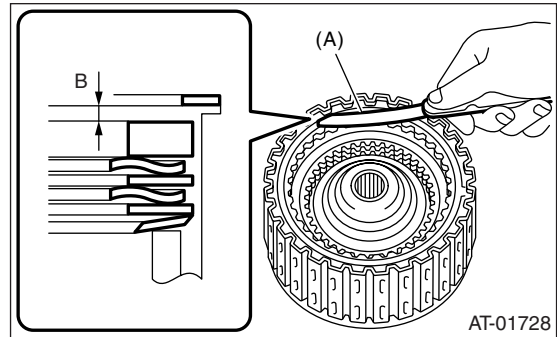
25) Install the driven plate, drive plate, retaining plate and snap ring.



26) Apply compressed air intermittently to check for operation.



27) Measure and record the clearance B between the retaining plate and snap ring. (Reverse clutch) At this time, do not press down the retaining plate.



(A) Thickness gauge

28) Piston stroke calculation

Select the retaining plate within the specification by calculating with A and B dimensions which have been recorded before. If the calculated value exceeds the usage limit, replace the drive plate with a new one and adjust it within the specification.

$$T = A + B$$

T: Piston stroke

A: Collapse amount of drive plate

B: Clearance between retaining plate and snap ring

Initial standard:

1.1 — 1.4 mm (0.043 — 0.055 in)

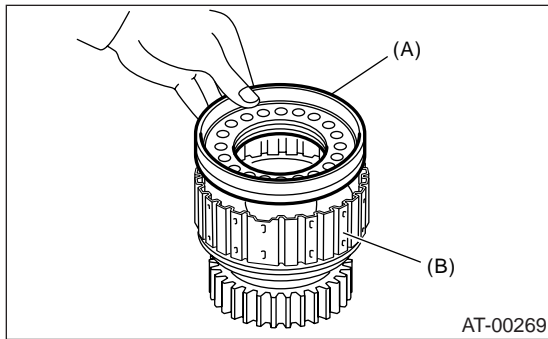
Limit thickness:

1.6 mm (0.063 in)

Reverse clutch retaining plate	
Part number	Thickness mm (in)
31567AA910	4.0 (0.157)
31567AA920	4.2 (0.165)
31567AA930	4.4 (0.173)
31567AA940	4.6 (0.181)
31567AA950	4.8 (0.189)
31567AA960	5.0 (0.197)
31567AA970	5.2 (0.205)
31567AA980	5.4 (0.213)

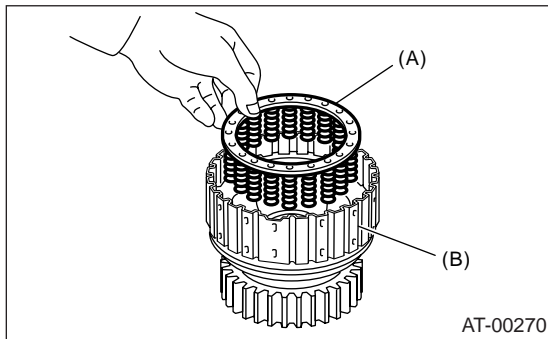
2. PLANETARY GEAR AND LOW CLUTCH

- 1) Apply ATF to D-ring and install it to low clutch piston.
- 2) Install the low clutch piston to low clutch drum.



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

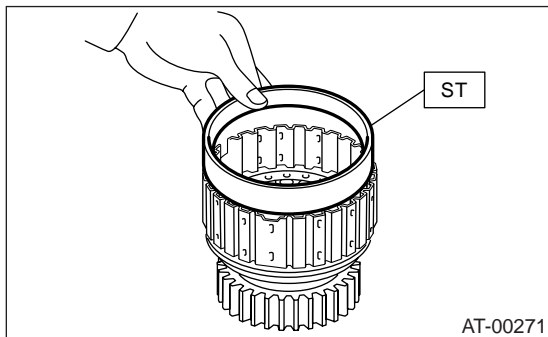
- 3) Install the spring retainer to low clutch piston.



(A) Spring retainer
(B) Low clutch drum

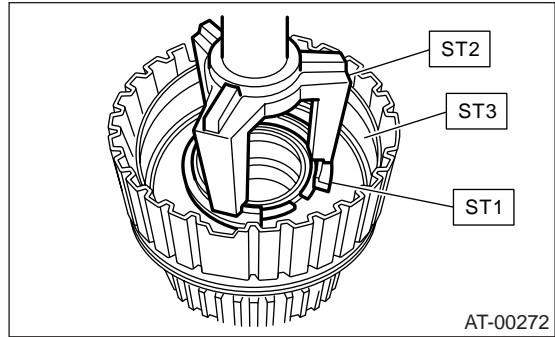
- 4) Install the ST to low clutch drum.

ST 498437100 LOW CLUTCH PISTON GUIDE

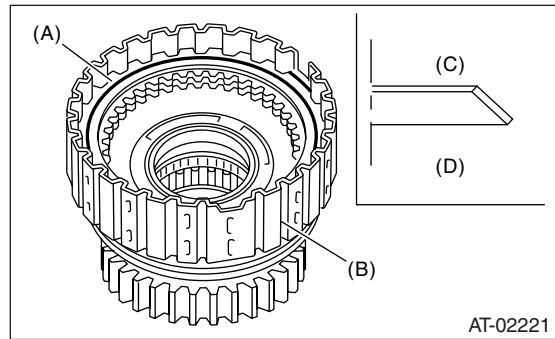


- 5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring. At this time, be careful not to fold the cover seal during installation.

ST1 498627100 SEAT
ST2 398673600 COMPRESSOR
ST3 498437100 LOW CLUTCH PISTON GUIDE



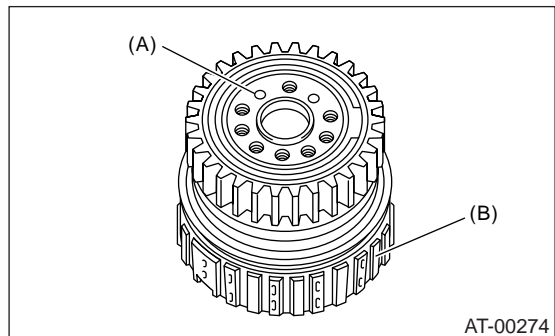
- 6) Install the dish plate, driven plate and retaining plate, and then secure them with snap ring.



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

- 7) Check the low clutch for operation.

- (1) Remove the one-way clutch. <Ref. to 4AT-119, REMOVAL, AT Main Case.>
- (2) Set the one-way clutch inner race, and apply compressed air for checking.



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

- 8) Check the low clutch clearance.

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

AT Main Case

AUTOMATIC TRANSMISSION

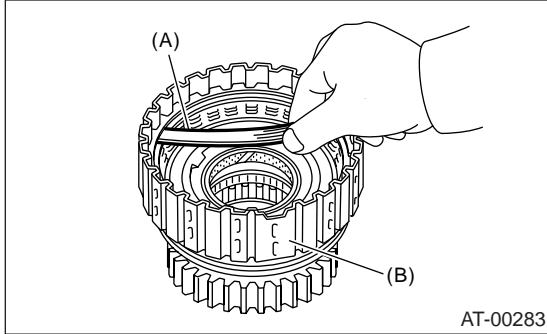
(2) Check the clearance between retaining plate and low clutch operation.

Initial standard:

0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:

1.5 mm (0.059 in)

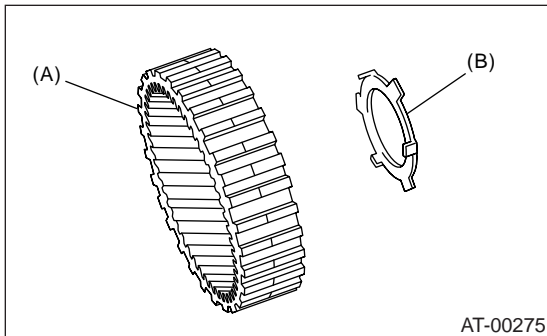


- (A) Thickness gauge
- (B) Low clutch drum

If the clearance is out of specification, select a suitable retaining plate.

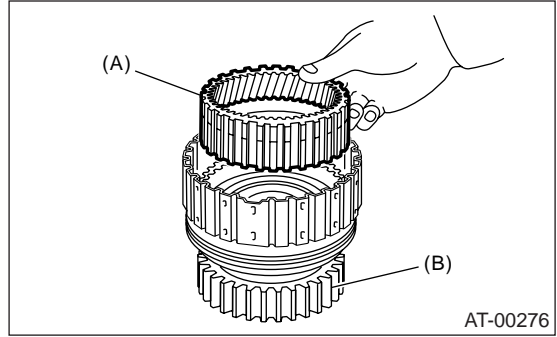
Retaining plate	
Part number	Thickness mm (in)
31567AB050	3.8 (0.150)
31567AB060	4.0 (0.157)
31567AB070	4.2 (0.165)
31567AB080	4.4 (0.173)
31567AB090	4.6 (0.181)

9) Install the washer to rear internal gear.



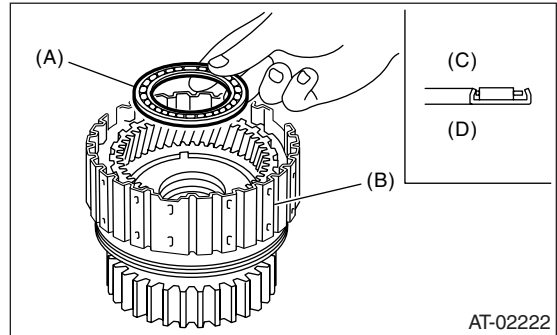
- (A) Rear internal gear
- (B) Washer

10) Install the rear internal gear.



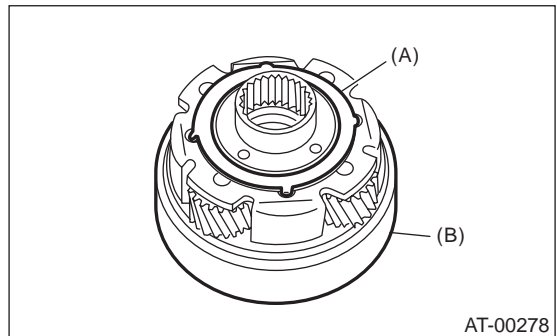
- (A) Rear internal gear
- (B) Low clutch drum

11) Install the thrust needle bearing in correct direction.



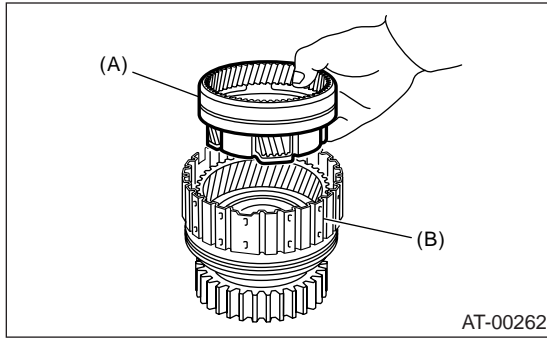
- (A) Thrust needle bearing
- (B) Low clutch drum
- (C) Rear planetary carrier side
- (D) Low clutch piston side

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



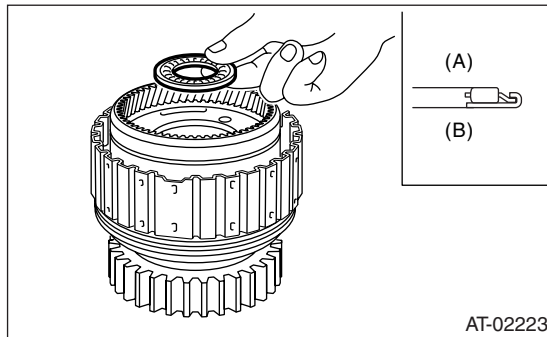
- (A) Washer
- (B) Rear planetary carrier

13) Install the rear planetary carrier to low clutch drum.



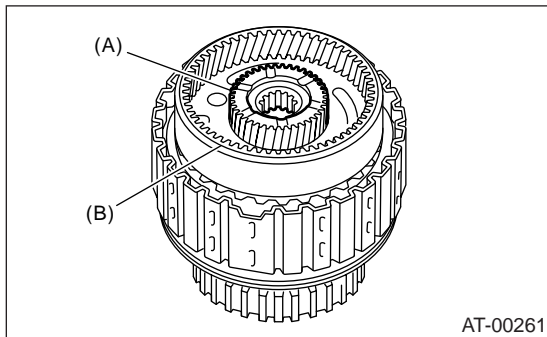
- (A) Rear planetary carrier
- (B) Low clutch drum

14) Install the thrust needle bearing in correct direction.



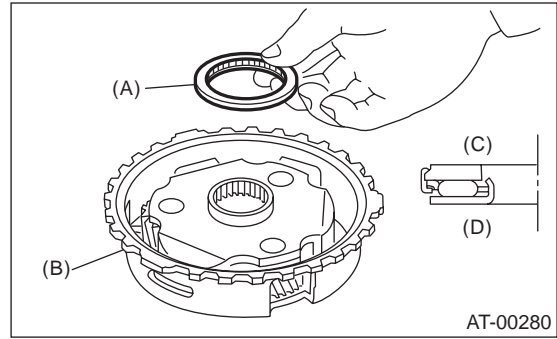
- (A) Rear sun gear side
- (B) Rear planetary carrier side

15) Install the rear sun gear in proper direction.



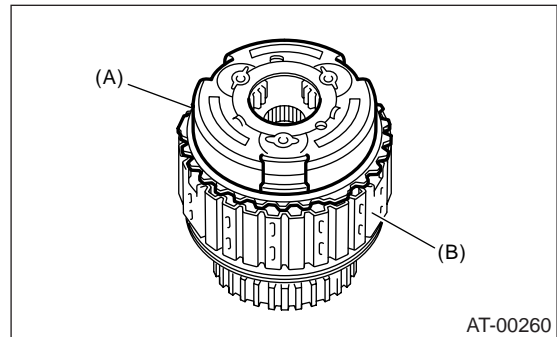
- (A) Rear sun gear
- (B) Rear planetary carrier

16) Install the thrust needle bearing in proper direction.



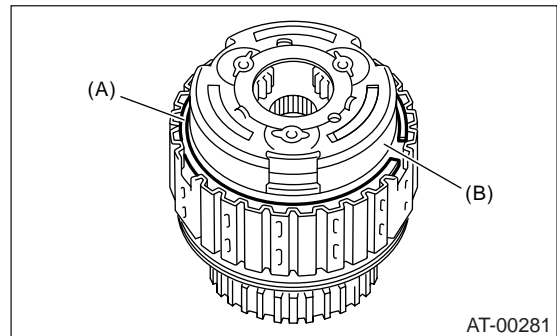
- (A) Thrust needle bearing
- (B) Front planetary carrier
- (C) Rear sun gear side
- (D) Front planetary carrier side

17) Install the front planetary carrier to low clutch drum.



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

18) Install the snap ring to low clutch drum.

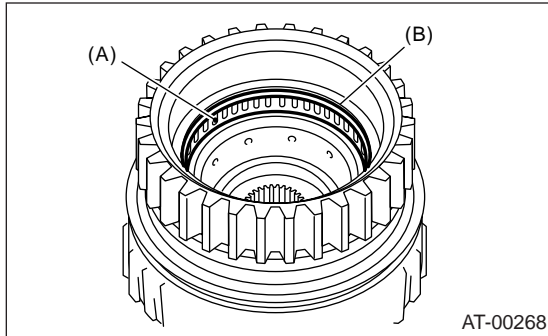


- (A) Snap ring
- (B) Front planetary carrier

AT Main Case

AUTOMATIC TRANSMISSION

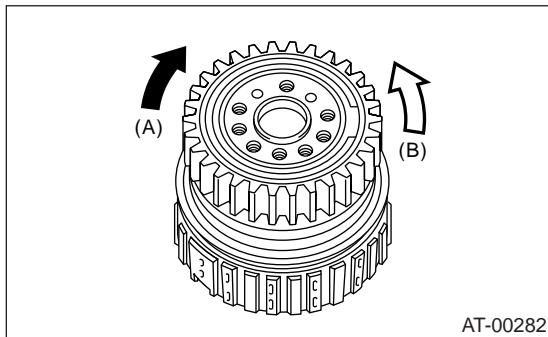
19) Install the needle bearing, and then secure with the snap ring.



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

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

21) Set the inner race. Make sure that the clutch locks in the clockwise direction and rotates freely in the counterclockwise direction.

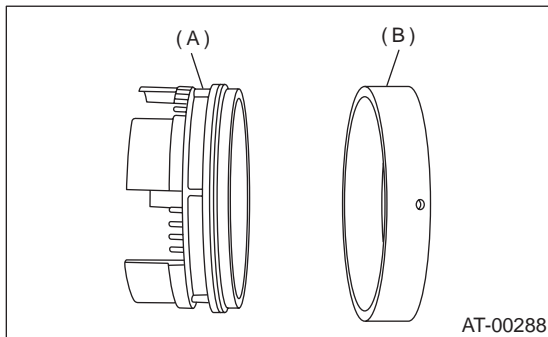


- (A) Locked
- (B) Free

3. 2-4 BRAKE

1) Apply ATF to D-ring, and install it to 2-4 brake piston.

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

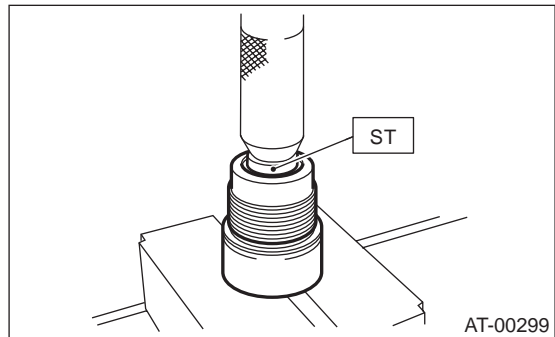


- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

4. ONE-WAY CLUTCH INNER RACE

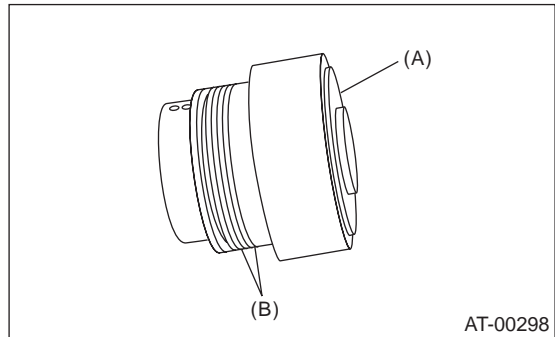
1) Install the needle bearing to inner race using ST and press.

ST 398497701 SEAT



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

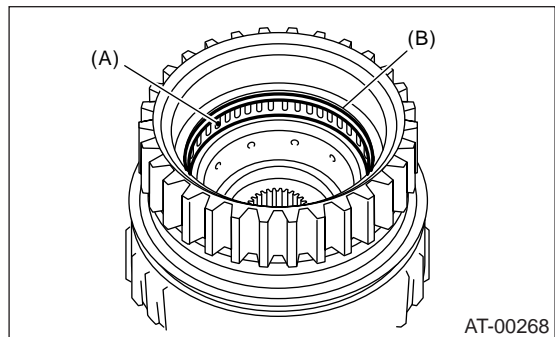
3) Install two seal rings to one-way clutch inner race.



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

5. ONE-WAY CLUTCH OUTER RACE

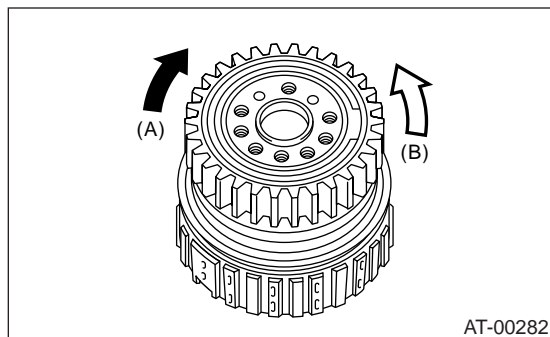
1) Install the needle bearing, and then secure with the snap ring.



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

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

3) Set the inner race. Make sure that the clutch locks in the clockwise direction and rotates freely in the counterclockwise direction.



(A) Locked

(B) Free

E: INSPECTION

1. HIGH CLUTCH AND REVERSE CLUTCH

Check the following items:

- Drive plate facing for wear and damage
- Driven plate for discoloration (burned color)
- 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 the total end play. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

2. PLANETARY GEAR AND LOW CLUTCH

Check the following items:

- Drive plate facing for wear and damage
- Driven plate for discoloration (burned color)
- Snap ring for wear, return spring for setting and breakage, and spring retainer for deformation
- Lip seal and D-ring for damage
- Piston check ball for operation
- Measure the total end play and adjust it within specifications. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

3. 2-4 BRAKE

Check the following items:

- Drive plate facing for wear and damage
- Driven plate for discoloration (burned color)
- Snap ring for wear and spring retainer for deformation
- Lip seal and D-ring for damage
- Measure the total end play and adjust it within specifications. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

4. ONE-WAY CLUTCH

- Make sure the snap ring is not worn and the seal rings are not deformed.
- Measure the total end play and adjust it within specifications. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

5. LOW & REVERSE BRAKE

Check the following items:

- Drive plate facing for wear and damage
- Driven plate for discoloration (burned color)
- Snap ring for wear and spring retainer for deformation

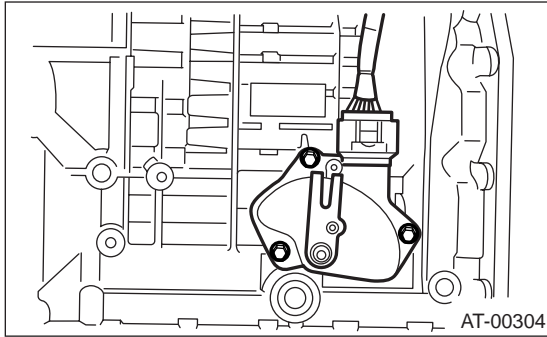
Transmission Control Device

AUTOMATIC TRANSMISSION

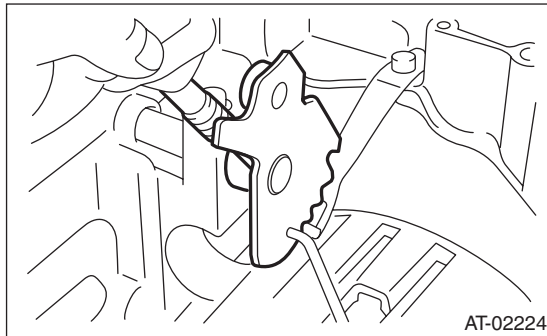
41. Transmission Control Device

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.
- 4) Lift-up the lever on the rear side of transmission harness connector, and then remove it from stay.
- 5) Disconnect the air breather hose. <Ref. to 4AT-78, REMOVAL, Air Breather Hose.>
- 6) Remove the inhibitor switch connector from stay.
- 7) Wrap vinyl tape around the nipple attached to the air breather hose.
- 8) Remove the pitching stopper bracket.
- 9) Remove the inhibitor switch.



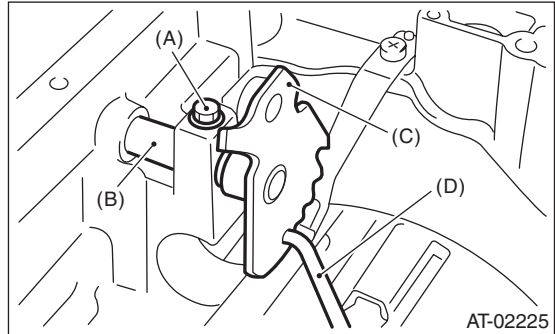
- 10) Remove the control valve body assembly. <Ref. to 4AT-60, REMOVAL, Control Valve Body.>
- 11) Pull out the straight pin of manual plate.



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

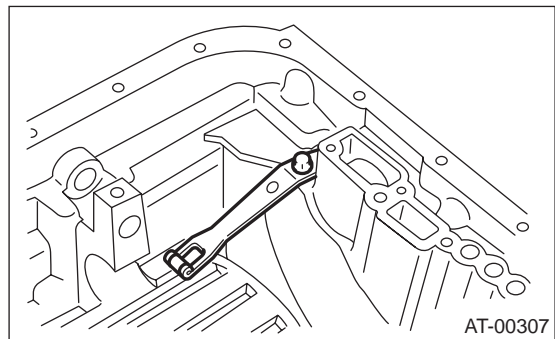
NOTE:

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



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

- 13) Remove the detention spring.

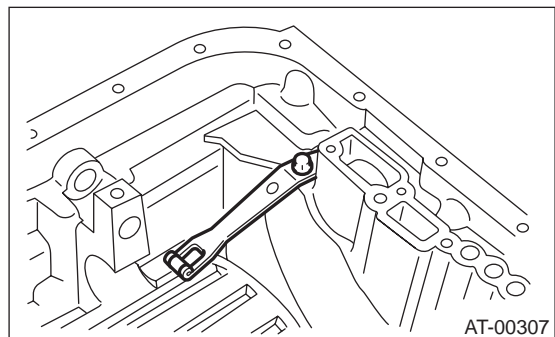


B: INSTALLATION

- 1) Install the detention spring to transmission case.

Tightening torque:

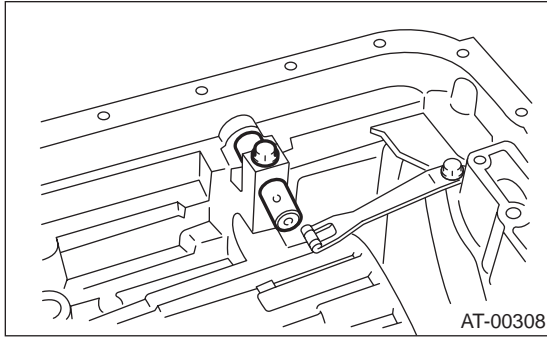
6 N·m (0.6 kgf-m, 4.3 ft-lb)



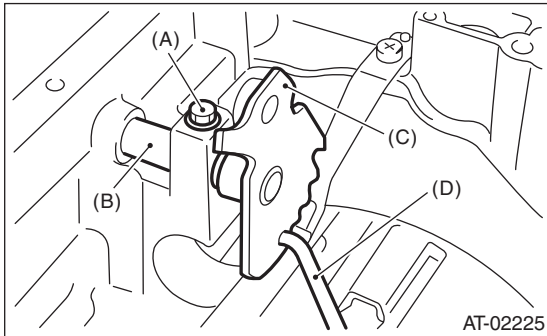
- 2) Insert the select lever, and then tighten the bolt.

Tightening torque:

6 N·m (0.6 kgf·m, 4.3 ft·lb)

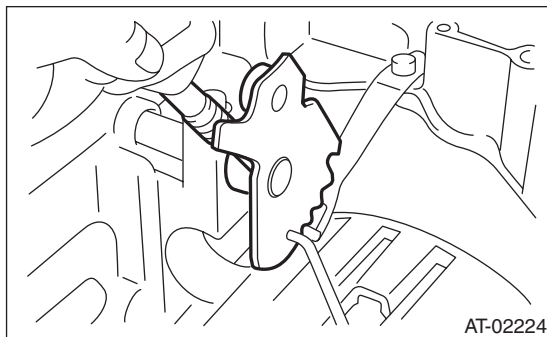


3) Insert the manual plate and parking rod.



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

4) Insert a new straight pin to manual plate.



5) Install the oil pan and control valve assembly. <Ref. to 4AT-60, INSTALLATION, Control Valve Body.>

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

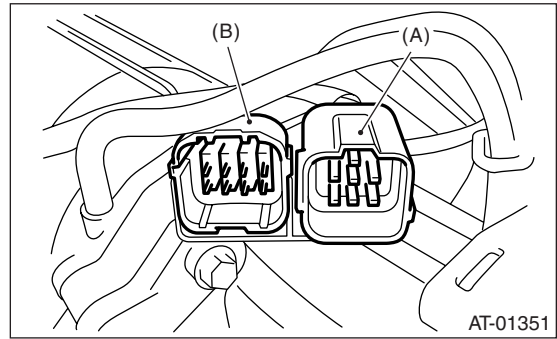
7) Install the pitching stopper bracket.

Tightening torque:

41 N·m (4.2 kgf·m, 30.4 ft·lb)

8) Install and adjust the inhibitor switch. <Ref. to 4AT-52, Inhibitor Switch.>

9) Insert the inhibitor switch and transmission connector to the stay.



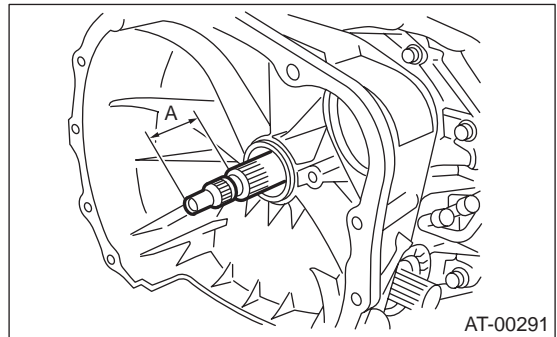
- (A) Transmission connector
- (B) Inhibitor switch connector

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

11) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

Normal protrusion A:

50 — 55 mm (1.97 — 2.17 in)



12) Install the torque converter clutch assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>

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

C: INSPECTION

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

