

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.

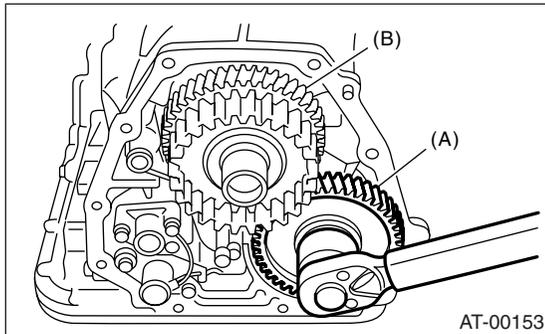
All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

CONTROL SYSTEM**CS****AUTOMATIC TRANSMISSION****4AT****AUTOMATIC TRANSMISSION
(DIAGNOSTIC)****4AT(H4SO)****AUTOMATIC TRANSMISSION
(DIAGNOSTIC)****4AT(H4DOTC)****AUTOMATIC TRANSMISSION
(DIAGNOSTIC)****4AT(H4DOTC 2.5)****MANUAL TRANSMISSION AND
DIFFERENTIAL****5MT****CLUTCH SYSTEM****CL**

31.Reduction Driven Gear

A: REMOVAL

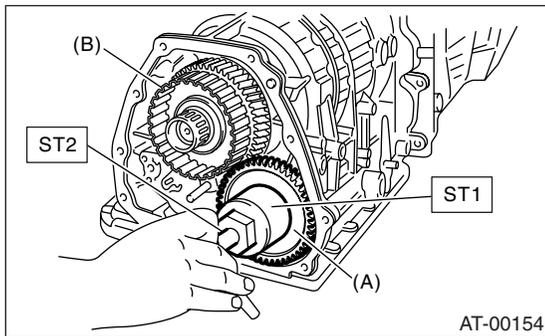
- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor, and then separate the extension case from transmission case. <Ref. to 4AT-90, REMOVAL, Extension Case.>
- 3) Set the range select lever to "P" range.
- 4) Remove the caulking part, and then remove the lock nut.



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

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

ST1 499737000 PULLER
ST2 899524100 PULLER SET



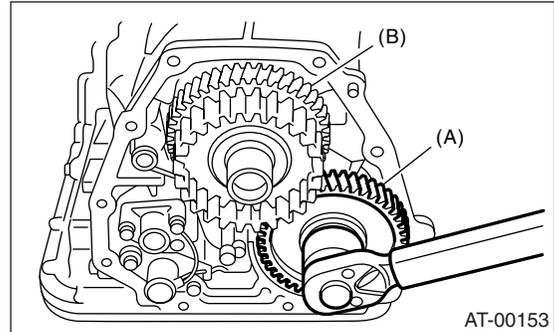
- (A) Reduction driven gear ASSY
- (B) Reduction drive gear ASSY

B: INSTALLATION

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

Tightening torque:

100 N·m (10.2 kgf-m, 73.8 ft-lb)

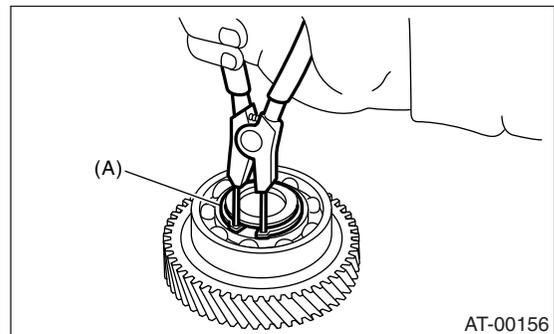


- (A) Reduction driven gear ASSY
- (B) Reduction drive gear ASSY

- 3) After tightening, stake the lock nut securely.
- 4) Combine the transmission case with the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-90, INSTALLATION, Extension Case.>
- 5) Install the transmission assembly into the vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

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



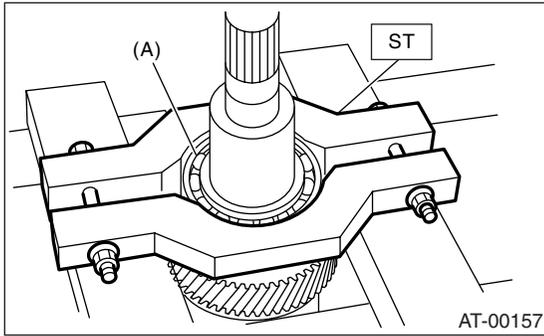
- (A) Snap ring

Reduction Driven Gear

AUTOMATIC TRANSMISSION

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

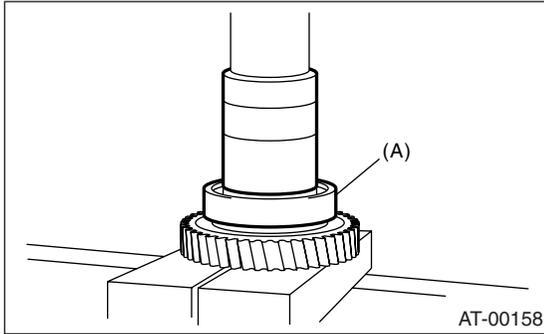
ST 498077600 REMOVER



(A) Ball bearing

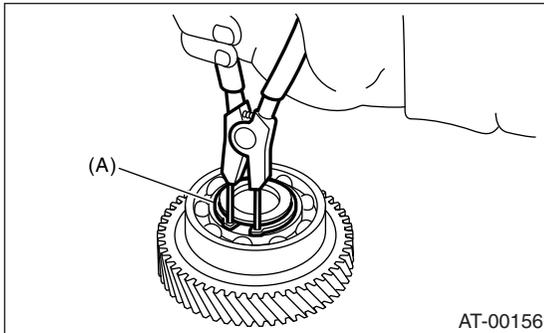
D: ASSEMBLY

1) Install the new ball bearing to reduction driven gear using press.



(A) Ball bearing

2) Install the snap ring to reduction driven gear.



(A) Snap ring

E: INSPECTION

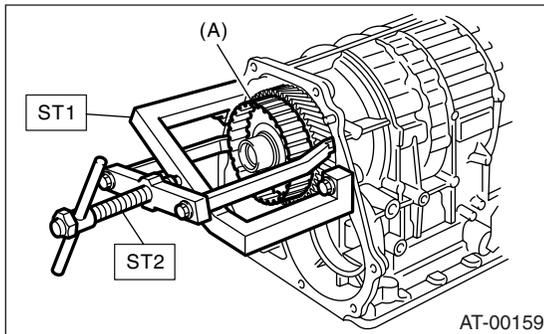
Make sure the ball bearing and gear is not deformed or damaged.

32.Reduction Drive Gear

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor, and then separate the extension case from transmission case. <Ref. to 4AT-90, REMOVAL, Extension Case.>
- 3) Remove the reduction driven gear. <Ref. to 4AT-97, REMOVAL, Reduction Driven Gear.>
- 4) Using ST, extract the reduction drive gear assembly.

ST1 499737100 PULLER SET
 ST2 899524100 PULLER SET



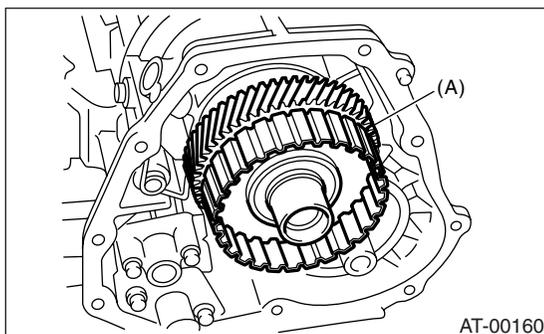
(A) Reduction drive gear ASSY

B: INSTALLATION

- 1) Install the reduction drive gear assembly.

NOTE:

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



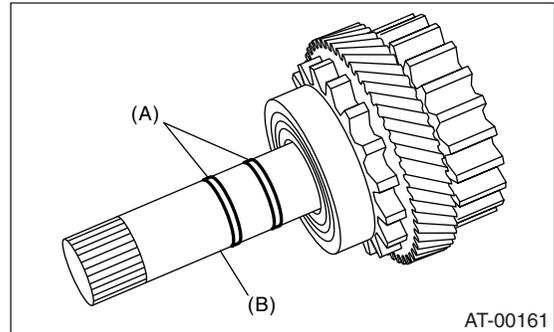
(A) Reduction drive gear ASSY

- 2) Install the reduction driven gear. <Ref. to 4AT-97, INSTALLATION, Reduction Driven Gear.>
- 3) Combine the transmission case with the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-90, INSTALLATION, Extension Case.>

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

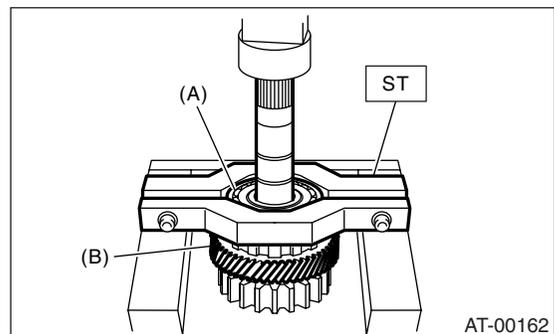
C: DISASSEMBLY

- 1) Take out the seal ring.



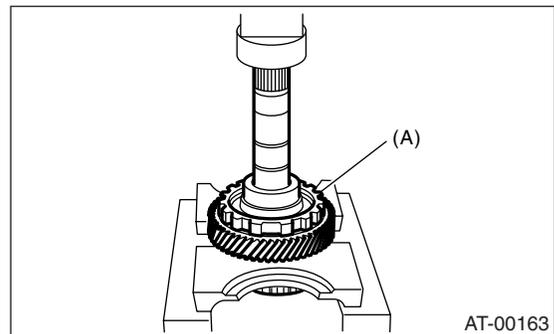
(A) Seal ring
 (B) Reduction drive shaft

- 2) Remove ball bearing using ST.
- ST 498077600 REMOVER



(A) Ball bearing
 (B) Reduction drive gear

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



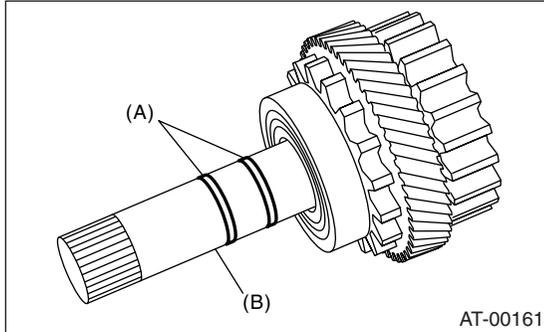
(A) Reduction drive gear

Reduction Drive Gear

AUTOMATIC TRANSMISSION

D: ASSEMBLY

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



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

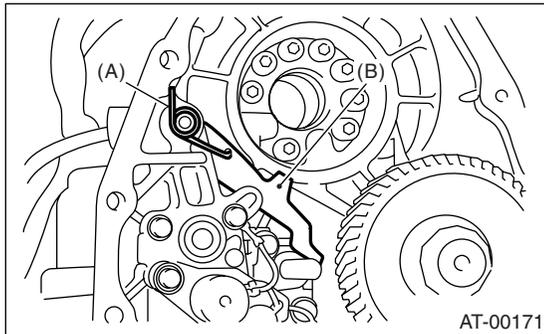
E: INSPECTION

- Rotate the bearing by hand, make sure it rotates smoothly.
- Make sure that each component is free of harmful gouges, cuts or dust.
- Measure the extension end play and adjust it to specification. <Ref. to 4AT-95, ADJUSTMENT, Transfer Clutch.>

33. Parking Pawl

A: REMOVAL

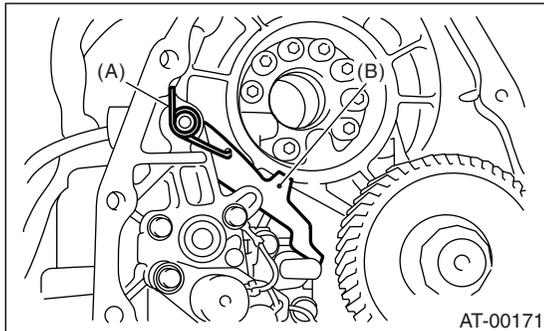
- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Remove the rear vehicle speed sensor, and then separate the extension case from transmission case. <Ref. to 4AT-90, REMOVAL, Extension Case.>
- 3) Remove the reduction drive gear. <Ref. to 4AT-99, 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-99, INSTALLATION, Reduction Drive Gear.>
- 3) Install the extension case and rear vehicle speed sensor. <Ref. to 4AT-90, 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.

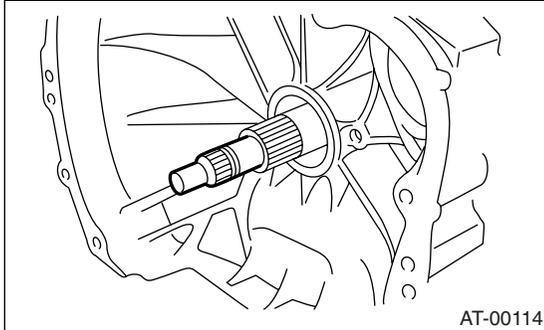
Torque Converter Clutch Case

AUTOMATIC TRANSMISSION

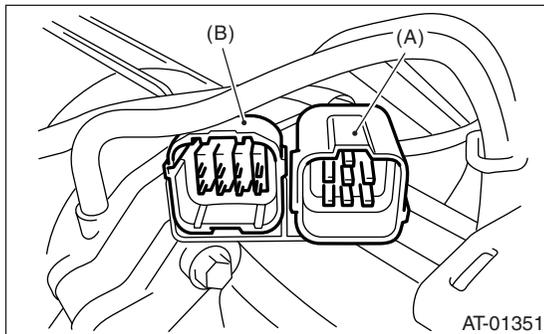
34. Torque Converter Clutch Case

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-89, 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.



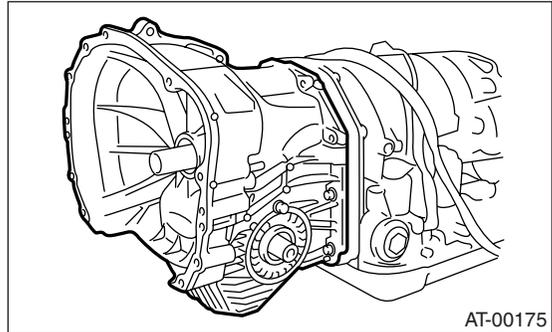
- (A) Transmission harness ASSY
- (B) Inhibitor switch harness

- 6) Remove the air breather hose. <Ref. to 4AT-87, REMOVAL, Air Breather Hose.>
- 7) Remove the ATF charger pipe. <Ref. to 4AT-88, REMOVAL, Oil Charger Pipe.>
- 8) Remove the ATF cooler inlet and outlet pipes. <Ref. to 4AT-79, REMOVAL, ATF Cooler Pipe and Hose.>

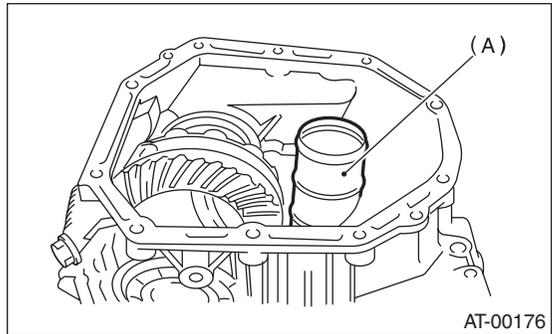
- 9) Remove the torque converter clutch case aligning bolt, and then separate the transmission case and torque converter clutch case by lightly tapping with plastic hammer.

CAUTION:

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



- 10) Remove the seal pipe.



- (A) Seal pipe

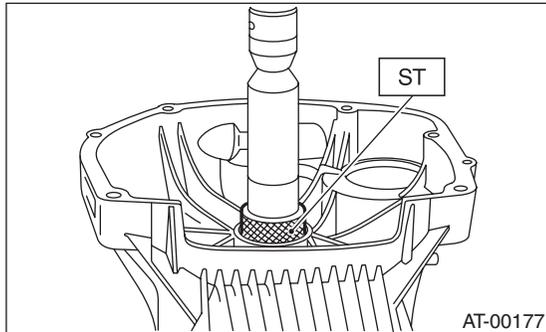
- 11) Remove the differential assembly. <Ref. to 4AT-117, REMOVAL, Front Differential.>
- 12) Remove the oil seal from torque converter clutch case.

B: INSTALLATION

1) Check the appearance of each component and clean them.

2) Press-fit the new oil seal to torque converter clutch case using ST.

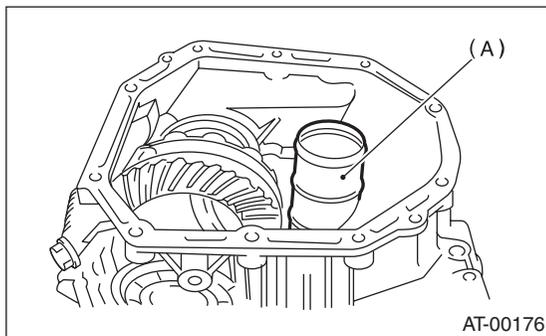
ST 398437700 DRIFT



3) Install the differential assembly to case. <Ref. to 4AT-117, INSTALLATION, Front Differential.>

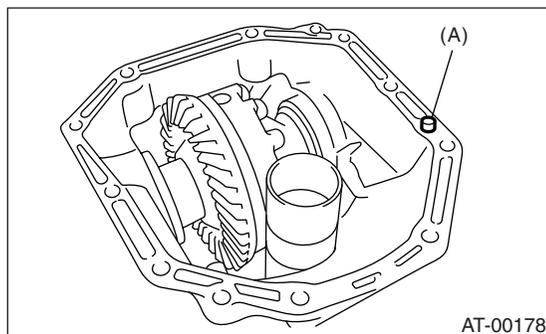
4) Install the left and right side retainers. <Ref. to 4AT-121, ADJUSTMENT, Front Differential.>

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



(A) Seal pipe

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

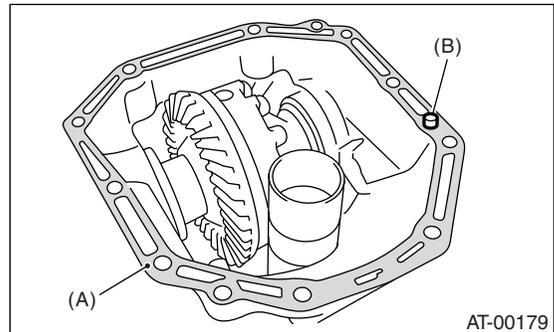


(A) Rubber seal

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

Liquid gasket:

THREE BOND 1215 (Part No. 004403007)



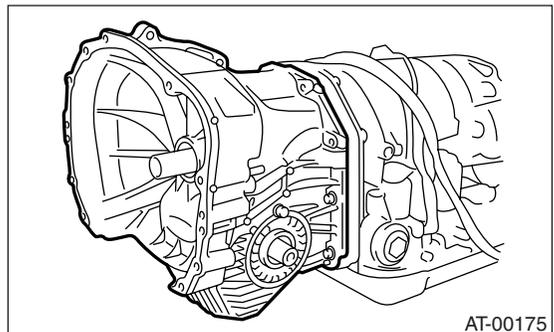
(A) THREE BOND 1215

(B) Rubber seal

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

Tightening torque:

41 N·m (4.2 kgf-m, 30.4 ft-lb)



AT-00175

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

10) Install the air breather hose. <Ref. to 4AT-87, INSTALLATION, Air Breather Hose.>

11) Install the ATF cooler pipe. <Ref. to 4AT-81, INSTALLATION, ATF Cooler Pipe and Hose.>

12) Install the ATF charger pipe with O-ring. <Ref. to 4AT-88, INSTALLATION, Oil Charger Pipe.>

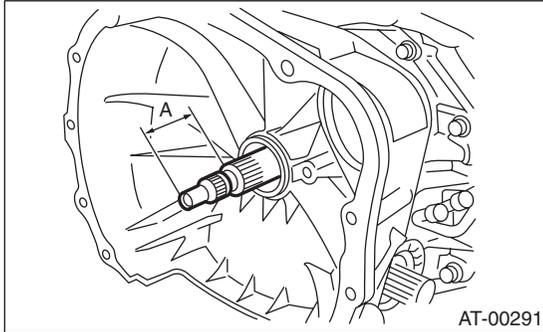
Torque Converter Clutch Case

AUTOMATIC TRANSMISSION

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-89, INSTALLATION, Torque Converter Clutch Assembly.>

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

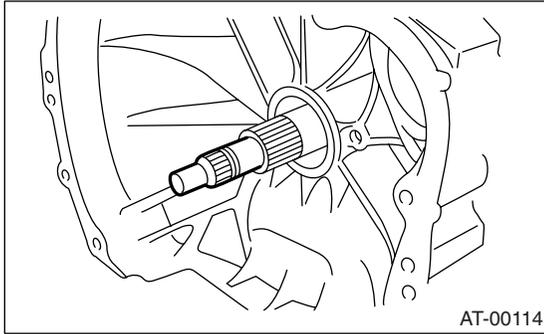
C: INSPECTION

Measure the backlash, and then adjust it within specification. <Ref. to 4AT-114, ADJUSTMENT, Drive Pinion Shaft Assembly.>

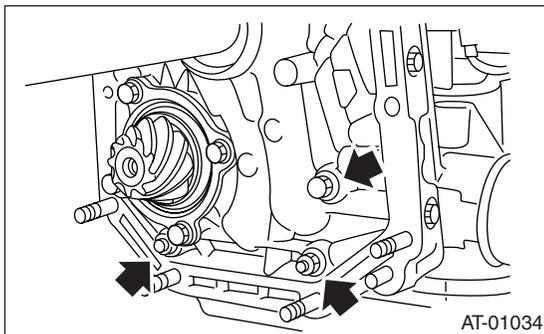
35.Oil Pump Housing

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-89, 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) Remove the ATF charger pipe. <Ref. to 4AT-88, REMOVAL, Oil Charger Pipe.>
- 7) Remove the ATF cooler inlet and outlet pipes. <Ref. to 4AT-79, REMOVAL, ATF Cooler Pipe and Hose.>
- 8) Separate the torque converter clutch case and transmission case part. <Ref. to 4AT-102, REMOVAL, Torque Converter Clutch Case.>
- 9) Separate the transmission case and extension case part. <Ref. to 4AT-90, REMOVAL, Extension Case.>
- 10) Remove the reduction drive gear. <Ref. to 4AT-99, REMOVAL, Reduction Drive Gear.>
- 11) Remove the reduction driven gear. <Ref. to 4AT-97, REMOVAL, Reduction Driven Gear.>
- 12) Loosen the oil pump housing mounting bolts.



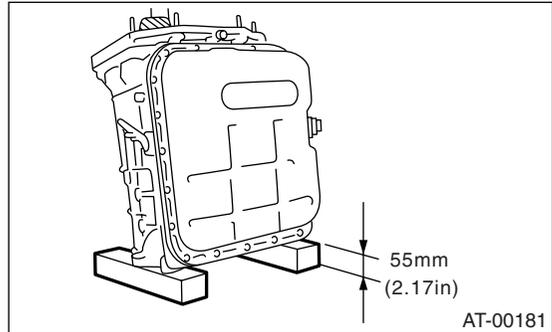
- 13) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

CAUTION:

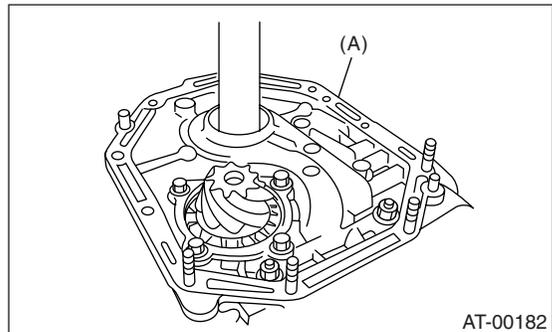
Be careful not to scratch the rear mating surface of transmission case.

NOTE:

Check the height of wooden blocks to avoid damaging the protrudes that on the mating surface of parking rod and drive pinion.



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



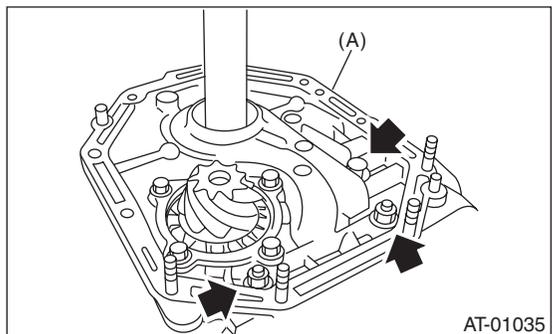
(A) Oil pump housing

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)

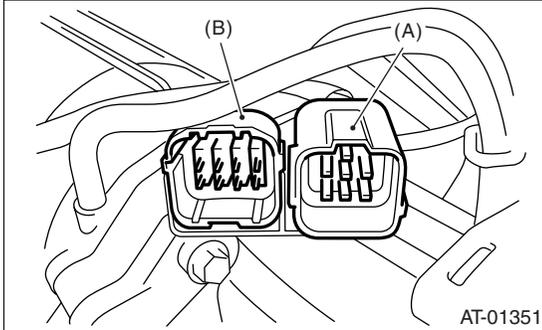


(A) Oil pump housing

Oil Pump Housing

AUTOMATIC TRANSMISSION

- 2) Install the torque converter clutch case to transmission case. <Ref. to 4AT-89, INSTALLATION, Torque Converter Clutch Assembly.>
- 3) Install the reduction driven gear. <Ref. to 4AT-97, INSTALLATION, Reduction Driven Gear.>
- 4) Install the reduction drive gear. <Ref. to 4AT-99, INSTALLATION, Reduction Drive Gear.>
- 5) Align the transmission case and extension case. <Ref. to 4AT-90, INSTALLATION, Extension Case.>
- 6) Insert the inhibitor switch and transmission connector to the stay.

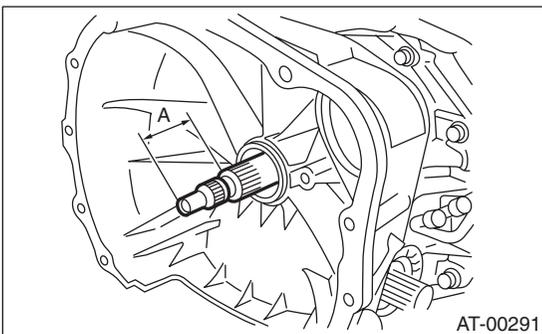


- (A) Transmission harness ASSY
- (B) Inhibitor switch harness

- 7) Install the ATF cooler pipe. <Ref. to 4AT-81, INSTALLATION, ATF Cooler Pipe and Hose.>
- 8) Install the ATF charger pipe with O-ring. <Ref. to 4AT-88, INSTALLATION, Oil Charger 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)

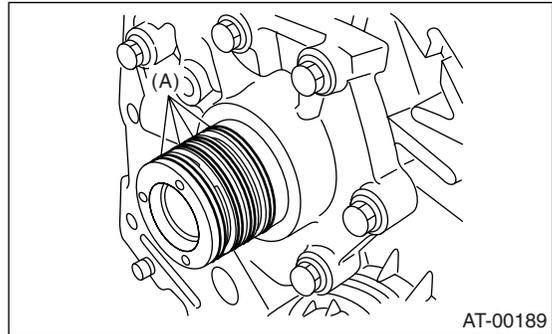


- 10) Install the torque converter clutch assembly. <Ref. to 4AT-89, INSTALLATION, Torque Converter Clutch Assembly.>
- 11) Install the transmission assembly into the vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

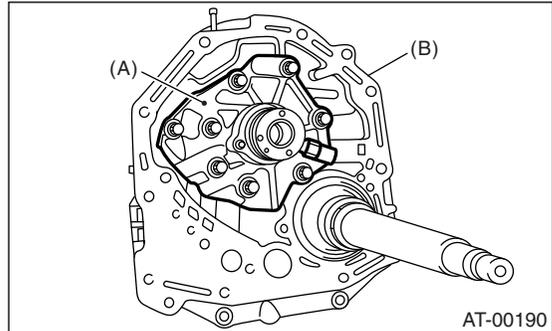
1. OIL PUMP COVER

- 1) Remove four seal rings.



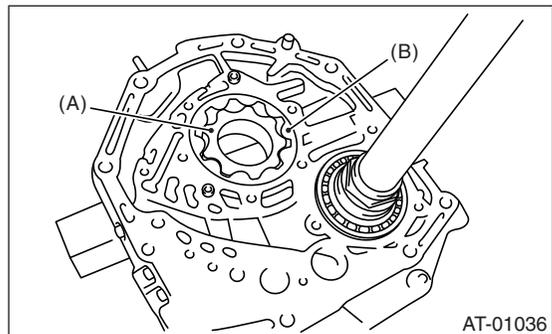
- (A) Seal ring

- 2) Remove the installing bolt, and then remove the cover by lightly tapping the end of starter shaft.



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

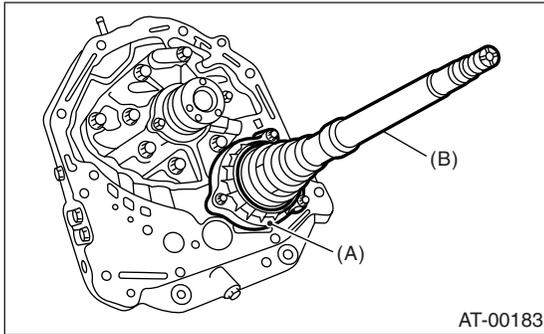
- 3) Remove the oil pump inner and outer rotor.



- (A) Oil pump inner rotor
- (B) Oil pump outer rotor

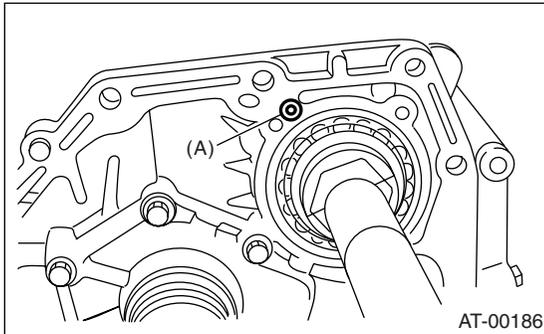
2. OIL SEAL RETAINER

1) Remove the oil seal retainer.



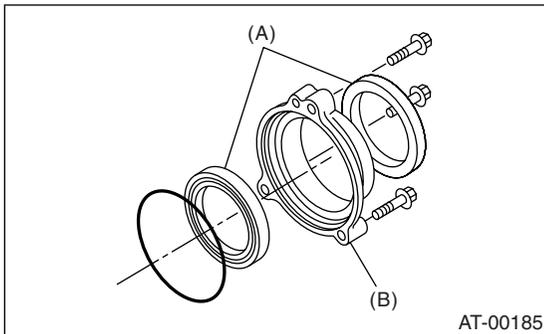
- (A) Oil seal retainer
- (B) Drive pinion shaft

2) Remove the O-ring.



- (A) O-ring

3) Remove the oil seal from oil seal retainer.

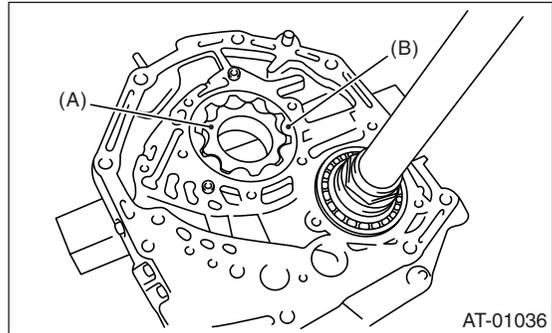


- (A) Oil seal
- (B) Oil seal retainer

D: ASSEMBLY

1. OIL PUMP COVER

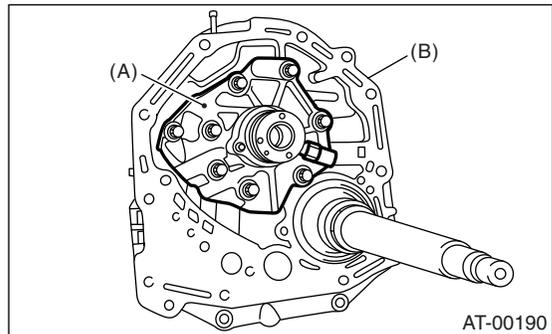
1) Install the oil pump rotor assembly to oil pump housing.



- (A) Oil pump inner rotor
- (B) Oil pump 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.

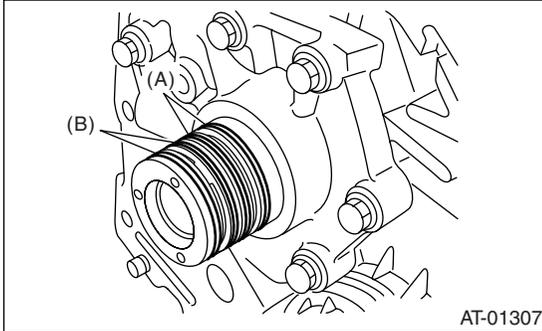
Oil Pump Housing

AUTOMATIC TRANSMISSION

4) Install the oil seal retainer and new seal rings. After installing, adjust the tooth contact and backlash of drive pinion. <Ref. to 4AT-109, ADJUSTMENT, Oil Pump Housing.>

CAUTION:

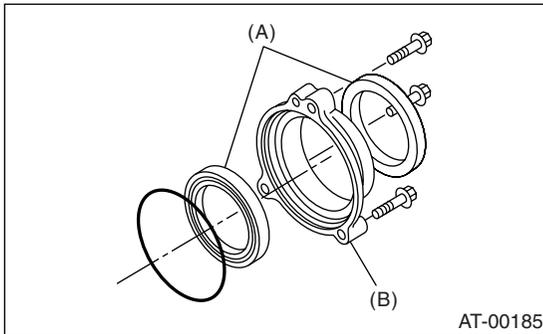
There are two kinds of seal rings and those are identified by color. Be sure to install proper positions with referring figure.



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

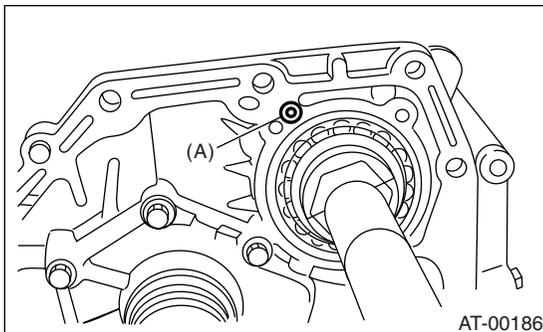
2. OIL SEAL RETAINER

1) Install two new oil seals to oil seal retainer in proper direction using ST.
ST 499247300 INSTALLER



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

2) Install a new O-ring to oil seal retainer using vaseline.

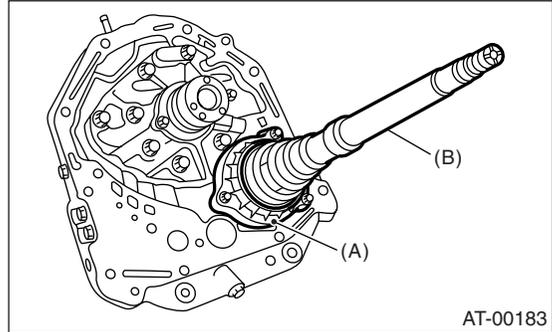


- (A) O-ring

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

Tightening torque:

7 N·m (0.7 kgf·m, 5.1 ft·lb)



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

E: INSPECTION

1) Check seal ring and oil seal for breaks or damages.

2) Check other parts for dents or abnormalities.

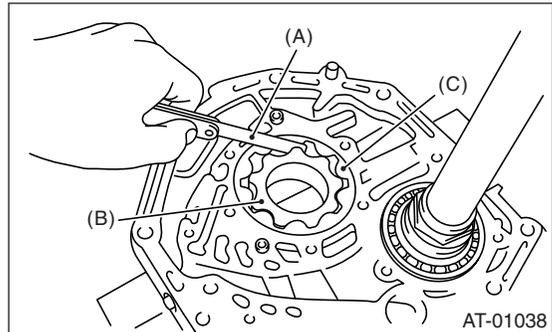
3) Selection of oil pump rotor assembly

(1) Tip clearance

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

Tip clearance:

0.02 — 0.15 mm (0.0008 — 0.0059 in)



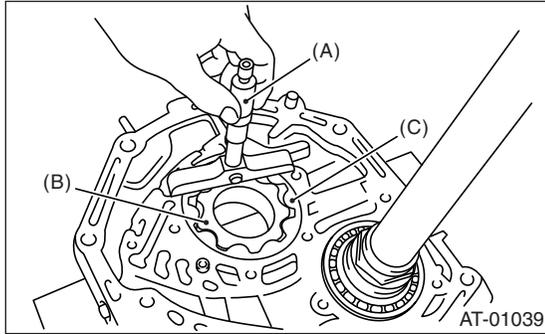
- (A) Thickness gauge
- (B) Oil pump inner rotor
- (C) Oil pump outer rotor

(2) Side clearance

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

Side clearance:

0.02 — 0.04 mm (0.0008 — 0.0016 in)



- (A) DEPTH GAUGE
- (B) Oil pump inner rotor
- (C) Oil pump outer rotor

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

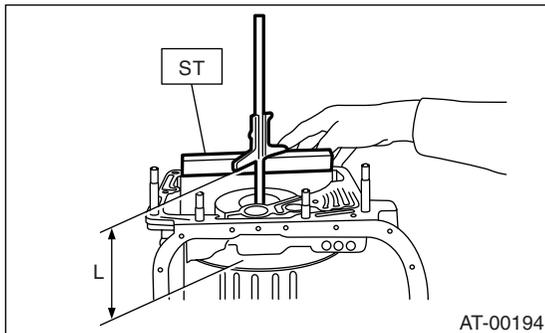
Oil pump rotor ASSY	
TOOL NUMBER	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

Measure the total end play and adjust it within specifications. <Ref. to 4AT-109, ADJUSTMENT, Oil Pump Housing.>

F: ADJUSTMENT

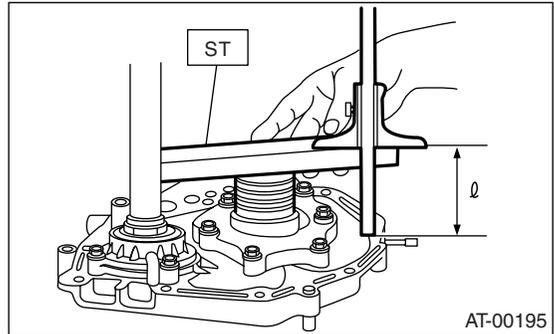
1) Using ST, measure length “L”, which is from mating surface of transmission case to concave side of high clutch drum.

ST 398643600 GAUGE



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

ST 398643600 GAUGE

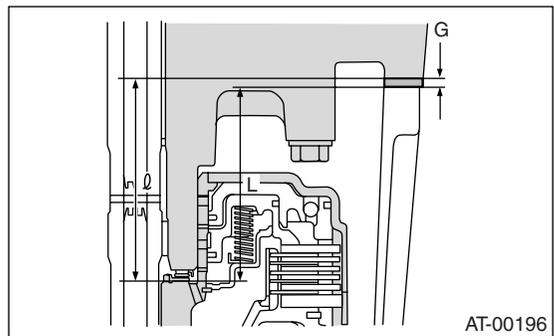


3) Calculation of total end play

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

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

C	Clearance between concave portion of high clutch and end of clutch drum support
L	Length from transmission case mating surface to concave portion of high clutch
G	Gasket thickness [0.28 mm (0.0110 in)]
d	Height from oil pump housing mating surface to upper surface of oil pump cover with thrust needle bearing



Thrust needle bearing	
TOOL 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)

Oil Pump Housing

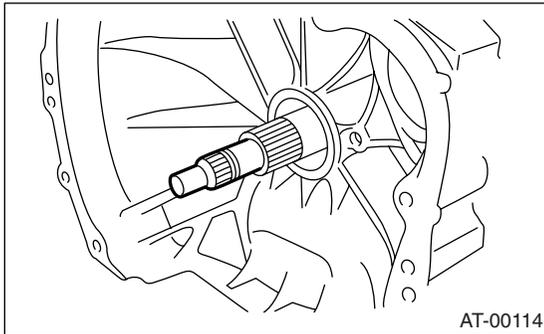
AUTOMATIC TRANSMISSION

- 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.

36. Drive Pinion Shaft Assembly

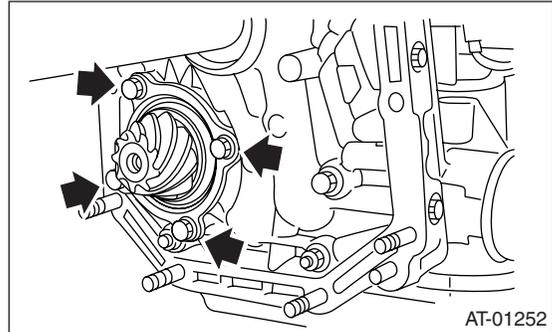
A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-89, 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-87, REMOVAL, Air Breather Hose.>
- 7) Remove the ATF charger pipe. <Ref. to 4AT-88, REMOVAL, Oil Charger Pipe.>
- 8) Remove the ATF cooler inlet and outlet pipes. <Ref. to 4AT-79, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate the torque converter clutch case and transmission case part. <Ref. to 4AT-102, REMOVAL, Torque Converter Clutch Case.>
- 10) Separate the transmission case and extension case part. <Ref. to 4AT-90, REMOVAL, Extension Case.>
- 11) Remove the reduction drive gear. <Ref. to 4AT-99, REMOVAL, Reduction Drive Gear.>
- 12) Remove the reduction driven gear. <Ref. to 4AT-97, REMOVAL, Reduction Driven Gear.>

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



B: INSTALLATION

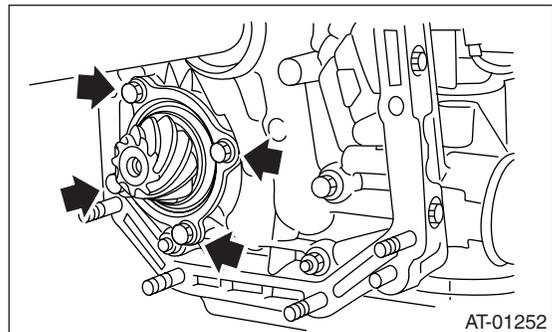
- 1) Assemble the drive pinion assembly to oil pump housing.

NOTE:

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

Tightening torque:

40 N·m (4.1 kgf-m, 29.5 ft-lb)



- 2) Combine the torque converter case with transmission case. <Ref. to 4AT-103, INSTALLATION, Torque Converter Clutch Case.>
- 3) Install the reduction driven gear. <Ref. to 4AT-97, INSTALLATION, Reduction Driven Gear.>
- 4) Install the reduction drive gear. <Ref. to 4AT-99, INSTALLATION, Reduction Drive Gear.>
- 5) Align the transmission case and extension case. <Ref. to 4AT-90, INSTALLATION, Extension Case.>
- 6) Insert the inhibitor switch and transmission connector to the stay.
- 7) Install the air breather hose. <Ref. to 4AT-87, INSTALLATION, Air Breather Hose.>
- 8) Install the ATF cooler inlet and outlet pipes. <Ref. to 4AT-81, INSTALLATION, ATF Cooler Pipe and Hose.>

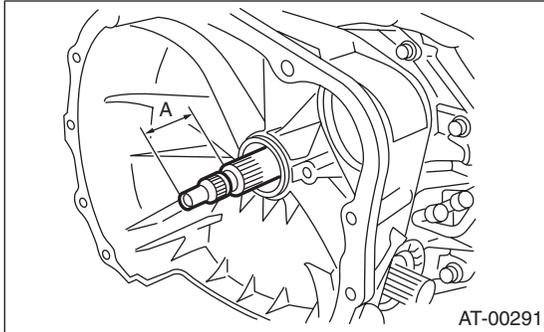
Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

- 9) Install the ATF charger pipe with O-ring.
- 10) 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)

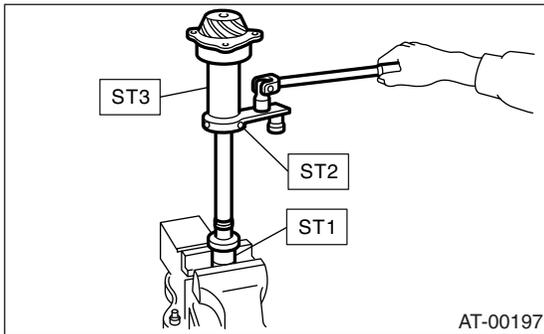


- 11) Install the torque converter clutch assembly. <Ref. to 4AT-89, INSTALLATION, Torque Converter Clutch Assembly.>
- 12) Install the transmission assembly into the vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

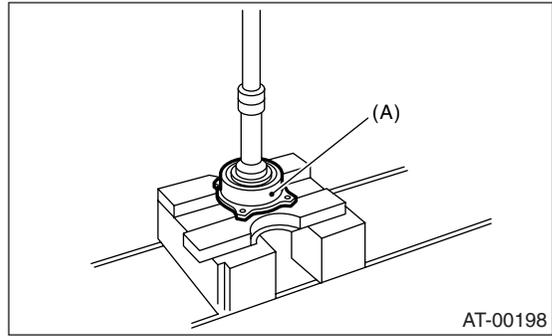
- 1) Remove the caulking part of lock nut, and then remove the lock nut with holding rear spline part of drive pinion shaft using ST1 and ST2. Pull out the drive pinion collar.

ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER



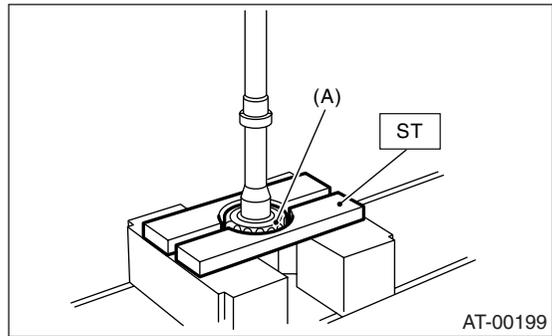
- 2) Remove the O-ring.

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



(A) Outer race

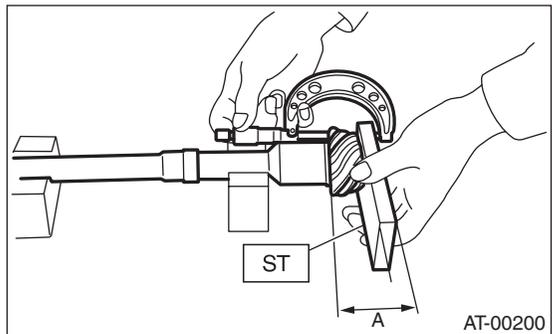
- 4) Separate the front roller bearing from drive pinion shaft using the press and ST. ST 498517000 REPLACER



(A) Front roller bearing

D: ASSEMBLY

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



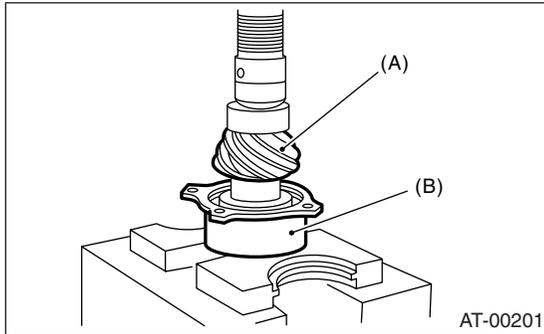
Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

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

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

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

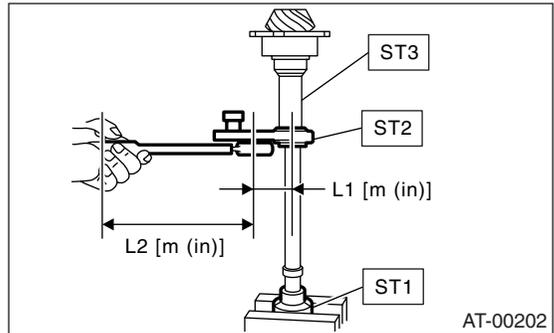
Example:

Torque wrench length m (in)	Tightening torque N·m (kgf·m, ft·lb)
0.4 (15.75)	98 (10.0, 72.3)
0.45 (17.72)	100 (10.2, 73.5)
0.5 (19.69)	101 (10.3, 74.6)
0.55 (21.65)	102 (10.4, 75.4)

- ST1 498937110 HOLDER
- ST2 499787700 WRENCH
- ST3 499787500 ADAPTER

NOTE:

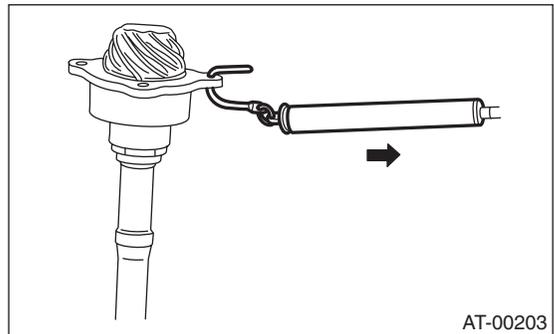
Install ST2 to torque wrench as straight as possible.



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

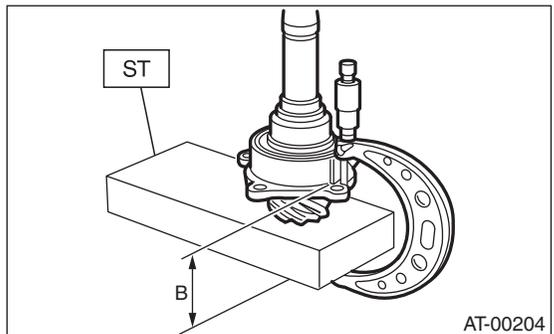
Starting torque:

7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 3.88 kg)



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.

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

Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

10) Select three or less shims from following table.

Drive pinion shim	
TOOL 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-114, ADJUSTMENT, Drive Pinion Shaft Assembly.>

F: ADJUSTMENT

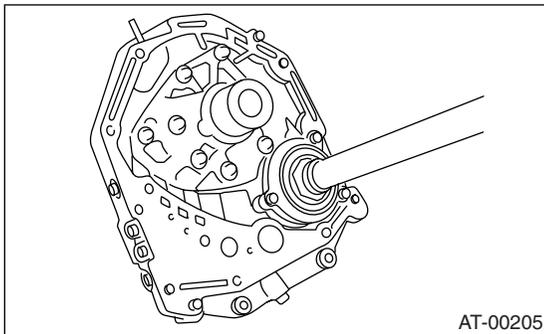
- 1) Remove the liquid gasket completely.
- 2) Install the oil pump housing assembly to torque converter clutch case, and secure them with tightening four bolts evenly.

NOTE:

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

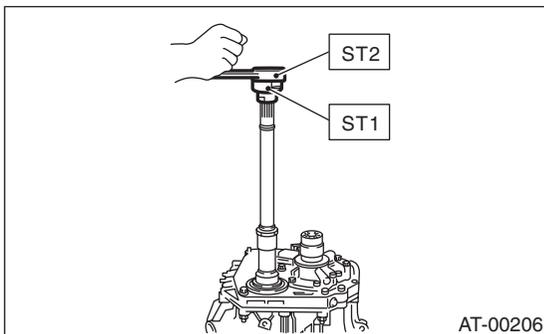
Tightening torque:

41 N·m (4.2 kgf·m, 30.4 ft·lb)



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

ST1 498937110 HOLDER
ST2 499787700 WRENCH



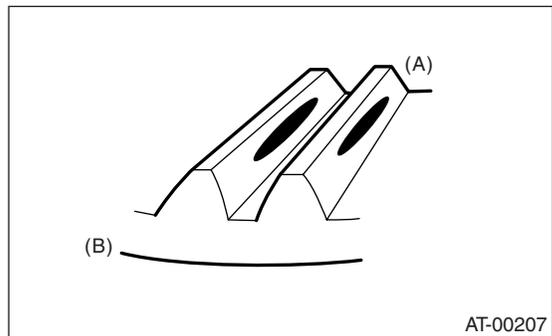
4) Adjust backlash between drive pinion and hypoid driven gear. <Ref. to 4AT-121, ADJUSTMENT, Front Differential.>

5) Apply red lead evenly to the surfaces of three or four teeth on hypoid driven 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-121, ADJUSTMENT, Front Differential.>

- Correct tooth contact

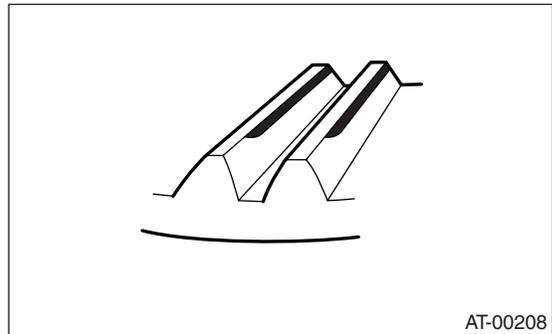
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]



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

- Face contact

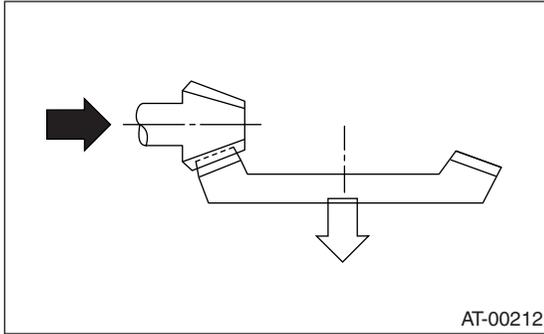
Checking item: Backlash is too large.
Contact pattern



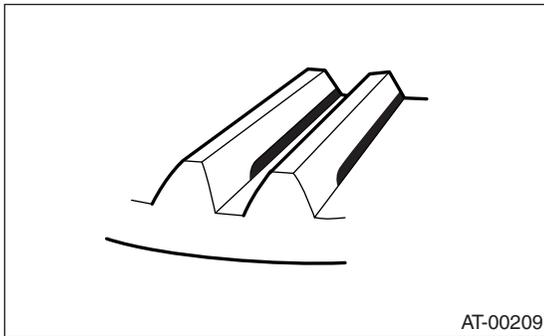
Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

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

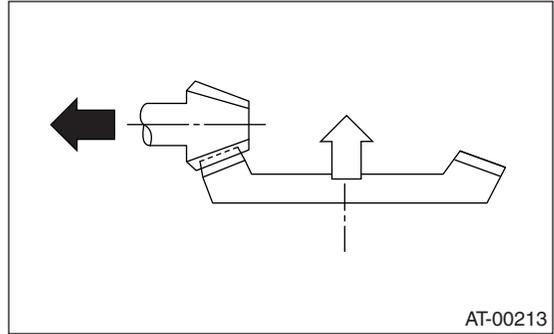


- Flank contact
- Checking item: Backlash is too small.**
Contact pattern

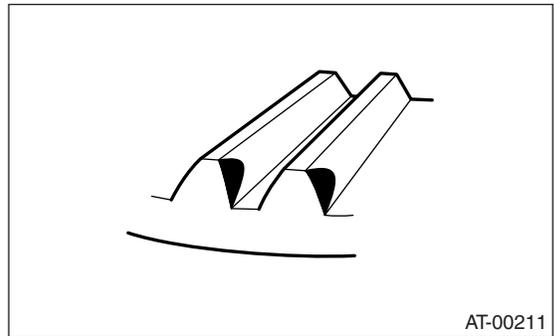


Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion shaft away from hypoid driven gear.

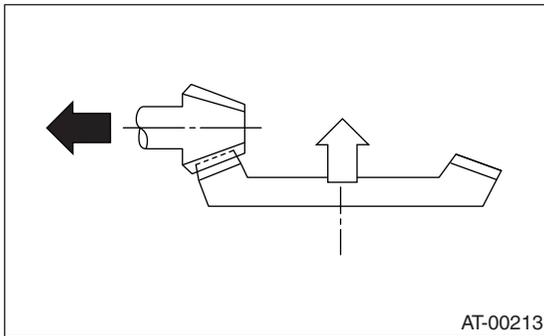
Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion shaft away from hypoid driven gear.



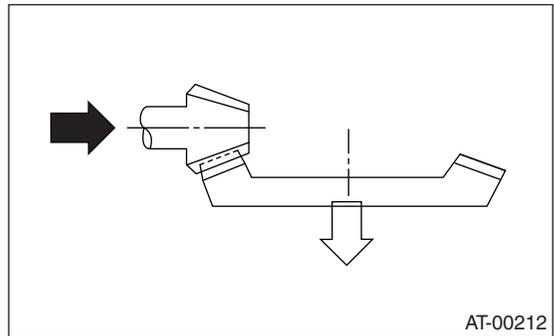
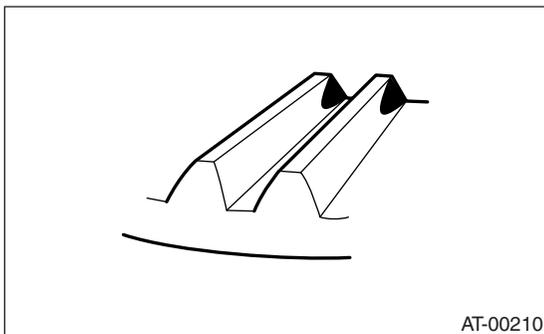
- Heel contact (outside end contact)
- Checking item: Contact areas is small**
Contact pattern



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



- Toe contact (inside end contact)
- Checking item: Contact areas is small**
Contact pattern



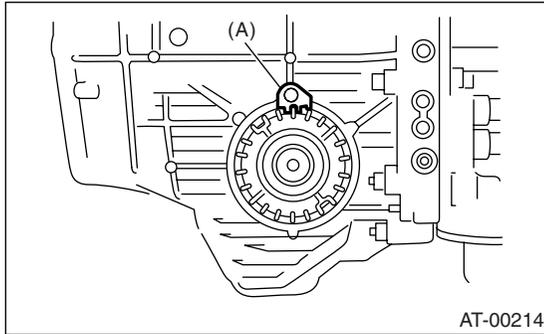
Drive Pinion Shaft Assembly

AUTOMATIC TRANSMISSION

6) If tooth contact is correct, mark the differential side retainer position and loosen it. After fitting a new O-ring and oil seal, screw in the differential side 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)

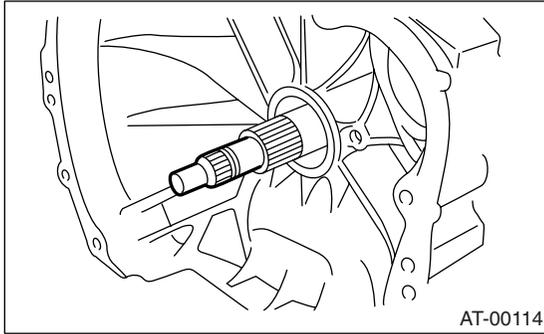


(A) Lock plate

37. Front Differential

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-89, 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 from the stay.
- 6) Remove the ATF charger pipe. <Ref. to 4AT-88, REMOVAL, Oil Charger Pipe.>
- 7) Remove the ATF cooler inlet and outlet pipes. <Ref. to 4AT-79, REMOVAL, ATF Cooler Pipe and Hose.>
- 8) Separate the torque converter clutch case and transmission case. <Ref. to 4AT-102, REMOVAL, Torque Converter Clutch 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 torque converter clutch case.

ST 499787000 WRENCH ASSY

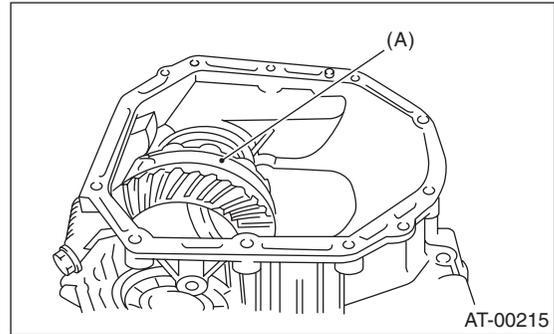
- 11) Remove the differential assembly without damaging installation part of retainer.

B: INSTALLATION

- 1) Install the differential assembly to torque converter clutch case.

CAUTION:

Do not damage the inside of torque converter clutch case (especially the mating surface of differential side retainer).

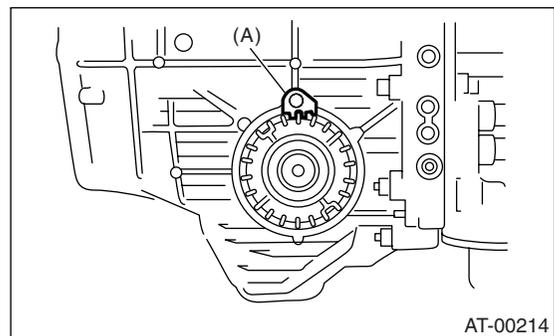


(A) Differential ASSY

- 2) Install the O-ring to left and right differential side retainer.
- 3) Install the side retainers using ST. <Ref. to 4AT-117, REMOVAL, Front Differential.>
ST 499787000 WRENCH ASSY
- 4) Adjust the front differential backlash. <Ref. to 4AT-121, ADJUSTMENT, Front Differential.>
- 5) Install the lock plate.

Tightening torque:

25 N·m (2.5 kgf·m, 18.1 ft·lb)

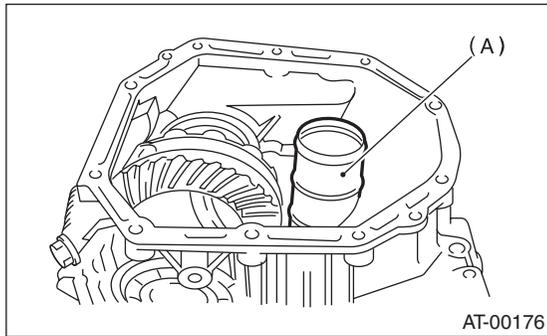


(A) Lock plate

Front Differential

AUTOMATIC TRANSMISSION

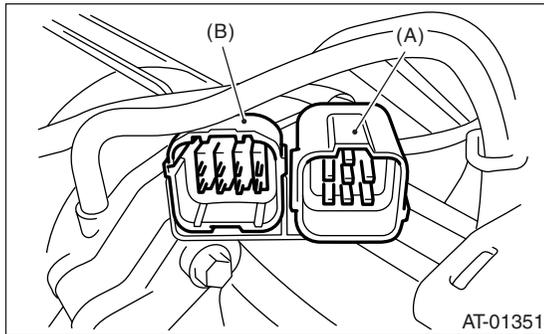
6) Install the new seal pipe to torque converter clutch case.



(A) Seal pipe

7) Install the torque converter clutch case to transmission case. <Ref. to 4AT-103, INSTALLATION, Torque Converter Clutch Case.>

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



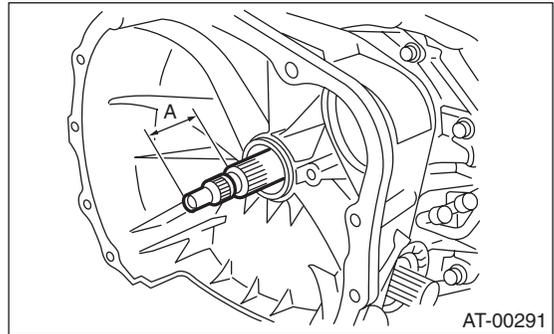
(A) Transmission harness ASSY
(B) Inhibitor switch harness

9) Install the ATF cooler pipe. <Ref. to 4AT-81, INSTALLATION, ATF Cooler Pipe and Hose.>

10) Install the ATF charger pipe with O-ring. <Ref. to 4AT-88, INSTALLATION, Oil Charger 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)



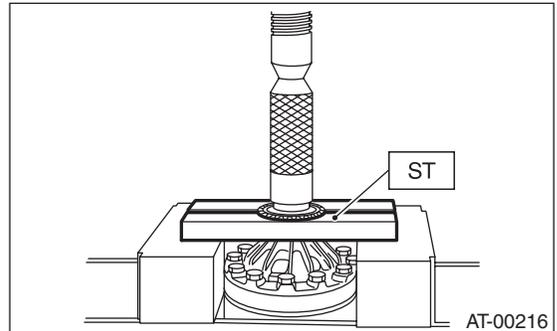
12) Install the torque converter clutch assembly. <Ref. to 4AT-89, INSTALLATION, Torque Converter Clutch Assembly.>

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

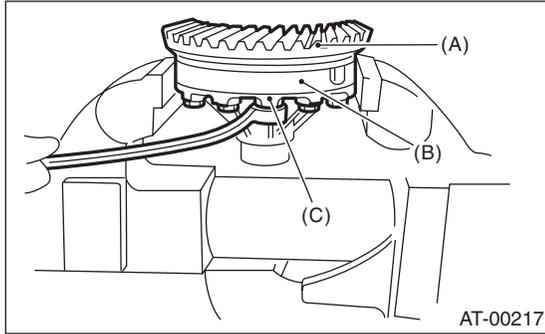
C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

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

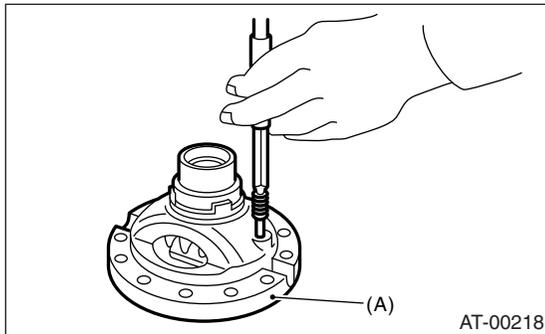


2) Secure the case in a vise and remove the hypoid driven gear tightening bolts, then separate the hypoid driven gear, differential case (RH) and differential case (LH).



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

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



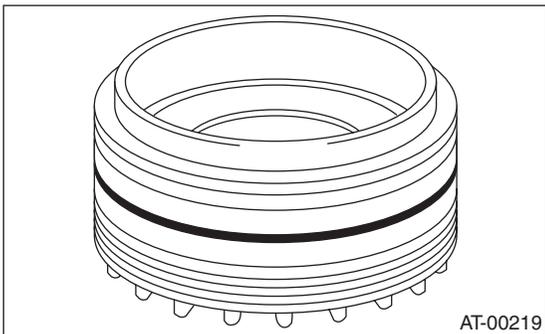
- (A) Differential case (RH)

2. DIFFERENTIAL SIDE RETAINER

NOTE:

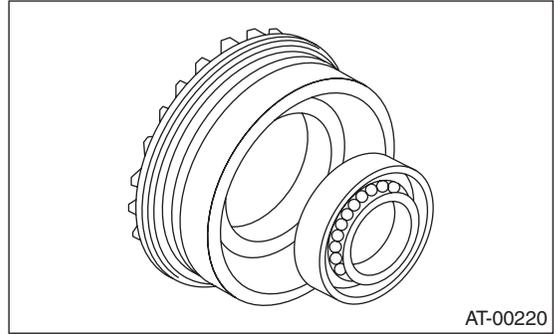
After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.

1) Remove the O-ring.



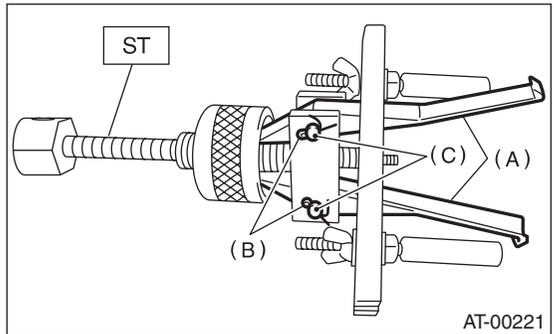
AT-00219

2) Remove the oil seal.



AT-00220

3) Remove the split pin, and then remove the claw.
ST 398527700 PULLER ASSY

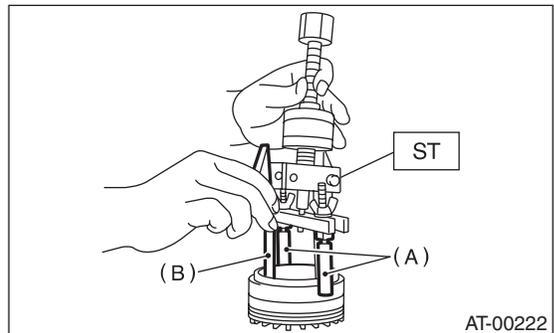


AT-00221

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

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

ST 398527700 PULLER ASSY



AT-00222

- (A) Shaft
- (B) Claw

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

Front Differential

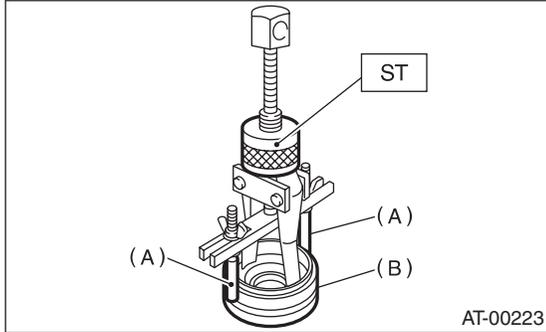
AUTOMATIC TRANSMISSION

6) Hold the shaft of ST to avoid removing from differential 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.



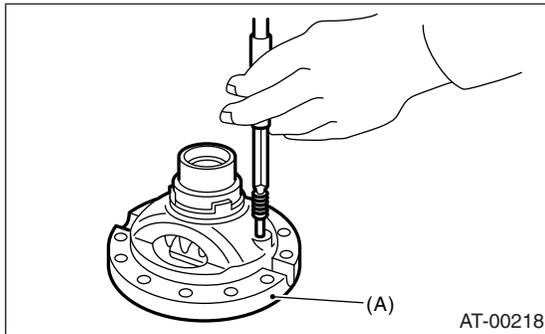
(A) Shaft
(B) Differential side retainer

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

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

2) Install the straight pin in reverse direction.



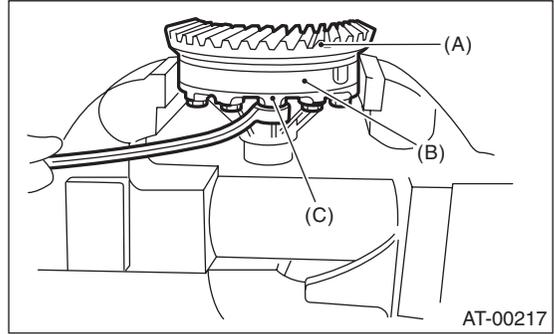
(A) Differential case (RH)

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

ST1 498247001 MAGNET BASE

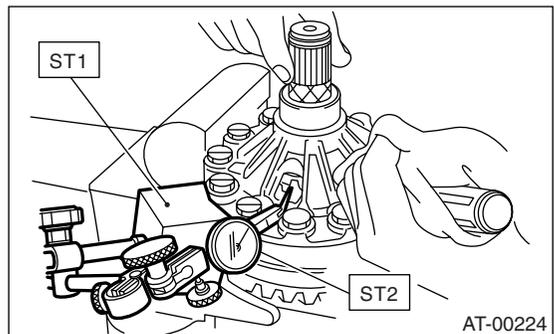
ST2 498247100 DIAL GAUGE

NOTE:

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

Standard value:

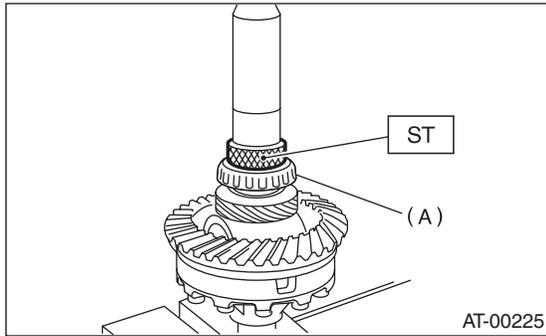
0.13 — 0.18 mm (0.0051 — 0.0071 in)



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

Washer	
TOOL NUMBER	Thickness mm (in)
803038021	0.95 (0.037)
803038022	1.00 (0.039)
803038023	1.05 (0.041)

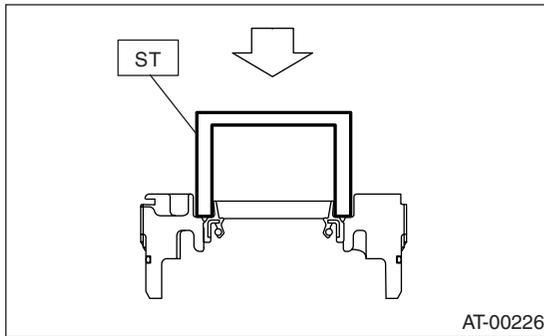
- 6) Using ST, install the taper roller bearing.
 ST 398487700 INSTALLER



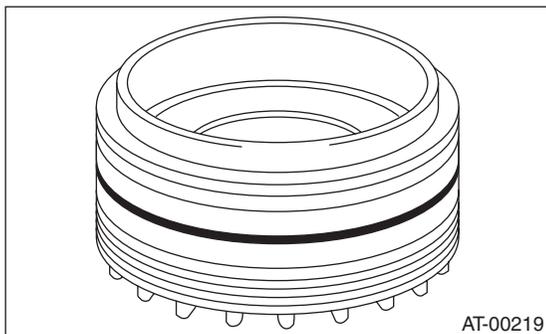
(A) Taper roller bearing

2. DIFFERENTIAL SIDE RETAINER

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



- 3) Install a new O-ring.



E: INSPECTION

- Check each component for harmful cuts, damage and other faults.
 - Measure the backlash, and then adjust it within specification.
- <Ref. to 4AT-121, ADJUSTMENT, Front Differential.>

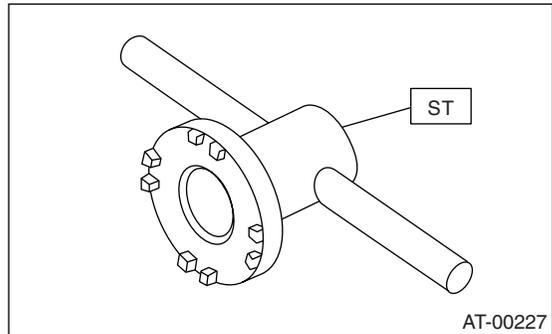
F: ADJUSTMENT

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

NOTE:

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

- ST 499787000 WRENCH ASSY



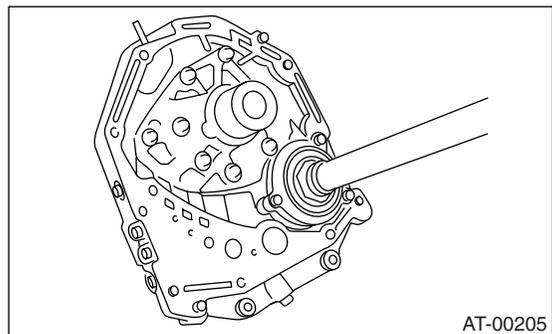
- 2) Remove the oil pump housing.
 3) Remove the liquid gasket completely.
 4) Install the oil pump housing assembly to torque converter clutch case, and secure them with tightening four bolts evenly.

NOTE:

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

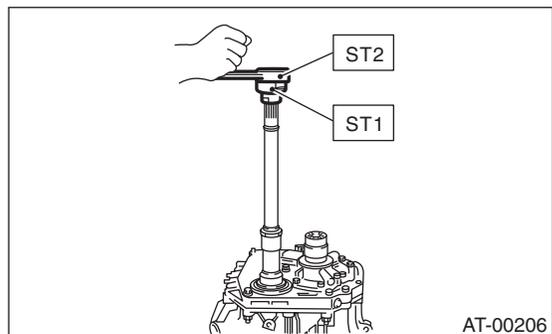
Tightening torque:

41 N·m (4.2 kgf·m, 30.4 ft·lb)



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

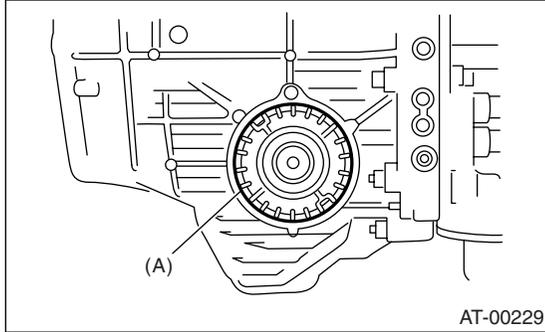
- ST1 498937110 HOLDER
 ST2 499787700 WRENCH



Front Differential

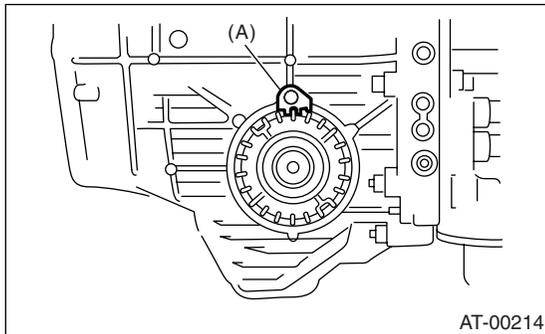
AUTOMATIC TRANSMISSION

6) Tighten the LH side of differential side retainer until contact is felt while rotating the shaft. Then loosen the RH side of differential side retainer. Keep tightening the LH side of differential side retainer, and loosening the RH side until the pinion shaft not be able to turned. This is the “zero” state.



(A) Differential side retainer

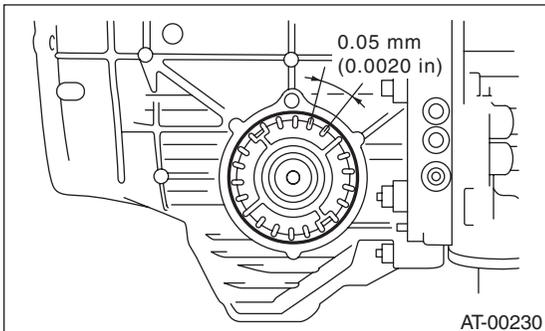
7) After the “zero” state is established, back off the LH side of differential side retainer 3 notches and secure it with the lock plate. Then back off the RH side of differential side retainer and retighten until it stops. Rotate the drive pinion few times. Tighten the RH side of differential side retainer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



(A) Lock plate

NOTE:

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

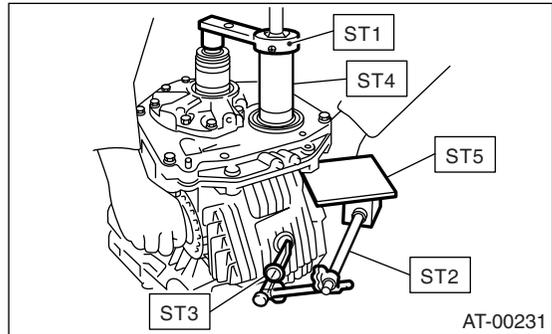


8) Turn the drive pinion several times with ST1 and check to see if the backlash is within the specified value with ST2, ST3, ST4 and ST5.

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)

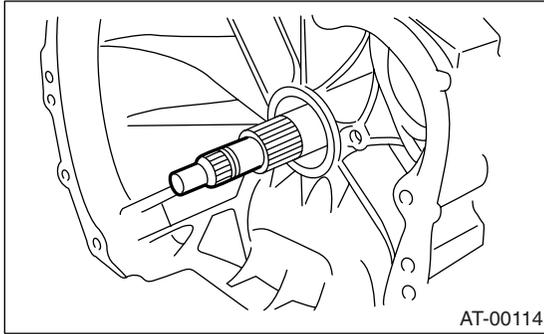


9) Adjust the tooth contact between front differential and drive shaft. <Ref. to 4AT-114, ADJUSTMENT, Drive Pinion Shaft Assembly.>

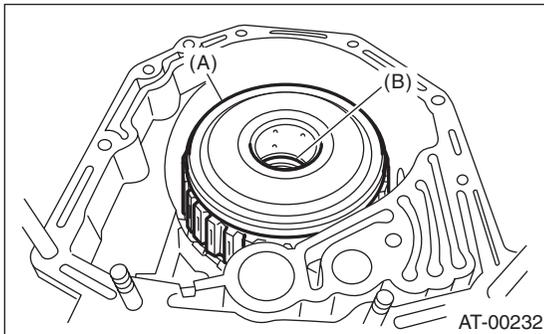
38.AT Main Case

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-89, REMOVAL, Torque Converter Clutch Assembly.>
- 3) Remove the input shaft.

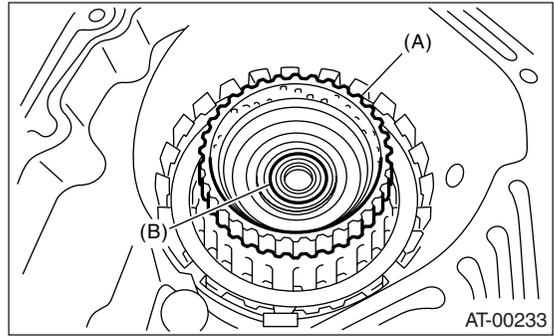


- 4) Lift-up the lever on rear side of transmission harness connector, and then disconnect it from the stay.
- 5) Disconnect the inhibitor switch connector from the stay.
- 6) Disconnect the air breather hose.
- 7) Remove the ATF charger pipe. <Ref. to 4AT-88, REMOVAL, Oil Charger Pipe.>
- 8) Remove the ATF cooler inlet and outlet pipes. <Ref. to 4AT-79, REMOVAL, ATF Cooler Pipe and Hose.>
- 9) Separate the torque converter clutch case and transmission case. <Ref. to 4AT-102, REMOVAL, Torque Converter Clutch Case.>
- 10) Remove the oil pump housing. <Ref. to 4AT-105, REMOVAL, Oil Pump Housing.>
- 11) Take out the high clutch & reverse clutch assembly and thrust needle bearing.



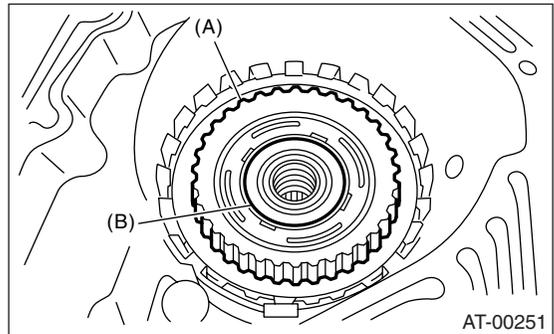
- (A) High clutch & reverse clutch ASSY
- (B) Thrust needle bearing

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



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

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

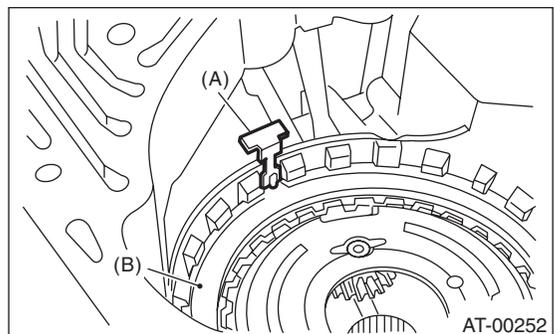


- (A) Front sun gear
- (B) Thrust needle bearing

- 14) Pull out the leaf spring of 2-4 brake without folding.

NOTE:

Remove it while pressing down on lower leaf spring.

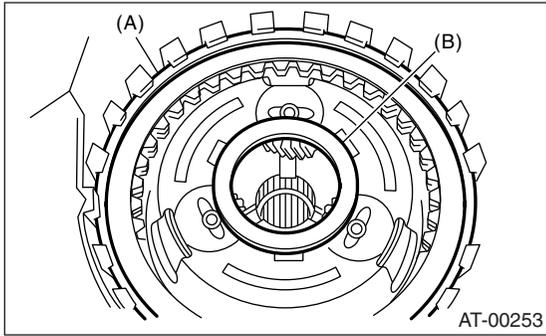


- (A) Leaf spring
- (B) Retaining plate

AT Main Case

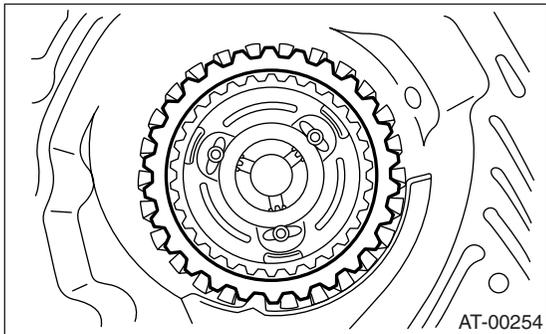
AUTOMATIC TRANSMISSION

15) Remove the snap ring and thrust needle bearing.

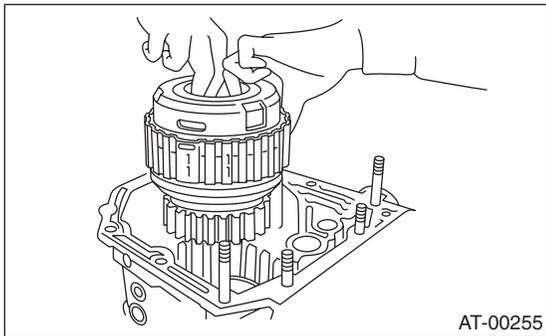


- (A) Snap ring
- (B) Thrust needle bearing

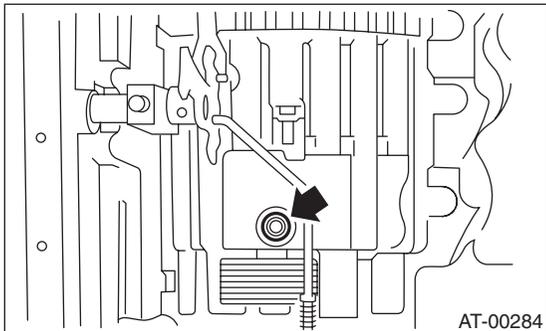
16) Take out the retaining plate, drive plate and driven plate of 2-4 brake.



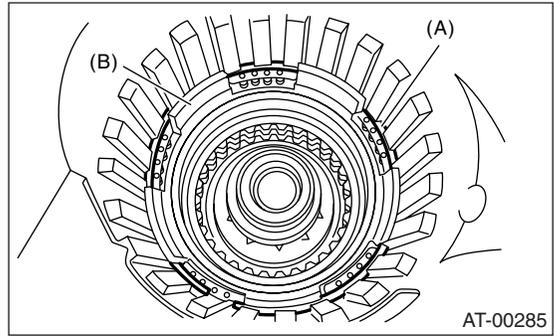
17) Take out the thrust needle bearing, planetary gear assembly and low clutch assembly.



18) Remove the 2-4 brake seal.

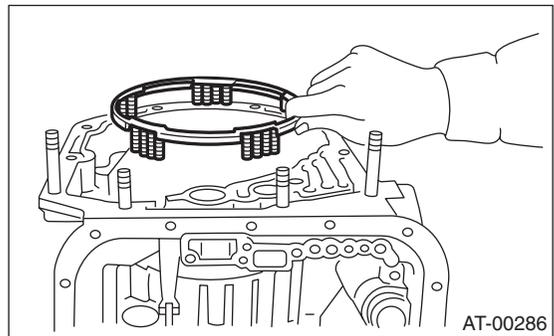


19) Remove the snap ring.

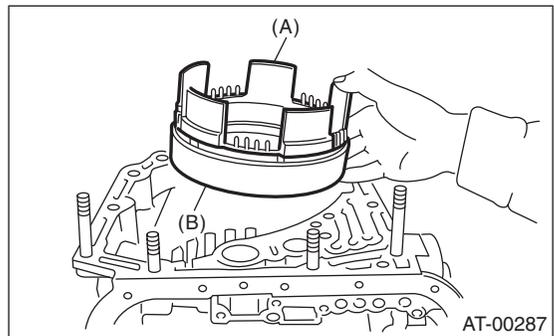


- (A) Snap ring
- (B) 2-4 brake piston

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

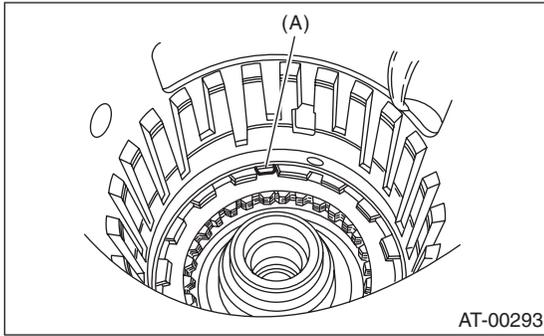


21) Remove the 2-4 brake piston and 2-4 brake piston retainer without damaging.



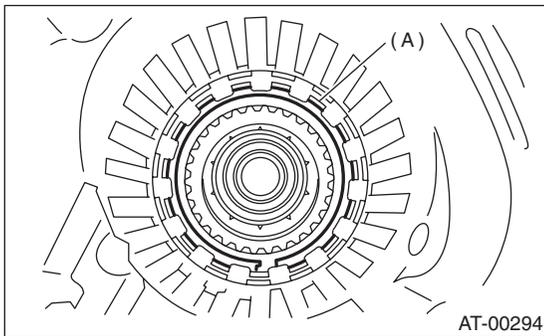
- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

22) Pull out the leaf spring of low & reverse brake without folding.



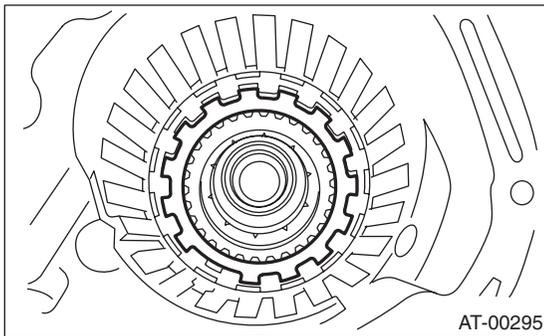
(A) Leaf spring

23) Remove the snap ring.

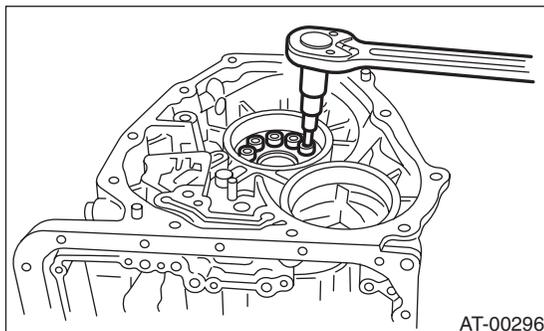


(A) Snap ring

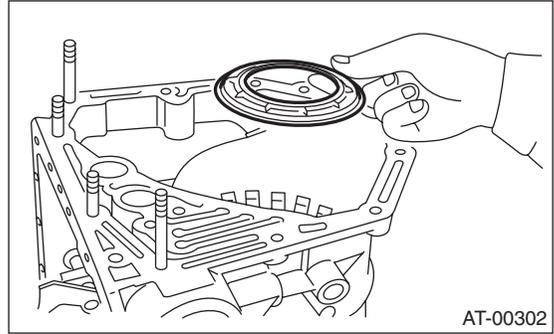
24) Take out the retaining plate of low & reverse brake, drive plate, driven plate and dish plate.



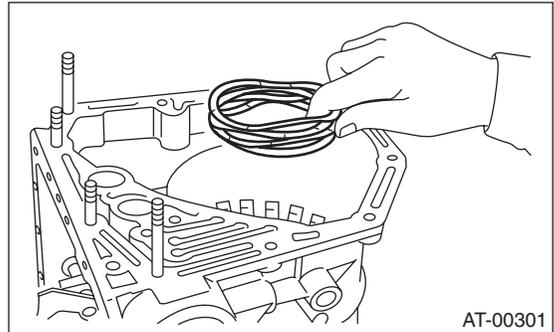
25) Turn the transmission case upside down, and then take out the socket bolts while holding the one-way clutch inner race with hand.



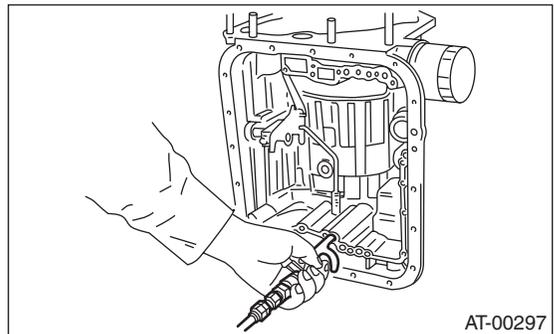
26) Remove the spring retainer.



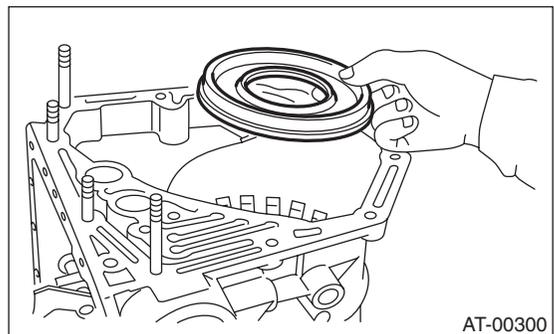
27) Take out the return spring.



28) Apply compressed air.



29) Take out the low & reverse brake piston.



AT Main Case

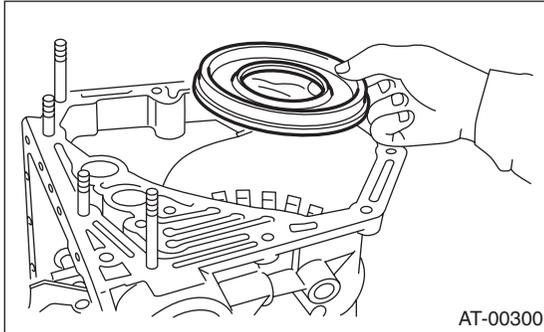
AUTOMATIC TRANSMISSION

B: INSTALLATION

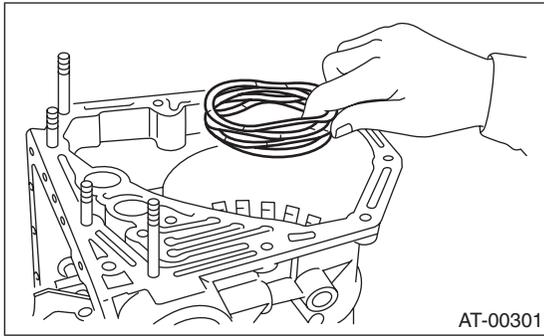
1) Install the low & reverse piston.

CAUTION:

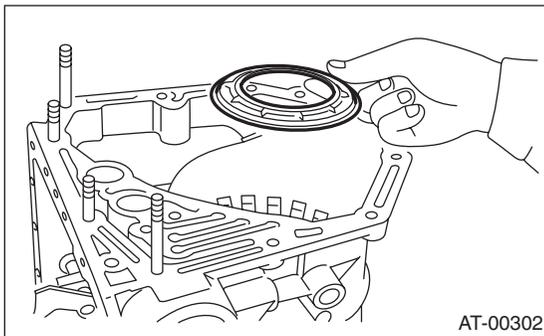
Be careful not to damage the lip seal.



2) Install the return spring.



3) Install the spring retainer.

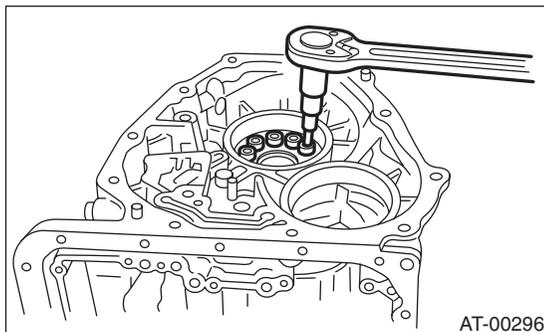


4) Install the one-way clutch inner race.

5) Tighten the socket head 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.

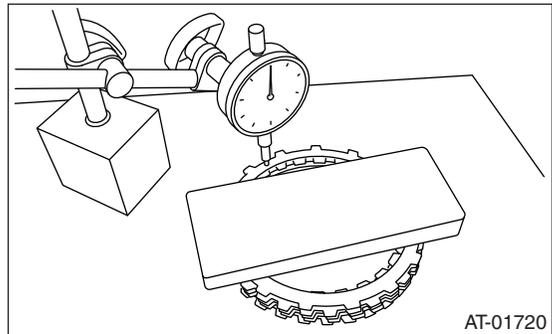
10) Scale and record the weight "Z" of a flat board which will be put on plates.

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 plate 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

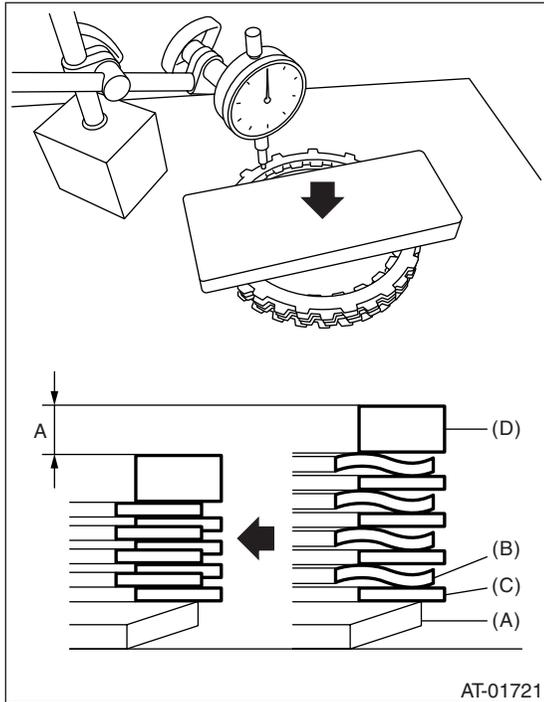
83 N (8.5 kgf, 18.7 lb): Load applied to clutch plate

Z: Flat plate weight

13) Press the center of retaining plate with applying force of N, 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°.



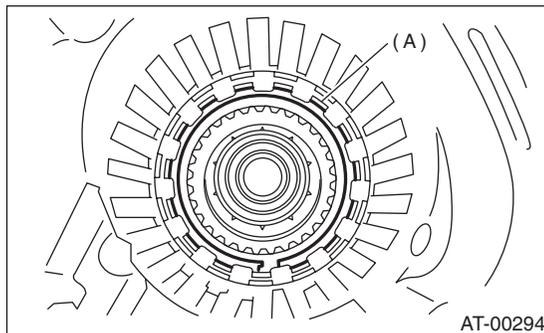
- (A) Dish plate
- (B) Driven plate
- (C) Drive plate
- (D) Retaining plate

14) Installation of the low & reverse brake:

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

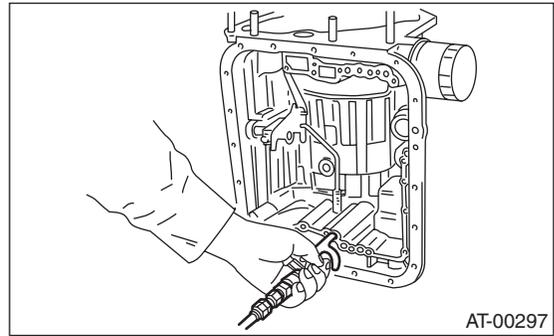
NOTE:

Pay attention to the orientation of dish plate.



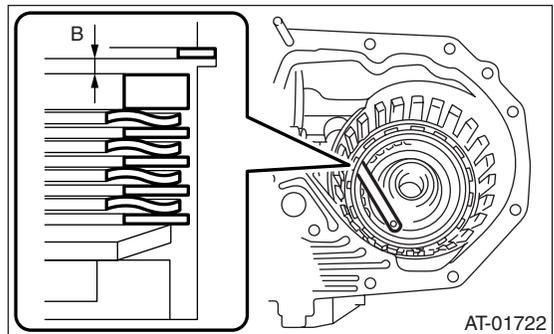
- (A) Snap ring

15) Apply compressed air intermittently to check for operation.



16) Measure the clearance.

Place the same thickness of shim on both sides to prevent pressure plate from tilting, and then measure the clearance B and note it.



AT Main Case

AUTOMATIC TRANSMISSION

17) Calculation of piston stroke

Calculate from noted dimension A and B, and then select the retaining plate to adjust it within specification. If the calculated value exceed the limit, replace the drive plate with a new one to adjust it within specification.

$$T = A+B$$

T: Piston stroke

A: Collapsing amount of drive plate

B: Clearance between retaining plate and snap ring

TURBO model

Initial standard:

2.7 — 3.2 mm (0.106 — 0.126 in)

Limit thickness:

4.2 mm (0.165 in)

NON-TURBO model

Initial standard:

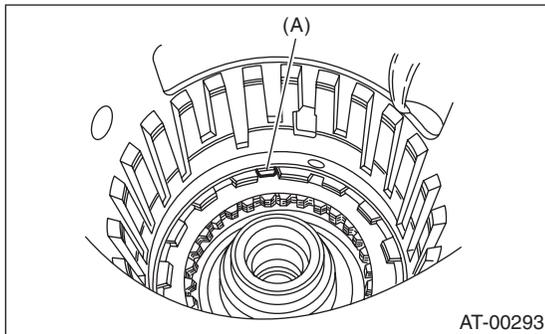
2.4 — 2.9 mm (0.094 — 0.114 in)

Limit thickness:

3.9 mm (0.154 in)

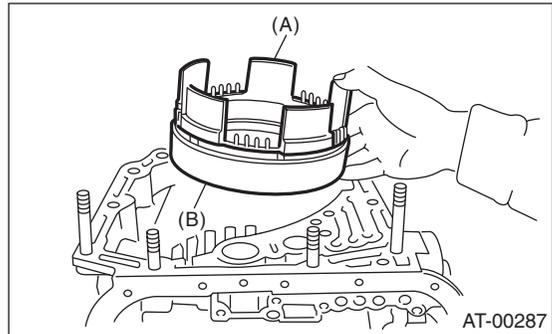
Retaining plate	
TOOL NUMBER	Thickness mm (in)
31667AA320	4.1 (0.161)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

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



(A) Leaf spring

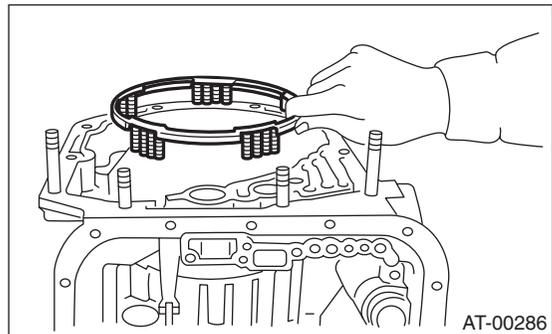
19) Install the 2-4 brake piston and 2-4 brake retainer by aligning hole of 2-4 brake retainer and hole of transmission case.



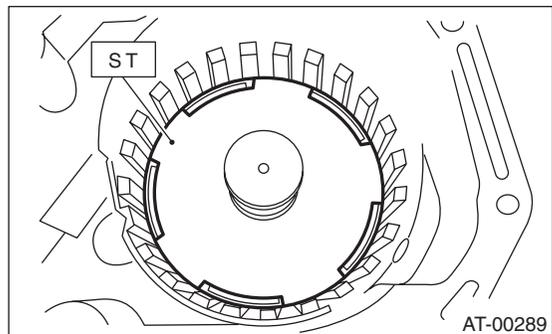
(A) 2-4 brake piston

(B) 2-4 brake piston retainer

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



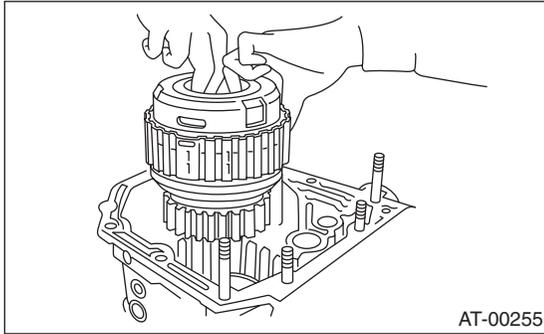
21) Position the snap ring in transmission. Using ST, press the snap ring into specified place. ST 498677100 COMPRESSOR



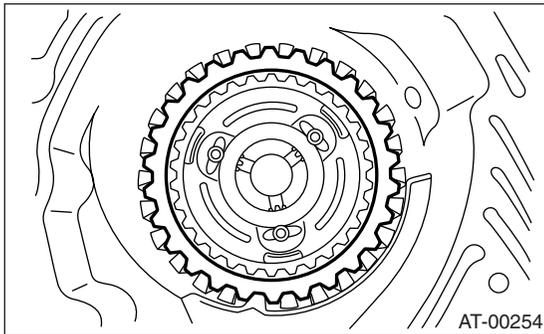
22) Install the planetary gear and low clutch assembly to transmission case.

CAUTION:

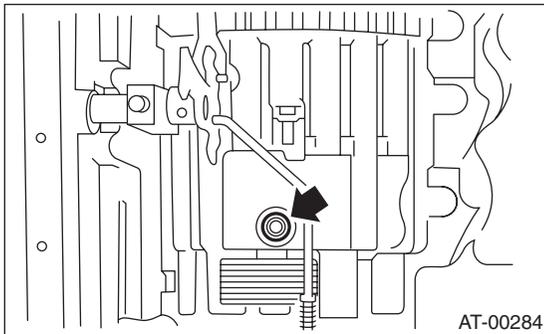
When install the low clutch and planetary gear assembly with rotating them, rotate them slowly and paying attention not to damage the seal ring.



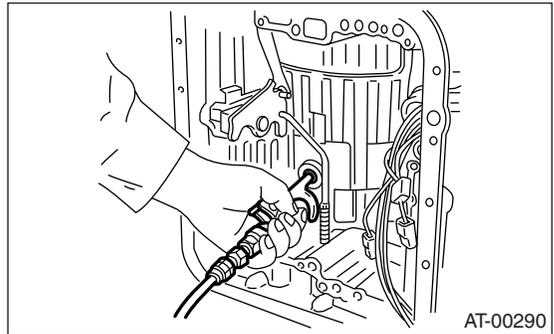
23) Install the pressure rear plate, drive plate of 2-4 brake, driven plate, retaining plate and snap ring.



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



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



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

NOTE:

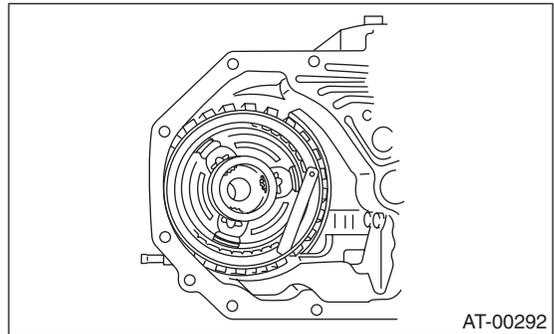
Select a retaining plate with a suitable value from following table, so that the clearance becomes within specified value.

Initial standard:

0.8 — 1.2 mm (0.031 — 0.047 in)

Limit thickness:

1.5 mm (0.059 in)



Retaining plate	
TOOL NUMBER	Thickness mm (in)
31567AA612	5.6 (0.220)
31567AA622	5.8 (0.228)
31567AA632	6.0 (0.236)
31567AA642	6.2 (0.244)
31567AA652	6.4 (0.252)
31567AA662	6.6 (0.260)

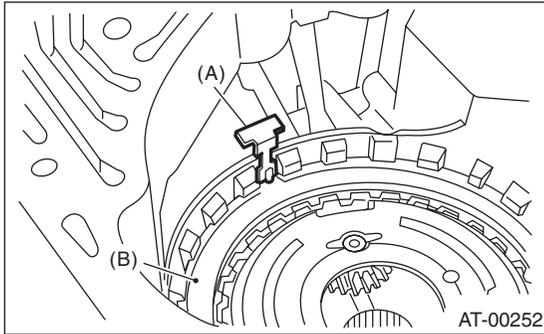
AT Main Case

AUTOMATIC TRANSMISSION

27) Install the leaf spring of 2-4 brake.

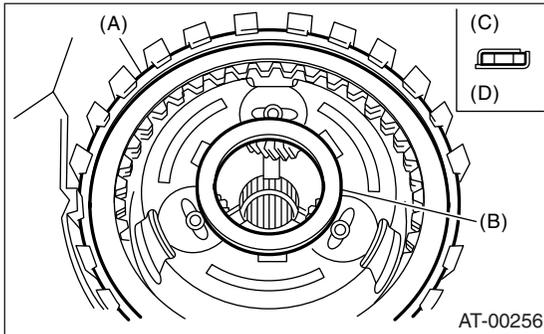
CAUTION:

Do not install in the wrong place.



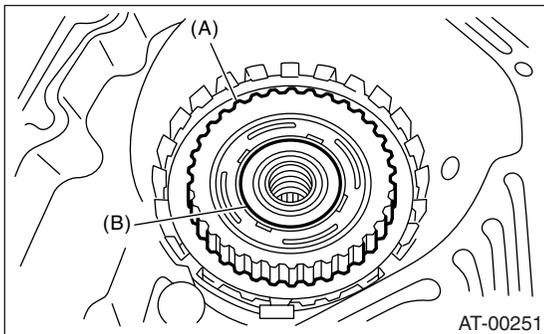
- (A) Leaf spring
- (B) Retaining plate

28) Install the thrust needle bearing in correct direction.



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

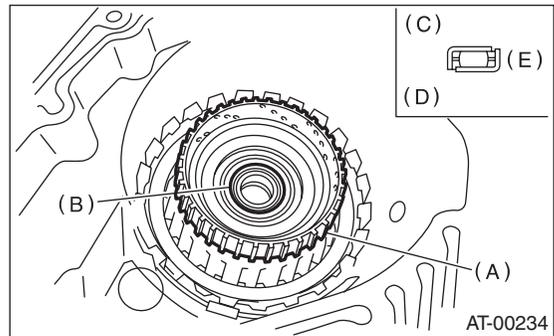
29) Install the front sun gear and thrust needle bearing.



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

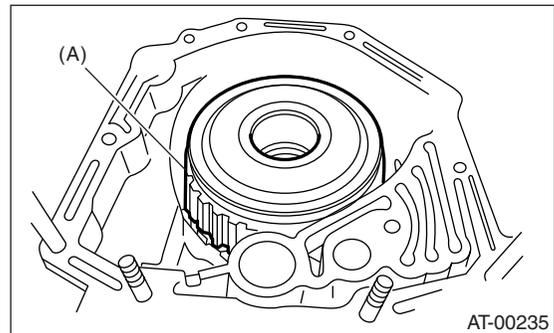
30) Attach the thrust needle bearing to high clutch hub using vaseline, and then install the high clutch hub by correctly engaging the splines of the front planetary carrier.

31) Install the thrust needle bearing in correct direction.



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

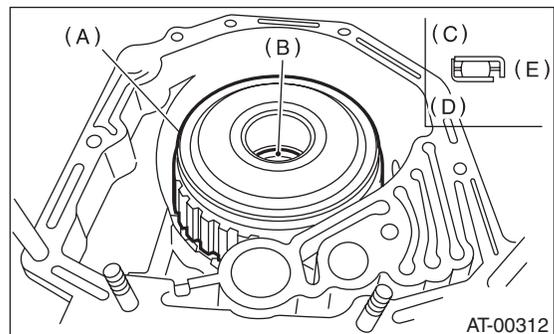
32) Install the high clutch assembly and reverse clutch assembly.



- (A) High clutch and reverse clutch ASSY

33) Adjust total end play. <Ref. to 4AT-109, ADJUSTMENT, Oil Pump Housing.>

34) Install the thrust needle bearing in correct direction.

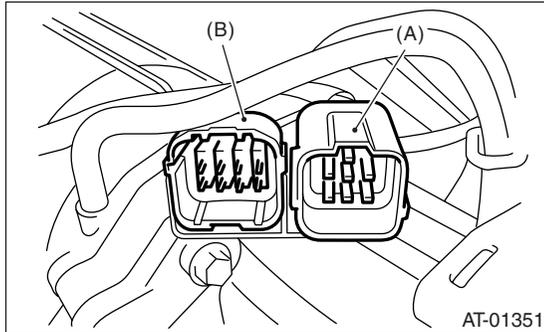


- (A) High clutch and reverse clutch ASSY
- (B) Thrust needle bearing
- (C) Upside
- (D) Downside
- (E) Outside

35) Install the oil pump housing assembly with a new gasket.

36) Install the torque converter clutch case assembly into transmission case assembly. <Ref. to 4AT-103, INSTALLATION, Torque Converter Clutch Case.>

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



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

38) Install the air breather hose. <Ref. to 4AT-87, INSTALLATION, Air Breather Hose.>

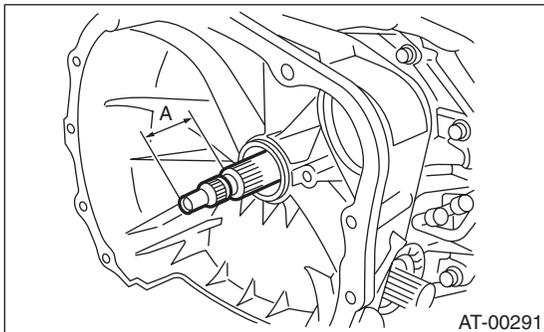
39) Install the ATF cooler pipe. <Ref. to 4AT-81, INSTALLATION, ATF Cooler Pipe and Hose.>

40) Install the ATF charger pipe with O-ring. <Ref. to 4AT-88, INSTALLATION, Oil Charger Pipe.>

41) 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)



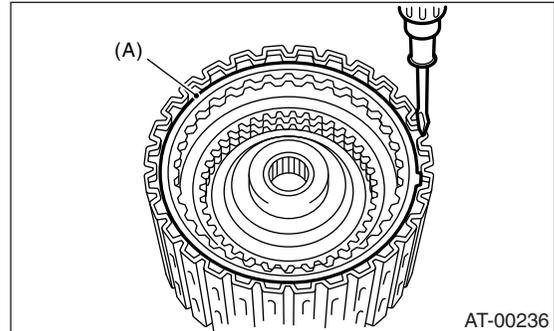
42) Install the torque converter clutch assembly. <Ref. to 4AT-89, INSTALLATION, Torque Converter Clutch Assembly.>

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

C: DISASSEMBLY

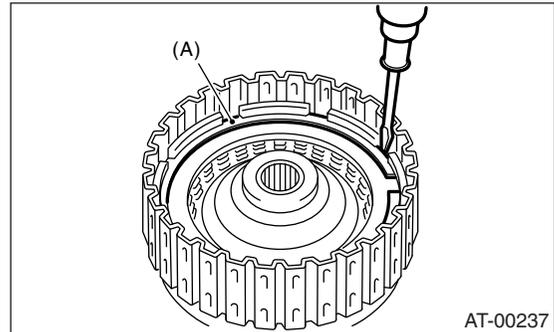
1. HIGH CLUTCH AND REVERSE CLUTCH

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



(A) Snap ring

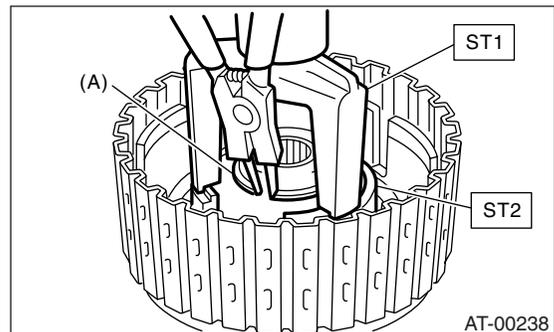
2) Remove the snap ring, and then take out the retaining plate, drive plate and driven plate.



(A) Snap ring

3) Using ST1 and ST2, remove the snap ring.

ST1 398673600 COMPRESSOR
ST2 498627100 SEAT

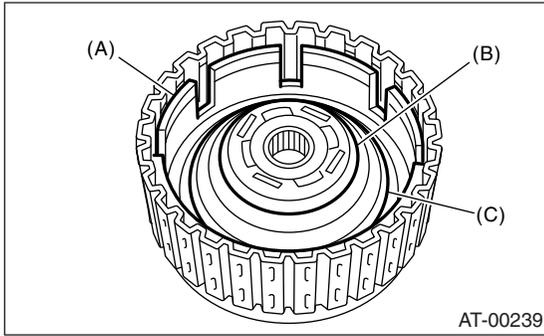


(A) Snap ring

AT Main Case

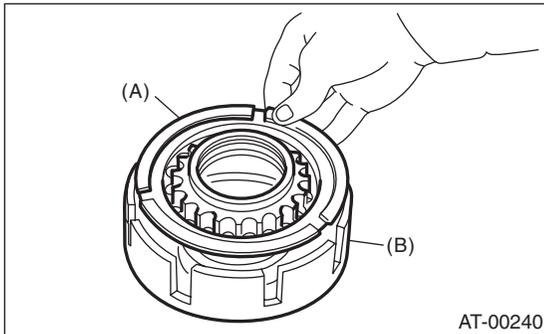
AUTOMATIC TRANSMISSION

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



- (A) Reverse clutch piston
- (B) Clutch cover
- (C) Return spring

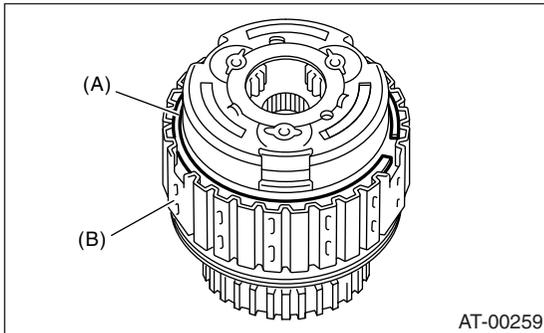
5) Remove the D-ring and lip seal from high clutch piston and reverse clutch piston.



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

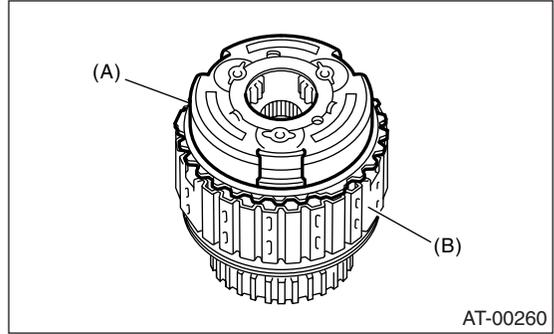
2. PLANETARY GEAR AND LOW CLUTCH

1) Remove the snap ring from low clutch drum.



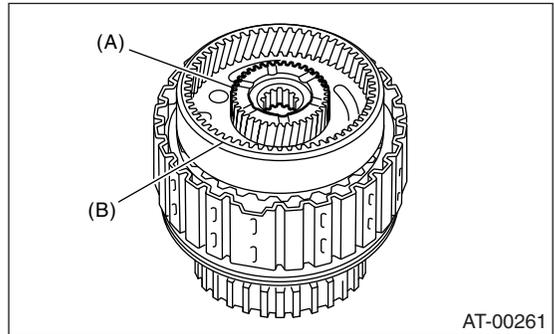
- (A) Snap ring
- (B) Low clutch drum

2) Take out the front planetary carrier.



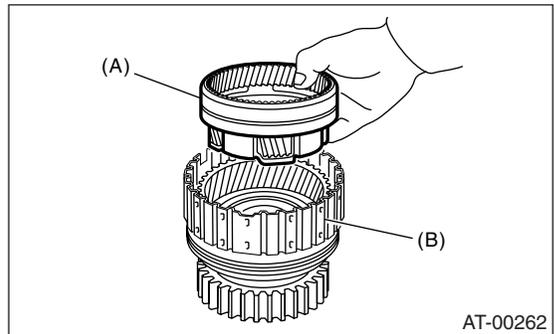
- (A) Front planetary carrier
- (B) Low clutch drum

3) Take out the rear sun gear.



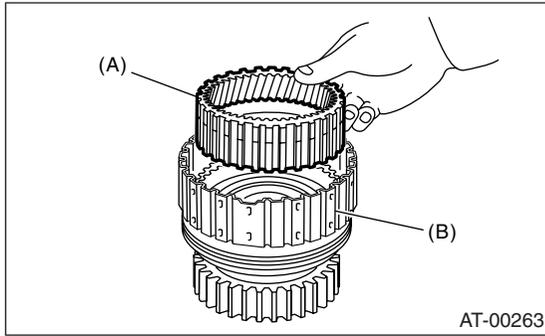
- (A) Rear sun gear
- (B) Rear planetary carrier

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



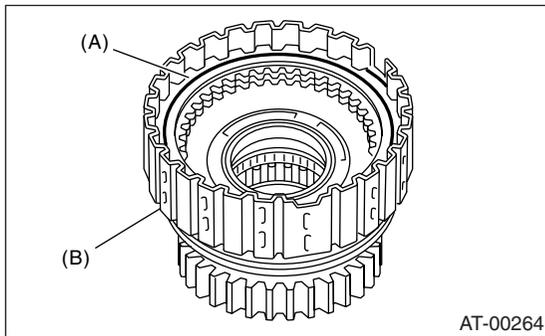
- (A) Rear planetary carrier
- (B) Low clutch drum

5) Take out the rear internal gear.



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

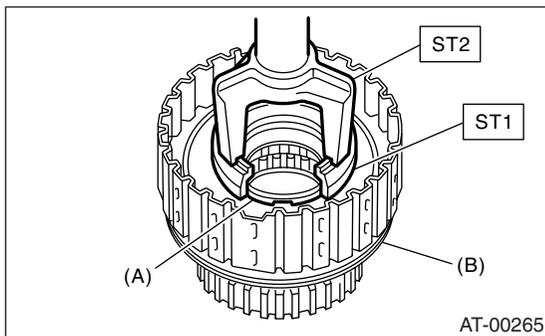
6) Remove the snap ring from low clutch drum.



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

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

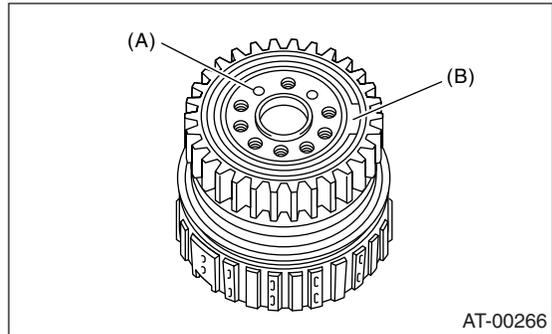
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



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

8) Remove the one-way clutch. <Ref. to 4AT-123, REMOVAL, AT Main Case.>

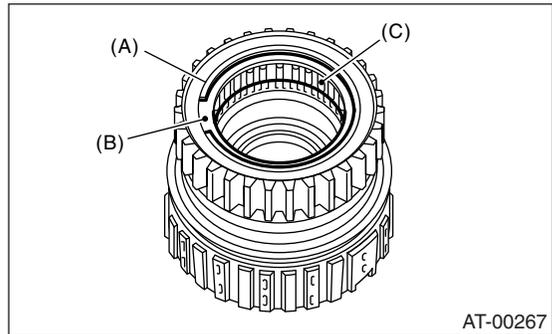
9) Install the one-way clutch inner race to low clutch drum, and then apply compressed air to remove the low clutch piston.



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

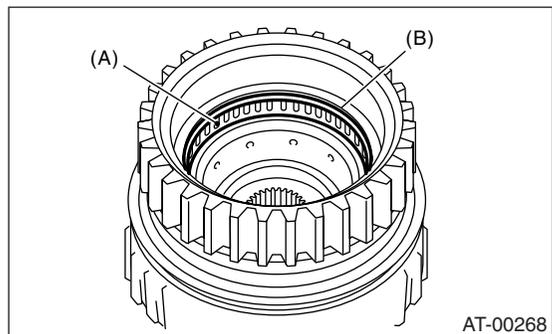
10) Remove the one-way clutch inner race.

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.



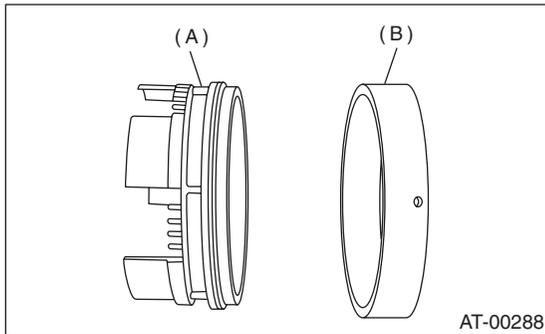
- (A) Needle bearing
- (B) Snap ring

AT Main Case

AUTOMATIC TRANSMISSION

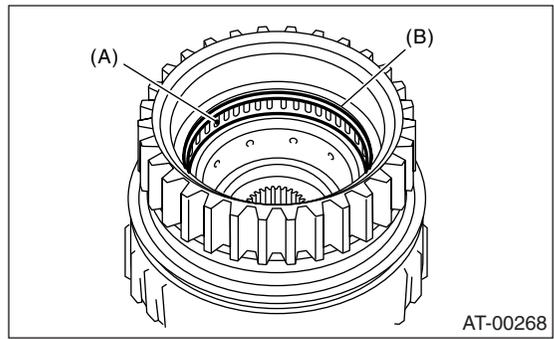
3. 2-4 BRAKE

Separate the 2-4 brake piston and piston retainer.



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

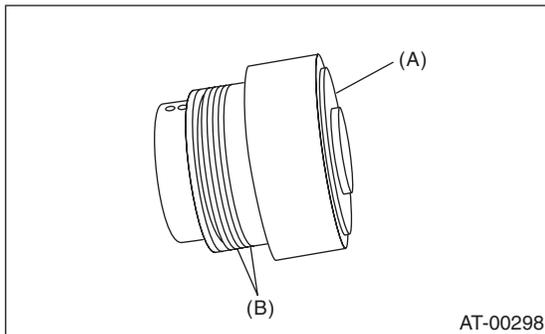
2) Remove the needle bearing after taking out the snap ring.



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

4. ONE-WAY CLUTCH INNER RACE

1) Remove the seal ring.

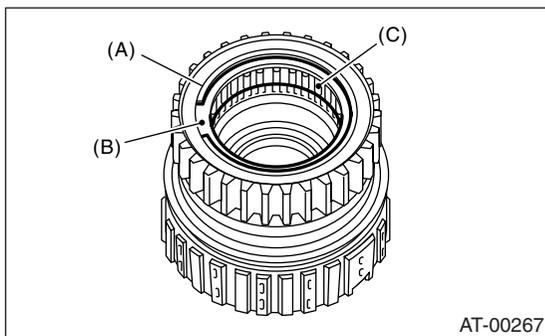


- (A) One-way clutch inner race
- (B) Seal ring

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.



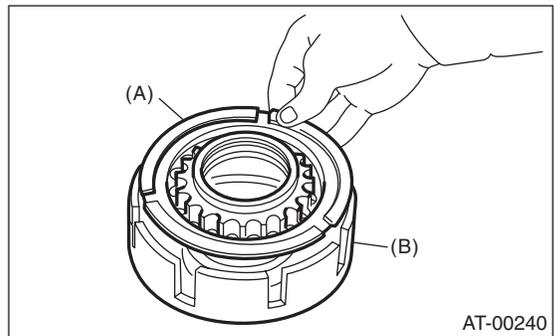
- (A) Snap ring
- (B) Plate
- (C) One-way clutch

D: ASSEMBLY

1. HIGH CLUTCH AND REVERSE CLUTCH

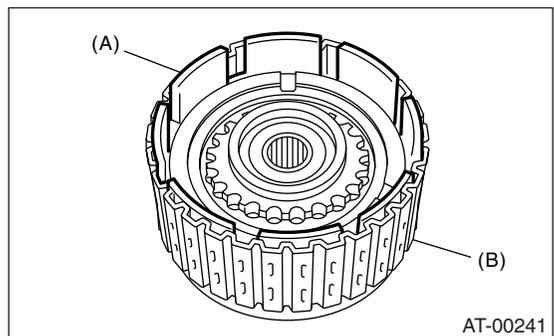
1) Install the new D-ring and lip seal to high clutch piston and reverse clutch piston.

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



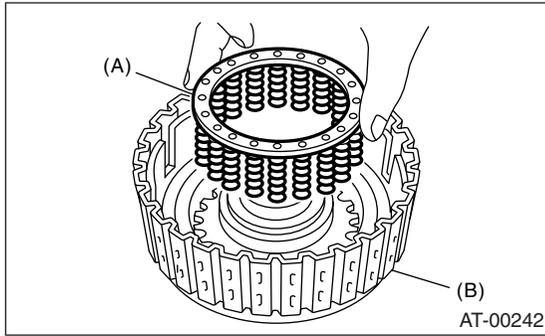
- (A) High clutch piston
- (B) Reverse clutch piston

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



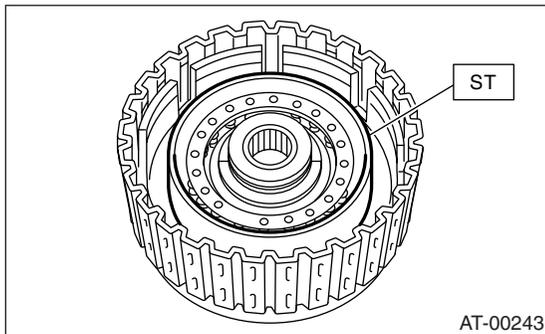
- (A) Reverse clutch piston
- (B) High clutch drum

4) Install the spring retainer to high clutch piston.



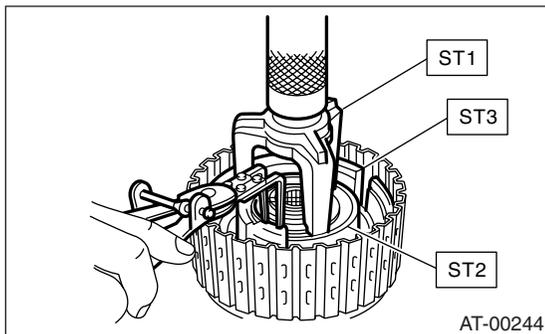
- (A) Return spring
- (B) High clutch drum

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

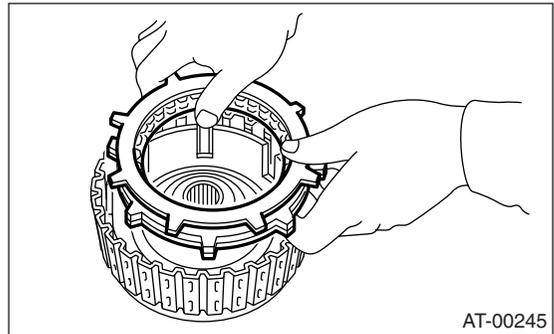


6) Install the cover to high clutch piston without folding the high clutch piston seal.

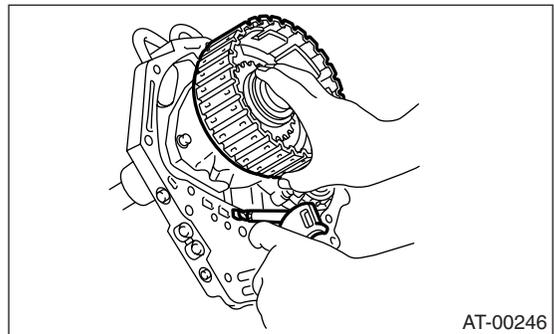
7) Install the snap ring using ST1 and ST2.
 ST1 398673600 COMPRESSOR
 ST2 498627100 SEAT
 ST3 498437000 HIGH CLUTCH PISTON GAUGE



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



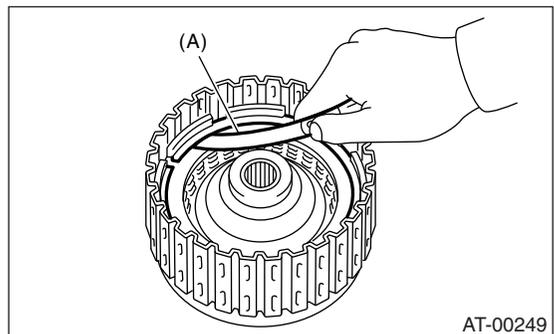
9) Install the snap ring to high clutch drum.
 10) Apply compressed air intermittently to check for operation.



11) Measure the clearance between the retaining plate of high clutch and snap ring.
 At this time, do not press down the retaining plate.

Initial standard:
 0.8 — 1.1 mm (0.031 — 0.043 in)

Limit thickness:
 1.5 mm (0.059 in)



- (A) Thickness gauge

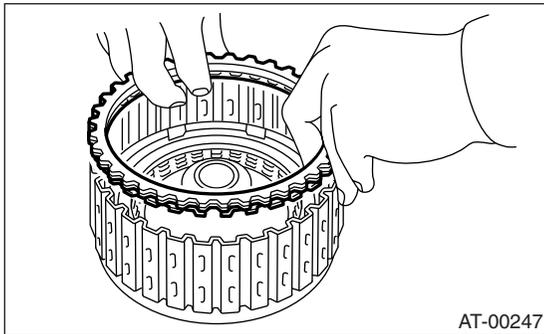
AT Main Case

AUTOMATIC TRANSMISSION

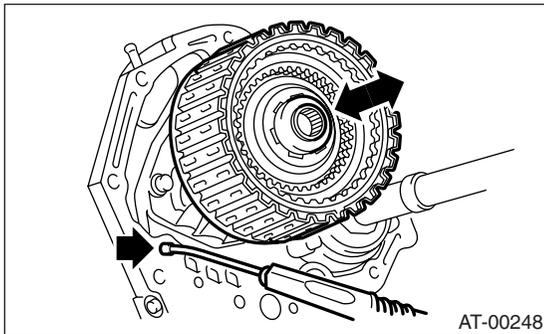
If the specified tolerance limits are exceeded, select a suitable retaining plate.

Retaining plate	
TOOL NUMBER	Thickness mm (in)
31567AA710	4.7 (0.185)
31567AA720	4.8 (0.189)
31567AA730	4.9 (0.193)
31567AA740	5.0 (0.197)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)

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



13) Apply compressed air intermittently to check for operation.



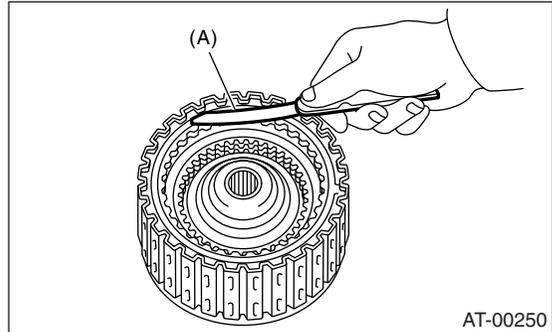
14) Measure the clearance between the retaining plate of reverse clutch and snap ring. At this time, do not press down the retaining plate.

Initial standard:

0.5 — 0.8 mm (0.020 — 0.031 in)

Limit thickness:

1.2 mm (0.047 in)



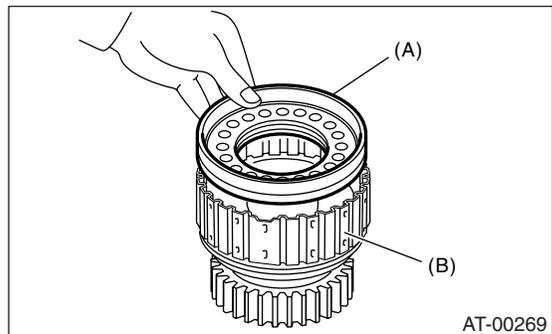
(A) Thickness gauge

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

Retaining plate	
TOOL 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

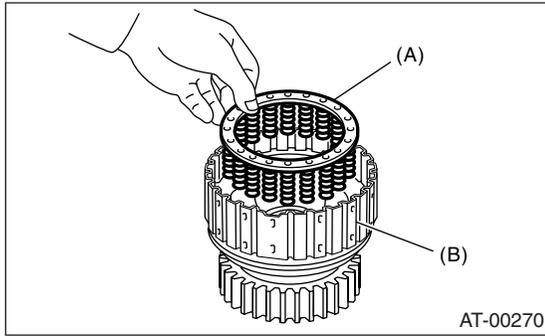
- 1) Install new D-ring to low clutch piston.
- 2) Install the low clutch piston to low clutch drum.



(A) Low clutch piston

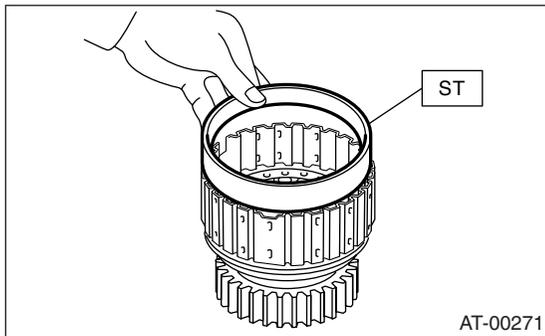
(B) Low clutch drum

3) Install the spring retainer to low clutch piston.



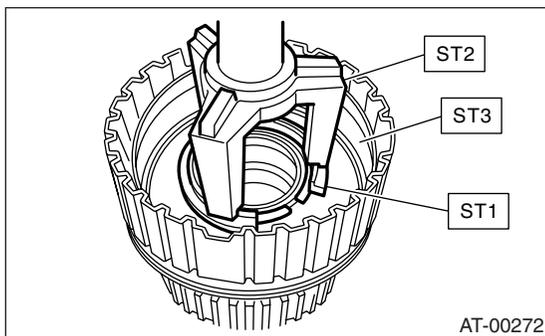
- (A) Spring retainer
- (B) Low clutch drum

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

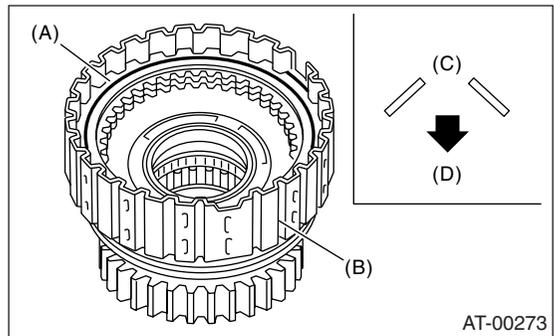


5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring. At this time, be careful not to fold the cover seal during installation.

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

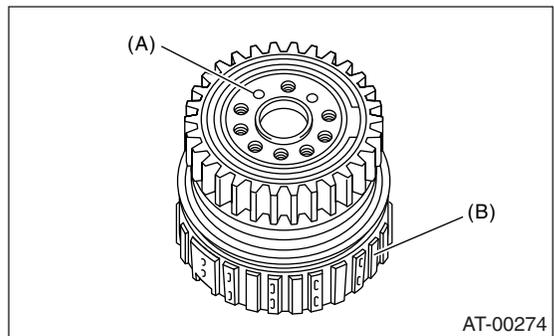


6) Install the dish plate, driven plate and retaining plate, and then secure them with snap ring.



- (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-123, 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

AT Main Case

AUTOMATIC TRANSMISSION

8) Check the low clutch clearance.

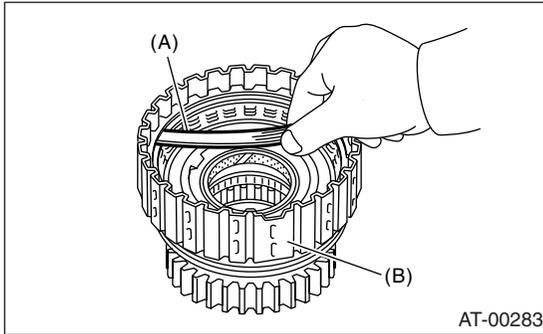
- (1) Place the same thickness of shim on both sides to prevent pressure plate from tilting.
- (2) Check the clearance between retaining plate and low clutch operation.

Initial standard:

0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:

1.6 mm (0.063 in)

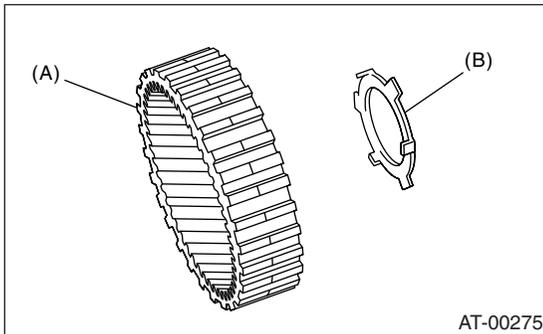


- (A) Thickness gauge
- (B) Low clutch drum

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

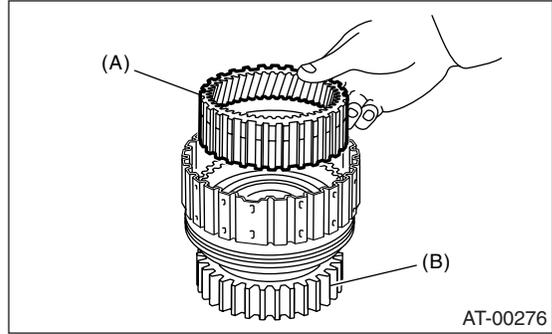
Retaining plate	
Tool number	Thickness mm (in)
31567AA830	3.8 (0.150)
31567AA840	4.0 (0.157)
31567AA850	4.2 (0.165)
31567AA860	4.4 (0.173)
31567AA870	4.6 (0.181)

9) Install the washer to rear internal gear.



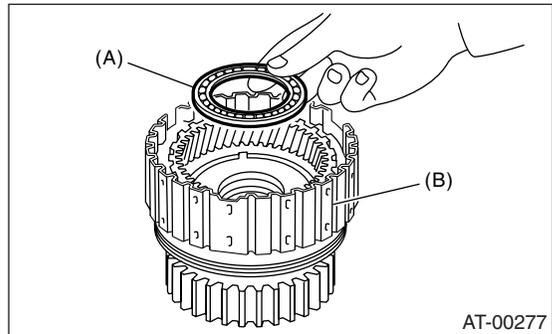
- (A) Rear internal gear
- (B) Washer

10) Install the rear internal gear.



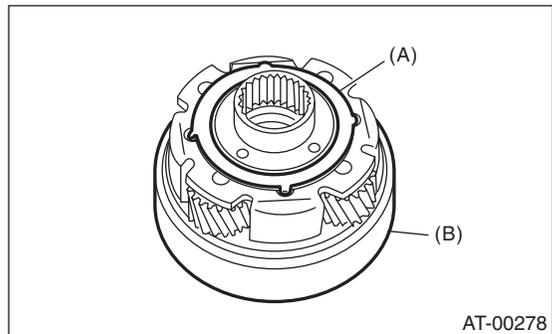
- (A) Rear internal gear
- (B) Low clutch drum

11) Install the thrust needle bearing in correct direction.



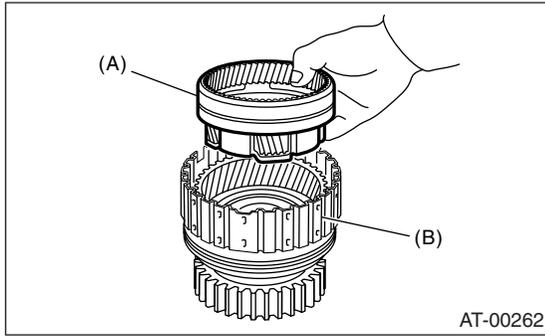
- (A) Thrust needle bearing
- (B) Low clutch drum

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



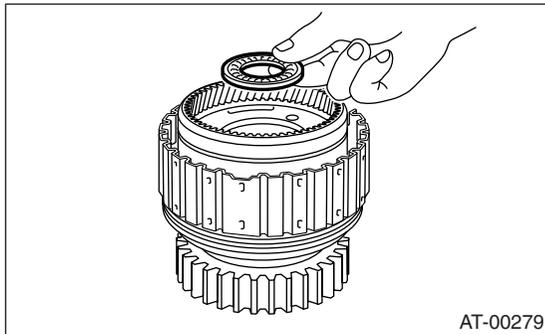
- (A) Washer
- (B) Rear planetary carrier

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

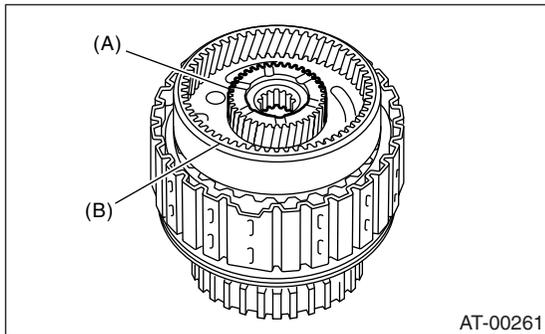


- (A) Rear planetary carrier
- (B) Low clutch drum

14) Install the thrust needle bearing in correct direction.

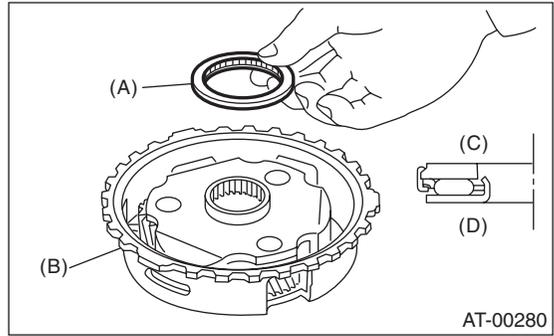


15) Install the rear sun gear in correct direction.



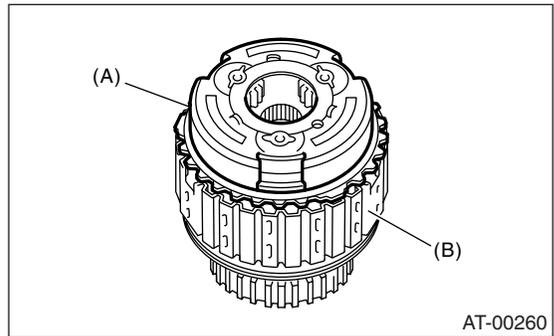
- (A) Rear sun gear
- (B) Rear planetary carrier

16) Install the thrust needle bearing in correct direction.



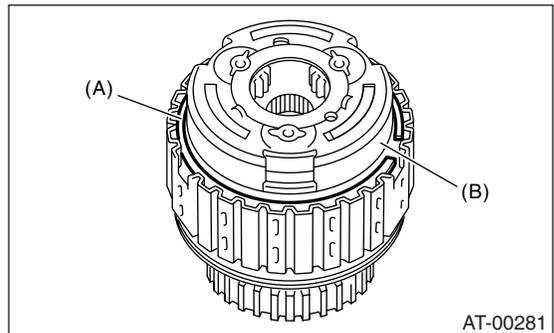
- (A) Thrust needle bearing
- (B) Front planetary carrier
- (C) Rear sun gear side
- (D) Front planetary carrier side

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.

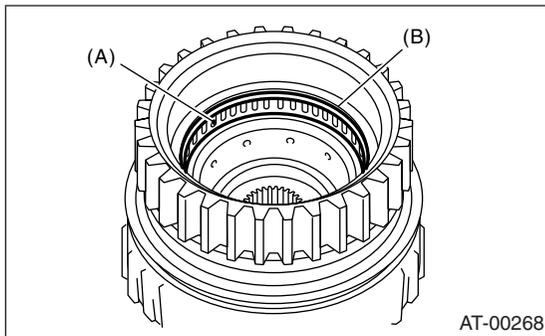


- (A) Snap ring
- (B) Front planetary carrier

AT Main Case

AUTOMATIC TRANSMISSION

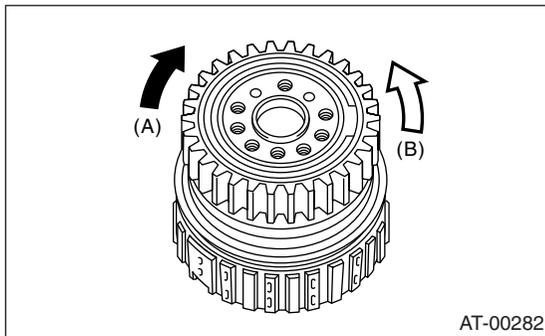
19) Install the needle bearing, and then secure with the snap ring.



- (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.

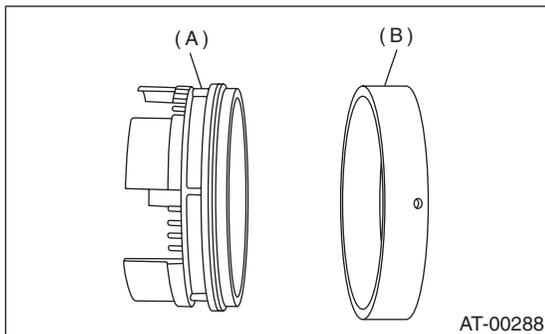
21) Set the one way clutch inner race to D clutch drum. Make sure that the forward clutch is free in the clockwise direction and locked in the counter clockwise direction, as viewed from the front of the vehicle.



- (A) Locked
- (B) Free

3. 2-4 BRAKE

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

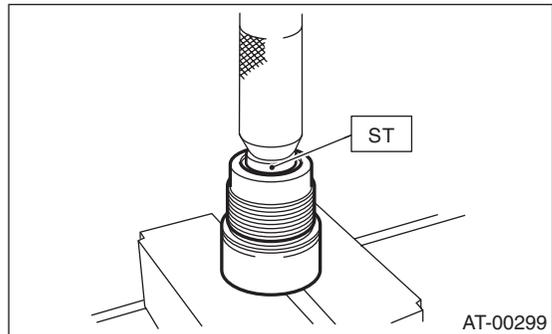


- (A) 2-4 brake piston
- (B) 2-4 brake piston retainer

4. ONE-WAY CLUTCH INNER RACE

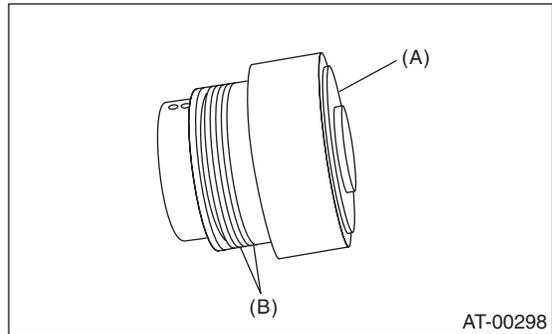
1) Install the needle bearing to inner race using ST and press.

ST 398497701 SEAT



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

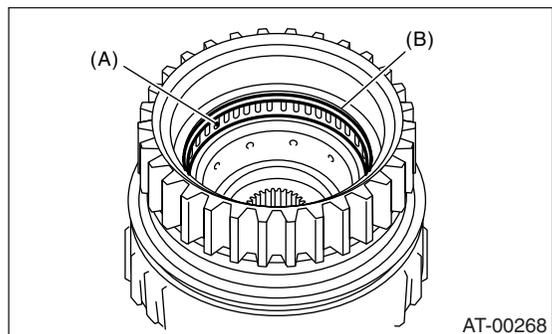
3) Install two seal rings to one-way clutch inner race.



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

5. ONE-WAY CLUTCH OUTER RACE

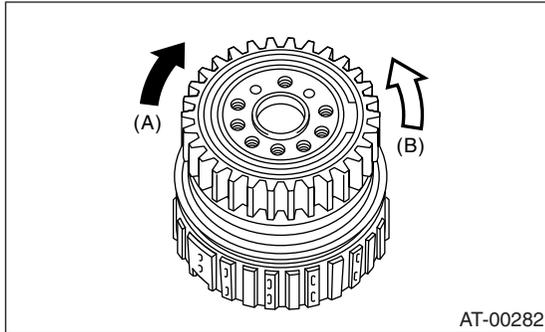
1) Install the needle bearing, and then secure with the snap ring.



- (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 one way clutch inner race to low clutch drum. Make sure that the forward clutch is free in the clockwise direction and locked in the counter clockwise direction, as viewed from the front of the vehicle.



- (A) Locked
- (B) Free

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-109, ADJUSTMENT, Oil Pump Housing.>

5. LOW AND REVERSE BRAKE

Check the following:

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

E: INSPECTION

1. HIGH CLUTCH AND REVERSE CLUTCH

Check the following items:

- Drive plate facing for wear and damage
- Snap ring for wear, return spring for setting and breakage, and snap ring retainer for deformation
- Lip seal and D-ring for damage
- Piston and drum check ball for operation
- Adjust total end play. <Ref. to 4AT-109, ADJUSTMENT, Oil Pump Housing.>

2. PLANETARY GEAR AND LOW CLUTCH

Check the following items:

- Drive plate facing for wear and damage
- 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-109, ADJUSTMENT, Oil Pump Housing.>

3. 2-4 BRAKE

Check the following items:

- Drive plate facing for wear and damage
- Snap ring for wear and spring retainer for deformation
- Lip seal and D-ring for damage
- Measure the total end play and adjust it within specifications. <Ref. to 4AT-109, ADJUSTMENT, Oil Pump Housing.>

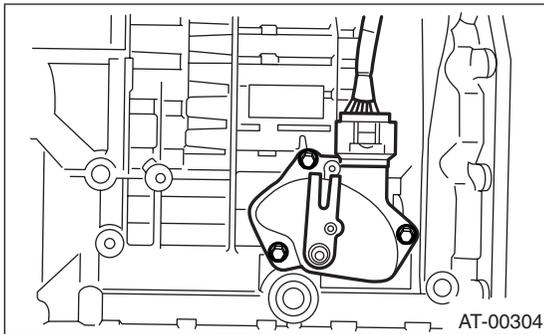
Transmission Control Device

AUTOMATIC TRANSMISSION

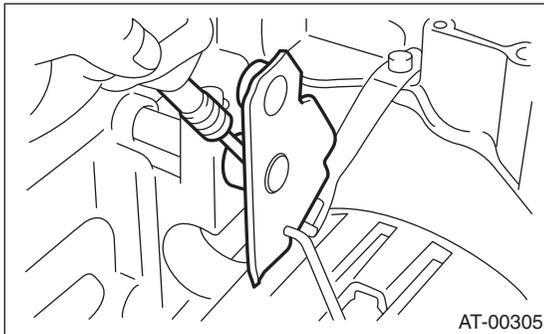
39. Transmission Control Device

A: REMOVAL

- 1) Remove the transmission assembly from vehicle. <Ref. to 4AT-39, REMOVAL, Automatic Transmission Assembly.>
- 2) Pull out the torque converter clutch assembly. <Ref. to 4AT-89, 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 air breather hose. <Ref. to 4AT-87, REMOVAL, Air Breather Hose.>
- 6) Disconnect the inhibitor switch connector from the 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.



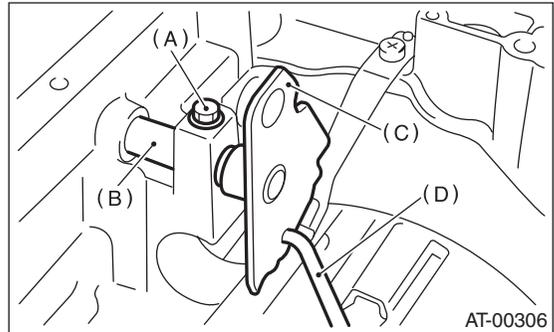
- 10) Remove the control valve body assembly. <Ref. to 4AT-61, REMOVAL, Control Valve Body.>
- 11) Pull out the spring pin of manual plate.



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

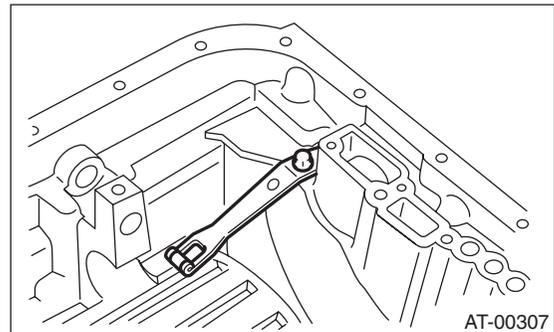
NOTE:

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.

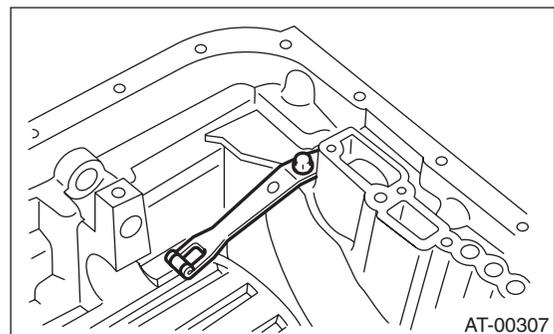


B: INSTALLATION

- 1) Install the detention spring to transmission case.

Tightening torque:

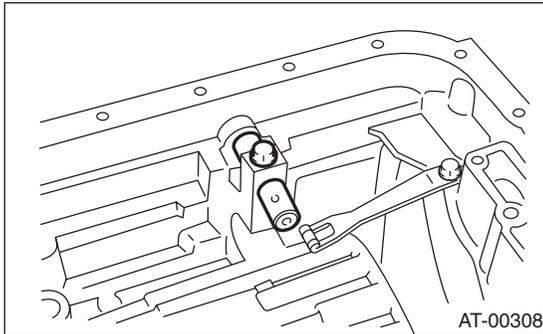
6 N·m (0.6 kgf-m, 4.4 ft-lb)



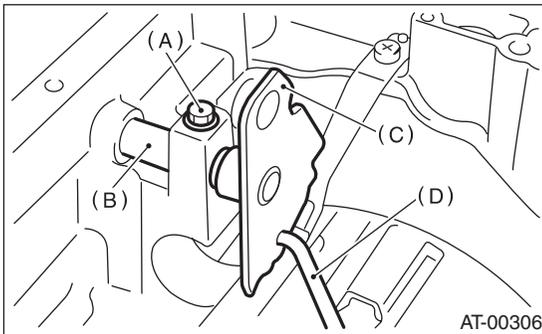
2) Insert the range select lever, and then tighten the bolt.

Tightening torque:

6 N·m (0.6 kgf·m, 4.4 ft·lb)

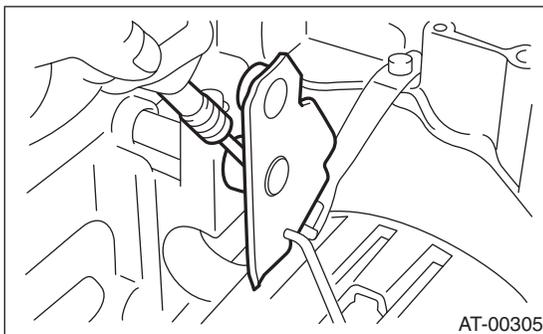


3) Insert the manual plate and parking rod.



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

4) Insert the spring pin to manual plate.



5) Install the oil pan and control valve assembly. <Ref. to 4AT-63, INSTALLATION, Control Valve Body.>

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

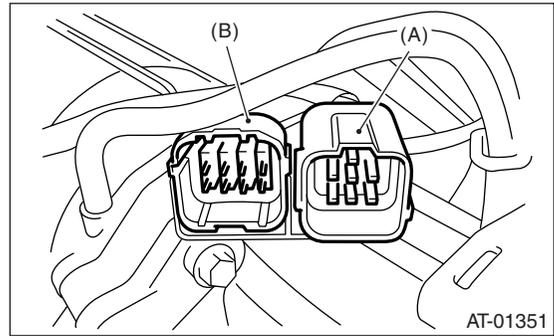
7) Install the pitching stopper bracket.

Tightening torque:

41 N·m (4.2 kgf·m, 30.4 ft·lb)

8) Install and adjust the inhibitor switch. <Ref. to 4AT-51, Inhibitor Switch.>

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



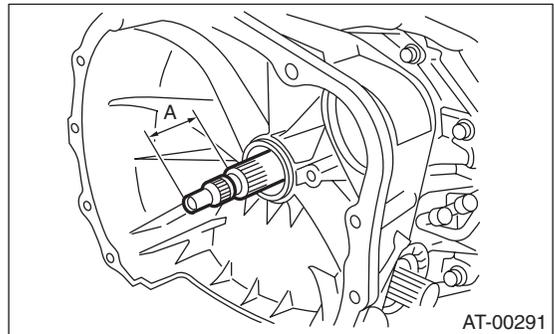
- (A) Transmission harness
- (B) Inhibitor switch harness

10) Install the air breather hose. <Ref. to 4AT-87, 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-89, 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.

